From: Jason Churchill
To: Miller, Alan
Date: 1/31/01 4:58PM
Subject: Monitor Creek metals data

FYI--

You may recall that on a couple of occasions I mentioned to you my conclusion, based on the 205(j)(2) study of Monitor Creek (Vinyard & Watts, 1992), that the available data does not provide evidence indicating that metals concentrations in Monitor Creek routinely exceed water quality objectives. This is of interest because Monitor Creek is listed on the 303(d) list as impaired due to metals.

I just completed a careful review of all the data of which I am aware. The data include: the Vinyard & Watts study; data collected by Western States Minerals in 1998 and 1999; data presented in the final EA/EIR for the proposed (but never implemented) California Silver Zaca Mine Expansion (1982); and results of fish tissue testing under the State Board's Toxic Substances Monitoring Program (TSMP, 1991). My review of these data confirm my earlier conclusion.

The Vinyard & Watts study included analysis for arsenic, cadmium, chromium, cobalt, copper, iron, lead, mercury, and silver (note that testing for aluminum was *not* done). I compared the data for Monitor Creek with criteria listed in the California Toxics Rule. (Some of these criteria should properly be adjusted for hardness and/or water-effect ratio and/or acute conversion factor, but I didn't have the information to make these adjustments, so I just went with the values given directly in the CTR table--I think this approach will work as a rough approximation for my purposes.) I found that out of a total of 99 samples for these various metals, taken at various locations in Monitor Creek, only two samples (both for copper, at 13.5 and 17.8 ug/L) exceeded the corresponding CTR maximum concentration criterion (13 ug/L for copper). Only four samples exceeded the corresponding CTR continuous concentration criterion (CCC). These included the two copper samples mentioned above (CCC = 9 ug/L), one sample for cadmium (3.1 ug/L compared to a CCC of 2.2 ug/L), and one sample for lead (5.47 ug/L compared to a CCC of 2.5). The CCC is supposed to represent a 4-day average, so keep in mind that we are comparing spot samples to a 4-day average criterion.

The Monitor Creek data in the Western States Minerals collection is limited to a single sample from upper Monitor Creek taken in July, 1998. The metals tested included aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, and thallium. With the exception of aluminum (0.4 mg/L compared to an EPA ambient Freshwater Aquatic Standard of 0.087 mg/L), iron (0.67 mg/L compared to a California Secondary MCL of 0.3 mg/L), and manganese (0.26 mg/L compared to a California Secondary MCL of 0.05 mg/L), all of the metals were either less than the most restrictive applicable water quality criteria, or else were not detectable at the analytical sensitivity of the method used.

The data from the Caifornia Silver Zaca Mine Expansion final EA/EIR is very limited, and is difficult to interpret because the data do not include method detection limits, and I suspect that some of the metals values reported are actually detection limits rather than measured values. My suspicion is based on the fact that samples from a variety of gauging stations often have exactly the same reported low concentration value for some metals. If the data are actual measured values rather than detection limits, then they could indicate potential exceedance of CTR CCC values for cadmium, chromium, lead, mercury, and silver.

Finally, there are the data from the 1991 TSMP. According to the Vinyard study, the TSMP revealed that "one of three cutthroat trout collected from lower Monitor Creek in 1988 and 1989 contained liver concentrations of silver exceeding the 85th percentile in a sample of 433 fish from locations throughout the state."

My conclusions, based on the above review, are as follows:

1. Only one Monitor Creek sample has ever been tested for aluminum (see Western States Minerals data, above). This single sample *may* indicate a problem with aluminum, but further testing would certainly be required to validate such a conclusion. High levels of aluminum, if confirmed, would be consistent with the grayish, cloudy precipitate and streambed deposits observed in Monitor Creek downstream of the Lower Advance adit discharge. Steve Brooks of the U.S. Forest Service is fairly confident that this precipitate is an aluminum compound.

2. Only a very small proportion of samples analyzed exceeded water quality objectives for other metals, but currently available data do not provide evidence that exceedance of objectives is common or significant.

3. Further sampling is highly recommended, particularly for aluminum, to confirm whether there is a metals "problem." The U.S. Forest Service plans to initiate a quarterly metals monitoring program this spring, to last for at least one year. Steve Brooks tells me that the draft Sampling and Analysis Plan should be available for our review in one to two weeks.

4. There is clearly extensive habitat degradation in Monitor Creek downstream of the Lower Advance adit. I suspect this is due to the aluminum deposits hypothesized in conclusion 1, above. However, if high concentrations of aluminum or other metals cannot be confirmed in Monitor Creek, we may need to consider at some point having the source of impairment to Monitor Creek relisted on the 303(d) list from "metals" to some other category. I believe Judith Unsicker said that waters can be listed for narrative impacts such as "habitat degradation."

--Jason

From: Jason Churchill
To: Unsicker, Judith
Date: 10/12/01 12:58PM
Subject: Monitor Creek 303(d) Listing

Judith--

Just got back from vacation today, so I am responding to your message now. You asked me to provide Chuck with a list of parameters for which there is evidence of numeric or narrative objectives violations, or adverse impacts to beneifical uses.

Most of the data comes from the Vinyard & Watts 205(j)(2) study, which was conducted during a drought. Very limited toxicity testing was conducted (at three stations?) on a one-time basis, as part of that study, but did not reveal any significant toxicity.

There is no evidence for violation of any narrative water quality objective that I am aware of.

Here is a summary of parameters possibly violating numeric objectives:

1) The study indicated that **iron** in the vicinity immediately below the Lower Advance adit (a.k.a., Zaca Mine adit) may regularly exceed the EPA freshwater aquatic life chronic exposure criterion (1 mg/L) throughout the year. Values from four sampling runs ranged from 1-3 mg/L.

2) The study also indicated that the chronic exposure criterion for **silver** may be exceeded at stations throughout Monitor Creek (this conclusion is based on extremely limited data, from a single sampling run). The values ranged from 0.3-0.7 mg/l, compared to a criterion of 0.12 mg/l. This finding is especially noteworthy in light of the fact that one of three cutthroat trout collected from lower Monitor Creek in the 1988 and 1989 TSMP contained liver concentrations of silver exceeding the 85th percentile. However, keep in mind that Vinyard & Watts samples taken from the East Fork Carson River both upstream and downstream of Monitor Creek indicated silver levels that were comparable to those in Monitor Creek.

3) Vinyard & Watts did not monitor for **aluminum**, however, a sample taken in 2000 by Western States Minerals Corp. just above the Carson River confluence had an aluminum level of 0.4 mg/L, compared to an EPA chronic toxicity standard of 0.087 mg/L.

4) There is also evidence that manganese in Monitor Creek may exceed EPA/California secondary MCLs of 0.05 mg/L.

Violations may be seasonal, and intensive monitoring during certain periods might be necessary to verify that violations for the above parameters are occurring.

The US Forest Service just finished its third round of quarterly sampling in Monitor Creek for metals and minerals. The data have not been thoroughly analyzed yet, but will probably not reveal any new parameters of concern, except possibly those three (iron, silver, and aluminum) mentioned above.

Despite the very limited evidence for violations of specific metals criteria in the water column, it is very clear that there are adverse impacts to beneficial uses. This is clear from visual observation, as well as from the Vinyard & Watts study conclusion that benthic invertebrate populations and periphyton colonization are greatly reduced in the reach downstream of the Lower Advance adit.

I would emphasize again my opinion that it may not be possible to correlate these impacts with the concentrations of specific metals in the water column. I suspect that the impacts are either due to a synergistic effect of numerous metals at relatively low concentrations, or even more likely, due to deposition of metallic compounds on the streambed that would not be revealed by water column chemistry. The precipitate is particularly evident during the late summer through fall. I have some great pictures taken in July or August that Chuck really needs to see. When I gave him a tour earlier in the year, the precipitate wasn't very obvious, and I'm not sure he really appreciated the nature of the problem.

The USFS agrees that there is a significant precipitation problem, and is planning to do sediment sampling very soon.

--Jason

>>> Judith Unsicker 10/08/01 01:20PM >>>
I talked to Chuck about your suggestion to change the Monitor Creek "metals" listing to "acid mine drainage". He feels that this is still too vague, and would like to get more specific about pollutants. Could you send me a list of parameters that you think are either in violation of narrative or numerical objectives, or adversely impacting beneficial uses? Thanks!

I will be in the Bay Area this week helping my father who got out of the hospital last week. You can reach me by Groupwise or phone at (408) 736-6341. There's an answering machine if we're out at a doctor appointment,etc.

CC: Curtis, Chuck; Steude, John

From: Jason Churchill
To: Unsicker, Judith
Date: 3/6/01 10:26AM
Subject: Monitor Creek 303(d) listing update?

Judith--

As a followup to my earlier posts regarding whether there is any evidence indicating that water quality objectives for metals are being exceeded in Monitor Creek . . . I recently received a copy of the US Forest Service's draft Preliminary Assessment (PA) on the Colorado Hill mining area (a CERCLA document). The PA points out that silver concentrations throughout Monitor Creek as reported in the 205(j)(2) study (Vinyard & Watts, 1992) exceeded the U.S. EPA Feshwater Aquatic Life Chronic Exposure Criterion (0.12 ug/L). Unfortunately, silver sampling was conducted on only one date (3/23/91) for the study, so it is not clear whether there is actually a "chronic" silver problem. But at least this suggests that we need to look very carefully at silver in the future. Especially if we consider that the fish tissue analysis from the 1991 TSMP indicated that silver exceed the 85th percentile value in the liver of one of the three fish collected at that time.

It is important to note, however, that silver levels in the Carson River, also determined during the 205(j)(2) study, were comparable to those in Monitor Creek, and also exceeded the chronic freshwater criterion for silver.

Apparently, there was no chronic criterion for silver available at the time of the 205(j)(2) study, so the study authors compared the data to an "instantaneous maximum" value (from the SWRCB Inland Surface Waters Plan) which was never exceeded. Since that time, until the draft PA, apparently nobody has compared silver levels in Monitor Creek to the chronic freshwater criterion.

Another metal we need to pay close attention to in future monitoring efforts is aluminum--unfortunately, no aluminum analysis was done as part of the 205(j)(2) study. However, analysis of the discharges from a number of mine adits in the area indicates that aluminum levels in these discharges often exceed iron levels. In Monitor Creek, one can observe a gray-colored precipitate coming out of solution as a plume just below the point where the Lowever Advance (aka Zaca Mine) adit discharges. This precipitate appears to be the main source of the deposits that armor the streambed. Steve Brooks, the US Forest Service's CERCLA On-Scene Coordinator, is convinced that this material is a compound of aluminum, mainly because of its color, but also because aluminum is apparently tends to come out of solution easily upon pH changes (such as would occur at the point of the adit discharge confluence with the Creek.

CC: Miller, Alan

Data submitted by South Tahoe Public Utility District at stakeholder meeting for Indian Creek Reservoir TMDL

ALPINE COUNTY DITCH MONITORING

Date	ID	Location	Temp C	pH	EC umhos	Total P mg/L	PO4-P mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Site: D-1	**Stream: Carson River, West Fork**										
01/11/00	20000111-25	Carson R @ Diversion	1.7	6.66	79	0.022					
05/09/00	20000509-17	Carson R @ Diversion	4.7	6.87	42	0.049					
05/17/00	20000517-18	Carson R @ Diversion	7.3	7.72	53	< 0.010					
05/25/00	20000525-07	Carson R @ Diversion	8.9	7.89	37	0.056	< 0.010	21.60	5.5	0.5	0.9
06/01/00	20000601-25	Carson R @ Diversion	8.6	7.82	44	0.022	< 0.010	5.72	1	0.6	
06/06/00	20000606-19	Carson R @ Diversion	11.5	7.67	47	0.044					
Site: D-2	**Stream: Carson River, West Fork**										
05/17/00	20000517-19	SnowShoe @ Dressler	10.2	7.68	62	< 0.010					
05/25/00	20000525-08	SnowShoe @ Dressler	13.4	8.14	43	0.038	< 0.010	9.60	4.7	< 0.5	0.8
06/01/00	20000601-26	SnowShoe @ Dressler	9.3	7.48	49	0.058	< 0.010	20.10	6.3	0.5	
06/06/00	20000606-20	SnowShoe @ Dressler	14.7	7.78	45	0.026					
Site: D-3	**Stream: Carson R. / Indian Cr.**										
01/11/00	20000111-27	Dressler @ ICR Inlet	0.2	6.13	88	0.022					
02/01/00	20000201-23	Dressler @ ICR Inlet	3.8	6.90	19	0.027					
03/15/00	20000315-07	Dressler @ ICR Inlet	6.5	8.05	76	0.010					
05/09/00	20000509-18	Dressler @ ICR Inlet	15.8	7.44	88	0.029					
05/17/00	20000517-20	Dressler @ ICR Inlet	15.2	7.56	63	0.010					
05/25/00	20000525-10	Dressler @ ICR Inlet	18.1	8.02	56	0.037	< 0.010	6.80	4.5	0.5	0.7
06/01/00	20000601-28	Dressler @ ICR Inlet	13.3	7.83	64	0.033	< 0.010	6.40	3	0.7	
06/06/00	20000606-21	Dressler @ ICR Inlet	19.8	7.73	68	0.024					
Site: D-4	**Stream: Carson R. / Indian Cr.**										
01/11/00	20000111-29	Millich @ Indian Cr	1.4	6.56	78	0.050					
05/09/00	20000509-19	Millich @ Indian Cr	8.2	6.91	43	0.100					
Site: GW-15	**Stream: Groundwater**										
05/12/00	20000512-06	ICR Campground	10.6	7.79	231	0.039					
Site: Red Lake	**Stream: Carson River, West Fork**										
05/25/00	20000525-11	Red Lake	15.2	7.32	63	0.022	< 0.010	2.90	.85	4.0	2.3

ALPINE COUNTY DITCH MONITORING

06/09/00

Site: SW-02 Stream: Indian Creek

Date	ID	Location	Temp C	pH	EC umhos	Total P mg/L	PO4-P mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
01/11/00	20000111-26	Indian Cr Upper	1.3	6.39	94	0.036					
02/01/00	20000201-22	Indian Cr Upper	2.6	7.04	80	0.029					
03/01/00	20000301-15	Indian Cr Upper	1.8	7.39	79	0.042	< 0.010	3.54	3.7	1.5	3.6
04/04/00	20000404-08	Indian Cr Upper	7.0	7.56	88	0.016	< 0.010	0.66	1.8	0.7	3.1
05/09/00	20000509-08	Indian Cr Upper	12.7	7.72	126	0.033	< 0.010	1.66	2.3	1.1	2.5
05/25/00	20000525-09	Indian Cr Upper	14.6	7.97	99	0.082	0.010			0.9	< 0.5
06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110	0.024	< 0.010	1.80	1.7	0.6	

Site: SW-11 Stream: Indian Creek Reservoir

Date	ID	Location	Temp C	pH	EC umhos	Total P mg/L	PO4-P mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
01/11/00	20000111-28	ICR Effluent @ HPR box	2.3	6.52	118	0.068					
02/01/00	20000201-24	ICR Effluent @ HPR box	4.5	7.25	106	0.052					
03/15/00	20000315-08	ICR Effluent @ HPR box	8.9	7.90	85	0.046					

Data collected by South Tahoe Public Utility District – from Regional Board discharger self monitoring files.

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	
Groundwaters													
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	
Reservoirs													
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4
Surfacewaters: Carson R													
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8
Surfacewaters: Indian Cr													
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	

Groundwaters

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	

Reservoirs

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057

Surfacewaters: Carson R

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	

Surfacewaters: Indian Cr

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	< 1.1	< 1.1	
ACMW-01BE	06/13/00	< 1.1	< 1.1	
ACMW-02N	06/13/00	< 1.1	< 1.1	
ACMW-02S	06/13/00	< 1.1	< 1.1	
ACMW-03	06/13/00	23	< 1.1	
ACMW-04W	06/13/00	< 1.1	< 1.1	
ACMW-06N	06/13/00	< 1.1	< 1.1	
ACMW-06S	06/13/00	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00			
GW-03	06/01/00	< 1.1	< 1.1	
GW-04	06/01/00	< 1.1	< 1.1	
GW-05	06/01/00	< 1.1	< 1.1	
GW-07	06/01/00	< 1.1	< 1.1	
GW-08	06/01/00	1.1	< 1.1	
GW-11	06/01/00	< 1.1	< 1.1	
GW-14	06/01/00	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	> 1600	< 2	80

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	< 30	< 30	
SW-05	06/06/00	430	430	
SW-06	06/06/00	430	230	
SW-08	06/06/00	11000	11000	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00			
SW-02	06/06/00	< 30	< 30	
SW-03	06/06/00	430	430	
SW-04	06/06/00	2400	930	

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring											
MW11	06/20/00	20000620-13	Sludge Pond	6267.8	8.1	6.79	77	0.8	< 5.0	0.076	
MW12	06/20/00	20000620-14	Sludge Pond	6266.0	8.6	6.22	147	1.9	< 5.0	0.119	
MW13	06/20/00	20000620-15	Sludge Pond	6257.2	7.1	6.83	729	2.6	16.3	1.520	
ERB Monitoring											
CONTROL	06/20/00	20000620-06	At Post Office	6282.9	9.8	7.01	175	6.9	< 5.0	2.490	
MW01.5	06/20/00	20000620-07	SW corner of ERB	6268.8	10.4	7.25	170	2.9	< 5.0	0.630	
MW02-50	06/20/00	20000620-08	Black Bart side of ERB	6268.6	11.0	6.87	408	38.9	< 5.0	8.820	
MW03-50	06/20/00	20000620-09	Black Bart side of ERB	6268.6	11.0	6.56	375	33.4	< 5.0	3.490	
MW04-50	06/20/00	20000620-10	Hank Monk side of ERB	6268.7	8.8	6.67	75	4.9	< 5.0	0.057	
MW07-50	06/20/00	20000620-11	North side of ERB	6279.3	8.8	6.30	261	26.7	< 5.0	0.649	
Heavenly Valley Creek											
HVC-1	06/02/00	20000602-06	Downstream of Pioneer		5.8	7.62	33	0.6	< 5.0	0.015	
HVC-2	06/02/00	20000602-07	250' upstream of Pond #2		5.4	7.40	35	0.7	< 5.0	< 0.010	
HVC-3	06/02/00	20000602-08	25' downstream of Johnson Blvd		5.4	7.44	36	0.9	< 5.0	0.015	
HVC-4	06/02/00	20000602-09	Effluent of drain from Lower Shop		9.4	7.41	115	0.7	< 5.0	0.071	
HVC-5	06/02/00	20000602-HVC5	Effluent of drainage pipe along Jo								Dry
Treatment Plant Monitoring											
MW08-25	06/20/00	20000620-12	SW side of Pond #1	6247.4	10.1	6.30	1031	50.6	85.2	< 0.010	

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	

Groundwaters

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	

Reservoirs

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4

Surfacewaters: Carson R

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8

Surfacewaters: Indian Cr

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

07/09/00

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	
Groundwaters									
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	
Reservoirs									
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057
Surfacewaters: Carson R									
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	
Surfacewaters: Indian Cr									
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	< 1.1	< 1.1	
ACMW-01BE	06/13/00	< 1.1	< 1.1	
ACMW-02N	06/13/00	< 1.1	< 1.1	
ACMW-02S	06/13/00	< 1.1	< 1.1	
ACMW-03	06/13/00	23	< 1.1	
ACMW-04W	06/13/00	< 1.1	< 1.1	
ACMW-06N	06/13/00	< 1.1	< 1.1	
ACMW-06S	06/13/00	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00			
GW-03	06/01/00	< 1.1	< 1.1	
GW-04	06/01/00	< 1.1	< 1.1	
GW-05	06/01/00	< 1.1	< 1.1	
GW-07	06/01/00	< 1.1	< 1.1	
GW-08	06/01/00	1.1	< 1.1	
GW-11	06/01/00	< 1.1	< 1.1	
GW-14	06/01/00	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	> 1600	< 2	80

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	< 30	< 30	
SW-05	06/06/00	430	430	
SW-06	06/06/00	430	230	
SW-08	06/06/00	11000	11000	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00			
SW-02	06/06/00	< 30	< 30	
SW-03	06/06/00	430	430	
SW-04	06/06/00	2400	930	

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L		COD mg/L		NO3-N mg/L	Comment
Buried Sludge Monitoring													
MW11	06/20/00	20000620-13	Sludge Pond	6267.8	8.1	6.79	77	0.8	<	5.0		0.076	
MW12	06/20/00	20000620-14	Sludge Pond	6266.0	8.6	6.22	147	1.9	<	5.0		0.119	
MW13	06/20/00	20000620-15	Sludge Pond	6257.2	7.1	6.83	729	2.6		16.3		1.520	
ERB Monitoring													
CONTROL	06/20/00	20000620-06	At Post Office	6282.9	9.8	7.01	175	6.9	<	5.0		2.490	
MW01.5	06/20/00	20000620-07	SW corner of ERB	6268.8	10.4	7.25	170	2.9	<	5.0		0.630	
MW02-50	06/20/00	20000620-08	Black Bart side of ERB	6268.6	11.0	6.87	408	38.9	<	5.0		8.820	
MW03-50	06/20/00	20000620-09	Black Bart side of ERB	6268.6	11.0	6.56	375	33.4	<	5.0		3.490	
MW04-50	06/20/00	20000620-10	Hank Monk side of ERB	6268.7	8.8	6.67	75	4.9	<	5.0		0.057	
MW07-50	06/20/00	20000620-11	North side of ERB	6279.3	8.8	6.30	261	26.7	<	5.0		0.649	
Heavenly Valley Creek													
HVC-1	06/02/00	20000602-06	Downstream of Pioneer		5.8	7.62	33	0.6	<	5.0		0.015	
HVC-2	06/02/00	20000602-07	250' upstream of Pond #2		5.4	7.40	35	0.7	<	5.0	<	0.010	
HVC-3	06/02/00	20000602-08	25' downstream of Johnson Blvd		5.4	7.44	36	0.9	<	5.0		0.015	
HVC-4	06/02/00	20000602-09	Effluent of drain from Lower Shop		9.4	7.41	115	0.7	<	5.0		0.071	
HVC-5	06/02/00	20000602-HVC5	Effluent of drainage pipe along Jo										Dry
Treatment Plant Monitoring													
MW08-25	06/20/00	20000620-12	SW side of Pond #1	6247.4	10.1	6.30	1031	50.6		85.2	<	0.010	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	
Groundwaters													
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	
Reservoirs													
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4
Surfacewaters: Carson R													
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8
Surfacewaters: Indian Cr													
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	

Groundwaters

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	

Reservoirs

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057

Surfacewaters: Carson R

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	

Surfacewaters: Indian Cr

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	< 1.1	< 1.1	
ACMW-01BE	06/13/00	< 1.1	< 1.1	
ACMW-02N	06/13/00	< 1.1	< 1.1	
ACMW-02S	06/13/00	< 1.1	< 1.1	
ACMW-03	06/13/00	23	< 1.1	
ACMW-04W	06/13/00	< 1.1	< 1.1	
ACMW-06N	06/13/00	< 1.1	< 1.1	
ACMW-06S	06/13/00	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00			
GW-03	06/01/00	< 1.1	< 1.1	
GW-04	06/01/00	< 1.1	< 1.1	
GW-05	06/01/00	< 1.1	< 1.1	
GW-07	06/01/00	< 1.1	< 1.1	
GW-08	06/01/00	1.1	< 1.1	
GW-11	06/01/00	< 1.1	< 1.1	
GW-14	06/01/00	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	> 1600	< 2	80

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	< 30	< 30	
SW-05	06/06/00	430	430	
SW-06	06/06/00	430	230	
SW-08	06/06/00	11000	11000	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00			
SW-02	06/06/00	< 30	< 30	
SW-03	06/06/00	430	430	
SW-04	06/06/00	2400	930	

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L		COD mg/L		NO3-N mg/L	Comment
Buried Sludge Monitoring													
MW11	06/20/00	20000620-13	Sludge Pond	6267.8	8.1	6.79	77	0.8	<	5.0		0.076	
MW12	06/20/00	20000620-14	Sludge Pond	6266.0	8.6	6.22	147	1.9	<	5.0		0.119	
MW13	06/20/00	20000620-15	Sludge Pond	6257.2	7.1	6.83	729	2.6		16.3		1.520	
ERB Monitoring													
CONTROL	06/20/00	20000620-06	At Post Office	6282.9	9.8	7.01	175	6.9	<	5.0		2.490	
MW01.5	06/20/00	20000620-07	SW corner of ERB	6268.8	10.4	7.25	170	2.9	<	5.0		0.630	
MW02-50	06/20/00	20000620-08	Black Bart side of ERB	6268.6	11.0	6.87	408	38.9	<	5.0		8.820	
MW03-50	06/20/00	20000620-09	Black Bart side of ERB	6268.6	11.0	6.56	375	33.4	<	5.0		3.490	
MW04-50	06/20/00	20000620-10	Hank Monk side of ERB	6268.7	8.8	6.67	75	4.9	<	5.0		0.057	
MW07-50	06/20/00	20000620-11	North side of ERB	6279.3	8.8	6.30	261	26.7	<	5.0		0.649	
Heavenly Valley Creek													
HVC-1	06/02/00	20000602-06	Downstream of Pioneer		5.8	7.62	33	0.6	<	5.0		0.015	
HVC-2	06/02/00	20000602-07	250' upstream of Pond #2		5.4	7.40	35	0.7	<	5.0	<	0.010	
HVC-3	06/02/00	20000602-08	25' downstream of Johnson Blvd		5.4	7.44	36	0.9	<	5.0		0.015	
HVC-4	06/02/00	20000602-09	Effluent of drain from Lower Shop		9.4	7.41	115	0.7	<	5.0		0.071	
HVC-5	06/02/00	20000602-HVC5	Effluent of drainage pipe along Jo										Dry
Treatment Plant Monitoring													
MW08-25	06/20/00	20000620-12	SW side of Pond #1	6247.4	10.1	6.30	1031	50.6		85.2	<	0.010	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	
Groundwaters													
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	
Reservoirs													
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4
Surfacewaters: Carson R													
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8
Surfacewaters: Indian Cr													
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	

Groundwaters

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	

Reservoirs

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057

Surfacewaters: Carson R

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	

Surfacewaters: Indian Cr

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

Alpine Monitoring Wells

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	<	1.1	<	1.1	
ACMW-01BE	06/13/00	<	1.1	<	1.1	
ACMW-02N	06/13/00	<	1.1	<	1.1	
ACMW-02S	06/13/00	<	1.1	<	1.1	
ACMW-03	06/13/00		23	<	1.1	
ACMW-04W	06/13/00	<	1.1	<	1.1	
ACMW-06N	06/13/00	<	1.1	<	1.1	
ACMW-06S	06/13/00	<	1.1	<	1.1	

Groundwaters

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00					
GW-03	06/01/00	<	1.1	<	1.1	
GW-04	06/01/00	<	1.1	<	1.1	
GW-05	06/01/00	<	1.1	<	1.1	
GW-07	06/01/00	<	1.1	<	1.1	
GW-08	06/01/00		1.1	<	1.1	
GW-11	06/01/00	<	1.1	<	1.1	
GW-14	06/01/00	<	1.1	<	1.1	

Reservoirs

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	>	1600	<	2	80

Surfacewaters: Carson R

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	<	30	<	30	
SW-05	06/06/00		430		430	
SW-06	06/06/00		430		230	
SW-08	06/06/00		11000		11000	

Surfacewaters: Indian Cr

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00					
SW-02	06/06/00	<	30	<	30	
SW-03	06/06/00		430		430	
SW-04	06/06/00		2400		930	

TAHOE BASIN MONITORING

Buried Sludge Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
MW11	06/20/00	20000620-13	Sludge Pond	6267.8	8.1	6.79	77	0.8	< 5.0	0.076	
MW12	06/20/00	20000620-14	Sludge Pond	6266.0	8.6	6.22	147	1.9	< 5.0	0.119	
MW13	06/20/00	20000620-15	Sludge Pond	6257.2	7.1	6.83	729	2.6	16.3	1.520	

ERB Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
CONTROL	06/20/00	20000620-06	At Post Office	6282.9	9.8	7.01	175	6.9	< 5.0	2.490	
MW01.5	06/20/00	20000620-07	SW corner of ERB	6268.8	10.4	7.25	170	2.9	< 5.0	0.630	
MW02-50	06/20/00	20000620-08	Black Bart side of ERB	6268.6	11.0	6.87	408	38.9	< 5.0	8.820	
MW03-50	06/20/00	20000620-09	Black Bart side of ERB	6268.6	11.0	6.56	375	33.4	< 5.0	3.490	
MW04-50	06/20/00	20000620-10	Hank Monk side of ERB	6268.7	8.8	6.67	75	4.9	< 5.0	0.057	
MW07-50	06/20/00	20000620-11	North side of ERB	6279.3	8.8	6.30	261	26.7	< 5.0	0.649	

Heavenly Valley Creek

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
HVC-1	06/02/00	20000602-06	Downstream of Pioneer		5.8	7.62	33	0.6	< 5.0	0.015	
HVC-2	06/02/00	20000602-07	250' upstream of Pond #2		5.4	7.40	35	0.7	< 5.0	< 0.010	
HVC-3	06/02/00	20000602-08	25' downstream of Johnson Blvd		5.4	7.44	36	0.9	< 5.0	0.015	
HVC-4	06/02/00	20000602-09	Effluent of drain from Lower Shop		9.4	7.41	115	0.7	< 5.0	0.071	
HVC-5	06/02/00	20000602-HVC5	Effluent of drainage pipe along Jo								Dry

Treatment Plant Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
MW08-25	06/20/00	20000620-12	SW side of Pond #1	6247.4	10.1	6.30	1031	50.6	85.2	< 0.010	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	
Groundwaters													
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	
Reservoirs													
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4
Surfacewaters: Carson R													
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8
Surfacewaters: Indian Cr													
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	
Groundwaters									
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	
Reservoirs									
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057
Surfacewaters: Carson R									
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	
Surfacewaters: Indian Cr									
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	< 1.1	< 1.1	
ACMW-01BE	06/13/00	< 1.1	< 1.1	
ACMW-02N	06/13/00	< 1.1	< 1.1	
ACMW-02S	06/13/00	< 1.1	< 1.1	
ACMW-03	06/13/00	23	< 1.1	
ACMW-04W	06/13/00	< 1.1	< 1.1	
ACMW-06N	06/13/00	< 1.1	< 1.1	
ACMW-06S	06/13/00	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00			
GW-03	06/01/00	< 1.1	< 1.1	
GW-04	06/01/00	< 1.1	< 1.1	
GW-05	06/01/00	< 1.1	< 1.1	
GW-07	06/01/00	< 1.1	< 1.1	
GW-08	06/01/00	1.1	< 1.1	
GW-11	06/01/00	< 1.1	< 1.1	
GW-14	06/01/00	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	> 1600	< 2	80

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	< 30	< 30	
SW-05	06/06/00	430	430	
SW-06	06/06/00	430	230	
SW-08	06/06/00	11000	11000	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00			
SW-02	06/06/00	< 30	< 30	
SW-03	06/06/00	430	430	
SW-04	06/06/00	2400	930	

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L		COD mg/L		NO3-N mg/L	Comment
Buried Sludge Monitoring													
MW11	06/20/00	20000620-13	Sludge Pond	6267.8	8.1	6.79	77	0.8	<	5.0		0.076	
MW12	06/20/00	20000620-14	Sludge Pond	6266.0	8.6	6.22	147	1.9	<	5.0		0.119	
MW13	06/20/00	20000620-15	Sludge Pond	6257.2	7.1	6.83	729	2.6		16.3		1.520	
ERB Monitoring													
CONTROL	06/20/00	20000620-06	At Post Office	6282.9	9.8	7.01	175	6.9	<	5.0		2.490	
MW01.5	06/20/00	20000620-07	SW corner of ERB	6268.8	10.4	7.25	170	2.9	<	5.0		0.630	
MW02-50	06/20/00	20000620-08	Black Bart side of ERB	6268.6	11.0	6.87	408	38.9	<	5.0		8.820	
MW03-50	06/20/00	20000620-09	Black Bart side of ERB	6268.6	11.0	6.56	375	33.4	<	5.0		3.490	
MW04-50	06/20/00	20000620-10	Hank Monk side of ERB	6268.7	8.8	6.67	75	4.9	<	5.0		0.057	
MW07-50	06/20/00	20000620-11	North side of ERB	6279.3	8.8	6.30	261	26.7	<	5.0		0.649	
Heavenly Valley Creek													
HVC-1	06/02/00	20000602-06	Downstream of Pioneer		5.8	7.62	33	0.6	<	5.0		0.015	
HVC-2	06/02/00	20000602-07	250' upstream of Pond #2		5.4	7.40	35	0.7	<	5.0	<	0.010	
HVC-3	06/02/00	20000602-08	25' downstream of Johnson Blvd		5.4	7.44	36	0.9	<	5.0		0.015	
HVC-4	06/02/00	20000602-09	Effluent of drain from Lower Shop		9.4	7.41	115	0.7	<	5.0		0.071	
HVC-5	06/02/00	20000602-HVC5	Effluent of drainage pipe along Jo										Dry
Treatment Plant Monitoring													
MW08-25	06/20/00	20000620-12	SW side of Pond #1	6247.4	10.1	6.30	1031	50.6		85.2	<	0.010	

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	

Groundwaters

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	

Reservoirs

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4

Surfacewaters: Carson R

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8

Surfacewaters: Indian Cr

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	
Groundwaters									
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	
Reservoirs									
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057
Surfacewaters: Carson R									
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	
Surfacewaters: Indian Cr									
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	< 1.1	< 1.1	
ACMW-01BE	06/13/00	< 1.1	< 1.1	
ACMW-02N	06/13/00	< 1.1	< 1.1	
ACMW-02S	06/13/00	< 1.1	< 1.1	
ACMW-03	06/13/00	23	< 1.1	
ACMW-04W	06/13/00	< 1.1	< 1.1	
ACMW-06N	06/13/00	< 1.1	< 1.1	
ACMW-06S	06/13/00	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00			
GW-03	06/01/00	< 1.1	< 1.1	
GW-04	06/01/00	< 1.1	< 1.1	
GW-05	06/01/00	< 1.1	< 1.1	
GW-07	06/01/00	< 1.1	< 1.1	
GW-08	06/01/00	1.1	< 1.1	
GW-11	06/01/00	< 1.1	< 1.1	
GW-14	06/01/00	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	> 1600	< 2	80

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	< 30	< 30	
SW-05	06/06/00	430	430	
SW-06	06/06/00	430	230	
SW-08	06/06/00	11000	11000	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00			
SW-02	06/06/00	< 30	< 30	
SW-03	06/06/00	430	430	
SW-04	06/06/00	2400	930	

Data from South Tahoe Public Utility District (STPUD) discharger self monitoring files at Regional Board office.

The West Fork, Carson River Water Quality Objectives and East Fork, Carson River limitations were exceeded as follows (a ✓ indicates objective exceeded):

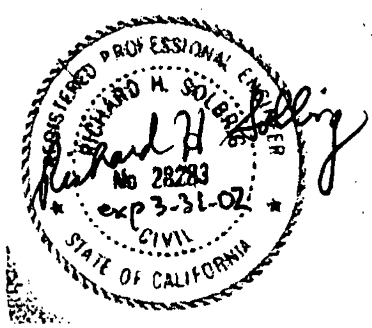
		TDS		Cl^-		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
Site	Location	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence
SW-01	Carson River, Woodfords	55		1.0		0.13	✓	0.02		0.15	✓	0.02		2.0		0.02	✓	20	
SW-06	Carson River, Stateline	70		2.5		0.22		0.03		0.25		0.03		2.0		0.02	✓	20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30	✓	0.03		8.0		0.25		30	
SW-03	Indian Creek, Mid	100	✓	6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-04	Indian Creek, Lower	100		6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03		8.0		0.25		30	

Blue Green Algae and soils test results will be sent as soon as the tests are completed.

<u>Certification</u>

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,



Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring											
MW11	06/20/00	20000620-13	Sludge Pond	6267.8	8.1	6.79	77	0.8	< 5.0	0.076	
MW12	06/20/00	20000620-14	Sludge Pond	6266.0	8.6	6.22	147	1.9	< 5.0	0.119	
MW13	06/20/00	20000620-15	Sludge Pond	6257.2	7.1	6.83	729	2.6	16.3	1.520	
ERB Monitoring											
CONTROL	06/20/00	20000620-06	At Post Office	6282.9	9.8	7.01	175	6.9	< 5.0	2.490	
MW01.5	06/20/00	20000620-07	SW corner of ERB	6268.8	10.4	7.25	170	2.9	< 5.0	0.630	
MW02-50	06/20/00	20000620-08	Black Bart side of ERB	6268.6	11.0	6.87	408	38.9	< 5.0	8.820	
MW03-50	06/20/00	20000620-09	Black Bart side of ERB	6268.6	11.0	6.56	375	33.4	< 5.0	3.490	
MW04-50	06/20/00	20000620-10	Hank Monk side of ERB	6268.7	8.8	6.67	75	4.9	< 5.0	0.057	
MW07-50	06/20/00	20000620-11	North side of ERB	6279.3	8.8	6.30	261	26.7	< 5.0	0.649	
Heavenly Valley Creek											
HVC-1	06/02/00	20000602-06	Downstream of Pioneer		5.8	7.62	33	0.6	< 5.0	0.015	
HVC-2	06/02/00	20000602-07	250' upstream of Pond #2		5.4	7.40	35	0.7	< 5.0	< 0.010	
HVC-3	06/02/00	20000602-08	25' downstream of Johnson Blvd		5.4	7.44	36	0.9	< 5.0	0.015	
HVC-4	06/02/00	20000602-09	Effluent of drain from Lower Shop		9.4	7.41	115	0.7	< 5.0	0.071	
HVC-5	06/02/00	20000602-HVC5	Effluent of drainage pipe along Jo								Dry
Treatment Plant Monitoring											
MW08-25	06/20/00	20000620-12	SW side of Pond #1	6247.4	10.1	6.30	1031	50.6	85.2	< 0.010	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	
Groundwaters													
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	
Reservoirs													
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4
Surfacewaters: Carson R													
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8
Surfacewaters: Indian Cr													
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	

Groundwaters

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	

Reservoirs

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057

Surfacewaters: Carson R

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	

Surfacewaters: Indian Cr

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	< 1.1	< 1.1	
ACMW-01BE	06/13/00	< 1.1	< 1.1	
ACMW-02N	06/13/00	< 1.1	< 1.1	
ACMW-02S	06/13/00	< 1.1	< 1.1	
ACMW-03	06/13/00	23	< 1.1	
ACMW-04W	06/13/00	< 1.1	< 1.1	
ACMW-06N	06/13/00	< 1.1	< 1.1	
ACMW-06S	06/13/00	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00			
GW-03	06/01/00	< 1.1	< 1.1	
GW-04	06/01/00	< 1.1	< 1.1	
GW-05	06/01/00	< 1.1	< 1.1	
GW-07	06/01/00	< 1.1	< 1.1	
GW-08	06/01/00	1.1	< 1.1	
GW-11	06/01/00	< 1.1	< 1.1	
GW-14	06/01/00	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	> 1600	< 2	80

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	< 30	< 30	
SW-05	06/06/00	430	430	
SW-06	06/06/00	430	230	
SW-08	06/06/00	11000	11000	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00			
SW-02	06/06/00	< 30	< 30	
SW-03	06/06/00	430	430	
SW-04	06/06/00	2400	930	

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring											
MW11	06/20/00	20000620-13	Sludge Pond	6267.8	8.1	6.79	77	0.8	< 5.0	0.076	
MW12	06/20/00	20000620-14	Sludge Pond	6266.0	8.6	6.22	147	1.9	< 5.0	0.119	
MW13	06/20/00	20000620-15	Sludge Pond	6257.2	7.1	6.83	729	2.6	16.3	1.520	
ERB Monitoring											
CONTROL	06/20/00	20000620-06	At Post Office	6282.9	9.8	7.01	175	6.9	< 5.0	2.490	
MW01.5	06/20/00	20000620-07	SW corner of ERB	6268.8	10.4	7.25	170	2.9	< 5.0	0.630	
MW02-50	06/20/00	20000620-08	Black Bart side of ERB	6268.6	11.0	6.87	408	38.9	< 5.0	8.820	
MW03-50	06/20/00	20000620-09	Black Bart side of ERB	6268.6	11.0	6.56	375	33.4	< 5.0	3.490	
MW04-50	06/20/00	20000620-10	Hank Monk side of ERB	6268.7	8.8	6.67	75	4.9	< 5.0	0.057	
MW07-50	06/20/00	20000620-11	North side of ERB	6279.3	8.8	6.30	261	26.7	< 5.0	0.649	
Heavenly Valley Creek											
HVC-1	06/02/00	20000602-06	Downstream of Pioneer		5.8	7.62	33	0.6	< 5.0	0.015	
HVC-2	06/02/00	20000602-07	250' upstream of Pond #2		5.4	7.40	35	0.7	< 5.0	< 0.010	
HVC-3	06/02/00	20000602-08	25' downstream of Johnson Blvd		5.4	7.44	36	0.9	< 5.0	0.015	
HVC-4	06/02/00	20000602-09	Effluent of drain from Lower Shop		9.4	7.41	115	0.7	< 5.0	0.071	
HVC-5	06/02/00	20000602-HVC5	Effluent of drainage pipe along Jo								Dry
Treatment Plant Monitoring											
MW08-25	06/20/00	20000620-12	SW side of Pond #1	6247.4	10.1	6.30	1031	50.6	85.2	< 0.010	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	06/13/00	20000613-24	Main Dam	11.1	7.02	110		49	82			3.2	
ACMW-01BE	06/13/00	20000613-25	Secondary Dam	10.3	7.03	95		47	72			0.5	
ACMW-02N	06/13/00	20000613-26	Access Gate	13.4	7.01	125		59	91			2.4	
ACMW-02S	06/13/00	20000613-27	Access Gate	13.0	6.87	93		46	70			0.9	
ACMW-03	06/13/00	20000613-28	HWY 88	13.6	5.64	166		69	121			4.8	
ACMW-04W	06/13/00	20000613-29	Gansberg	12.0	5.83	189		51	138			13.8	
ACMW-06N	06/13/00	20000613-30	Celio	12.0	7.00	686		260	431			56.2	
ACMW-06S	06/13/00	20000613-31	Celio	13.7	6.97	776		272	479			76.1	
Groundwaters													
GW-01	06/01/00	20000601-16	Cohen	11.6	7.36	152							
GW-03	06/01/00	20000601-17	Smith/Springmeyer	16.2	7.49	307		130	229			1.5	
GW-04	06/01/00	20000601-18	Celio	14.4	7.48	263		117	200			3.1	
GW-05	06/01/00	20000601-19	Neddenriep	12.8	7.03	269		62	177			23.9	
GW-07	06/01/00	20000601-20	Gansberg	13.0	7.11	124		54	98			1.3	
GW-08	06/01/00	20000601-21	Arant	14.4	7.20	288		50	191			34.5	
GW-11	06/01/00	20000601-22	Diamond Val. School	17.2	7.13	100		48	87			0.9	
GW-14	06/01/00	20000601-23	Sierrra Pines	14.3	7.23	112		52	102			1.2	
Reservoirs													
HPR	06/13/00	20000613-10	Harvey Place Reservoir	21.2	9.01	414	15.20	92	222	17.40	3.6	52.6	19.4
Surfacewaters: Carson R													
SW-01	06/06/00	20000606-10	Carson R Woodfords	8.1	7.49	41	7.30	20	41	4.84	1.4	0.6	1.8
SW-05	06/06/00	20000606-14	Carson R Paynesville	12.0	7.18	45	6.50	21	49	5.48	1.6	< 0.5	2.3
SW-06	06/06/00	20000606-15	Carson R Stateline	12.3	7.42	49	5.80	24	56	5.29	1.6	0.5	1.7
SW-08	06/06/00	20000606-16	Irrigation Ditch	13.8	7.08	78	5.10	38	81	3.21	1.8	0.8	5.8
Surfacewaters: Indian Cr													
SW-02	06/01/00	20000601-27	Indian Cr Upper	9.6	7.58	110				1.80	1.7	0.6	
SW-02	06/06/00	20000606-11	Indian Cr Upper	15.6	7.65	113	5.80	60	92	0.33	1.4	1.0	1.9
SW-03	06/06/00	20000606-12	Indian Cr Mid	17.1	7.23	186	5.70	90	135	5.81	6.2	4.7	3.6
SW-04	06/06/00	20000606-13	Indian Cr Lower	13.8	7.09	84	5.50	43	77	11.60	2.1	0.7	3.0

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
ACMW-01AW	06/13/00				< 0.020	< 0.010	0.556	0.566	
ACMW-01BE	06/13/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02N	06/13/00				0.041	< 0.010	0.069	0.079	
ACMW-02S	06/13/00				0.029	< 0.010	0.062	0.072	
ACMW-03	06/13/00				0.040	< 0.010	0.320	0.330	
ACMW-04W	06/13/00				0.025	< 0.010	2.470	2.480	
ACMW-06N	06/13/00				0.067	< 0.010	< 0.010	0.020	
ACMW-06S	06/13/00				< 0.020	< 0.010	0.022	0.032	

Groundwaters

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
GW-01	06/01/00							0.000	
GW-03	06/01/00				< 0.020	< 0.010	0.707	0.717	
GW-04	06/01/00				< 0.020	< 0.010	0.808	0.818	
GW-05	06/01/00				< 0.020	< 0.010	3.460	3.470	
GW-07	06/01/00				< 0.020	< 0.010	1.010	1.020	
GW-08	06/01/00				< 0.020	< 0.010	6.680	6.690	
GW-11	06/01/00				< 0.020	< 0.010	0.396	0.406	
GW-14	06/01/00				< 0.020	< 0.010	0.450	0.460	

Reservoirs

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
HPR	06/13/00	2.380	2.110	15.400	10.600	0.369	1.110	16.879	0.057

Surfacewaters: Carson R

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-01	06/06/00	0.022	< 0.010	0.221	0.024	< 0.010	< 0.010	0.241	
SW-05	06/06/00	0.078	< 0.010	0.114	0.022	< 0.010	< 0.010	0.134	
SW-06	06/06/00	0.030	< 0.010	0.107	0.021	< 0.010	< 0.010	0.127	
SW-08	06/06/00	0.076	0.014	0.745	0.052	< 0.010	0.038	0.793	

Surfacewaters: Indian Cr

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-02	06/01/00	0.024	< 0.010	0.306	< 0.020	< 0.010	< 0.010	0.326	
SW-02	06/06/00	0.032	< 0.010	0.417	0.020	< 0.010	< 0.010	0.437	
SW-03	06/06/00	0.096	0.043	0.288	0.029	< 0.010	0.023	0.321	
SW-04	06/06/00	0.064	0.020	0.416	0.023	< 0.010	< 0.010	0.436	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	06/13/00												5483.0
ACMW-01BE	06/13/00												5495.7
ACMW-02N	06/13/00												5460.1
ACMW-02S	06/13/00												5461.9
ACMW-03	06/13/00												5042.6
ACMW-04W	06/13/00												4908.1
ACMW-06N	06/13/00												5214.8
ACMW-06S	06/13/00												5204.0
Groundwaters													
GW-01	06/01/00												
GW-03	06/01/00												
GW-04	06/01/00												
GW-05	06/01/00												
GW-07	06/01/00												
GW-08	06/01/00												
GW-11	06/01/00												
GW-14	06/01/00												
Reservoirs													
HPR	06/13/00	54	> 12		0.23	14.5	3.4	42.3	8.8	2.59	59.9		53.8
Surfacewaters: Carson R													
SW-01	06/06/00		1		0.03	4.3	1.2	1.8	0.7	0.20	19.1		
SW-05	06/06/00		0		0.03	4.6	1.3	2.1	0.8	0.23	20.5		
SW-06	06/06/00		1		0.04	5.0	1.5	2.4	0.9	0.24	20.7		
SW-08	06/06/00		2		0.05	8.1	2.1	5.2	1.3	0.42	27.1		
Surfacewaters: Indian Cr													
SW-02	06/01/00												
SW-02	06/06/00		0		0.04	12.3	2.9	6.8	1.7	0.45	24.7		
SW-03	06/06/00		1		0.06	17.2	5.1	12.7	2.3	0.69	29.3		
SW-04	06/06/00		1		0.04	9.2	2.8	3.9	0.9	0.29	19.4		

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	06/13/00	< 1.1	< 1.1	
ACMW-01BE	06/13/00	< 1.1	< 1.1	
ACMW-02N	06/13/00	< 1.1	< 1.1	
ACMW-02S	06/13/00	< 1.1	< 1.1	
ACMW-03	06/13/00	23	< 1.1	
ACMW-04W	06/13/00	< 1.1	< 1.1	
ACMW-06N	06/13/00	< 1.1	< 1.1	
ACMW-06S	06/13/00	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-01	06/01/00			
GW-03	06/01/00	< 1.1	< 1.1	
GW-04	06/01/00	< 1.1	< 1.1	
GW-05	06/01/00	< 1.1	< 1.1	
GW-07	06/01/00	< 1.1	< 1.1	
GW-08	06/01/00	1.1	< 1.1	
GW-11	06/01/00	< 1.1	< 1.1	
GW-14	06/01/00	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	06/13/00	> 1600	< 2	80

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	06/06/00	< 30	< 30	
SW-05	06/06/00	430	430	
SW-06	06/06/00	430	230	
SW-08	06/06/00	11000	11000	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	06/01/00			
SW-02	06/06/00	< 30	< 30	
SW-03	06/06/00	430	430	
SW-04	06/06/00	2400	930	

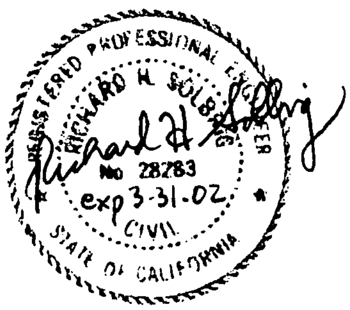
Site	Location	TDS		Cl		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance
SW-01	Carson River, Woodfords	55	✓	1.0	✓	0.13		0.02		0.15		0.02		2.0	✓	0.02		20	✓
SW-06	Carson River, Stateline	70	✓	2.5	✓	0.22		0.03	✓	0.25	✓	0.03		2.0	✓	0.02		20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30		0.03		8.0		0.25		30	✓
SW-03	Indian Creek, Mid	100		6.0						0.30		0.03		8.0		0.25		30	
SW-04	Indian Creek, Lower	100		6.0						0.30		0.03		8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03		8.0		0.25		30	

The March soils tests are not yet completed. They will be sent to you as soon as they are available.

Certification

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,



Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

04/04/01

Buried Sludge Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umho	Cl mg/L	COD mg/L	TKN mg/L	NO3-N mg/L	Comment
MW11	03/27/01	20010327-16	Sludge Pond	6265.5	9.7	7.00	78	0.9	< 5.0		0.066	
MW12	03/27/01	20010327-17	Sludge Pond	6263.9	9.8	6.62	122	2.3	8.1		0.450	
MW13	03/27/01	20010327-18	Sludge Pond	6258.2	4.0	6.50	688	3.0	21.6		6.570	

ERB Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umho	Cl mg/L	COD mg/L	TKN mg/L	NO3-N mg/L	Comment
CONTROL	03/27/01	20010327-10	At Post Office	6281.1	9.2	7.34	171	8.0	5.7		2.350	
MW02-50	03/27/01	20010327-11	Black Bart side of ERB	6268.3	11.4	6.95	388	38.9	6.1		8.850	
MW03-50	03/27/01	20010327-12	Black Bart side of ERB	6268.3	11.4	6.93	337	31.5	5.1		5.060	
MW04-50	03/27/01	20010327-13	Hank Monk side of ERB	6268.2	9.5	7.01	75	5.7	< 5.0		0.065	
MW07-50	03/27/01	20010327-14	North side of ERB	6278.2	7.9	6.09	250	24.8	< 5.0		0.572	

Heavenly Valley Creek

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umho	Cl mg/L	COD mg/L	TKN mg/L	NO3-N mg/L	Comment
HVC-1	03/14/01	20010314-29	Downstream of Pioneer		4.0	7.16	67	1.8	5.7	< 0.100	0.219	
HVC-2	03/14/01	20010314-30	250' upstream of Pond #2		2.7	7.33	51	1.8	10.0	0.350	0.026	
HVC-3	03/14/01	0010314-HVC3	25' downstream of Johnson Blvd									Frozen
HVC-4	03/14/01	0010314-HVC4	Effluent of drain from Lower Shop a									Frozen
HVC-5	03/14/01	0010314-HVC5	Effluent of drainage pipe along John									Standing water

Treatment Plant Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umho	Cl mg/L	COD mg/L	TKN mg/L	NO3-N mg/L	Comment
MW08-25	03/27/01	20010327-15	SW side of Pond #1	6247.8	10.0	6.38	993	43.7	89.0		0.040	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	03/20/01	20010320-07	Main Dam	11.6	7.02	61		28	83			1.4	2.4
ACMW-01BE	03/20/01	20010320-08	Secondary Dam	9.1	7.24	63		58	72			1.2	1.5
ACMW-02N	03/20/01	20010320-09	Access Gate	13.1	6.66	130		61	90			3.1	3.0
ACMW-02S	03/20/01	20010320-10	Access Gate	12.0	6.71	94		45	79			1.9	1.3
ACMW-04W	03/20/01	20010320-11	Gansberg	13.3	6.11	186		51	136			14.8	7.8
ACMW-06N	03/20/01	20010320-12	Celio	11.7	6.79	697		260	441			62.5	22.2
ACMW-06S	03/20/01	20010320-13	Celio	12.6	7.50	620		186	382			74.1	23.4
Groundwaters													
GW-03	03/14/01	20010314-20	Smith/Springmeyer	11.6	7.15	303		132	225			1.6	25.9
GW-04	03/14/01	20010314-21	Celio	13.0	6.88	260		121	188			3.6	11.5
GW-05	03/14/01	20010314-22	Neddenriep	11.2	6.52	259		62	172			23.8	13.5
GW-07	03/14/01	20010314-23	Gansberg	10.5	6.55	121		53	95			2.0	2.4
GW-08	03/14/01	20010314-24	Arant	9.5	6.90	237		53	152			24.1	9.3
GW-11	03/14/01	20010314-25	Diamond Val. School	10.1	7.17	148		77	115			0.8	0.8
GW-14	03/14/01	20010314-26	Sierrra Pines	7.5	7.04	108		53	97			1.2	1.7
ICR TMDL													
SW-11	03/14/01	20010314-28	ICR Effluent @ HPR box	7.0	7.26	110		51	78	9.36	7.45	1.4	4.3
SW-11	03/20/01	20010320-15	ICR Effluent @ HPR box	7.0	7.65	107				9.50	9.16	1.4	
Reservoirs													
HPR	03/07/01	20010307-12	Harvey Place Reservoir	5.3	7.75	504	6.78	124	238	0.26	1.4	59.5	18.0
Surfacewaters: Carson R													
SW-01	03/06/01	20010306-07	Carson R Woodfords	2.2	7.38	77	9.40	36	59	0.91	.35	1.8	2.4
SW-05	03/06/01	20010306-11	Carson R Paynesville	4.3	7.39	93	10.30	42	70	1.73	.48	2.0	3.2
SW-06	03/06/01	20010306-12	Carson R Stateline	6.2	7.69	100	10.80	42	73	1.22	.45	2.9	3.7
SW-08	03/06/01	20010306-13	Irrigation Ditch	10.8	7.60	128	9.10	52	107	6.02	2.1	3.2	6.3
Surfacewaters: Indian Cr													
SW-02	03/06/01	20010306-08	Indian Cr Upper	4.0	7.37	79	10.45	41	66	0.47	1.7	0.8	< 0.5
SW-03	03/06/01	20010306-09	Indian Cr Mid	2.0	7.39	83	10.42	37	60	2.26	1.3	1.9	2.5
SW-04	03/06/01	20010306-10	Indian Cr Lower	3.0	7.19	97	9.61	45	72	5.97	2	2.6	2.1

ALPINE COUNTY MONITORING

04/05/01

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	03/20/01	0.264		< 0.100		< 0.020	0.026	0.146	
ACMW-01BE	03/20/01	0.046		< 0.100		< 0.010	0.032	0.142	
ACMW-02N	03/20/01	0.018		< 0.100		< 0.010	0.073	0.183	
ACMW-02S	03/20/01	0.016		< 0.100		< 0.010	< 0.010	0.120	
ACMW-04W	03/20/01	0.020		0.135		< 0.020	2.810	2.965	
ACMW-06N	03/20/01	0.400		0.241		< 0.010	< 0.100	0.351	
ACMW-06S	03/20/01	0.022		0.194		0.053	0.099	0.346	
Groundwaters									
GW-03	03/14/01	0.032		0.082		0.195	0.718	0.995	
GW-04	03/14/01	0.052		0.143		< 0.010	0.817	0.970	
GW-05	03/14/01	0.028		0.078		< 0.030	3.530	3.638	
GW-07	03/14/01	0.098		< 0.100		< 0.010	1.270	1.380	
GW-08	03/14/01	0.058		0.103		< 0.010	4.270	4.383	
GW-11	03/14/01	0.034		< 0.100		< 0.010	0.454	0.564	
GW-14	03/14/01	0.052		0.142		< 0.010	0.463	0.615	
ICR TMDL									
SW-11	03/14/01	0.062	< 0.010	0.688	< 0.100	< 0.010	< 0.010	0.708	
SW-11	03/20/01	0.062	< 0.010	0.674		< 0.010	< 0.010	0.694	
Reservoirs									
HPR	03/07/01	2.400	2.410	18.600	19.400	0.105	0.441	19.146	
Surfacewaters: Carson R									
SW-01	03/06/01	< 0.010	0.042	0.118		< 0.010	0.011	0.139	
SW-05	03/06/01	0.012	0.010	< 0.100		< 0.010	0.034	0.144	
SW-06	03/06/01	0.012	< 0.010	0.199		< 0.010	0.054	0.263	
SW-08	03/06/01	0.052	0.028	0.418		< 0.010	0.277	0.705	
Surfacewaters: Indian Cr									
SW-02	03/06/01	0.012	0.046	0.121		< 0.010	< 0.010	0.141	
SW-03	03/06/01	0.018	< 0.010	0.153		< 0.010	< 0.010	0.173	
SW-04	03/06/01	0.034	< 0.010	0.236		< 0.010	< 0.010	0.256	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	03/20/01												5482.9
ACMW-01BE	03/20/01												5490.9
ACMW-02N	03/20/01												5458.3
ACMW-02S	03/20/01												5459.2
ACMW-04W	03/20/01												4895.9
ACMW-06N	03/20/01												5216.2
ACMW-06S	03/20/01												5204.8
Groundwaters													
GW-03	03/14/01												
GW-04	03/14/01												
GW-05	03/14/01												
GW-07	03/14/01												
GW-08	03/14/01												
GW-11	03/14/01												
GW-14	03/14/01												
ICR TMDL													
SW-11	03/14/01				0.01								
SW-11	03/20/01					12.0	2.0	6.6	2.2	0.47	26.0		
Reservoirs													
HPR	03/07/01	28	3		0.24	14.6	3.3	41.4	9.2	2.55	59.4		49.5
Surfacewaters: Carson R													
SW-01	03/06/01		1		< 0.01	7.9	2.0	4.2	1.4	0.35	23.4		
SW-05	03/06/01		1		< 0.01	8.7	2.3	5.4	1.8	0.42	26.0		
SW-06	03/06/01		1		< 0.01	8.9	2.6	5.7	1.9	0.43	26.0		
SW-08	03/06/01		1		< 0.01	10.0	2.5	9.8	3.0	0.72	35.2		
Surfacewaters: Indian Cr													
SW-02	03/06/01		1		< 0.01	7.4	1.9	6.2	1.3	0.52	32.5		
SW-03	03/06/01		2		< 0.01	8.2	2.1	4.6	1.5	0.37	24.3		
SW-04	03/06/01		1		< 0.01	9.3	2.7	5.4	1.6	0.40	24.4		

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	03/20/01	< 1.1	< 1.1	
ACMW-01BE	03/20/01	< 1.1	< 1.1	
ACMW-02N	03/20/01	< 1.1	< 1.1	
ACMW-02S	03/20/01	< 1.1	< 1.1	
ACMW-04W	03/20/01	< 1.1	< 1.1	
ACMW-06N	03/20/01	< 1.1	< 1.1	
ACMW-06S	03/20/01	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-03	03/14/01	< 1.1	< 1.1	
GW-04	03/14/01	< 1.1	< 1.1	
GW-05	03/14/01	< 1.1	< 1.1	
GW-07	03/14/01	< 1.1	< 1.1	
GW-08	03/14/01	< 1.1	< 1.1	
GW-11	03/14/01	< 1.1	< 1.1	
GW-14	03/14/01	< 1.1	< 1.1	

ICR TMDL

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-11	03/14/01	30	< 30	
SW-11	03/20/01	< 3	< 3	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	03/07/01	8	< 2	< 2

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	03/06/01	9	< 3	
SW-05	03/06/01	93	4	
SW-06	03/06/01	93	< 3	
SW-08	03/06/01	93	43	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	03/06/01	43	< 3	
SW-03	03/06/01	39	4	
SW-04	03/06/01	9	< 3	

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
March, 2001										
20010306-07	SW-01	Carson R Woodfords	03/06/01	0	0	0	0	O	0	0
20010306-08	SW-02	Indian Cr Upper	03/06/01	0	0	0	0	O	0	0
20010306-09	SW-03	Indian Cr Mid	03/06/01	0	0	0	0	O	0	0
20010306-10	SW-04	Indian Cr Lower	03/06/01	0	0	0	0	O	0	0
20010306-11	SW-05	Carson R Paynesville	03/06/01	0	0	0	0	O	0	0
20010306-12	SW-06	Carson R Stateline	03/06/01	0	0	0	0	O	0	0
20010306-13	SW-08	Irrigation Ditch	03/06/01	0	0	0	0	O	0	0
20010307-12	HPR	Harvey Place Reservoir	03/07/01	0	0	0	0	O	0	0
20010307-16	ICR-1	Indian Creek Reservoir	03/07/01	0	0	0	0	O	0	0
20010307-17	ICR-1	Indian Creek Reservoir	03/07/01	0	0	0	0	O	0	0
20010307-18	ICR-1	Indian Creek Reservoir	03/07/01	0	0	0	0	O	0	0
20010314-28	SW-11	ICR Effluent @ HPR box	03/14/01	0	0	0	0	O	0	0

The West Fork, Carson River Water Quality Objectives and East Fork, Carson River limitations were exceeded as follows (a ✓ indicates objective exceeded):

Site	Location	TDS		Cl^-		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence
SW-01	Carson River, Woodfords	55		1.0		0.13	✓	0.02		0.15	✓	0.02		2.0		0.02		20	✓
SW-06	Carson River, Stateline	70		2.5		0.22	✓	0.03		0.25	✓	0.03		2.0	✓	0.02		20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-03	Indian Creek, Mid	100	✓	6.0						0.30	✓	0.03	✓	8.0		0.25		30	✓
SW-04	Indian Creek, Lower	100	✓	6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03		8.0		0.25		30	

Blue Green Algae test results will be sent as soon as the tests are completed.

<u>Certification</u>

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
RICHARD H. SOLBRIG
No 28283
exp 3-31-02
CIVIL
STATE OF CALIFORNIA

Richard H Solbrig

Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

Buried Sludge Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
MW11	07/25/00	20000725-32	Sludge Pond	6267.6	10.5	6.54	77	0.8	< 5.0	0.115	NO3-N is (NO2 + NO3)-N
MW12	07/25/00	20000725-33	Sludge Pond	6265.5	11.3	6.41	149	1.8	< 5.0	0.191	NO3-N is (NO2 + NO3)-N
MW13	07/25/00	20000725-34	Sludge Pond	6256.5	10.6	6.78	754	2.5	11.7	1.840	NO3-N is (NO2 + NO3)-N

ERB Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
CONTROL	07/25/00	20000725-25	At Post Office	6282.9	11.7	6.67	174	7.3	< 5.0	2.340	
MW01.5	07/25/00	20000725-26	SW corner of ERB	6268.7	10.8	7.14	173	2.5	< 5.0	0.614	NO3-N is (NO2 + NO3)-N
MW02-50	07/25/00	20000725-27	Black Bart side of ERB	6268.4	12.0	6.59	398	37.4	< 5.0	8.040	NO3-N is (NO2 + NO3)-N
MW03-50	07/25/00	20000725-28	Black Bart side of ERB	6268.4	11.5	6.44	379	32.0	< 5.0	3.630	NO3-N is (NO2 + NO3)-N
MW04-50	07/25/00	20000725-29	Hank Monk side of ERB	6268.4	9.0	6.51	75	5.3	< 5.0	0.111	NO3-N is (NO2 + NO3)-N
MW07-50	07/25/00	20000725-30	North side of ERB	6279.1	9.5	6.46	261	25.1	< 5.0	0.616	NO3-N is (NO2 + NO3)-N

Heavenly Valley Creek

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
HVC-1	07/11/00	20000711-06	Downstream of Pioneer		9.7	7.37	40	0.7	< 5.0	0.030	
HVC-2	07/11/00	20000711-07	250' upstream of Pond #2		9.2	7.32	44	0.7	< 5.0	< 0.010	
HVC-3	07/11/00	20000711-08	25' downstream of Johnson Blvd		9.9	7.36	47	0.8	< 5.0	0.032	
HVC-4	07/11/00	20000711-HVC4	Effluent of drain from Lower Shop								
HVC-5	07/11/00	20000711-HVC5	Effluent of drainage pipe along Jo								

Treatment Plant Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
MW08-25	07/25/00	20000725-31	SW side of Pond #1	6246.9	12.0	6.40	1025	52.3	75.4	0.026	NO3-N is (NO2 + NO3)-N

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	07/18/00	20000718-07	Main Dam	12.3	6.73	98		43	79			2.3	2.1
ACMW-01BE	07/18/00	20000718-09	Secondary Dam	11.8	6.57	94		46	77			0.8	1.6
ACMW-02N	07/18/00	20000718-11	Access Gate	13.5	6.64	124		57	84			2.6	3.4
ACMW-02S	07/18/00	20000718-13	Access Gate	13.7	6.42	99		48	71			1.1	1.5
ACMW-03	07/18/00	20000718-14	HWY 88	15.1	6.50	198		68	118			6.9	3.6
ACMW-04W	07/18/00	20000718-16	Gansberg	11.7	6.13	186		48	128			14.6	9.2
ACMW-06N	07/18/00	20000718-18	Celio	12.0	6.92	692		255	427			55.5	22.0
ACMW-06S	07/18/00	20000718-20	Celio	12.4	6.82	772		268	471			75.9	33.2
Groundwaters													
GW-03	07/11/00	20000711-15	Smith/Springmeyer	17.4	7.75	307		130	232			1.5	
GW-04	07/11/00	20000711-17	Celio	16.0	7.69	263		118	202			3.1	
GW-05	07/11/00	20000711-19	Neddenriep	12.9	6.81	268		63	173			23.6	
GW-07	07/11/00	20000711-21	Gansberg	13.5	6.87	122		53	100			1.3	
GW-08	07/11/00	20000711-23	Arant	16.6	6.85	264		52	172			27.7	
GW-11	07/11/00	20000711-25	Diamond Val. School	23.2	6.60	103		50	91			0.9	
GW-14	07/11/00	20000711-27	Sierrra Pines	13.0	7.13	113		52	102			1.1	
Reservoirs													
HPR	07/05/00	20000705-19	Harvey Place Reservoir	20.2	7.74	453	5.80	102	224	70.70	4.9	53.5	17.2
Surfacewaters: Carson R													
SW-01	07/05/00	20000705-11	Carson R Woodfords	11.5	7.08	58	8.30	29	45	2.30	.55	0.7	1.6
SW-05	07/05/00	20000705-15	Carson R Paynesville	13.9	6.96	66	7.80	32	51	3.16	.8	0.7	1.9
SW-06	07/05/00	20000705-16	Carson R Stateline	13.0	7.27	69	7.40	33	55	3.24	.72	1.0	2.1
SW-07	07/05/00	20000705-17	Fredericksburg Ditch	14.2	7.21	230	6.80	75	155	4.26	2.7	19.5	7.3
SW-08	07/05/00	20000705-18	Irrigation Ditch	14.2	7.18	107	6.80	53	89	3.14	.86	1.3	3.5
Surfacewaters: Indian Cr													
SW-02	07/05/00	20000705-12	Indian Cr Upper	17.5	7.63	152	5.80	79	110	0.42	.64	1.8	0.1
SW-03	07/05/00	20000705-13	Indian Cr Mid	17.0	7.06	220	8.50	109	154	1.84	3.2	6.0	3.3
SW-04	07/05/00	20000705-14	Indian Cr Lower	14.5	7.31	121	6.70	63	92	3.64	2	1.4	1.1

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	Total P mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
ACMW-01AW	07/18/00	0.032		< 0.100	< 0.020	< 0.010	0.232	0.342	
ACMW-01BE	07/18/00	0.030		< 0.100	< 0.020	< 0.010	0.062	0.172	
ACMW-02N	07/18/00	0.020		< 0.100	< 0.020	< 0.010	0.058	0.168	
ACMW-02S	07/18/00	0.020		< 0.100	< 0.020	< 0.010	< 0.010	0.120	
ACMW-03	07/18/00	0.160		0.352	0.139	0.011	0.725	1.088	
ACMW-04W	07/18/00	0.024		< 0.100	< 0.020	< 0.010	2.320	2.430	
ACMW-06N	07/18/00	0.280		0.126	0.044	< 0.010	< 0.010	0.146	
ACMW-06S	07/18/00	0.052		0.160	< 0.020	< 0.010	< 0.010	0.180	

Groundwaters

Site	Date	Total P mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
GW-03	07/11/00	0.058		0.107	< 0.020	< 0.010	0.731	0.848	
GW-04	07/11/00	0.052		< 0.100	0.020	< 0.010	0.853	0.963	
GW-05	07/11/00	0.036		0.110	< 0.020	< 0.010	3.200	3.320	
GW-07	07/11/00	0.104		< 0.100	< 0.020	< 0.010	0.930	1.040	
GW-08	07/11/00	0.042		0.133	< 0.020	< 0.010	5.940	6.083	
GW-11	07/11/00	0.026		< 0.100	0.020	< 0.010	0.353	0.463	
GW-14	07/11/00	0.052		< 0.100	< 0.020	< 0.010	0.474	0.584	

Reservoirs

Site	Date	Total P mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
HPR	07/05/00	2.420	2.220	15.800	12.700	0.448	0.756	17.004	

Surfacewaters: Carson R

Site	Date	Total P mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-01	07/05/00	0.020	< 0.010	0.185	0.024	< 0.010	0.010	0.205	
SW-05	07/05/00	0.021	< 0.010	0.197	< 0.020	< 0.010	0.018	0.225	
SW-06	07/05/00	0.024	< 0.010	0.254	< 0.020	< 0.010	0.023	0.287	
SW-07	07/05/00	0.286	0.232	1.490	0.683	0.075	0.711	2.276	
SW-08	07/05/00	0.036	0.014	0.265	< 0.020	< 0.010	0.104	0.379	

Surfacewaters: Indian Cr

Site	Date	Total P mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-02	07/05/00	0.050	0.010	0.418	< 0.020	< 0.010	< 0.010	0.438	
SW-03	07/05/00	0.068	0.030	0.438	< 0.020	< 0.010	0.012	0.460	
SW-04	07/05/00	0.064	0.028	0.344	< 0.020	< 0.010	< 0.010	0.364	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	07/18/00												5483.5
ACMW-01BE	07/18/00												5494.2
ACMW-02N	07/18/00												5459.6
ACMW-02S	07/18/00												5461.2
ACMW-03	07/18/00												5041.5
ACMW-04W	07/18/00												4906.3
ACMW-06N	07/18/00												5215.1
ACMW-06S	07/18/00												5204.0
Groundwaters													
GW-03	07/11/00												
GW-04	07/11/00												
GW-05	07/11/00												
GW-07	07/11/00												
GW-08	07/11/00												
GW-11	07/11/00												
GW-14	07/11/00												
Reservoirs													
HPR	07/05/00	41	7		0.20	11.3	3.6	41.2	9.0	2.73	62.2		49.5
Surfacewaters: Carson R													
SW-01	07/05/00		1		< 0.01	5.5	1.7	2.8	1.1	0.27	21.7		
SW-05	07/05/00		0		0.01	5.6	1.9	3.5	1.2	0.32	24.5		
SW-06	07/05/00		1		< 0.01	5.8	2.0	3.7	1.3	0.34	24.8		
SW-07	07/05/00		1		0.07	13.2	4.1	21.2	4.3	1.31	45.5		
SW-08	07/05/00		1		0.02	8.7	2.6	7.9	1.8	0.60	33.2		
Surfacewaters: Indian Cr													
SW-02	07/05/00		1		0.01	14.2	4.0	9.0	1.9	0.55	26.6		
SW-03	07/05/00		1		0.04	17.1	6.5	15.0	2.0	0.78	31.2		
SW-04	07/05/00		1		0.02	11.0	3.8	6.2	1.1	0.41	23.3		

Alpine Monitoring Wells

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
ACMW-01AW	07/18/00	<	1.1	<	1.1		
ACMW-01BE	07/18/00	<	1.1	<	1.1		
ACMW-02N	07/18/00	<	1.1	<	1.1		
ACMW-02S	07/18/00	<	1.1	<	1.1		
ACMW-03	07/18/00	>	23	>	23		
ACMW-04W	07/18/00		3.6	<	1.1		
ACMW-06N	07/18/00		1.1	<	1.1		
ACMW-06S	07/18/00	<	1.1	<	1.1		

Groundwaters

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
GW-03	07/11/00	<	1.1	<	1.1		
GW-04	07/11/00	<	1.1	<	1.1		
GW-05	07/11/00	<	1.1	<	1.1		
GW-07	07/11/00	<	1.1	<	1.1		
GW-08	07/11/00	<	1.1	<	1.1		
GW-11	07/11/00	<	1.1	<	1.1		
GW-14	07/11/00	<	1.1	<	1.1		

Reservoirs

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
HPR	07/05/00		240	<	2	<	30

Surfacewaters: Carson R

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
SW-01	07/05/00		90	<	30		
SW-05	07/05/00		430		40		
SW-06	07/05/00		230		40		
SW-07	07/05/00		4600		2400		
SW-08	07/05/00		430		430		

Surfacewaters: Indian Cr

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
SW-02	07/05/00		230		40		
SW-03	07/05/00		2400		930		
SW-04	07/05/00		90		90		

Site	Location	TDS Limit	TDS Exceedance	Cl Limit	Cl Exceedance	TKN Limit	TKN Exceedance	NO_3-N Limit	NO_3-N Exceedance	Total N Limit	Total N Exceedance	Total P Limit	Total P Exceedance	SO_4 Limit	SO_4 Exceedance	Boron Limit	Boron Exceedance	Exch Na % Limit	Exch Na % Exceedance
SW-01	Carson River, Woodfords	55		1.0	✓	0.13	✓	0.02		0.15	✓	0.02		2.0	✓	0.02		20	✓
SW-06	Carson River, Stateline	70	✓	2.5		0.22		0.03		0.25		0.03		2.0	✓	0.02		20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30	✓	0.03	✓	8.0		0.25		30	✓
SW-03	Indian Creek, Mid	100		6.0						0.30		0.03		8.0		0.25		30	
SW-04	Indian Creek, Lower	100		6.0						0.30		0.03	✓	8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30	✓	0.03	✓	8.0		0.25		30	

The blue-green algae test results for October and November are included in this report.

Certification

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
RICHARD H. SOLBRIG
No 28283
exp 3-31-02
CIVIL
STATE OF CALIFORNIA

Richard H Solbrig

Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L		COD mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring												
MW11	11/20/00	20001120-43	Sludge Pond	6266.5	8.5	6.91	77	0.8	<	5.0	0.059	
MW12	11/20/00	20001120-44	Sludge Pond	6263.9	9.3	6.54	124	2.1		6.3	0.445	
MW13	11/20/00	20001120-45	Sludge Pond	6256.0	8.0	6.90	756	4.0		16.6	2.100	
ERB Monitoring												
CONTROL	11/20/00	20001120-37	At Post Office	6281.8	9.0	7.14	175	7.5	<	5.0	2.400	
MW02-50	11/20/00	20001120-38	Black Bart side of ERB	6268.3	9.5	6.66	392	34.4	<	5.0	7.960	
MW03-50	11/20/00	20001120-39	Black Bart side of ERB	6268.3	9.7	6.47	409	31.3		6.6	9.240	
MW04-50	11/20/00	20001120-40	Hank Monk side of ERB	6268.0	8.0	6.59	76	5.6	<	5.0	0.057	
MW07-50	11/20/00	20001120-41	North side of ERB	6278.5	7.5	6.69	259	23.7	<	5.0	0.620	
Heavenly Valley Creek												
HVC-1	11/07/00	20001107-06	Downstream of Pioneer		2.3	6.59	60	1.1	<	5.0	0.077	
HVC-2	11/07/00	0001107-HVC2	250' upstream of Pond #2									Standing water
HVC-3	11/07/00	0001107-HVC3	25' downstream of Johnson Blvd									Dry
HVC-4	11/07/00	20001107-07	Effluent of drain from Lower Shop		7.5	7.19	134	1.2		18.8	0.064	
HVC-5	11/07/00	0001107-HVC5	Effluent of drainage pipe along Jo									Standing water
Treatment Plant Monitoring												
MW08-25	11/20/00	20001120-42	SW side of Pond #1	6246.3	11.0	6.44	1026	50.5		95.9	0.011	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	11/07/00	20001107-09	Main Dam	12.8	6.30	151		46	104		.51	10.7	1.3
ACMW-01BE	11/07/00	20001107-10	Secondary Dam	11.8	6.65	94		46	76		4.8	1.1	1.3
ACMW-02N	11/07/00	20001107-11	Access Gate	11.1	6.82	125		58	90		.73	3.1	3.2
ACMW-02S	11/07/00	20001107-12	Access Gate	11.3	6.49	100		50	76		.47	1.6	1.2
ACMW-04W	11/07/00	20001107-13	Gansberg	12.0	6.09	186		51	134		2.5	14.4	8.5
ACMW-06N	11/07/00	20001107-14	Celio	11.2	6.58	690		256	432		4.7	57.1	22.7
ACMW-06S	11/07/00	20001107-15	Celio	10.5	6.67	784		282	483		.49	72.5	33.3
Groundwaters													
GW-03	11/03/00	20001103-14	Smith/Springmeyer	13.0	7.27	304		129	227		.4	1.5	27.4
GW-04	11/03/00	20001103-15	Celio	13.9	7.49	259		117	200		.54	3.4	11.8
GW-05	11/03/00	20001103-16	Neddenriep	11.2	6.88	256		62	170		.1	22.5	14.3
GW-07	11/03/00	20001103-17	Gansberg	8.8	6.88	123		53	97		.09	2.0	2.5
GW-08	11/03/00	20001103-18	Arant	12.2	6.94	229		51	147		.2	22.4	9.1
GW-11	11/03/00	20001103-19	Diamond Val. School	12.7	7.07	147		75	111		.38	0.7	0.8
GW-14	11/03/00	20001103-20	Sierrra Pines	10.0	6.89	118		52	95		.1	1.5	1.8
Reservoirs													
HPR	11/14/00	20001114-09	Harvey Place Reservoir	6.2	7.92	497	7.49	107	238	12.80	4	60.5	21.0
Surfacewaters: Carson R													
SW-01	11/01/00	20001101-06	Carson R Woodfords	1.6	7.58	74		34	55	0.50	.3	1.1	2.2
SW-05	11/01/00	20001101-10	Carson R Paynesville	4.1	7.27	93	8.20	44	77	0.44	.33	1.5	2.9
SW-06	11/01/00	20001101-11	Carson R Stateline	4.4	7.09	101	11.20	44	87	0.42	.49	2.5	3.4
SW-08	11/01/00	20001101-12	Irrigation Ditch	7.1	7.10	132	8.00	54	109	75.30	8.5	2.9	7.0
SW-09	11/01/00	20001101-13	Carson R Dressler Ln	5.6	6.84	136	7.90	53	105	1.08	.68	5.5	6.1
Surfacewaters: Indian Cr													
SW-02	11/01/00	20001101-07	Indian Cr Upper	6.0	6.90	109	7.90	56	91	0.44	1	2.3	< 0.5
SW-03	11/01/00	20001101-08	Indian Cr Mid	2.4	7.01	78		36	63	1.92	1.4	1.5	2.7
SW-04	11/01/00	20001101-09	Indian Cr Lower	3.2	7.13	90	9.20	42	76	5.24	1.7	2.1	2.6
SW-10	11/01/00	20001101-14	Indian Cr at Bruns	3.5	7.24	95	8.60	43	85	18.00	4.5	1.9	2.7

ALPINE COUNTY MONITORING

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	11/07/00	0.118		0.390	< 0.020	< 0.010	2.960	3.360	
ACMW-01BE	11/07/00	0.112		< 0.100	0.031	< 0.010	0.177	0.287	
ACMW-02N	11/07/00	0.012		0.230	0.032	< 0.010	0.081	0.321	
ACMW-02S	11/07/00	0.012		0.185	0.059	< 0.010	< 0.010	0.205	
ACMW-04W	11/07/00	0.018		0.169	0.023	< 0.010	2.500	2.679	
ACMW-06N	11/07/00	0.249		0.280	0.055	< 0.010	< 0.010	0.300	
ACMW-06S	11/07/00	0.062		0.157	0.039	< 0.010	0.017	0.184	
Groundwaters									
GW-03	11/03/00	0.042		0.107	0.031	< 0.010	0.764	0.881	
GW-04	11/03/00	0.056		< 0.100	< 0.020	< 0.010	0.860	0.970	
GW-05	11/03/00	0.038		< 0.100	< 0.020	< 0.010	3.380	3.490	
GW-07	11/03/00	0.088		< 0.100	< 0.020	< 0.010	1.290	1.400	
GW-08	11/03/00	0.040		< 0.100	< 0.020	< 0.010	4.180	4.290	
GW-11	11/03/00	0.042		< 0.100	< 0.020	< 0.010	0.435	0.545	
GW-14	11/03/00	0.056		< 0.100	< 0.020	< 0.010	0.482	0.592	
Reservoirs									
HPR	11/14/00	2.170	2.010	20.400	17.000	0.251	0.895	21.546	
Surfacewaters: Carson R									
SW-01	11/01/00	0.012	< 0.010	0.210	0.024	< 0.010	< 0.010	0.230	
SW-05	11/01/00	0.017	< 0.010	0.110	0.024	< 0.010	< 0.010	0.130	
SW-06	11/01/00	0.014	< 0.010	0.148	0.023	< 0.010	0.016	0.174	
SW-08	11/01/00	0.174	0.022	0.743	0.028	< 0.010	0.381	1.134	
SW-09	11/01/00	0.022	< 0.010	0.389	< 0.020	< 0.010	0.013	0.412	
Surfacewaters: Indian Cr									
SW-02	11/01/00	0.400	< 0.010	0.357	0.023	< 0.010	< 0.010	0.377	
SW-03	11/01/00	0.026	< 0.010	0.230	0.021	< 0.010	< 0.010	0.250	
SW-04	11/01/00	0.042	0.010	0.188	< 0.020	< 0.010	< 0.010	0.208	
SW-10	11/01/00	0.094	< 0.010	0.352	< 0.020	< 0.010	< 0.010	0.372	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	11/07/00	< 5										57.5	5482.4
ACMW-01BE	11/07/00	< 5										38.4	5490.0
ACMW-02N	11/07/00	< 5										45	5458.3
ACMW-02S	11/07/00	< 5										39.4	5459.0
ACMW-04W	11/07/00	< 5										46	4901.3
ACMW-06N	11/07/00	< 5										248	5215.8
ACMW-06S	11/07/00	< 5										338	5204.5
Groundwaters													
GW-03	11/03/00	< 5										81	
GW-04	11/03/00	< 5										98.3	
GW-05	11/03/00	< 5										82.2	
GW-07	11/03/00	< 5										47	
GW-08	11/03/00	< 5										48.4	
GW-11	11/03/00	< 5										56.9	
GW-14	11/03/00	< 5										42	
Reservoirs													
HPR	11/14/00	31	6		0.21	31.4	3.6	44.8	8.9	2.02	48.3		27.0
Surfacewaters: Carson R													
SW-01	11/01/00	< 5	2		< 0.01	7.0	2.0	4.1	1.5	0.36	24.8		
SW-05	11/01/00	< 5	1		< 0.01	8.2	2.4	5.5	1.8	0.43	26.8		
SW-06	11/01/00	< 5	1		0.01	8.8	2.7	5.8	2.0	0.44	26.3		
SW-08	11/01/00	28	2		0.01	11.2	3.2	10.3	2.6	0.70	33.5		
SW-09	11/01/00	< 5	2		0.02	10.8	3.5	8.9	2.3	0.60	30.4		
Surfacewaters: Indian Cr													
SW-02	11/01/00	7	2		0.02	10.0	2.8	9.3	2.0	0.67	34.3		
SW-03	11/01/00	< 5	2		0.02	7.2	2.1	4.6	1.5	0.39	25.9		
SW-04	11/01/00	< 5	2		0.01	8.2	2.6	5.4	1.8	0.42	26.0		
SW-10	11/01/00	< 5	2		0.02	8.4	2.8	5.6	1.9	0.43	25.9		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
ACMW-01AW	11/07/00	<	1.1	<	1.1		
ACMW-01BE	11/07/00	<	1.1	<	1.1		
ACMW-02N	11/07/00	<	1.1	<	1.1		
ACMW-02S	11/07/00	<	1.1	<	1.1		
ACMW-04W	11/07/00		3.6		1.1		
ACMW-06N	11/07/00	<	1.1	<	1.1		
ACMW-06S	11/07/00	<	1.1	<	1.1		

Groundwaters

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
GW-03	11/03/00	<	1.1	<	1.1		
GW-04	11/03/00	<	1.1	<	1.1		
GW-05	11/03/00	<	1.1	<	1.1		
GW-07	11/03/00	<	1.1	<	1.1		
GW-08	11/03/00	<	1.1	<	1.1		
GW-11	11/03/00	<	1.1	<	1.1		
GW-14	11/03/00	<	1.1	<	1.1		

Reservoirs

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
HPR	11/14/00		110		2		17

Surfacewaters: Carson R

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
SW-01	11/01/00	<	30	<	30	<	30
SW-05	11/01/00		390		40		30
SW-06	11/01/00		750		40	<	30
SW-08	11/01/00		2400		2400		230
SW-09	11/01/00	<	30	<	30	<	30

Surfacewaters: Indian Cr

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
SW-02	11/01/00		1500		40		40
SW-03	11/01/00		930		430		150
SW-04	11/01/00		390		230		40
SW-10	11/01/00		750		750		40

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
October, 2000										
20001003-07	SW-01	Carson River, Woodfords	10/03/00	0	0	0	0	0	0	0
20001003-08	SW-02	Indian Creek, Upper	10/03/00	0	0	0	0	0	0	0
20001003-09	SW-03	Indian Creek, Mid	10/03/00	0	0	0	0	0	0	0
20001003-10	SW-04	Indian Creek, Lower	10/03/00	0	0	0	0	0	0	0
20001003-11	SW-05	Carson River, Paynesville	10/03/00	0	0	0	0	0	0	0
20001003-12	SW-06	Carson River, Stateline	10/03/00	0	0	0	0	0	0	0
20001003-13	SW-08	Irrigation Ditch	10/03/00	0	0	0	0	0	0	0
20001003-14	HPR	Harvey Place Reservoir	10/03/00	0	0	0	0	0	0	0
20001005-10	ICR-1 Top	Indian Creek Reservoir	10/05/00	70	14,100	598	27,300	0	0	0
20001005-11	ICR-1 Mid	Indian Creek Reservoir	10/05/00	70	26,400	387	24,600	0	0	0
20001005-12	ICR-1 Bot	Indian Creek Reservoir	10/05/00	35	24,600	176	8,450	0	0	0

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
November, 2000										
20001101-06	SW-01	Carson River, Woodfords	11/01/00	0	0	0	0	0	0	0
20001101-07	SW-02	Indian Creek, Upper	11/01/00	0	0	0	0	0	0	0
20001101-08	SW-03	Indian Creek, Mid	11/01/00	0	0	0	0	0	0	0
20001101-09	SW-04	Indian Creek, Lower	11/01/00	0	0	0	0	0	0	0
20001101-10	SW-05	Carson River, Paynesville	11/01/00	0	0	0	0	0	0	0
20001101-11	SW-06	Carson River, Stateline	11/01/00	0	0	0	0	0	0	0
20001101-12	SW-08	Irrigation Ditch	11/01/00	0	0	0	0	0	0	0
20001101-13	SW-09	Carson River, Dresselr La	11/01/00	0	0	0	0	0	0	0
20001101-14	SW-10	Indian Creek, Bruce Brun'	11/01/00	0	0	0	0	0	0	0
20001114-06	ICR-1 Top	Indian Creek Reservoir	11/14/00	0	0	0	0	0	0	0
20001114-07	ICR-1 Mid	Indian Creek Reservoir	11/14/00	0	0	0	0	0	0	0
20001114-08	ICR-1 Bot	Indian Creek Reservoir	11/14/00	0	0	0	0	0	0	0
20001114-09	HPR	Harvey Place Reservoir	11/14/00	0	0	0	0	0	0	0

Site	Location	TDS		Cl⁻		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence
SW-01	Carson River, Woodfords	55		1.0	✓	0.13	✓	0.02		0.15		0.02		2.0	✓	0.02		20	✓
SW-06	Carson River, Stateline	70		2.5		0.22		0.03	✓	0.25	✓	0.03		2.0	✓	0.02		20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30		0.03		8.0		0.25		30	✓
SW-03	Indian Creek, Mid	100		6.0						0.30		0.03	✓	8.0		0.25		30	
SW-04	Indian Creek, Lower	100		6.0						0.30		0.03		8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03		8.0		0.25		30	

The March soils tests are not yet completed. They will be sent to you as soon as they are available.

<u>Certification</u>

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,

Richard Solbrig,
Assistant Manager/Engineer

SAMPLE LOCATIONS

TAHOE BASIN MONITORING WELLS

Site	Location
ERB	Emergency Retention Basin
CONTROL	North of Post Office
MW02-25, -50	Emergency Retention Basin, S side
MW03-25, -50	Emergency Retention Basin, S side
MW04-25, -50	Emergency Retention Basin, W side
MW07-25, -50	Emergency Retention Basin, N side
MW08-25, -50	Pond #1, SW corner
MW11	S.E. corner of wastewater treatment plant grounds
MW12	South of Emergency Pump Building, for buried sludge
MW13	Pond 2, along Heavenly Valley Creek, for buried sludge

HEAVENLY VALLEY CREEK

HVC-1	At Pioneer Trail
HVC-2	250 ft upstream of Pond #2
HVC-3	25 ft downstream of Johnson Blvd.
HVC-4	Effluent of drain pipe from Lower Shop area
HVC-5	Effluent of drainage pipe along Johnson Blvd, 10 feet upstream of Johnson Blvd.

ALPINE COUNTY MONITORING WELLS

Site	Location
ACMW-01AW	Below main dam at Harvey Place Reservoir
ACMW-01BE	Below auxiliary dam at Harvey Place Reservoir
ACMW-02, N&S	On dam access road at Diamond Valley Road
ACMW-03	Bruns ranch, east side of Highway 88
ACMW-04W	Gansberg ranch, west side of Highway 88
ACMW-05	Dressler ranch
ACMW-06, N&S	Celio ranch, on Diamond Valley Road

ALPINE SOILS

Site	Ranch
S2	Celio
S3	Hall
S4	Gansberg
S5	Gansberg
S6	Neddenriep
S7	Bruns
S8	Dressler

ALPINE GROUNDWATERS

Site	Homeowner
GW-01	Sagues
GW-03	Smith/Springmeyer
GW-04	Celio
GW-05	Neddenriep
GW-07	Gansberg, Jr.
GW-08	Arant
GW-11	Diamond Valley School
GW-14	Sierra Pines Store

ALPINE SURFACEWATERS

Site	Location
SW-01	Carson River, Woodfords
SW-02	Indian Creek, @ HWY 89
SW-03	Indian Creek, @ upper bridge
SW-04	Indian Creek, @ lower bridge
SW-05	Carson River, Paynesville
SW-06	Carson River, Stateline
SW-07	Fredericksberg Ditch, Stateline
SW-08	Irrigation Ditch along Carson River Road
SW-09	Carson River, Dressler Lane
SW-10	Indian Creek, @ Smith-Springmeyer Ranch

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umho	Cl mg/L	COD mg/L	TKN mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring												
MW11	04/24/01	20010424-31	Sludge Pond	6265.3	9.1	7.07	79	0.9	< 5.0		0.054	
MW12	04/24/01	20010424-32	Sludge Pond	6263.5	9.5	6.97	117	1.9	< 5.0		0.391	
MW13	04/24/01	20010424-33	Sludge Pond	6257.5	5.3	6.82	703	3.5	18.1		6.460	
ERB Monitoring												
CONTROL	04/24/01	20010424-24	At Post Office	6281.1	10.0	6.78	168	7.6	< 5.0		2.370	
MW01.5	04/24/01	20010424-25	SW corner of ERB	6268.5	9.3	6.80	157	2.6	< 5.0		0.514	
MW02-50	04/24/01	20010424-26	Black Bart side of ERB	6268.3	11.6	6.53	389	35.9	< 5.0		8.500	
MW03-50	04/24/01	20010424-27	Black Bart side of ERB	6268.3	10.8	6.44	338	29.4	< 5.0		4.680	
MW04-50	04/24/01	20010424-28	Hank Monk side of ERB	6268.2	8.8	6.65	77	5.3	< 5.0		0.054	
MW07-50	04/24/01	20010424-29	North side of ERB	6278.3	7.8	6.39	250	24.5	< 5.0		0.589	
Heavenly Valley Creek												
HVC-1	04/10/01	20010410-27	Downstream of Pioneer		1.7	6.91	60	1.3	6.4	0.137	0.131	
HVC-2	04/10/01	20010410-28	250' upstream of Pond #2		3.3	6.36	56	2.3	9.7	0.211	0.012	
HVC-3	04/10/01	20010410-29	25' downstream of Johnson Blvd		1.0	6.20	90	3.3	9.0	0.549	< 0.010	
HVC-4	04/10/01	20010410-30	Effluent of drain from Lower Shop a		5.6	6.31	115	1.3	24.6	0.588	0.107	
HVC-5	04/10/01	0010410-HVC5	Effluent of drainage pipe along John									Dry
Treatment Plant Monitoring												
MW08-25	04/24/01	20010424-30	SW side of Pond #1	6248.1	8.7	6.30	1001	45.4	77.8		< 0.010	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	04/17/2001	20010417-11	Main Dam	10.0	6.79	65		28	76			2.0	2.2
ACMW-01BE	04/17/2001	20010417-12	Secondary Dam	8.0	6.91	62		29	60			1.6	1.4
ACMW-02N	04/17/2001	20010417-13	Access Gate	12.1	7.10	127		61	86			3.1	3.0
ACMW-02S	04/17/2001	20010417-14	Access Gate	11.0	6.48	95		46	68			1.7	1.3
ACMW-04W	04/17/2001	20010417-15	Gansberg	11.5	6.46	182		49	124			15.4	7.7
ACMW-06N	04/17/2001	20010417-16	Celio	10.5	6.83	701		258	434			62.5	22.6
ACMW-06S	04/17/2001	20010417-17	Celio	11.8	6.85	64		229	392			71.2	27.1
Groundwaters													
GW-03	04/10/2001	20010410-19	Smith/Springmeyer	11.2	6.81	303		129	223			1.6	27.2
GW-04	04/10/2001	20010410-20	Celio	13.4	6.46	258		118	195			3.7	12.0
GW-05	04/10/2001	20010410-21	Neddenriep	9.5	6.51	256		60	167			25.0	14.1
GW-07	04/10/2001	20010410-22	Gansberg	10.1	6.55	123		52	97			2.1	2.5
GW-08	04/10/2001	20010410-23	Arant	11.2	6.04	239		52	154			25.3	9.7
GW-11	04/10/2001	20010410-24	Diamond Val. School	11.2	6.97	144		75	110			0.7	0.8
GW-14	04/10/2001	20010410-25	Sierrra Pines	9.0	6.90	109		52	91			1.4	1.8
Reservoirs													
HPR	04/03/2001	20010403-14	Harvey Place Reservoir	10.5	7.64	516	6.31	120	235	4.06	1.71	60.8	19.2
Surfacewaters: Carson R													
SW-01	04/03/2001	20010403-07	Carson R Woodfords	2.8	7.46	56	11.44	24	50	6.42	2.75	1.5	2.1
SW-05	04/03/2001	20010403-11	Carson R Paynesville	5.6	7.71	59	10.74	25	45	7.15	2.89	1.6	2.5
SW-06	04/03/2001	20010403-12	Carson R Stateline	6.7	7.77	65	10.13	27	50	3.79	2.36	2.1	2.8
SW-08	04/03/2001	20010403-13	Irrigation Ditch	9.8	7.72	82	9.39	42	80	4.64	2.75	1.7	3.3
Surfacewaters: Indian Cr													
SW-02	04/03/2001	20010403-08	Indian Cr Upper	3.4	7.52	95	10.14	48	78	0.31	1.23	1.0	< 0.5
SW-03	04/03/2001	20010403-09	Indian Cr Mid	6.9	7.48	132	8.64	62	97	1.15	2.46	2.6	2.4
SW-04	04/03/2001	20010403-10	Indian Cr Lower	5.0	7.56	111	10.52	53	84	3.36	2.34	2.0	1.7

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
ACMW-01AW	04/17/2001					< 0.020	0.023	0.043	
ACMW-01BE	04/17/2001					< 0.010	0.038	0.048	
ACMW-02N	04/17/2001					< 0.010	0.071	0.081	
ACMW-02S	04/17/2001					< 0.010	< 0.010	0.020	
ACMW-04W	04/17/2001					< 0.020	2.070	2.090	
ACMW-06N	04/17/2001					< 0.010	< 0.010	0.020	
ACMW-06S	04/17/2001					0.014	0.081	0.095	

Groundwaters

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
GW-03	04/10/2001					< 0.010	0.748	0.758	
GW-04	04/10/2001					< 0.010	0.859	0.869	
GW-05	04/10/2001					< 0.030	3.640	3.670	
GW-07	04/10/2001					< 0.010	1.360	1.370	
GW-08	04/10/2001					< 0.030	4.480	4.510	
GW-11	04/10/2001					< 0.010	0.436	0.446	
GW-14	04/10/2001					< 0.010	0.485	0.495	

Reservoirs

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
HPR	04/03/2001	2.330	2.290	20.200	19.000	0.087	0.521	20.808	

Surfacewaters: Carson R

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-01	04/03/2001	0.022	< 0.010	0.231	0.028	< 0.010	0.016	0.257	
SW-05	04/03/2001	0.026	< 0.010	0.216	0.025	< 0.010	0.020	0.246	
SW-06	04/03/2001	0.018	< 0.010	0.173	0.033	< 0.010	0.038	0.221	
SW-08	04/03/2001	0.020	< 0.010	0.157	0.022	< 0.010	0.084	0.251	

Surfacewaters: Indian Cr

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
SW-02	04/03/2001	0.010	0.025	0.159	0.029	< 0.010	< 0.010	0.179	
SW-03	04/03/2001	0.072	< 0.010	< 0.100	0.030	< 0.010	0.042	0.152	
SW-04	04/03/2001	0.032	< 0.010	< 0.100	0.021	< 0.010	0.014	0.124	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	04/17/2001												5482.1
ACMW-01BE	04/17/2001												5489.2
ACMW-02N	04/17/2001												5458.0
ACMW-02S	04/17/2001												5458.8
ACMW-04W	04/17/2001												4900.8
ACMW-06N	04/17/2001												5215.9
ACMW-06S	04/17/2001												5204.6
Groundwaters													
GW-03	04/10/2001												
GW-04	04/10/2001												
GW-05	04/10/2001												
GW-07	04/10/2001												
GW-08	04/10/2001												
GW-11	04/10/2001												
GW-14	04/10/2001												
Reservoirs													
HPR	04/03/2001	32	4		0.18	16.6	3.6	43.4	9.1	2.52	58.2		51.2
Surfacewaters: Carson R													
SW-01	04/03/2001		1		0.01	6.0	1.7	2.8	1.1	0.26	20.7		
SW-05	04/03/2001		1		< 0.01	6.5	1.8	3.2	1.3	0.29	21.8		
SW-06	04/03/2001		1		< 0.01	6.8	1.9	3.5	1.4	0.31	22.4		
SW-08	04/03/2001		0		0.02	9.4	2.3	7.4	1.7	0.56	31.4		
Surfacewaters: Indian Cr													
SW-02	04/03/2001		1		0.02	9.3	2.4	7.3	1.2	0.55	31.3		
SW-03	04/03/2001		1		0.02	12.6	3.7	7.9	1.5	0.50	26.1		
SW-04	04/03/2001		1		0.01	11.2	3.4	6.3	1.6	0.42	23.6		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	04/17/2001	< 1.1	< 1.1	
ACMW-01BE	04/17/2001	< 1.1	< 1.1	
ACMW-02N	04/17/2001	< 1.1	< 1.1	
ACMW-02S	04/17/2001	< 1.1	< 1.1	
ACMW-04W	04/17/2001	< 1.1	< 1.1	
ACMW-06N	04/17/2001	< 1.1	< 1.1	
ACMW-06S	04/17/2001	< 1.1	< 1.1	

Groundwaters

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-03	04/10/2001	< 1.1	< 1.1	
GW-04	04/10/2001	< 1.1	< 1.1	
GW-05	04/10/2001	< 1.1	< 1.1	
GW-07	04/10/2001	< 1.1	< 1.1	
GW-08	04/10/2001	< 1.1	< 1.1	
GW-11	04/10/2001	< 1.1	< 1.1	
GW-14	04/10/2001	< 1.1	< 1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	04/03/2001	50	2	4

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	04/03/2001	7	< 3	
SW-05	04/03/2001	43	< 3	
SW-06	04/03/2001	43	9	
SW-08	04/03/2001	43	9	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	04/03/2001	15	< 3	
SW-03	04/03/2001	43	43	
SW-04	04/03/2001	9	9	

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
April, 2001										
20010403-07	SW-01	Carson R Woodfords	04/03/01	0	0	0	0	0	0	0
20010403-08	SW-02	Indian Cr Upper	04/03/01	0	0	0	0	0	0	0
20010403-09	SW-03	Indian Cr Mid	04/03/01	0	0	0	0	0	0	0
20010403-10	SW-04	Indian Cr Lower	04/03/01	0	0	0	0	0	0	0
20010403-11	SW-05	Carson R Paynesville	04/03/01	0	0	0	0	0	0	0
20010403-12	SW-06	Carson R Stateline	04/03/01	0	0	0	0	0	0	0
20010403-13	SW-08	Irrigation Ditch	04/03/01	0	0	0	0	0	0	0
20010403-14	HPR	Harvey Place Reservoir	04/03/01	0	0	0	0	0	0	0
20010404-16	ICR-1	Indian Creek Reservoir	04/04/01	35	1,470	0	0	0	0	0
20010404-17	ICR-1	Indian Creek Reservoir	04/04/01	141	4,290	0	0	0	0	0
20010404-18	ICR-1	Indian Creek Reservoir	04/04/01	35	38,700	0	0	0	0	0

South Tahoe
Public Utility District

1275 Meadow Crest Drive • South Lake Tahoe • CA 96150
Phone 530 544-6474 • Fax 530 541-0614

June 13, 2001

Harold Singer
California Regional Water Quality
Control Board - Lahontan Region
2501 Lake Tahoe Boulevard
South Lake Tahoe, CA 96150

Subject: Monitoring Report - May 2001

Dear Mr. Singer,

Enclosed is the South Tahoe Public Utility District's self-monitoring report for May, 2001. The District is reporting as required by the Wastewater Reclamation Permit (Board Order 6-95-65, WDID No. 6A095900700).

Wastewater Reclamation Permit (Board Order 6-95-65).

The effluent met all the requirements set forth in the Board Order for the month of May.

Emergency Retention Basin (ERB)

During the month of May, no wastewater was pumped to the ERB. There was no wastewater remaining in the ERB on May 31, 2001.

Export Pipeline

The District's Final effluent export pipeline route was visually inspected on June 4, 2001 from the treatment plant to station 564+06. No damage to the pipe was found.

Wastewater Reclamation Permit Compliance

The District is monitoring under the revisions approved by the Regional Board (letter dated November 30, 1998). The revisions provide for: discontinued surfacewater monitoring, except SW-01, SW-02 and SW-05, during the months of December, January and February. The West Fork, Carson River Water Quality Objectives and East Fork, Carson River limitations were exceeded as follows (a ✓ indicates objective exceeded):

Site	Location	TDS		Cl		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceeded	Limit	Exceeded	Limit	Exceeded	Limit	Exceeded	Limit	Exceeded	Limit	Exceeded	Limit	Exceeded	Limit	Exceeded	Limit	Exceeded
SW-01	Carson River, Woodfords	55		1.0		0.13	✓	0.02		0.15	✓	0.02	✓	2.0		0.02		20	✓
SW-06	Carson River, Stateline	70		2.5		0.22	✓	0.03		0.25	✓	0.03	✓	2.0		0.02		20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30		0.03		8.0		0.25		30	
SW-03	Indian Creek, Mid	100	✓	6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-04	Indian Creek, Lower	100		6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30	✓	0.03	✓	8.0		0.25		30	

I have also included the soils results for December 2000 and March 2001.

Certification

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
RICHARD H. SOLBRIG
Richard H. Solbrig
No 28283
exp 3-31-02
CIVIL
STATE OF CALIFORNIA

Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umho	Cl mg/L	COD mg/L	TKN mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring												
MW11	05/22/01	20010522-34	Sludge Pond	6265.0	9.2	6.62	83	1.0	< 5.0		0.061	
MW12	05/22/01	20010522-35	Sludge Pond	6263.8	9.8	6.55	113	1.9	< 5.0		0.386	
MW13	05/22/01	20010522-36	Sludge Pond	6257.0	8.7	6.60	720	5.7	20.7		4.820	
ERB Monitoring												
CONTRO	05/22/01	20010522-29	At Post Office	6281.0	11.0	6.64	167	7.8	< 5.0		2.470	
MW03-50	05/22/01	20010522-30	Black Bart side of ERB	6268.1	12.0	6.44	340	31.9	< 5.0		6.340	
MW04-50	05/22/01	20010522-31	Hank Monk side of ERB	6268.0	9.8	7.01	75	5.9	< 5.0		0.108	
MW07-50	05/22/01	20010522-32	North side of ERB	6278.1	9.0	6.51	254	24.2	< 5.0		0.617	
Heavenly Valley Creek												
HVC-1	05/08/01	20010508-24	Downstream of Pioneer		10.4	7.14	37	1.4	6.1	0.118	0.016	
HVC-2	05/08/01	20010508-25	250' upstream of Pond #2		14.2	6.98	36	1.5	5.4	0.136	< 0.010	
HVC-3	05/08/01	20010508-26	25' downstream of Johnson Blvd		13.5	7.12	37	1.4	< 5.0	0.118	0.011	
HVC-4	05/08/01	20010508-HVC4	Effluent of drain from Lower Shop a									Trickle
HVC-5	05/08/01	20010508-HVC5	Effluent of drainage pipe along Johi									Dry
Treatment Plant Monitoring												
MW08-25	05/22/01	20010522-33	SW side of Pond #1	6247.1	10.0	6.40	1012	45.7	77.2		0.032	

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
ACMW-01AW	05/15/2001	20010515-06	Main Dam	8.2	6.48	67		29	71		21.6	2.1	2.2
ACMW-01BE	05/15/2001	20010515-07	Secondary Dam	6.0	6.52	70		29	57		5.09	1.8	1.3
ACMW-02N	05/15/2001	20010515-08	Access Gate	12.6	6.51	121		58	76		1.32	2.3	2.4
ACMW-02S	05/15/2001	20010515-09	Access Gate	10.7	6.52	96		41	64		1.5	2.0	1.5
ACMW-03	05/15/2001	20010515-10	HWY 88	9.9	6.19	295		21	188		1.4	49.0	12.1
ACMW-04W	05/15/2001	20010515-11	Gansberg	11.4	6.08	185		50	123		.36	15.0	7.6
ACMW-06N	05/15/2001	20010515-12	Celio	10.9	6.80	717		263	435		16.1	61.5	22.1
ACMW-06S	05/15/2001	20010515-13	Celio	123.0	7.16	7		229	399		.51	70.1	27.5

Groundwaters

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
GW-03	05/08/2001	20010508-15	Smith/Springmeyer	16.8	7.36	302		133	226		.2	1.6	25.4
GW-04	05/08/2001	20010508-16	Celio	15.2	7.30	257		120	202		1.31	3.5	11.3
GW-05	05/08/2001	20010508-17	Neddenriep	13.0	6.50	252		64	171		.12	23.2	13.5
GW-07	05/08/2001	20010508-18	Gansberg	12.2	6.54	120		55	99		.1	1.9	2.5
GW-08	05/08/2001	20010508-19	Arant	12.5	6.74	251		49	166		5.98	27.9	9.6
GW-11	05/08/2001	20010508-20	Diamond Val. School	15.9	7.30	147		78	119		.06	0.8	0.8
GW-14	05/08/2001	20010508-21	Sierrra Pines	13.5	6.70	110		54	96		.17	1.3	1.7

Reservoirs

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
HPR	05/09/2001	20010509-13	Harvey Place Reservoir	18.5	8.62	474	13.68	114	231	20.00	6.86	60.2	19.5

Surfacewaters: Carson R

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
SW-01	05/01/2001	20010501-06	Carson R Woodfords	4.6	6.97	41	10.50	19	41	23.70	7.88	0.7	1.2
SW-05	05/01/2001	20010501-10	Carson R Paynesville	7.5	7.10	45	10.90	20	39	19.90	8.48	0.7	1.3
SW-06	05/01/2001	20010501-11	Carson R Stateline	10.9	6.92	51	10.30	22	39	17.80	8.12	0.9	1.4
SW-08	05/01/2001	20010501-12	Irrigation Ditch	18.5	6.85	118	7.95	52	87	6.78	4.25	1.2	3.2
SW-09	05/01/2001	20010501-13	Carson R Dressler Ln	12.1	6.94	58	10.70	24	51	13.80	8.34	1.4	2.1

Surfacewaters: Indian Cr

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
SW-02	05/01/2001	20010501-07	Indian Cr Upper	10.4	6.93	107	9.20	55	84	0.32	1.28	1.1	< 0.5
SW-03	05/01/2001	20010501-08	Indian Cr Mid	14.7	6.59	196	8.20	92	130	1.38	4.78	3.1	2.3
SW-04	05/01/2001	20010501-09	Indian Cr Lower	12.5	6.68	106	8.25	50	91	19.60	7.4	1.8	1.9
SW-10	05/01/2001	20010501-14	Indian Cr at Bruns	13.2	7.07	116	9.50	55	98	9.36	6.58	1.8	1.9

ALPINE COUNTY MONITORING

Alpine Monitoring Wells

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L
ACMW-01AV	05/15/2001	0.061		0.145		< 0.020	0.063	0.228
ACMW-01BE	05/15/2001	0.024		0.107		< 0.010	0.103	0.220
ACMW-02N	05/15/2001	0.016		< 0.100		< 0.010	0.035	0.145
ACMW-02S	05/15/2001	0.013		< 0.100		< 0.010	0.094	0.204
ACMW-03	05/15/2001	0.069		0.207		< 0.010	7.190	7.407
ACMW-04W	05/15/2001	0.019		0.155		< 0.020	2.480	2.655
ACMW-06N	05/15/2001	0.318		0.371		< 0.020	< 0.020	0.411
ACMW-06S	05/15/2001	0.042		0.238		< 0.020	0.042	0.300

Groundwaters

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L
GW-03	05/08/2001	0.034		< 0.100		< 0.010	0.741	0.851
GW-04	05/08/2001	0.052		< 0.100		< 0.010	0.810	0.920
GW-05	05/08/2001	0.028		< 0.100		< 0.030	3.310	3.440
GW-07	05/08/2001	0.097		< 0.100		< 0.010	1.200	1.310
GW-08	05/08/2001	0.103		< 0.100		< 0.030	5.420	5.550
GW-11	05/08/2001	0.044		< 0.100		< 0.010	0.458	0.568
GW-14	05/08/2001	0.051		0.146		< 0.010	0.467	0.623

Reservoirs

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L
HPR	05/09/2001	2.390	2.150	22.700	19.000	0.112	0.468	23.280

Surfacewaters: Carson R

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L
SW-01	05/01/2001	0.053	< 0.010	0.423		< 0.010	0.018	0.451
SW-05	05/01/2001	0.052	< 0.010	0.310		< 0.010	0.015	0.335
SW-06	05/01/2001	0.051	< 0.010	0.233		< 0.010	0.012	0.255
SW-08	05/01/2001	0.038	0.028	0.315		< 0.010	0.015	0.340
SW-09	05/01/2001	0.052	< 0.010	0.544		< 0.010	0.014	0.568

Surfacewaters: Indian Cr

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L
SW-02	05/01/2001	0.016	0.049	0.284		< 0.010	< 0.010	0.304
SW-03	05/01/2001	0.091	< 0.010	0.280		< 0.010	0.029	0.319
SW-04	05/01/2001	0.140	0.060	0.766		< 0.010	< 0.010	0.786
SW-10	05/01/2001	0.130	0.047	0.744		< 0.010	< 0.010	0.764

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AV	05/15/2001	11										25.8	5482.5
ACMW-01BE	05/15/2001	11										24.3	5493.1
ACMW-02N	05/15/2001	13										43.9	5460.0
ACMW-02S	05/15/2001	9										34.5	5462.3
ACMW-03	05/15/2001	12										55.8	5038.2
ACMW-04W	05/15/2001	7										44.9	4907.1
ACMW-06N	05/15/2001	13										258	5215.1
ACMW-06S	05/15/2001	10										275	5203.9
Groundwaters													
GW-03	05/08/2001	< 5										126	
GW-04	05/08/2001	< 5										103	
GW-05	05/08/2001	< 5										85.1	
GW-07	05/08/2001	< 5										47.4	
GW-08	05/08/2001	< 5										46.6	
GW-11	05/08/2001	< 5										57.8	
GW-14	05/08/2001	< 5										34.3	
Reservoirs													
HPR	05/09/2001	57	> 15		0.25	15.4	3.3	36.7	9.0	2.21	55.7		56.0
Surfacewaters: Carson R													
SW-01	05/01/2001	24	1		< 0.01	3.5	1.3	2.1	0.6	0.24	23.5		
SW-05	05/01/2001	23	1		< 0.01	4.8	1.3	2.4	0.9	0.25	21.7		
SW-06	05/01/2001	21	1		< 0.01	4.8	1.4	2.5	1.1	0.26	22.2		
SW-08	05/01/2001	20	1		0.01	9.3	2.4	8.7	1.6	0.66	35.1		
SW-09	05/01/2001	20	1		0.01	5.5	1.6	3.2	1.3	0.31	23.9		
Surfacewaters: Indian Cr													
SW-02	05/01/2001	20	1		< 0.01	10.5	2.5	7.7	1.3	0.55	30.3		
SW-03	05/01/2001	17	1		0.03	17.3	4.5	12.5	1.8	0.69	29.9		
SW-04	05/01/2001	39	2		0.01	9.8	3.0	5.8	2.7	0.41	23.7		
SW-10	05/01/2001	38	2		0.01	11.8	3.7	6.1	3.0	0.40	21.6		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
ACMW-01AV	05/15/2001		1.1	<	1.1		
ACMW-01BE	05/15/2001	<	1.1	<	1.1		
ACMW-02N	05/15/2001	<	1.1	<	1.1		
ACMW-02S	05/15/2001	<	1.1	<	1.1		
ACMW-03	05/15/2001	<	1.1	<	1.1		
ACMW-04W	05/15/2001	<	1.1	<	1.1		
ACMW-06N	05/15/2001	<	1.1	<	1.1		
ACMW-06S	05/15/2001	<	1.1	<	1.1		

Groundwaters

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
GW-03	05/08/2001	<	1.1	<	1.1		
GW-04	05/08/2001	<	1.1	<	1.1		
GW-05	05/08/2001	<	1.1	<	1.1		
GW-07	05/08/2001		2.2	<	1.1		
GW-08	05/08/2001	<	1.1	<	1.1		
GW-11	05/08/2001	<	1.1	<	1.1		
GW-14	05/08/2001	<	1.1	<	1.1		

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	05/09/2001	1600	50	500

Surfacewaters: Carson R

Site	Date	Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
SW-01	05/01/2001	23	<	3	<	30
SW-05	05/01/2001	43		43		40
SW-06	05/01/2001	230		23		230
SW-08	05/01/2001	2400		240		930
SW-09	05/01/2001	230		93		40

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	05/01/2001	43	9	90
SW-03	05/01/2001	150	43	150
SW-04	05/01/2001	43	15	430
SW-10	05/01/2001	4600	460	430

INDIAN CREEK RESERVOIR PROFILING

Date	Time	Depth ft	Temp C	pH	EC umhos	DO mg/L	Total P Unfilter mg/L	Total P 0.45 um mg/L	PO4-P mg/L	TKN mg/L	Total NH3-N mg/L	Unionized NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L
Site: **ICR-1**															
05/09/2001	10:38	0.5	16.0	7.54	108.0	7.53	0.022		0.016	0.553	0.044	< 0.010	< 0.010	< 0.010	0.573
05/09/2001	11:00	18.0	12.2	7.65	107.0	5.42	0.035		0.015	0.613	< 0.020	< 0.010	< 0.010	< 0.010	0.633
05/09/2001	10:50	33.0	10.0	7.18	112.0	0.60	0.051		< 0.010	0.979	0.116	< 0.010	< 0.010	< 0.010	0.999

INDIAN CREEK RESERVOIR PROFILING

Date	Depth ft	Chlorophyll a mg/m3	Cl mg/L	TDS mg/L	SS mg/L	Turb NTU	Alkalinity mg/L	COD mg/L	BOD mg/L	Boron mg/L	SO4 mg/L	Fe ug/L	Mn ug/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L
Site: ICR-1																	
05/09/2001	0.5	2.8	1.37	70	1.20	1.85	50.3	25.9	0.94	0.025	4.31	201	< 20				
05/09/2001	18.0	5.1	1.37	80	4.44	4.48	50.2	24.6	1.38	0.030	4.32	323	< 20				
05/09/2001	33.0	5.0	1.39	73	5.26	5.95	52.3	26.0	0.66	0.018	4.47	422	41.1				

ALPINE COUNTY DITCH MONITORING

Date	ID	Location	Temp C	pH	EC umhos	SS mg/L	Turb NTU	Cl mg/L
Site: D-3		**Stream: Carson R. / Indian Cr.**						
05/01/01	20010501-16	Dressler @ ICR Inlet	11.3	7.09	46	3.26	5.77	0.7
05/08/01	20010508-23	Dressler @ ICR Inlet	16.9	7.71	47	2.12	3.22	0.6
Site: SW-02		**Stream: Indian Creek**						
05/01/01	20010501-07	Indian Cr Upper	10.4	6.93	107	0.32	1.28	1.1

ALPINE COUNTY DITCH MONITORING

Date	ID	Location	Total P mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L
Site: D-3		Stream: Carson R. / Indian Cr.						
05/01/01	20010501-16	Dressler @ ICR Inlet	0.022	< 0.010	0.298		< 0.010	< 0.010
05/08/01	20010508-23	Dressler @ ICR Inlet	0.017	< 0.010	0.321		< 0.010	< 0.010
Site: SW-02		Stream: Indian Creek						
05/01/01	20010501-07	Indian Cr Upper	0.016	0.049	0.284		< 0.010	< 0.010

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
May, 2001										
20010501-06	SW-01	Carson R Woodfords	05/01/01	0	0	0	0	0	0	0
20010501-07	SW-02	Indian Cr Upper	05/01/01	0	0	0	0	0	0	0
20010501-08	SW-03	Indian Cr Mid	05/01/01	0	0	0	0	0	0	0
20010501-09	SW-04	Indian Cr Lower	05/01/01	0	0	0	0	0	0	0
20010501-10	SW-05	Carson R Paynesville	05/01/01	0	0	0	0	0	0	0
20010501-11	SW-06	Carson R Stateline	05/01/01	0	0	0	0	0	0	0
20010501-12	SW-08	Irrigation Ditch	05/01/01	0	0	0	0	0	0	0
20010501-13	SW-09	Carson R Dressler Ln	05/01/01	0	0	0	0	0	0	0
20010501-14	SW-10	Indian Cr at Bruns	05/01/01	0	0	0	0	0	0	0

ALPINE COUNTY SOILS

Site	Date	Location	Type	pH	EC mmho	%Sat	TKN mg/Kg	NO3-N mg/L	Total P mg/Kg	Exch P mg/L
S2a	12/01/00	Cello	KT	8.19	2.40	55.6	1,760	0.8	850	3.7
S3a	12/01/00	Hall	SMB	5.97	0.33	34.0	1,070	2.3	1,080	16.9
S4a	12/01/00	Gansberg	DI	6.64	2.27	40.7	1,690	1.0	590	24.2
S5a	12/01/00	Gansberg	HRB	5.98	0.27	31.5	970	4.8	810	7.9
S6a	12/01/00	Neddenriep	DWB	5.31	0.18	37.9	862	10.6	620	31.8
S7a	12/01/00	Bruns	JaC	6.12	0.11	37.4	1,390	1.5	820	3.6
S8a	12/01/00	Dressler	SOD	6.41	0.13	17.4	249	0.8	300	9.4

Site	Date	Cl mg/L	SO4 mg/Kg	CEC meq/100g	Cu mg/Kg	Mo mg/Kg	Ca mg/L	Mg mg/L	Na mg/L	SAR	% Na
S2a	12/01/00		74	35.7	22.0	< 1.0	68.6	61.0	328.0	6.94	8.1
S3a	12/01/00		4	17.9	29.0	< 1.0	18.1	6.0	31.9	1.66	1.1
S4a	12/01/00		26	20.4	43.0	< 1.0	85.7	24.8	199.0	4.87	5.5
S5a	12/01/00		2	15.8	33.0	< 1.0	14.9	3.0	28.3	1.75	1.3
S6a	12/01/00		13	17.0	44.0	< 1.0	5.8	1.3	18.8	1.83	1.4
S7a	12/01/00		3	16.9	46.0	< 1.0	5.4	1.3	10.5	1.05	< 1.0
S8a	12/01/00		5	13.3	19.0	< 1.0	4.5	2.2	13.5	1.30	< 1.0

ALPINE COUNTY SOILS

Site	Date	Location	Type	pH	EC mmho	%Sat	TKN mg/Kg	NO3-N mg/L	Total P mg/Kg	Exch P mg/L
S2a	03/09/01	Celio	KT	8.35	1.66	61.5	1,870	1.1	820	3.9
S3a	03/09/01	Hall	SMB	6.15	0.32	31.6	665	1.9	960	12.6
S4a	03/09/01	Gansberg	DI	6.39	0.90	33.7	998	1.7	560	9.5
S5a	03/09/01	Gansberg	HRB	5.88	0.42	34.4	967	7.0	900	10.9
S6a	03/09/01	Neddenriep	DWB	7.01	0.42	40.5	1,300	5.2	880	
S7a	03/09/01	Bruns	JaC	5.84	0.32	38.7	1,300	3.7	880	8.5
S8a	03/09/01	Dressler	SOD	6.44	0.12	16.5	198	1.0	340	7.0

Site	Date	Cl mg/L	SO4 mg/Kg	CEC meq/100g	Cu mg/Kg	Mo mg/Kg	Ca mg/L	Mg mg/L	Na mg/L	SAR	% Na
S2a	03/09/01		44	31.0	20.0	2.0	55.4	33.8	242.0	6.32	7.3
S3a	03/09/01		< 1	15.3	28.0	3.0	19.8	6.5	30.4	1.52	< 1.0
S4a	03/09/01		2	17.1	46.0	1.0	52.4	11.3	115.0	3.76	4.0
S5a	03/09/01		< 1	14.6	37.0	< 1.0	27.2	5.3	41.1	1.89	1.5
S6a	03/09/01		< 1	16.2	45.0	< 1.0	20.2	4.0	62.8	3.34	3.5
S7a	03/09/01		< 1	14.7	51.0	1.0	26.2	5.8	15.3	0.71	< 1.0
S8a	03/09/01		< 1	10.2	25.0	3.0	5.3	1.9	12.3	1.17	< 1.0

June. By special dispensation, this month, Alpine County groundwaters and Alpine County monitoring wells were not sampled.The West Fork, Carson River Water Quality Objectives and East Fork, Carson River limitations were exceeded as follows (a ✓ indicates objective exceeded):

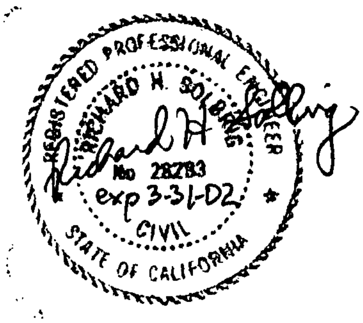
Site	Location	TDS		Cl^-		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence
SW-01	Carson River, Woodfords	55		1.0	✓	0.13	✓	0.02		0.15	✓	0.02	✓	2.0	✓	0.02		20	✓
SW-06	Carson River, Stateline	70		2.5		0.22	✓	0.03		0.25	✓	0.03	✓	2.0	✓	0.02	✓	20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30		0.03		8.0		0.25		30	
SW-03	Indian Creek, Mid	100	✓	6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-04	Indian Creek, Lower	100	✓	6.0						0.30	✓	0.03	✓	8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03		8.0		0.25		30	

Blue Green Algae test results will be sent as soon as the tests are completed.

Certification

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,



Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

09/06/00

Buried Sludge Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
MW11	08/22/00	20000822-13	Sludge Pond	6267.3	8.2	6.23	75	0.8	< 5.0	0.071	
MW12	08/22/00	20000822-14	Sludge Pond	6265.5	8.2	5.94	145	1.8	< 5.0	0.162	
MW13	08/22/00	20000822-15	Sludge Pond	6256.2	8.2	6.78	772	3.5	15.8	3.050	

ERB Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
CONTROL	08/22/00	20000822-06	At Post Office	6282.6	9.6	6.53	174	7.4	< 5.0	2.210	
MW01.5	08/22/00	20000822-07	SW corner of ERB	6268.5	10.0	7.08	170	2.9	< 5.0	0.571	
MW02-50	08/22/00	20000822-08	Black Bart side of ERB	6268.2	11.3	6.73	392	37.6	< 5.0	7.610	
MW03-50	08/22/00	20000822-09	Black Bart side of ERB	6268.2	11.4	6.45	374	29.1	< 5.0	4.080	
MW04-50	08/22/00	20000822-10	Hank Monk side of ERB	6268.0	8.6	6.48	75	5.3	< 5.0	0.051	
MW07-50	08/22/00	20000822-11	North side of ERB	6278.8	8.5	6.38	261	24.3	< 5.0	0.601	

Heavenly Valley Creek

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
							?				
HVC-1	08/09/00	20000809-06	Downstream of Pioneer		11.0	7.21	49	1.0	< 5.0	0.023	
HVC-2	08/09/00	20000809-07	250' upstream of Pond #2		11.5	6.42	60	1.0	7.0	< 0.010	
HVC-3	08/09/00	20000809-08	25' downstream of Johnson Blvd		12.0	7.04	69	1.1	5.6	< 0.010	
HVC-4	08/09/00	0000809-HVC4	Effluent of drain from Lower Shop								Muddy bottom
HVC-5	08/09/00	0000809-HVC5	Effluent of drainage pipe along Jo								Dry

Treatment Plant Monitoring

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L	COD mg/L	NO3-N mg/L	Comment
MW08-25	08/22/00	20000822-12	SW side of Pond #1	6246.9	11.4	6.41	1002	51.0	82.2	0.016	

ALPINE COUNTY MONITORING

09/06/00

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Reservoirs													
HPR	08/01/OO	20000801-16	Harvey Place Reservoir	22.1	8.88	424	12.00	92	245	12.60	2.4	55.7	17.8
Surfacewaters: Carson R													
SW-01	08/01/OO	20000801-08	Carson R Woodfords	15.6	6.78	69	9.20	33	55	4.36	.65	1.3	2.1
SW-05	08/01/OO	20000801-12	Carson R Paynesville	16.7	7.81	80	7.60	37	59	5.48	1.2	1.2	2.3
SW-06	08/01/OO	20000801-13	Carson R Stateline	20.3	7.27	84	8.00	38	66	5.01	1.2	1.6	2.5
SW-07	08/01/OO	20000801-14	Fredericksburg Ditch	20.4	6.85	229	7.80	74	161	8.36	5	17.3	7.4
SW-08	08/01/OO	20000801-15	Irrigation Ditch	21.9	7.15	125	6.20	55	99	25.50	4.5	1.6	4.6
Surfacewaters: Indian Cr													
SW-02	08/01/OO	20000801-09	Indian Cr Upper	18.1	6.88	125	6.70	64	97	0.75	1.2	1.1	0.4
SW-03	08/01/OO	20000801-10	Indian Cr Mid	16.3	7.72	232	8.70	112	164	6.03	5	6.0	3.2
SW-04	08/01/OO	20000801-11	Indian Cr Lower	17.2	7.70	142	6.30	70	108	5.45	3.9	2.0	1.3

ALPINE COUNTY MONITORING

Site	Date	TotalP mg/L		PO4-P mg/L		TKN mg/L		NH3-N mg/L		NO2-N mg/L		NO3-N mg/L	Total N mg/L	MBAS mg/L
Reservoirs														
HPR	08/01/00	2.450		2.250		13.400		9.970		0.519		1.300	15.219	
Surfacewaters: Carson R														
SW-01	08/01/00	0.022	<	0.010		0.232	<	0.020	<	0.010	<	0.010	0.252	
SW-05	08/01/00	0.030	<	0.010		0.221	<	0.020	<	0.010	<	0.010	0.241	
SW-06	08/01/00	0.032	<	0.010		0.288	<	0.020	<	0.010	<	0.010	0.308	
SW-07	08/01/00	0.258		0.144		0.947		0.064		0.054		1.030	2.031	
SW-08	08/01/00	0.101		0.018		0.603		0.028	<	0.010		0.210	0.823	
Surfacewaters: Indian Cr														
SW-02	08/01/00	0.026		0.014		0.181		0.024	<	0.010	<	0.010	0.201	
SW-03	08/01/00	0.088		0.027		0.565	<	0.020	<	0.010	<	0.010	0.585	
SW-04	08/01/00	0.088		0.030		0.384	<	0.020	<	0.010	<	0.010	0.404	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Reservoirs													
HPR	08/01/00	37	7		0.23	15.4	3.6	45.8	9.6	2.73	60.3		40.5
Surfacewaters: Carson R													
SW-01	08/01/00		0		0.02	6.9	1.8	3.3	1.4	0.29	21.4		
SW-05	08/01/00		0		0.02	7.5	2.1	4.3	1.7	0.35	24.0		
SW-06	08/01/00		1		0.03	7.2	2.3	4.6	1.8	0.38	25.3		
SW-07	08/01/00		1		0.06	17.2	4.3	19.5	4.9	1.09	38.8		
SW-08	08/01/00		1		0.03	11.5	2.6	9.1	2.6	0.63	31.7		
Surfacewaters: Indian Cr													
SW-02	08/01/00		0		0.02	13.5	3.1	7.2	1.7	0.46	24.4		
SW-03	08/01/00		1		0.05	22.5	6.6	14.5	2.8	0.69	26.6		
SW-04	08/01/00		0		0.03	14.6	4.2	6.9	1.8	0.41	21.2		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

Reservoirs

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	08/01/00	>	1600		4	30

Surfacewaters: Carson R

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	08/01/00	<	30	<	30	
SW-05	08/01/00		390		230	
SW-06	08/01/00		11000		430	
SW-07	08/01/00		4600		4600	
SW-08	08/01/00		4600		4600	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	08/01/00	930	90	
SW-03	08/01/00	4600	2400	
SW-04	08/01/00	1500	230	

ALPINE COUNTY SOILS

Site	Date	Location	Type	pH	EC mmho	%Sat	TKN mg/Kg	NO3-N mg/L	Total P mg/Kg	Exch P mg/L
S3a	06/09/00	Hall	SMB	6.18	0.48	35.6	988	0.6	1,060	12.2
S5a	06/09/00	Gansberg	HRB	6.16	0.19	31.6	1,130	6.7	830	13.4
S6a	06/09/00	Neddenriep	DWB	6.06	0.23	49.4	2,010	2.5	890	57.8
S7a	06/09/00	Bruns	JaC	6.03	0.17	41.3	1,860	4.5	870	6.5
S8a	06/09/00	Dressler	SOD	6.44	0.10	16.5	263	0.8	330	12.1
S2a	06/13/00	Celio	KT	8.33	2.74	75.7	2,340	0.8	850	4.4
S4a	06/13/00	Gansberg	DI	7.25	2.84	40.5	1,790	7.0	580	23.6

Site	Date	Cl mg/L	SO4 mg/Kg	CEC meq/100g	Cu mg/Kg	Mo mg/Kg	Ca mg/L	Mg mg/L	Na mg/L	SAR	% Na
S3a	06/09/00		11	7.4	26.0	< 1.0	27.3	11.8	38.4	1.55	< 1.0
S5a	06/09/00		2	15.5	33.0	1.0	15.5	2.9	18.6	1.14	< 1.0
S6a	06/09/00		7	19.6	39.0	< 1.0	8.8	2.0	21.8	1.73	1.2
S7a	06/09/00		180	11.9	43.0	< 1.0	11.0	2.4	16.4	1.17	< 1.0
S8a	06/09/00		4	12.5	17.0	< 1.0					
S2a	06/13/00		71	16.9	17.0	< 1.0	81.7	49.9	328.0	7.05	8.2
S4a	06/13/00		17	16.3	51.0	< 1.0	133.0	40.8	178.0	3.46	3.6

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
February, 2000										
20000201-14	SW-01	Carson R Woodfords	02/01/00	0	0	0	0	0	0	0
20000201-15	SW-05	Carson R Paynesville	02/01/00	0	0	0	0	0	0	0

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
March, 2000										
20000301-14	SW-01	Carson R Woodfords	03/01/00	0	0	0	0	0	0	0
20000301-15	SW-02	Indian Cr Upper	03/01/00	0	0	0	0	0	0	0
20000301-16	SW-03	Indian Cr Mid	03/01/00	0	0	0	0	0	0	0
20000301-17	SW-04	Indian Cr Lower	03/01/00	0	0	0	0	0	0	0
20000301-18	SW-05	Carson R Paynesville	03/01/00	0	0	0	0	0	0	0
20000301-19	SW-06	Carson R Stateline	03/01/00	1	0	0	0	0	0	0
20000301-20	SW-08	Irrigation Ditch	03/01/00	0	0	0	0	0	0	0

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
April, 2000										
20000404-07	SW-01	Carson R Woodfords	04/04/00	0	0	0	0	0	0	0
20000404-08	SW-02	Indian Cr Upper	04/04/00	0	0	0	0	0	0	0
20000404-09	SW-03	Indian Cr Mid	04/04/00	0	0	0	0	0	0	0
20000404-10	SW-04	Indian Cr Lower	04/04/00	0	0	0	0	0	0	0
20000404-11	SW-05	Carson R Paynesville	04/04/00	0	0	0	0	0	0	0
20000404-12	SW-06	Carson R Stateline	04/04/00	0	0	0	0	0	0	0
20000404-13	SW-07	Fredericksburg Ditch	04/04/00	0	0	0	0	0	0	0
20000404-14	SW-08	Irrigation Ditch	04/04/00	0	0	0	0	0	0	0

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
May, 2000										
20000509-07	SW-01	Carson R Woodfords	05/09/00	0	0	0	0	0	0	0
20000509-08	SW-02	Indian Cr Upper	05/09/00	0	0	0	0	0	0	0
20000509-09	SW-03	Indian Cr Mid	05/09/00	0	0	0	0	0	0	0
20000509-10	SW-04	Indian Cr Lower	05/09/00	0	0	0	0	0	0	0
20000509-11	SW-05	Carson R Paynesville	05/09/00	0	0	0	0	0	0	0
20000509-12	SW-06	Carson R Stateline	05/09/00	0	0	0	0	0	0	0
20000509-13	SW-08	Irrigation Ditch	05/09/00	0	0	0	0	0	0	0
20000509-14	SW-09	Carson R Dressler Ln	05/09/00	0	0	0	0	0	0	0
20000509-15	SW-10	Indian Cr at Bruns	05/09/00	0	0	0	0	0	0	0

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
June, 2000										
20000606-10	SW-01	Carson R Woodfords	06/06/00	0	0	0	0	0	0	0
20000606-11	SW-02	Indian Cr Upper	06/06/00	0	0	0	0	0	0	0
20000606-12	SW-03	Indian Cr Mid	06/06/00	0	0	0	0	0	0	0
20000606-13	SW-04	Indian Cr Lower	06/06/00	0	0	0	0	0	0	0
20000606-14	SW-05	Carson R Paynesville	06/06/00	0	0	0	0	0	0	0
20000606-15	SW-06	Carson R Stateline	06/06/00	0	0	0	0	0	0	0
20000606-16	SW-08	Irrigation Ditch	06/06/00	0	0	0	0	0	0	0

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
July, 2000										
20000705-11	SW-01	Carson R Woodfords	07/05/00	0	0	0	0	0	0	0
20000705-12	SW-02	Indian Cr Upper	07/05/00	0	0	0	0	0	0	0
20000705-13	SW-03	Indian Cr Mid	07/05/00	0	0	0	0	0	0	0
20000705-14	SW-04	Indian Cr Lower	07/05/00	0	0	0	0	0	0	0
20000705-15	SW-05	Carson R Paynesville	07/05/00	0	0	0	0	0	0	0
20000705-16	SW-06	Carson R Stateline	07/05/00	0	0	0	0	0	0	0
20000705-17	SW-07	Fredericksburg Ditch	07/05/00	0	0	0	0	0	0	0
20000705-18	SW-08	Irrigation Ditch	07/05/00	0	0	0	0	0	0	0

Site	Location	TDS		Cl^-		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence
SW-01	Carson River, Woodfords	55		1.0		0.13		0.02		0.15		0.02		2.0		0.02	✓	20	
SW-06	Carson River, Stateline	70	✓	2.5		0.22		0.03		0.25		0.03		2.0	✓	0.02		20	
SW-02	Indian Creek, Upper	100		6.0						0.30		0.03		8.0		0.25		30	
SW-03	Indian Creek, Mid	100	✓	6.0	✓					0.30		0.03		8.0		0.25		30	
SW-04	Indian Creek, Lower	100	✓	6.0						0.30		0.03	✓	8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03	✓	8.0		0.25		30	

Blue-green algae test results for September will be sent as soon as the tests are completed. The blue-green algae results for August are included in this report.

<u>Certification</u>

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,

Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L		COD mg/L		NO3-N mg/L	Comment
Buried Sludge Monitoring													
MW11	09/27/00	20000927-19	Sludge Pond	6266.9	9.5	6.82	82	0.8	<	5.0		0.064	
MW12	09/27/00	20000927-20	Sludge Pond	6265.0	10.6	6.29	139	1.8	<	5.0		0.216	
MW13	09/27/00	20000927-21	Sludge Pond	6255.8	9.7	6.89	764	4.0		13.4		3.310	
ERB Monitoring													
CONTROL	09/27/00	20000927-13	At Post Office	6282.3	10.3	6.73	169	7.4	<	5.0		2.410	
MW02-50	09/27/00	20000927-14	Black Bart side of ERB	6268.1	10.9	6.40	385	33.1	<	5.0		7.810	
MW03-50	09/27/00	20000927-15	Black Bart side of ERB	6268.1	11.3	6.29	389	31.1	<	5.0		6.200	
MW04-50	09/27/00	20000927-16	Hank Monk side of ERB	6267.7	8.6	6.27	75	5.5	<	5.0		0.068	
MW07-50	09/27/00	20000927-17	North side of ERB	6278.5	8.5	6.80	259	24.0	<	5.0		0.636	
Heavenly Valley Creek													
HVC-1	09/19/00	20000919-28	Downstream of Pioneer		12.1	7.81	55	0.7	<	5.0		0.037	
HVC-2	09/19/00	0000919-HVC2	250' upstream of Pond #2										Dry
HVC-3	09/19/00	0000919-HVC3	25' downstream of Johnson Blvd										Dry
HVC-4	09/19/00	0000919-HVC4	Effluent of drain from Lower Shop										Dry
HVC-5	09/19/00	0000919-HVC5	Effluent of drainage pipe along Jo										Dry
Treatment Plant Monitoring													
MW08-25	09/27/00	20000927-18	SW side of Pond #1	6246.4	11.4	6.35	996	50.5		83.1	<	0.010	

ALPINE COUNTY MONITORING

10/11/00

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	09/12/00	20000912-10	Main Dam	13.5	6.56	102		44	80			3.2	1.7
ACMW-04W	09/12/00	20000912-11	Gansberg	12.3	6.25	185		49	135			14.3	8.7
ACMW-01BE	09/19/00	20000919-14	Secondary Dam	13.2	7.00	96		47	76			1.0	< 0.5
ACMW-02N	09/19/00	20000919-15	Access Gate	13.5	6.63	128		57	90			2.9	3.0
ACMW-02S	09/19/00	20000919-16	Access Gate	16.5	6.62	109		52	76			1.4	1.2
ACMW-03	09/19/00	20000919-17	HWY 88	16.0	6.22	326		50	188			52.5	8.0
ACMW-06N	09/19/00	20000919-18	Celio	12.5	6.71	706		255	434			56.6	22.5
ACMW-06S	09/19/00	20000919-19	Celio	12.3	6.74	761		250	447			68.8	31.3
Groundwaters													
GW-03	09/12/00	20000912-12	Smith/Springmeyer	17.3	7.57	307		130	227			1.6	26.6
GW-04	09/12/00	20000912-13	Celio	14.7	7.56	263		117	200			3.3	11.9
GW-05	09/12/00	20000912-14	Neddenriep	11.9	6.58	257		63	169			22.7	< 0.5
GW-07	09/12/00	20000912-15	Gansberg	11.7	6.38	124		53	101			1.7	2.5
GW-08	09/12/00	20000912-16	Arant	15.6	6.57	227		51	153			20.3	10.5
GW-11	09/12/00	20000912-17	Diamond Val. School	16.0	7.06	150		75	120			1.1	0.8
GW-14	09/12/00	20000912-18	Sierrra Pines	13.1	6.30	113		52	97			1.2	1.8
Reservoirs													
HPR	09/05/00	20000905-23	Harvey Place Reservoir	16.0	7.53	495	5.80	118	244	6.78	3.5	57.8	17.9
Surfacewaters: Carson R													
SW-01	09/05/00	20000905-16	Carson R Woodfords	12.0	6.65	7	9.20	35	54	2.22	.37	< 0.5	2.0
SW-05	09/05/00	20000905-20	Carson R Paynesville	10.9	7.29	89	9.80	42	68	1.54	.7	< 0.5	2.5
SW-06	09/05/00	20000905-21	Carson R Stateline	10.8	7.08	118	9.50	49	85	1.68	.52	< 0.5	4.4
SW-08	09/05/00	20000905-22	Irrigation Ditch	17.1	6.49	122	11.00	56	98	145.00	4.9	< 0.5	4.2
Surfacewaters: Indian Cr													
SW-02	09/05/00	20000905-17	Indian Cr Upper	10.0	6.97	124	7.30	62	90	1.26	1	< 0.5	< 0.5
SW-03	09/05/00	20000905-18	Indian Cr Mid	15.2	7.04	229	9.40	111	160	7.96	3.2	6.2	2.6
SW-04	09/05/00	20000905-19	Indian Cr Lower	7.9	7.18	140	9.70	69	104	3.84	3.2	< 0.5	1.4

ALPINE COUNTY MONITORING

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	09/12/00	< 0.010		0.169	< 0.020	< 0.010	0.281	0.460	
ACMW-04W	09/12/00	< 0.010		0.122	< 0.020	< 0.010	2.440	2.572	
ACMW-01BE	09/19/00	0.012		< 0.100	0.033	< 0.010	0.123	0.233	
ACMW-02N	09/19/00	0.012		< 0.100	0.046	< 0.010	0.076	0.186	
ACMW-02S	09/19/00	< 0.010		0.125	< 0.020	< 0.010	< 0.010	0.145	
ACMW-03	09/19/00	0.071		0.305	< 0.020	< 0.010	2.950	3.265	
ACMW-06N	09/19/00	0.244		0.364	0.068	< 0.010	< 0.010	0.384	
ACMW-06S	09/19/00	0.036		0.248	0.052	0.024	0.012	0.284	
Groundwaters									
GW-03	09/12/00	0.012		< 0.100	< 0.020	< 0.010	0.737	0.847	
GW-04	09/12/00	0.030		0.111	< 0.020	< 0.010	0.864	0.985	
GW-05	09/12/00	0.010		0.409	< 0.020	< 0.010	3.180	3.599	
GW-07	09/12/00	0.080		< 0.100	< 0.020	< 0.010	1.260	1.370	
GW-08	09/12/00	0.014		0.112	< 0.020	< 0.010	4.220	4.342	
GW-11	09/12/00	0.016		< 0.100	< 0.020	< 0.010	0.440	0.550	
GW-14	09/12/00	0.022		0.156	< 0.020	< 0.010	0.482	0.648	
Reservoirs									
HPR	09/05/00	2.900	2.700	18.700	15.500	0.380	0.605	19.685	
Surfacewaters: Carson R									
SW-01	09/05/00	0.016	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	0.030	
SW-05	09/05/00	0.022	< 0.010	< 0.100	0.024	< 0.010	< 0.010	0.120	
SW-06	09/05/00	0.014	< 0.010	< 0.100	< 0.020	< 0.010	< 0.010	0.120	
SW-08	09/05/00	0.150	0.030	0.569	0.028	< 0.010	0.323	0.902	
Surfacewaters: Indian Cr									
SW-02	09/05/00	0.022	< 0.010	< 0.010	< 0.020	< 0.010	< 0.010	0.030	
SW-03	09/05/00	0.078	0.032	< 0.100	< 0.020	< 0.010	< 0.010	0.120	
SW-04	09/05/00	0.064	0.032	0.171	< 0.020	< 0.010	< 0.010	0.191	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	09/12/00												5481.1
ACMW-04W	09/12/00												4905.8
ACMW-01BE	09/19/00												5488.3
ACMW-02N	09/19/00												5458.5
ACMW-02S	09/19/00												5459.3
ACMW-03	09/19/00												5039.7
ACMW-06N	09/19/00												5215.8
ACMW-06S	09/19/00												5204.7
Groundwaters													
GW-03	09/12/00												
GW-04	09/12/00												
GW-05	09/12/00												
GW-07	09/12/00												
GW-08	09/12/00												
GW-11	09/12/00												
GW-14	09/12/00												
Reservoirs													
HPR	09/05/00	27			0.23	10.2	4.0		10.6	0.00	0.0		27.0
Surfacewaters: Carson R													
SW-01	09/05/00				0.03	4.2	2.1		1.4	0.00	0.0		
SW-05	09/05/00				0.01	6.6	2.5		1.8	0.00	0.0		
SW-06	09/05/00				0.01	10.5	3.6		2.2	0.00	0.0		
SW-08	09/05/00				0.01	8.0	3.3		2.7	0.00	0.0		
Surfacewaters: Indian Cr													
SW-02	09/05/00				0.01	12.5	3.2		1.9	0.00	0.0		
SW-03	09/05/00				0.04	21.4	6.8		2.2	0.00	0.0		
SW-04	09/05/00				0.01	13.5	4.5		2.0	0.00	0.0		

ALPINE COUNTY BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	09/12/00		1.1	<	1.1	
ACMW-04W	09/12/00	<	1.1	<	1.1	
ACMW-01BE	09/19/00	<	1.1	<	1.1	
ACMW-02N	09/19/00	<	1.1	<	1.1	
ACMW-02S	09/19/00	<	1.1	<	1.1	
ACMW-03	09/19/00	>	23		1.1	
ACMW-06N	09/19/00	<	1.1	<	1.1	
ACMW-06S	09/19/00	<	1.1	<	1.1	

Groundwaters

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-03	09/12/00	<	1.1	<	1.1	
GW-04	09/12/00	<	1.1	<	1.1	
GW-05	09/12/00	<	1.1	<	1.1	
GW-07	09/12/00	<	1.1	<	1.1	
GW-08	09/12/00	<	1.1	<	1.1	
GW-11	09/12/00	<	1.1	<	1.1	
GW-14	09/12/00	<	1.1	<	1.1	

Reservoirs

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	09/05/00		50	<	2	2

Surfacewaters: Carson R

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	09/05/00	<	30	<	30	
SW-05	09/05/00		430	<	30	
SW-06	09/05/00		150		90	
SW-08	09/05/00	>	24000		430	

Surfacewaters: Indian Cr

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	09/05/00		930		430	
SW-03	09/05/00		90		40	
SW-04	09/05/00		4600	<	30	

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
August, 2000										
20000801-08	SW-01	Carson River, Woodfords	08/01/00	0	0	0	0	0	0	0
20000801-09	SW-02	Indian Creek, Upper	08/01/00	0	0	0	0	0	0	0
20000801-10	SW-03	Indian Creek, Mid	08/01/00	0	0	0	0	0	0	0
20000801-11	SW-04	Indian Creek, Lower	08/01/00	0	0	0	0	0	0	0
20000801-12	SW-05	Carson River, Paynesville	08/01/00	0	0	0	0	0	0	0
20000801-13	SW-06	Carson River, Stateline	08/01/00	0	0	0	0	0	0	0
20000801-14	SW-07	Fredricksburg Ditch	08/01/00	0	0	0	0	0	0	0
20000801-15	SW-08	Irrigation Ditch	08/01/00	0	0	0	0	0	0	0

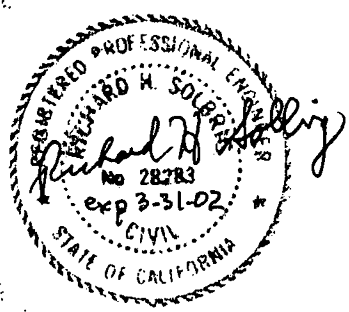
Site	Location	TDS		Cl^-		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence	Limit	Exceedence
SW-01	Carson River, Woodfords	55	✓	1.0		0.13	✓	0.02		0.15	✓	0.02		2.0		0.02	✓	20	✓
SW-06	Carson River, Stateline	70	✓	2.5	✓	0.22		0.03	✓	0.25		0.03		2.0	✓	0.02		20	✓
SW-02	Indian Creek, Upper	100		6.0						0.30		0.03	✓	8.0		0.25		30	
SW-03	Indian Creek, Mid	100	✓	6.0						0.30		0.03	✓	8.0		0.25		30	
SW-04	Indian Creek, Lower	100	✓	6.0						0.30		0.03	✓	8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03		8.0		0.25		30	

Blue-green algae test results for October will be sent as soon as the tests are completed. The blue-green algae test and soils results for September are included in this report.

Certification

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,



Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L		COD mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring												
MW11	10/17/00	20001017-17	Sludge Pond	6266.7	8.7	7.43	74	0.8	<	5.0	0.075	
MW12	10/17/00	20001017-18	Sludge Pond	6264.5	9.4	6.45	127	2.0	<	5.0	0.259	
MW13	10/17/00	20001017-19	Sludge Pond	6255.7	8.1	6.95	747	4.0		19.2	2.860	
ERB Monitoring												
CONTROL	10/17/00	20001017-11	At Post Office	6282.1	10.2	6.63	170	7.3	<	5.0	2.350	?
MW02-50	10/17/00	20001017-12	Black Bart side of ERB	6268.1	10.2	6.69	385	35.1	<	5.0	8.210	
MW03-50	10/17/00	20001017-13	Black Bart side of ERB	6268.1	10.2	6.47	385	30.5	<	5.0	5.540	
MW04-50	10/17/00	20001017-14	Hank Monk side of ERB	6267.8	8.0	6.77	75	5.3	<	5.0	0.051	
MW07-50	10/17/00	20001017-15	North side of ERB	6278.4	8.1	6.62	253	24.6	<	5.0	0.641	
Heavenly Valley Creek												
HVC-1	10/10/00	20001010-07	Downstream of Pioneer		6.9	7.83	59	1.0	<	5.0	0.045	
HVC-2	10/10/00	0001010-HVC2	250' upstream of Pond #2									
HVC-3	10/10/00	0001010-HVC3	25' downstream of Johnson Blvd									
HVC-4	10/10/00	20001010-08	Effluent of drain from Lower Shop		11.0	7.25	130	1.1		6.6	0.077	
HVC-5	10/10/00	0001010-HVC5	Effluent of drainage pipe along Jo									
Treatment Plant Monitoring												
MW08-25	10/17/00	20001017-16	SW side of Pond #1	6245.3	11.3	6.36	981	45.5		90.0	0.028	

ALPINE COUNTY MONITORING

10/31/00

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	10/10/00	20001010-09	Main Dam	12.5	6.53	102		44	83			3.4	1.6
ACMW-01BE	10/10/00	20001010-10	Secondary Dam	11.0	6.49	93		45	85			1.1	1.3
ACMW-02N	10/10/00	20001010-11	Access Gate	12.0	6.54	125		58	97			3.1	3.2
ACMW-02S	10/10/00	20001010-12	Access Gate	13.1	6.36	104		50	82			1.8	1.2
ACMW-04W	10/10/00	20001010-13	Gansberg	10.9	6.07	186		49	130			14.6	8.6
ACMW-06N	10/10/00	20001010-14	Celio	9.2	6.97	704		253	429			56.9	22.5
ACMW-06S	10/10/00	20001010-15	Celio	10.5	6.90	791		274	482			72.2	32.8
Groundwaters													
GW-03	10/10/00	20001010-17	Smith/Springmeyer	13.8	7.56	3		129	222			1.6	26.9
GW-04	10/10/00	20001010-18	Celio	13.1	7.41	259		117	192			3.3	11.8
GW-05	10/10/00	20001010-19	Neddenriep	11.6	6.33	257		62	172			22.1	14.1
GW-07	10/10/00	20001010-20	Gansberg	10.7	6.32	126		52	103			2.0	2.5
GW-08	10/10/00	20001010-21	Arant	13.7	6.52	227		51	145			21.7	9.4
GW-11	10/10/00	20001010-22	Diamond Val. School	12.8	6.99	148		76	118			0.9	0.9
GW-14	10/10/00	20001010-23	Sierrra Pines	11.7	6.72	108		52	104			1.2	18.2
Reservoirs													
HPR	10/03/00	20001003-14	Harvey Place Reservoir	16.2	7.81	511	7.60	119	243	22.80	6.3	57.0	17.5
Surfacewaters: Carson R													
SW-01	10/03/00	20001003-07	Carson R Woodfords	9.2	7.22	79	13.00	35	61	0.33	.27	1.1	2.0
SW-05	10/03/00	20001003-11	Carson R Paynesville	11.4	7.79	89	8.65	37	53	15.70	.46	1.3	2.3
SW-06	10/03/00	20001003-12	Carson R Stateline	12.6	7.66	117	9.20	47	81	0.84	.43	3.9	3.7
SW-08	10/03/00	20001003-13	Irrigation Ditch	16.0	7.59	128	9.10	57	98	24.60	4.3	1.7	4.1
Surfacewaters: Indian Cr													
SW-02	10/03/00	20001003-08	Indian Cr Upper	11.4	6.96	125	6.80	62	92	0.51	2.1	1.0	< 0.5
SW-03	10/03/00	20001003-09	Indian Cr Mid	11.2	7.35	235	7.50	111	163	2.56	2.8	5.6	2.3
SW-04	10/03/00	20001003-10	Indian Cr Lower	10.8	7.47	154	8.00	73	118	4.79	3.9	2.6	1.3

≥ 7.0

Jerry Towers X231

ALPINE COUNTY MONITORING

10/31/00

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	10/10/00				0.023	< 0.010	0.522	0.532	
ACMW-01BE	10/10/00				< 0.020	< 0.010	0.139	0.149	
ACMW-02N	10/10/00				< 0.020	< 0.010	0.084	0.094	
ACMW-02S	10/10/00				< 0.020	< 0.010	0.057	0.067	
ACMW-04W	10/10/00				< 0.020	< 0.010	2.540	2.550	
ACMW-06N	10/10/00				0.049	< 0.010	< 0.010	0.020	
ACMW-06S	10/10/00				0.026	< 0.010	0.025	0.035	
Groundwaters									
GW-03	10/10/00				< 0.020	< 0.010	0.746	0.756	
GW-04	10/10/00				< 0.020	< 0.010	0.866	0.876	
GW-05	10/10/00				< 0.020	< 0.010	3.230	3.240	
GW-07	10/10/00				< 0.020	< 0.010	1.490	1.500	
GW-08	10/10/00				0.021	< 0.010	4.110	4.120	
GW-11	10/10/00				< 0.020	< 0.010	0.423	0.433	
GW-14	10/10/00				< 0.020	< 0.010	0.480	0.490	
Reservoirs									
HPR	10/03/00	2.550	2.120	20.400	17.000	0.703	0.575	21.678	
Surfacewaters: Carson R									
SW-01	10/03/00	0.014	< 0.010	0.199	< 0.020	< 0.010	< 0.010	0.219	
SW-05	10/03/00	0.020	< 0.010	< 0.010	0.022	< 0.010	< 0.010	0.030	
SW-06	10/03/00	0.016	< 0.010	0.128	< 0.020	< 0.010	0.072	0.210	
SW-08	10/03/00	0.154	0.024	0.417	< 0.020	< 0.010	0.308	0.735	
Surfacewaters: Indian Cr									
SW-02	10/03/00	0.066	0.011	0.163	0.049	< 0.010	< 0.010	0.183	
SW-03	10/03/00	0.072	0.019	0.116	< 0.020	< 0.010	0.012	0.138	
SW-04	10/03/00	0.091	0.012	0.208	< 0.020	< 0.010	< 0.010	0.228	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	10/10/00												5480.8
ACMW-01BE	10/10/00												5488.8
ACMW-02N	10/10/00												5458.8
ACMW-02S	10/10/00												5459.6
ACMW-04W	10/10/00												4905.7
ACMW-06N	10/10/00												5215.3
ACMW-06S	10/10/00												5204.4
Groundwaters													
GW-03	10/10/00												
GW-04	10/10/00												
GW-05	10/10/00												
GW-07	10/10/00												
GW-08	10/10/00												
GW-11	10/10/00												
GW-14	10/10/00												
Reservoirs													
HPR	10/03/00	37	10		0.24	14.3	3.9	44.5	10.5	2.69	59.7		12.5
Surfacewaters: Carson R													
SW-01	10/03/00		1		< 0.01	2.0	2.1	3.9	1.7	0.45	34.6		
SW-05	10/03/00		0		< 0.01	4.9	2.4	6.1	1.8	0.57	35.6		
SW-06	10/03/00		0		0.01	9.6	3.4	6.0	2.3	0.42	24.0		
SW-08	10/03/00		1		0.01	9.1	2.9	9.4	2.4	0.69	35.1		
Surfacewaters: Indian Cr													
SW-02	10/03/00		1		0.01	10.2	3.2	7.3	1.8	0.51	27.8		
SW-03	10/03/00		1		0.03	22.0	7.0	14.6	2.2	0.69	26.8		
SW-04	10/03/00		1		0.01	14.1	4.8	7.8	2.3	0.46	22.8		

ALPINE COUNTY BACTERIOLOGICAL MONITORING

Alpine Monitoring Wells

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
ACMW-01AW	10/10/00	<	1.1	<	1.1	
ACMW-01BE	10/10/00	<	1.1	<	1.1	
ACMW-02N	10/10/00	<	1.1	<	1.1	
ACMW-02S	10/10/00	<	1.1	<	1.1	
ACMW-04W	10/10/00		23		1.1	
ACMW-06N	10/10/00	<	1.1	<	1.1	
ACMW-06S	10/10/00	<	1.1	<	1.1	

Groundwaters

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
GW-03	10/10/00	<	1.1	<	1.1	
GW-04	10/10/00	<	1.1	<	1.1	
GW-05	10/10/00	<	1.1	<	1.1	
GW-07	10/10/00	<	1.1	<	1.1	
GW-08	10/10/00		1.1	<	1.1	
GW-11	10/10/00	<	1.1	<	1.1	
GW-14	10/10/00	<	1.1	<	1.1	

Reservoirs

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
HPR	10/03/00	50	30	75

Surfacewaters: Carson R

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-01	10/03/00	<	30	<	30	
SW-05	10/03/00		430		90	
SW-06	10/03/00		140		140	
SW-08	10/03/00		4600		4600	

Surfacewaters: Indian Cr

Site	Date	Total Coliform MPN/100mL	Fecal Coliform MPN/100mL	Fecal Streptococci MPN/100mLL
SW-02	10/03/00	70	30	
SW-03	10/03/00	40	40	
SW-04	10/03/00	930	150	

ALPINE COUNTY
BLUE GREEN ALGAE

ID#	Site	Location	Date	Colonies #	Colony # Cells	Filaments #	Filaments # Cells	Filaments #	Filament Length	Single Cells, #
September, 2000										
20000905-16	SW-01	Carson River, Woodfords	09/05/00	0	0	0	0	0	0	0
20000905-17	SW-02	Indian Creek, Upper	09/05/00	0	0	0	0	0	0	0
20000905-18	SW-03	Indian Creek, Mid	09/05/00	0	0	0	0	0	0	0
20000905-19	SW-04	Indian Creek, Lower	09/05/00	0	0	0	0	0	0	0
20000905-20	SW-05	Carson River, Paynesville	09/05/00	0	0	0	0	0	0	0
20000905-21	SW-06	Carson River, Stateline	09/05/00	0	0	0	0	0	0	0
20000905-22	SW-08	Irrigation Ditch	09/05/00	0	0	0	0	0	0	0

10/31/00

ALPINE COUNTY SOILS

Site	Date	Location	Type	pH	EC mmho	%Sat	TKN mg/Kg	NO3-N mg/L	Total P mg/Kg	Exch P mg/L
S3a	09/01/00	Hall	SMB	6.93	0.50	34.9	1,345	2.0	1,070	22.4
S4a	09/01/00	Gansberg	DI	7.18	0.83	37.7	1,630	2.2	540	15.0
S5a	09/01/00	Gansberg	HRB	6.17	0.36	32.7	1,200	6.7	720	10.9
S6a	09/01/00	Neddenriep	DWB	5.86	0.35	44.1	1,530	1.3	600	32.6
S7a	09/01/00	Bruns	JaC	6.83	0.17	40.6	1,840	3.5	840	5.3
S8a	09/01/00	Dressler	SOD	6.68	0.15	19.3	857	3.0	370	4.7
S2a	09/12/00	Celio	KT	8.11	0.85	78.3	2,800	8.5	990	14.0

Site	Date	Cl mg/L	SO4 mg/Kg	CEC meq/100g	Cu mg/Kg		Mo mg/Kg	Ca mg/L	Mg mg/L	Na mg/L	SAR		% Na
S3a	09/01/00		5	21.2	28.0		1.0	30.9	9.0	59.8	2.43		2.2
S4a	09/01/00		12	18.5	41.0	<	1.0	45.4	10.5	97.3	3.38		3.5
S5a	09/01/00		3	14.3	26.0		1.0	24.6	5.4	32.6	1.55	<	1.0
S6a	09/01/00		8	17.8	38.0	<	1.0	15.4	4.6	39.0	2.24		1.9
S7a	09/01/00		19	16.3	42.0	<	1.0	15.2	3.6	13.5	0.81	<	1.0
S8a	09/01/00		5	10.5	20.0		1.0	9.7	5.1	7.8	0.51	<	1.0
S2a	09/12/00		22	34.2	21.0	<	1.0	53.1	20.6	78.0	2.30		2.0

Site	Location	TDS		Cl		TKN		NO_3-N		Total N		Total P		SO_4		Boron		Exch Na %	
		Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance	Limit	Exceedance
SW-01	Carson River, Woodfords	55	✓	1.0	✓	0.13	✓	0.02		0.15	✓	0.02		2.0	✓	0.02		20	✓
SW-06	Carson River, Stateline	70		2.5		0.22		0.03		0.25		0.03		2.0		0.02		20	
SW-02	Indian Creek, Upper	100		6.0						0.30	✓	0.03		8.0		0.25		30	✓
SW-03	Indian Creek, Mid	100		6.0						0.30		0.03		8.0		0.25		30	
SW-04	Indian Creek, Lower	100		6.0						0.30		0.03		8.0		0.25		30	
SW-10	Indian Creek, Stateline	100		6.0						0.30		0.03		8.0		0.25		30	

<u>Certification</u>

I hereby certify that the enclosed monitoring report was prepared under my direct supervision and that I am a duly Registered Engineer under the laws of the State of California.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
RICHARD H. SOLBRIG
No 28283
exp 3-31-02
CIVIL
STATE OF CALIFORNIA

Richard H Solbrig

Richard Solbrig,
Assistant Manager/Engineer

TAHOE BASIN MONITORING

Site	Date	ID	Location	Depth msl	Temp C	pH	EC umhos	Cl mg/L		COD mg/L	NO3-N mg/L	Comment
Buried Sludge Monitoring												
MW11	12/27/00	20001227-13	Sludge Pond	6266.1	8.2	6.60	75	0.8	<	5.0	0.066	
MW12	12/27/00	20001227-14	Sludge Pond	6263.8	8.8	6.41	131	1.9	<	5.0	0.482	
MW13	12/27/00	20001227-15	Sludge Pond	6255.9	6.5	6.70	713	4.0		11.7	2.760	
ERB Monitoring												
CONTROL	12/27/00	20001227-07	At Post Office	6281.6	8.2	6.72	171	7.6	<	5.0	2.410	
MW02-50	12/27/00	20001227-08	Black Bart side of ERB	6268.3	9.0	6.55	384	37.2	<	5.0	9.060	
MW03-50	12/27/00	20001227-09	Black Bart side of ERB	6268.3	9.5	6.22	414	32.2	<	5.0	10.000	
MW04-50	12/27/00	20001227-10	Hank Monk side of ERB	6268.0	7.8	6.26	75	5.6	<	5.0	0.060	
MW07-50	12/27/00	20001227-11	North side of ERB	6278.3	7.0	6.35	254	24.1	<	5.0	0.662	
Heavenly Valley Creek												
HVC-1	12/05/00	20001205-11	Downstream of Pioneer		2.1	7.82	50	1.4	<	5.0	0.081	
HVC-2	12/05/00	0001205-HVC2	250' upstream of Pond #2									No flow; ice and snow
HVC-3	12/05/00	0001205-HVC3	25' downstream of Johnson Blvd									No flow; ice and snow
HVC-4	12/05/00	20001205-12	Effluent of drain from Lower Shop		5.9	7.31	116	1.6		94.5	0.073	Very low flow
HVC-5	12/05/00	0001205-HVC5	Effluent of drainage pipe along Jo									No flow; ice and snow
Treatment Plant Monitoring												
MW08-25	12/27/00	20001227-12	SW side of Pond #1	6246.1	10.5	6.38	1027	52.4		90.8	0.011	

ALPINE COUNTY MONITORING

Site	Date	ID	Location	Temp C	pH	EC umhos	DO mg/L	Alk mg/L	TDS mg/L	SS mg/L	Turb NTU	Cl mg/L	SO4 mg/L
Alpine Monitoring Wells													
ACMW-01AW	12/19/00	20001219-20	Main Dam	11.3	6.49	91		40	75			2.5	2.1
ACMW-01BE	12/19/00	20001219-21	Secondary Dam	11.5	6.50	96		47	77			1.2	1.3
ACMW-02N	12/19/00	20001219-22	Access Gate	12.4	6.78	131		59	87			3.3	3.4
ACMW-02S	12/19/00	20001219-23	Access Gate	12.8	6.65	100		48	73			1.7	1.3
ACMW-04W	12/19/00	20001219-24	Gansberg	12.0	6.63	196		52	133			14.8	8.3
ACMW-06N	12/19/00	20001219-25	Celio	12.0	6.76	712		257	443			58.0	22.5
ACMW-06S	12/19/00	20001219-26	Celio	11.7	6.85	744		257	474			72.4	33.7
Groundwaters													
GW-03	12/05/00	20001205-17	Smith/Springmeyer	13.6	7.62	311		132	218			1.6	27.3
GW-04	12/05/00	20001205-18	Celio	13.0	7.64	267		118	193			3.4	12.0
GW-05	12/05/00	20001205-19	Neddenriep	9.9	6.41	265		63	169			22.3	14.2
GW-07	12/05/00	20001205-20	Gansberg	8.4	6.49	124		53	89			1.5	2.5
GW-08	12/05/00	20001205-21	Arant	9.8	6.49	240		53	153			23.2	9.2
GW-11	12/05/00	20001205-22	Diamond Val. School	10.4	7.02	153		77	116			1.1	0.8
GW-14	12/05/00	20001205-23	Sierrra Pines	7.6	6.36	111		52	90			1.2	1.8
Reservoirs													
HPR	12/06/00	20001206-15	Harvey Place Reservoir	5.1	7.89	494	7.05	113	236	2.30	2.1	58.1	19.9
Surfacewaters: Carson R													
SW-01	12/05/00	20001205-14	Carson R Woodfords	1.1	7.18	77	11.80	36	57	0.60	.33	1.1	2.3
SW-05	12/05/00	20001205-16	Carson R Paynesville	3.0	7.71	90	11.97	42	67	0.62	.51	1.4	3.0
Surfacewaters: Indian Cr													
SW-02	12/05/00	20001205-15	Indian Cr Upper	1.7	7.34	98	11.00	51	74	2.08	1.1	1.1	< 0.5

algae

ALPINE COUNTY MONITORING

01/09/01

Site	Date	TotalP mg/L	PO4-P mg/L	TKN mg/L	NH3-N mg/L	NO2-N mg/L	NO3-N mg/L	Total N mg/L	MBAS mg/L
Alpine Monitoring Wells									
ACMW-01AW	12/19/00				< 0.020	< 0.010	0.222	0.232	
ACMW-01BE	12/19/00				< 0.020	< 0.010	0.200	0.210	
ACMW-02N	12/19/00				< 0.020	< 0.010	0.088	0.098	
ACMW-02S	12/19/00				< 0.020	< 0.010	< 0.010	0.020	
ACMW-04W	12/19/00				< 0.020	< 0.020	2.690	2.710	
ACMW-06N	12/19/00				0.043	< 0.020	< 0.020	0.040	
ACMW-06S	12/19/00				< 0.020	< 0.020	< 0.020	0.040	
Groundwaters									
GW-03	12/05/00				0.026	< 0.010	0.754	0.764	
GW-04	12/05/00				0.029	< 0.010	0.866	0.876	
GW-05	12/05/00				0.029	< 0.030	3.390	3.420	
GW-07	12/05/00				0.032	< 0.010	0.983	0.993	
GW-08	12/05/00				0.031	< 0.030	4.310	4.340	
GW-11	12/05/00				0.021	< 0.010	0.448	0.458	
GW-14	12/05/00				0.022	< 0.010	0.485	0.495	
Reservoirs									
HPR	12/06/00	2.100	1.970	0.000	20.300	0.173	0.705	0.878	
Surfacewaters: Carson R									
SW-01	12/05/00	< 0.010	< 0.010	0.192	0.023	< 0.010	0.010	0.212	
SW-05	12/05/00	< 0.010	< 0.010	0.177	0.025	< 0.010	0.010	0.197	
Surfacewaters: Indian Cr									
SW-02	12/05/00	< 0.010	< 0.010	0.287	0.029	< 0.010	< 0.010	0.307	

ALPINE COUNTY MONITORING

Site	Date	COD mg/L	BOD mg/L	O & G mg/L	Boron mg/L	Ca mg/L	Mg mg/L	Na mg/L	K mg/L	SAR	Exch Na %	Hardness mg/L	Water Level MSL or Ft
Alpine Monitoring Wells													
ACMW-01AW	12/19/00												5482.5
ACMW-01BE	12/19/00												5488.8
ACMW-02N	12/19/00												5458.1
ACMW-02S	12/19/00												5458.7
ACMW-04W	12/19/00												4898.8
ACMW-06N	12/19/00												5216.2
ACMW-06S	12/19/00												5204.7
Groundwaters													
GW-03	12/05/00												
GW-04	12/05/00												
GW-05	12/05/00												
GW-07	12/05/00												
GW-08	12/05/00												
GW-11	12/05/00												
GW-14	12/05/00												
Reservoirs													
HPR	12/06/00	24	4		0.27	15.6	3.4	45.6	9.1	2.73	60.6		35.0
Surfacewaters: Carson R													
SW-01	12/05/00		2			7.4	1.9	4.2	1.5	0.35	24.3		
SW-05	12/05/00		1			8.4	2.2	5.5	1.8	0.44	27.1		
Surfacewaters: Indian Cr													
SW-02	12/05/00		1			8.6	2.2	8.0	1.3	0.63	35.1		

ALPINE COUNTY
BACTERIOLOGICAL MONITORING

01/09/01

Alpine Monitoring Wells

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
ACMW-01AW	12/19/00	<	1.1	<	1.1		
ACMW-01BE	12/19/00	<	1.1	<	1.1		
ACMW-02N	12/19/00	<	1.1	<	1.1		
ACMW-02S	12/19/00	<	1.1	<	1.1		
ACMW-04W	12/19/00		3.6	<	1.1		
ACMW-06N	12/19/00	<	1.1	<	1.1		
ACMW-06S	12/19/00	<	1.1	<	1.1		

Groundwaters

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
GW-03	12/05/00	<	1.1	<	1.1		
GW-04	12/05/00	<	1.1	<	1.1		
GW-05	12/05/00	<	1.1	<	1.1		
GW-07	12/05/00		2.2	<	1.1		
GW-08	12/05/00	<	1.1	<	1.1		
GW-11	12/05/00	<	1.1	<	1.1		
GW-14	12/05/00	<	1.1	<	1.1		

Reservoirs

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
HPR	12/06/00		8	<	2	<	2

Surfacewaters: Carson R

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
SW-01	12/05/00	<	3	<	3		
SW-05	12/05/00		23		4		

Surfacewaters: Indian Cr

Site	Date		Total Coliform MPN/100mL		Fecal Coliform MPN/100mL		Fecal Streptococci MPN/100mLL
SW-02	12/05/00		93		43		

WEST FORK CARSON RIVER AND INDIAN CREEK WATERSHEDS
WATER QUALITY CONTROL PLAN UPDATE
1983

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

Principal Investigators:

Michael R. James

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Judith E. Unsicker

ROY C. HAMPSON, EXECUTIVE OFFICER

TABLE OF CONTENTS

PAGE

PAGE

LIST OF TABLES

LIST OF TABLES

LIST OF FIGURES

RATIONALE FOR PROPOSED AMENDMENTS TO CHAPTER 1: HISTORICAL BENEFICIAL USES

Proposed language changes are added for a complete perspective on the Basin Planning process, and simply give historical status to the 1975 beneficial use designations for the waters in question.

RATIONALE FOR PROPOSED AMENDMENTS TO CHAPTER 2: PRESENT AND POTENTIAL BENEFICIAL USES

A. WEST FORK CARSON RIVER HYDROLOGIC UNIT

The waters of the West Fork Carson River are of very high quality, and excellent for all beneficial uses. They are comparable with the Truckee River as it leaves Lake Tahoe (Table 1) and with other West Coast rivers draining National Parks and wilderness areas.

No changes are proposed at this time in beneficial use designations for surface waters and groundwaters of the West Fork Carson River Hydrologic Unit. These waters continue to serve the uses recognized in Table 2-1 of the 1975 Basin Plan. With implementation of the control measures proposed in amendments to Chapter 5, there should be no impairment of these uses in the future.

If evidence is presented that the West Fork supports populations of Lahontan cutthroat trout, or that the Department of Fish and Game proposes to reintroduce such populations, the Regional Board may wish to consider designating surface waters for the rare and endangered species (RARE) use.

B. INDIAN CREEK RESERVOIR

The addition of water contact recreation (REC-1) as a potential beneficial use of Indian Creek Reservoir (ICR) is being proposed in recognition of the South Tahoe Public Utility District's (STPUD's) plans to replace the tertiary effluent discharge to ICR with fresh water diverted from the West Fork Carson River.

When the STPUD plant was designed, it was anticipated that the tertiary effluent exported to ICR would be of high enough quality to permit an eventual designation of the reservoir for water contact recreational use. However, the tertiary effluent discharge was never determined to be suitable for that use. Periodic treatment plant problems since the early 1970's have led to eutrophication of ICR. The excessive growths of algae and higher forms of plant life which have resulted are unsightly, may interfere with boating, cause odor problems when vegetation mats decay, and may taint fish flesh. Eutrophication, in combination with other environmental factors, has occasionally resulted in toxic concentrations of unionized ammonia, which has caused several documented fish kills.

Replacement of the effluent in ICR with fresh water would gradually flush out nutrients accumulated in the sediments, and would eventually result in a lake suitable for all beneficial uses which are proposed in this basin plan update. Detailed plans for the proposed restoration process are not yet available from STPUD, and other restoration techniques in addition to to flushing could be necessary. These include drawdown of the reservoir and mechanical removal of sediments, periodic harvesting and removal of vegetation, sealing of the sediments to prevent nutrient release, or other measures. STPUD would continue its commitment to maintain the reservoir for recreation as part of its renewed contract with Alpine County for mitigation of the impacts of disposing effluent to land in the County. If STPUD's plans to replace the tertiary effluent discharge with Carson River water are not realized, some of the restoration techniques discussed above might still be implemented to consistently maintain designated beneficial uses. This would be in addition to improving the tertiary effluent discharge.

If STPUD's proposed new disposal scheme, including the restoration of ICR, is approved and implemented, Regional Board staff will recommend the change of the potential REC-1 designation to an actual beneficial use once monitoring data show that ICR is suitable for that use.

C. INDIAN CREEK

Designated beneficial uses for Indian Creek in the 1975 Basin Plan are those applicable to "minor streams" of the East Fork Carson River HU. The State of Nevada also has no specific beneficial use designations for Indian Creek downstream of the State Line.

Little quantitative information on Indian Creek is available; however, it does support several important uses. It is diverted for irrigation, and provides water to livestock both in California and Nevada. The upper portion of its watershed includes important winter range for deer, and the creek provides a water supply and riparian habitat for many wildlife species. Limited electroshocking studies by Department of Fish and Game staff in 1977 and 1983 have shown that the creek supports at least 2 species of game fish and 2 species of nongame fish, with an estimated population density of 144.4 trout and 110 nongame fish per mile.

Because Indian Creek could be drastically affected by spills, runoff, or percolation of secondary wastewater if STPUD's proposed facility plan is implemented, more intensive study of its water quality and beneficial uses should be done in the future. Regional Board staff believe that present knowledge of its uses justifies specific use designations. The designated uses themselves do not differ from the uses presently applicable to Indian Creek as a "minor stream".

RATIONALE FOR PROPOSED AMENDMENTS TO CHAPTER 3: HISTORICAL WATER QUALITY OBJECTIVES

Historical status is proposed for the 1975 numerical water quality objectives for the West Fork Carson River because they are based on limited monitoring data collected before 1971. For example, Chapter 14 of the 1975 Basin Plan includes a table of "existing water quality" which shows that the current total phosphorus objective is based on only four samples (page II-14-28). The recent monitoring data used as the basis for proposed new numerical objectives are discussed in the rationale for amendments to Chapter 4, which follows.

RATIONALE FOR PROPOSED AMENDMENTS TO CHAPTER 4: WATER QUALITY OBJECTIVES

A. WEST FORK CARSON RIVER HYDROLOGIC UNIT DATA

The waters of the West Fork Carson River HU are of very high quality, and they are excellent for all designated beneficial uses. On an annual mean basis, the quality of the river has been relatively stable, as indicated by past and present water quality monitoring (Table 2). Historically, the river has been influenced by agricultural return flows, runoff from agricultural and urban lands, drainage from mining operations, and onsite domestic wastewater disposal systems. Historical agricultural use is discussed further in Appendix A.

Although the West Fork Carson River shows some signs of biostimulation, its chemical quality in California places it among the most oligotrophic streams in the nation. A comparison of the quality of the West Fork Carson River with West Coast rivers and other rivers throughout the nation is presented in Table 1.

1. Water Quantity and Quality Monitoring Programs

Streamflow data for the West Fork Carson River in California are limited. The U. S. Geological Survey (USGS) has continually maintained a gage station at Woodfords, California since 1938. The Federal Water Master has periodically operated a gage at Paynesville, California. However, the Paynesville data are unreliable because the station is affected by irrigation control facilities upstream and downstream. Streamflow downstream of the USGS station is dependent upon irrigation diversions from May through October.

The California Department of Water Resources (DWR) has monitored the quality of the river at Woodfords in cooperation with the USGS since 1958. Parameters, sampling frequency, and analytical methods varied from year to year. The usefulness of these data is limited, primarily due to the semiannual sampling frequency. Nutrient analyses were either incomplete or not conducted during many of the years. DWR has also collected limited data on a few of the major tributaries of the West Fork Carson River.

The Nevada Division of Environmental Protection (NDEP) has monitored the quality of the West Fork Carson River at Paynesville since 1967 on a monthly basis. These data represent the best long term continuous monitoring record available for the West Fork.

The University of Nevada, Reno, through the Renewable Natural Resources Center (RNR) and the Desert Research Institute (DRI), has periodically monitored the quality of the West Fork Carson River in Hope Valley and numerous tributaries of the West Fork.

The South Tahoe Public Utility District (STPUD) has been monitoring the quality of the West Fork Carson River and numerous irrigation ditches in its watershed on a monthly basis since 1981. The river monitoring has been conducted at Woodfords, Paynesville, State Line, and 2 miles north of State Line. Because these stations were monitored on the same days, they provide an excellent data base to examine spatial changes in water quality.

Regional Board staff has monitored the quality of the West Fork Carson River at Hope Valley, Woodfords, and Paynesville on a monthly basis since late 1981. Like the STPUD data, these data are comprised of sets of water quality measurements for common sampling dates and evaluations of spatial water quality changes.

USGS conducted a special study of the Carson River during the 1980 water year. Water quality monitoring was conducted during runoff and precipitation events. The data are presently available but the results of the study have not been released.

The U. S. Forest Service conducted a macroinvertebrate analysis on streams within the Toiyabe National Forest during July and August of 1981. Willow Creek and Horsethief Creek were included in this study.

2. Existing Chemical Water Quality

Water quality data obtained in each monitoring program are presented in Tables 3 through 8. Table 9 is a composite of all water quality data, except data collected by the USGS during their 1980 monitoring program (Table 8).

The 1980 USGS monitoring data have been omitted from Table 9 because sampling was conducted only during precipitation runoff events, when surface inflow contributions of potential pollutants to the river were atypically high. Sampling for this study was conducted during or shortly after precipitation events and during the spring thaw. A comparison of Tables 8 and 9 shows that the mean of monthly mean constituent values measured during the 1980 USGS precipitation runoff event study were generally higher than the corresponding values determined from the more random sampling which was conducted during the period of record.

a. Nitrate nitrogen data adjustments

Unfortunately, nitrate nitrogen analysis for most of the surface water quality samples which have been collected during the period of record for the West Fork Carson River except the 1980 USGS program were performed by the Brucine method, which has recently been found to be generally inaccurate at the low nitrate concentrations which were encountered. Regional Board samples which have been collected since 1981 were analyzed using the Cadmium Reduction Method, which is accurate at the low nitrate levels monitored on the West Fork Carson River. For this reason, only Regional Board data were used to determine the nitrate values listed in Table 9.

Since the bulk of the Regional Board samples were collected in 1982, we have analyzed data from other studies where the Brucine Method was used to determine nitrate levels in the river over several years to determine if 1982 was representative of the typical year for nitrate values. Meaningful conclusions can be drawn assuming that Brucine measurements from the same source, though not accurate, can indicate increases and decreases over time. Annual average nitrate values were determined for 1981 and 1982 using STPUD data and for 1980, 1981, and 1982 using NDEP data as shown in Table 10. Table 10 shows 1982 to have the highest annual average values recorded by both STPUD and NDEP. Typically, at low nitrate concentrations such as those found in the Carson River, Brucine method analyses give erroneously high results. Therefore, though we have lowered the nitrate levels from values that would be obtained by averaging all available nitrate data (including Brucine Method measurements), the fact that 1982 was probably a "high" nitrate year indicates that we may not have lowered them enough. Future nitrate data resulting from the Cadmium Reduction Method will be important in refining our analysis.

b. Total nitrogen data adjustments

Total nitrogen consists of nitrogen in four basic forms: Nitrite, nitrate, ammonia, and organic nitrogen. The sum of ammonia and organic nitrogen is called Kjeldahl nitrogen. Nitrite exists in very small quantities in surface waters, because it is readily oxidized to the nitrate form. In order to determine total nitrogen; nitrite, nitrate, and Kjeldahl nitrogen concentrations must be determined in separate analyses and summed together. Because historical nitrate determinations made by the Brucine Method have been inappropriately high, historical total nitrogen values must be adjusted downward to compensate for such inaccuracies.

For the West Fork Carson River, nitrate nitrogen has accounted for only 8 percent and 14 percent of historical total nitrogen measurements at Woodfords and Paynesville respectively. Thus, we are adjusting for relatively small errors in recorded nitrogen values, and it follows that possible errors in the adjustment process would also be small. Therefore, total nitrogen values were adjusted to utilize the relatively large quantity of data where the Brucine method was used for the nitrate component, rather than using only measurements where the Cadmium Reduction method was used.

At stations where Regional Board nitrate data were available, this Cadmium Reduction method mean of monthly means nitrate value was substituted for all Brucine method nitrate values and a new total nitrogen value determined. At stations where Regional Board staff did not monitor, the percent change in nitrate levels between a particular Brucine method station and the nearest upstream station monitored by Regional Board staff was first determined. For example, examination of Table 10 shows that the percent change from Paynesville to State Line is an 11 percent decrease using 1981 STPUD data. The percent change was then multiplied by and added to (or subtracted from) the Regional Board study nitrate value to obtain the nitrate value used to adjust total nitrogen values. The adjusted nitrate value was then added to measured Kjeldahl nitrogen and nitrite values to obtain the adjusted total nitrogen values.

3. Spatial Changes in Water Quality

When spatial comparisons of water quality constituent levels are made it is important that the samples to be compared were taken at approximately the same time. Only Regional Board staff and STPUD staff monitored different stations on the same day. Table 11 uses these data to compare water quality values for 5 different stations on the West Fork Carson River. Although the water quality of the West Fork Carson River is excellent at all monitored stations in California, some degradation is occurring. Review of Table 11 indicates that most constituent levels are increasing as the river travels downstream, except for sulfate.

Monitoring at the five stations indicates that total filterable residue (TFR) is increasing at a fairly constant rate from station to station for monitoring conducted by the Regional Board and STPUD in 1981. However, 1982 STPUD monitoring showed little increase from Woodfords to Paynesville and a large increase in the downstream station 2 miles north of State Line.

Nutrient increases occurred predominately between Woodfords and Paynesville as indicated by both the Regional Board and STPUD monitoring. Between Paynesville and State Line decreases were exhibited by 1981 STPUD monitoring for nitrate and total phosphorus, with a small increase in total nitrogen. 1982 STPUD monitoring showed increases in all three nutrients levels from Paynesville to 2 miles north of State Line. It is uncertain if these increases occurred during the 2 mile reach from Paynesville to State Line or from State Line to the station 2 miles downstream.

Table 9 indicates that mean sulfate levels on the West Fork Carson River at Hope Valley, Woodfords, and Paynesville were 3.5, 2.0, and 4.0 respectively. This is misleading because the Woodfords value was averaged with 30 samples taken by the Department of Water Resources (Table 3). The Hope Valley and Paynesville values of 3.5 and 4.0 respectively were each the average of only two samples. Table 11 shows the spatial changes in sulfate, based on the limited data available. It can be assumed that the average value of 2.0 mg/l from Woodfords is representative of the long-term average for all stations.

4. Variability of Water Quantity and Quality of the West Fork Carson River

Streamflow for the West Fork Carson River can fluctuate greatly. USGS has recorded maxium and minimum flows of 4890 cfs and 5 cfs respectively at Woodfords, CA. Flow above Woodfords is only slightly regulated by several small reservoirs, with a total capacity of about 1,500 acre-ft.

Annual stream flow can also vary tremendously. In 1977, 18,900 acre-ft. was recorded at Woodfords, compared to 136,800 acre-ft. in 1982. Figure 1 illustrates the annual streamflow recorded at Woodfords since 1939.

Water rights on the West Fork Carson River are extensive. Diversions for agricultural purposes can reduce the flow significantly from Woodfords to the State Line. During drought years, all the water in the West Fork Carson River has been diverted from the river upstream of Paynesville for irrigation. Below Paynesville the river bed has remained dry until agricultural return waters and groundwater inflow replenished it.

Water quality of the West Fork Carson River can fluctuate dramatically due to seasonal variations and precipitation runoff events. The 1980 USGS water quality monitoring was conducted during runoff events. The USGS recorded maximum values for total nitrogen and total phosphorus in Table 8 were over 10 times the mean of monthly means concentrations listed in Table 9. High runoff events cause increased sediments and organic nutrients to be washed into or eroded by the river, resulting in atypically high concentrations of these constituents.

5. Water Quality of Tributaries

Table 5 presents water quality data for the West Fork Carson River and selected tributaries. Many of the tributaries exhibit water quality significantly different from that of the West Fork. Due to the small amount of available data, specific numerical objectives are not proposed for these tributaries.

Total filterable residue has been determined to be much higher than in West Fork Carson River waters for most of tributaries listed in Table 5. Only Willow Creek exhibits similar quality. The cause of these differences is uncertain.

All tributaries exhibit sulfate levels similar to those of the West Fork, except Red Lake Creek. The mean of monthly mean value for Red Lake Creek is at least three times that of other tributaries and the West Fork. The high sulfate levels monitored by the Regional Board during the low flows of 1981 were probably caused by Red Lake Creek. The high sulfate concentrations in Red Lake Creek could be caused by drainage from an abandoned mining operation, or alternately, from a natural phenomenon.

B. INDIAN CREEK WATERSHED DATA

1. Indian Creek Reservoir

Indian Creek Reservoir (ICR) was constructed to provide storage for reclaimed wastewater exported by the South Tahoe Public Utility District (STPUD). ICR waters are used for irrigation typically from April through October. Because of the high quality of the exported reclaimed wastewater (when compared to conventionally treated wastewater), ICR is also used for recreational purposes.

Numerous water quality studies (1,2,3,4,5) have been conducted on Indian Creek Reservoir in addition to monitoring conducted by STPUD. Water quality data from these reports are not presented here. However, chemical water quality of ICR as monitored by STPUD during 1982 is presented in Table 12.

The water quality of ICR has been influenced almost entirely by the quality of effluent that STPUD exports to the reservoir. From 1969 to 1976, 78% of the total inflow to ICR came from STPUD. The remaining inflow has come from precipitation on ICR and runoff from relatively undisturbed lands.

The use of ICR waters for irrigation purposes has been successful. ICR has provided an additional 4,500 acre-ft. of water to supplement the natural water supply. Most importantly, ICR has provided water to agricultural lands when natural waters were unavailable.

Unfortunately, ICR has not been as successful as a recreational facility. Numerous fish kills have occurred at ICR over the years. Obnoxious algal blooms continue to plague the facility. The feasibility of maintaining designated beneficial uses of ICR with STPUD effluent is questionable. Potential nutrient removal capabilities may not be great enough to prevent future fish kills and obnoxious algal blooms.

2. Indian Creek

Indian Creek is tributary to the East Fork Carson River in Nevada and drains much of the agricultural land in Diamond, Dutch, and Long Valleys. Indian Creek and the East Fork have distinct watersheds in California. The water quality and quantity of Indian Creek are affected by adjacent agricultural lands and releases from ICR. West Fork Carson River water can be diverted into Indian Creek by irrigation ditches. This Indian Creek should not be confused with the Indian Creek which also flows into the East Fork Carson River near Markleeville, California.

a. Water quantity and quality monitoring

No streamflow data are available for Indian Creek. Its flows are subject to control by agricultural diversions and return flows, and releases from ICR. STPUD monitoring indicates that the stream bed dries up above Diamond Valley during the fall months.

Few water quality data are available for Indian Creek. STPUD has monitored the creek since 1981. Monitoring has been conducted primarily in Diamond Valley, with a few samples taken in Dutch Valley near State Line, and above Diamond Valley.

b. Existing chemical water quality

Table 13 presents Indian Creek water quality data for Diamond Valley. Table 14 presents spatial variations in Indian Creek water quality for the 1981 irrigation season.

As with the West Fork Carson River it was necessary to adjust nitrate and total nitrogen values due to the method used for nitrate analysis. However, Regional Board staff did not conduct any monitoring of Indian Creek. Adjustment was based upon split sampling conducted by the Regional Board and STPUD.

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Table 13 presents Indian Creek water quality data for Diamond Valley. Table 14 presents spatial variations in Indian Creek water quality for the 1981 irrigation season.

As with the West Fork Carson River it was necessary to adjust nitrate and total nitrogen values due to the method used for nitrate analysis. However, Regional Board staff did not conduct any monitoring of Indian Creek. Adjustment was based upon split sampling conducted by the Regional Board and STPUD.

Regional Board staff and STPUD conducted separate nitrate analyses on three samples obtained at three locations on the West Fork Carson River. The average difference between the separate analyses was 0.05 mg/l, with a standard deviation of 0.01 mg/l. All STPUD recorded values were below 0.10 mg/l during this test.

For values above 0.10 mg/l, the method STPUD uses for nitrate analyses (Brucine method) becomes considerably more accurate. Therefore, values STPUD recorded for Indian Creek above 0.10 mg/l were not adjusted. Values below 0.10 mg/l (7 out of 21 samples) were reduced by 0.05 mg/l. Because total nitrogen is the result of summing nitrate, nitrite, and Kjeldahl nitrogen results together, total nitrogen results were adjusted if nitrate results were adjusted. Because large nitrate values were recorded during the summer and fall months, the adjustments made had very little effect on the mean values listed in Tables 13 and 14.

Water quality monitoring of Indian Creek in Diamond Valley (Table 13) exhibits constituent values which are much higher than values recorded for the West Fork Carson River and its tributaries (Tables 5 and 9).

The mean value for nitrate in Indian Creek is 50 times greater than the mean value observed at Woodfords for the West Fork Carson River. Most of the other constituents are 2 to 20 times greater than West Fork mean values.

c. Spatial variations in Indian Creek quality

Spatial variations in Indian Creek water quality during the 1981 irrigation season are presented in Table 14. Substantial increases in all constituents, except ammonia, were observed in Diamond Valley. The largest increase was observed in nitrate, which increased from 0.22 mg/l above Diamond Valley to 1.13 mg/l in Diamond Valley.

From Diamond Valley to the State Line many constituent levels were observed to decrease. Reductions in total nonfilterable residue, electrical conductivity, nitrate and total nitrogen concentrations were observed to occur between Diamond Valley and Dutch Valley near State Line. Nitrate decreased from 1.13 mg/l to 0.07 mg/l between these points. It is assumed that the reduction in nitrate was the result of this biologically available form of nitrogen being taken up by aquatic vegetation, being converted to organic nitrogen in the process. This assumption is supported by the fact that organic nitrogen levels were observed to increase between Diamond Valley and the State Line. Total phosphorus levels were also observed to increase.

d. Temporal nitrate variations in Indian Creek

Figure 2 shows temporal nitrate variations in Indian Creek in Diamond Valley Nitrate levels are observed to increase dramatically during periods of irrigation. Releases from ICR are probably primarily responsible for the large increases in nitrate which have occurred in Indian Creek. However, it is uncertain why nitrate levels in samples which were collected remained low during the known ICR releases which occurred from February to June of 1982. The most probable explanation is that samples of Indian Creek were not taken during times of releases from ICR. Low May and June 1982 nitrate values could also result if ICR waters were entirely routed into Diamond Ditch for irrigation in Wade and Carson Valleys.

Average Concentrations[1] of Surface Irrigation Water During Irrigation Season

Soil "Type"	Item	TDS	BOD	TN[2]	NO_3-N	TP[2]	PO_4-P
Sarman-Witt	Head Water	136	4.4	0.81	0.25	0.45	0.23
	Tail Water	167	12.8	1.44	0.40	0.95	0.55
	Conc. Factor	1.2	2.9	1.8	1.6	2.1	2.4
Heritage	Head Water	99	1.7	0.32	0.14	0.14	0.08
	Tail Water	98	7.4	0.57	0.25	0.30	0.19
	Conc. Factor	1.0	4.4	1.8	1.8	2.1	2.4

[1]Averages of flow-weighted concentrations for 1974 and 1975 irrigation seasons and numerical average concentrations for 1976 irrigation season.

[2]Averages of concentrations for 1975 and 1976 irrigation seasons.

APPENDIX B

FLUX CALCULATION DETAILS FOR FIGURE 3

Figure 3 compares the potential total nitrogen loading to the West Fork Carson River due to existing septic tank/leachfield systems and the calculated average daily flux for 1982 at each of the specified locations based on recorded flows and river sampling data. Flux is expressed as the average pounds of total nitrogen that flow past each station in one day.

A. Method Used To Determine Calculated Flux

Regional Board and STPUD water quality data for 1982 and 1982 USGS streamflow rec~~ords were~~ used to determine the 1982 average daily flux at Hope Valley, Woodfords, Paynesville, and State Line. Total nitrogen flux was calculated by multiplying total nitrogen concentrations by streamflows. The 1982 average daily flux for each station presented in Figure 1 was determined by averaging the flux calculated at each station for each month. Flux for each month was calculated by multiplying average or adjusted monthly concentrations by the respective average monthly streamflows.

Streamflow was monitored continuously at Woodfords by USGS. No year-round streamflow monitoring was conducted at Hope Valley, Paynesville, or State Line. Average streamflow at Woodfords for each month was determined from USGS records. Streamflow values at Hope Valley were assumed to be 10 percent less than values recorded at Woodfords. Streamflow values at Paynesville and State Line were assumed to be 10 percent greater than values recorded at Woodfords.

Regional Board total nitrogen monitoring was conducted on a monthly basis at Hope Valley, Woodfords, and Paynesville during 1982. STPUD total nitrogen monitoring was conducted on a monthly basis at Woodfords, Paynesville, and two miles downstream of State Line during 1982. Regional Board and STPUD total nitrogen concentrations obtained at Woodfords and Paynesville were averaged for each month to determine the average monthly concentrations for each station. Only the Regional Board collected data at Hope Valley, and only STPUD monitored two miles downstream of State Line. Since Woodfords and Paynesville concentrations were averaged on a monthly basis, monthly concentrations used for Hope Valley and State Line had to be representative of both Regional Board and STPUD monitoring if spatial comparisons between each station were to be made. For this reason, Hope Valley and State Line total nitrogen concentrations used to determine the flux for each month were adjusted values.

Regional Board total nitrogen concentrations measured at Hope Valley were adjusted in the following manner:

1. For each month the Regional Board Hope Valley concentration was divided by the Regional Board Woodfords concentration monitored on the same day. This ratio represents the increase or decrease observed between Hope Valley and Woodfords for each month.

2. The ratio determined in No. 1 above for each month was multiplied by the respective monthly concentration at Woodfords as determined by averaging Regional Board and STPUD data. These values are estimates of the average Hope Valley concentrations for each month which would have been calculated if the Regional Board and STPUD had monitored at Hope Valley.

3. If no monitoring was conducted at Hope Valley by the Regional Board for a particular month, the adjustment ratio was calculated in an alternate manner from that which is described in No. 1 above. The ratio for that month was determined by dividing the 1982 average Regional Board concentration at Hope Valley by the 1982 average Regional Board concentration at Woodfords.

STPUD data collected two miles downstream of State Line were adjusted in the following manner:

1. For each month State Line values were determined by averaging the STPUD monthly sampling data collected two miles downstream and at Paynesville, because State Line is located approximately halfway between these two monitoring stations.

2. The State Line values determined in No. 1 above were divided by the STPUD Paynesville values for each month. This ratio represents the increase or decrease observed between Paynesville and State Line for each month.

3. The ratios determined in No. 2 above for each month were multiplied by the respective monthly average Paynesville values determined from Regional Board and STPUD data. These monthly values represent the average State Line value for each month which would have been calculated if both the Regional Board and STPUD had monitored at State Line during 1982.

4. If no monitoring was conducted by STPUD for a particular month, the adjustment ratio was calculated in an alternate manner from that which is described in No. 2 above. The ratio for that month was determined by dividing the 1982 average STPUD concentration as adjusted in No. 1 above by the 1982 average STPUD concentration at Paynesville.

B. Method Used To Determine Septic Tank/Leachfield Flux

Septic tank/leachfield systems discharge wastewater which contains an average of 13.0 gm/cap/day. Assuming 2.77 persons per residence, the average discharge from a residence would be 0.08 lbs/day. Assuming 20 percent removal from septic tank treatment and soil percolation, the potential total nitrogen input per residence is 0.064 lbs/day.

Regional Board staff counted the number of campground, hotel/motel, and residential units on the West Fork Carson River. Each campground unit was assumed to be equivalent to one quarter of a Single Family Unit (SFU) and each hotel/motel unit was assumed to be equivalent to one half of a SFU. Table 21 exhibits the number of SFU's and their respective loadings to the West Fork. The total loading is the sum of loading from all septic tank/leachfield systems above each station.

C. Additional Considerations

The potential total nitrogen inputs due to septic tank/leachfield systems were calculated based upon the assumption that all the nitrogen discharged enters the river, except for the 20 percent removed during septic tank treatment and soil percolation. This assumption is probably true for septic tank/leachfield input above Woodfords due to geologic conditions. However, below Woodfords there is little to base this assumption on. A certain percentage of the septic tank/leachfield loading probably enters groundwaters which do not enter the West Fork. The assumption is made that all effluent enters the river to calculate the maximum potential septic tank/leachfield loading.

Table 1

COMPARISON OF WEST FORK CARSON RIVER WATER QUALITY WITH RIVERS ACROSS THE UNITED STATES AND ON THE WEST COAST

(Data other than Carson River from Davis, et al, 1979)

	TFR mg/l	Cl mg/l	SO_4 mg/l	NO_3-N mg/l
70 Rivers Nationwide				
mean	288	54	69	0.70
range	36-2040	1.0-1252.3	2.0-845.4	0.01-5.10
25 West Coast Rivers				
mean	202	20.5	41.1	0.57
range	36-840	1.0-120.1	2.2-349.7	0.01-4.73
Truckee River				
Tahoe Outlet	60	2.0	2.0	0.01
Farad	61	2.6	2.2	0.06
West Fork Carson River				
Woodfords	52	0.8	2.0	0.01
Paynesville	62	2.1	-	0.03

TFR - Total Filterable Residue

Cl - Chloride

SO_4 - Sulfate

NO_3-N - Nitrate Nitrogen

Table 2

EXAMINATION OF LONG TERM TRENDS IN HISTORICAL WATER QUALITY[1]

FOR THE WEST FORK CARSON RIVER

Woodfords, California

	TFR[2]	Sulfate	Chloride
1982	51	2.0	-
1981	56	3.0	1.0
1980	46	-	1.0
1979	52	-	0.0
1978	43	-	0.0
1977	68	-	0.0
1976	53	-	2.0
1975	60	-	0.2
1974	66	2.9	0.0
1973	53	-	1.2
1966	56	1.8	0.4
1965	45	0.5	0.3
1964	61	1.5	0.9
1963	50	2.2	1.0
1962	54	1.5	1.5
1961	-	1.5	0.8
1960	-	2.0	1.2
1959	-	2.3	1.4
1958	-	3.1	1.2

[1] mean of monthly mean values

[2] Total filterable residue

Table 2, Cont.

EXAMINATION OF LONG TERM TRENDS IN HISTORICAL WATER QUALITY[1]

FOR THE WEST FORK CARSON RIVER

Paynesville, California

	TFR[2]	PO_4-P[3]	Chloride
1982	53	0.03	0.0
1981	62	0.04	0.4
1980	50	0.02	1.1
1979	58	0.03	1.6
1978	81	0.04	8.2
1977	70	0.05	2.4
1976	69	0.04	1.5
1975	65	0.03	2.0
1974	62	0.04	1.4
1973	62	0.03	1.8
1972	66	0.04	2.2
1971	63	0.04	2.4
1970	54	0.03	2.1
1969	59	0.03	1.8
1968	62	0.03	2.6

[1] mean of monthly mean values (mg/l)

[2] total filterable residue

[3] Total phosphate expressed as total phosphorus

Table 3

DEPARTMENT OF WATER RESOURCES CHEMICAL WATER QUALITY DATA FOR THE WEST FORK CARSON RIVER AT WOODFORDS (1958-1980)

		Mean[1]	Number of Samples
Total Filterable Residue	mg/l	54	23
Chloride	mg/l	0.8	111
Sulfate	mg/l	1.9	30
Boron	mg/l	0.017	76
% Sodium	%	20	114
Electrical Conductivity	µmho/cm	67.8	115
Hardness	mg/l as $CaCO_3$	30.6	114
Dissolved Oxygen	mg/l	10.1	115

[1] mean of monthly means for years indicated

Table 4

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
CHEMICAL WATER QUALITY DATA FOR THE
WEST FORK CARSON RIVER AT PAYNESVILLE (1968-1982)

		Mean[1]	Number of Samples
Total Filterable Residue	mg/l	62	166
Electrical Conductivity	μmho/cm	65	166
Chloride	mg/l	2.1	166
Alkalinity	mg/l as $CaCO_3$	33.8	166
pH	SU	7.85	166
Turbidity	NTU	2.0	166
Color	CPU	12.0	166
Ortho phosphate	mg/l	0.02	166
Nitrate NO_3-N[2]	mg/l	0.05[3]	34
Kjeldahl Nitrogen[2]	mg/l	0.18	34
Total Nitrogen[2]	mg/l	0.23[3]	34
Total Phosphate	mg/l	0.03	166

[1] Mean of monthly means for the years indicated

[2] Includes monitored values from 1980-82 only

[3] The Brucine analytical method was used to determine nitrate concentrations. Values are probably high due to inaccuracies in the Brucine method at low concentrations.

Table 5

UNIVERSITY OF NEVADA, RENO WATER QUALITY DATA[1] FOR THE

WEST FORK CARSON RIVER AND SELECTED TRIBUTARY STREAMS

Renewable Natural Resource Center, Desert Reasarch Institute

	Monitoring years	Number of samples	Total filterable residue	Total phosphate	Nitrate N	Organic Nitrogen	Total Nitrogen	Sulfate	Chloride
West fork above Red Lake creek	1972-76	6	43.4	-	-	-	-	1.44	0.42
West fork at Blue Lakes Rd	1973-76	16	-	0.01	0.03[2]	0.12	0.15	-	-
Red Lake Creek	1972-73	7	84.7	-	-	-	-	6.45	0.55
Willow Creek	1972-73	8	54.6	-	-	-	-	1.31	0.40
Deep Canyon Creek	1972-73	8	81.8	-	-	-	-	0.50	0.43
Horsethief Canyon Creek	1972-73	9	85.1	-	-	-	-	1.25	0.44
Fredricksburg Canyon Creek	1972-73	9	73.2	-	-	-	-	1.82	0.42

[1] Mean of monthly means for the years indicated

[2] Mean value influenced by recorded value of .31 on 12/22/75. Mean value of 0.018 if 12/22/95 value is excluded.

Table 6

SOUTH TAHOE PUBLIC UTILITY DISTRICT CHEMICAL WATER QUALITY DATA[1]

FOR THE WEST FORK CARSON RIVER (1981–1982)

Constituent	Units	Number of samples	Woodfords	Paynesville	Stateline[2]	2 Miles North of Stateline[3]
Total filterable residue	mg/l	16	53	57	70	68
Chloride	mg/l	2	1.0	1.5	1.5	–
Electrical conductivity	µmho/cm	15	61	67	84	96
pH	su	16	7.7	7.8	7.8	7.6
Alkalinity as $CaCO_3$	mg/l	16	29.2	32.8	38.6	41.0
Total phosphorus	mg/l	16	0.02	0.04	0.03	0.07
Nitrate nitrogen	mg-N/l	16	0.07[4]	0.09[4]	0.08[4]	0.10[4]
Kjeldahl nitrogen	mg-N/l	16	0.13	0.22	0.22	0.24
Total nitrogen	mg/l	16	0.20[4]	0.31[4]	0.30[4]	0.34[4]

[1] Mean of monthly means for the years indicated

[2] Monitoring conducted in 1981 (8 samples)

[3] Monitoring conducted in 1982 (8 samples)

[4] The Brucine analytical method was used to determine nitrate concentrations. Values are probably high due to inaccuracies in the Brucine method

C. PROPOSED WATER QUALITY OBJECTIVES

1. General

Water quality objectives are intended to protect the public health and welfare and to maintain or enhance water quality in relation to the intended beneficial uses of the water. They represent conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area. The objectives, when compared to future water quality and discharge data, will also provide the basis for detecting any future trend toward degradation or enhancement of basin waters.

For certain water quality constituents important to public health, objectives are written so as to provide protection under all circumstances and conditions for obvious reasons whereas constituents important to other beneficial uses may allow for degradation of use under extreme circumstances. Constituents of concern to public health are set forth in Title 22 of the California Administrative Code as maximum levels and these were incorporated as objectives for the West Fork Carson River and Indian Creek watersheds. Considerable information has been developed supporting the public health limits; thus quantitative levels are possible.

All of the proposed water quality objectives are consistent with the nondegradation policy established by the State Water Resources Control Board Resolution No. 68-16. The 1975 objectives were also based upon the nondegradation policy.

2. Evaluation of 1975 Objectives

Review of 1975 objectives and the water quality data used to establish them has revealed some shortcomings. Evaluation of recent water quality monitoring data has made it apparent that the following changes and additions should be be made to the 1975 objectives:

1. Establishing State Line numerical objectives.
2. Adding nitrate and Kjeldahl nitrogen objectives.
3. Specifying numerical objectives in terms of mean of monthly mean values instead of annual average and 90 percentile values.
4. Revising total nitrogen, total phosphorus and sulfate objectives at Woodfords.
5. Designating biological objectives to protect non-water-contact recreation and freshwater habitat beneficial uses.

3. Need For Dividing The West Fork Carson River Into Two Segments For Establishing Objectives

The 1975 West Fork Carson River objectives were based upon data collected at Woodfords, California. Woodfords is approximately 6 miles upstream of the State Line. Agriculture has historically taken place between Woodfords and the State Line (Appendix A). Monthly data collected at Paynesville since 1967 were not used in formulating objectives in the 1975 Basin Plan.

As was previously discussed, existing West Fork water quality at Woodfords is not representative of West Fork waters downstream. Though water quality monitoring below Woodfords shows these waters to be of excellent quality for all established beneficial uses, significant differences from upstream quality are apparent. This monitoring also indicates that the water quality of the West Fork in California below Woodfords has been relatively stable on an annual average basis (Table 2). We have therefore proposed to establish State Line objectives to represent West Fork Carson River water quality below Woodfords in California.

4. Need For Nitrate Nitrogen Objectives

Percolation of wastewater through adequate soils will effectively remove most undesirable constituents, including pathogenic organisms, so prevention of direct discharges to surface waters and groundwater basins will effectively protect such waters from most potential pollutants in many cases. However, nitrate nitrogen is not effectively removed by soils. In the West Fork Carson River Hydrologic Unit, the potential for degradation of groundwaters and surface waters due to nitrate discharges exists. Within this Hydrologic Unit, nitrate sources include onsite domestic wastewater systems, exported effluent from the South Tahoe Public Utility District (STPUD), and fertilizer applied to agricultural lands. As a means of monitoring and regulating these nitrogen inputs, nitrate nitrogen objectives are necessary. It is therefore recommended that specific surface water objectives for nitrate based on existing water quality be established to supplement the public health requirement that nitrate cannot exceed 10 mg/l as N in surface waters or groundwaters.

5. Need For Kjeldahl Nitrogen Objectives

Total nitrogen consists of nitrogen in the nitrate, nitrite, ammonia, and organic nitrogen forms. Kjeldahl nitrogen is the sum of ammonia and organic nitrogen. Nitrites are usually not detectable in natural waters because they readily oxidize to the nitrate form. Therefore, total nitrogen, for all practical purposes, is the sum of nitrate and Kjeldahl nitrogen determinations. For this reason, Kjeldahl nitrogen objectives are needed.

6. Rationale For Specifying Numerical Objectives Only As Mean Of Monthly Means

Mean of monthly mean objectives are proposed because they are more representative of actual water quality than the present annual average objective. An annual average can be weighted toward a particular month or season if most of the monitoring occurs during that time. A mean of monthly means value weights all the monthly data equally, producing a more representative water quality value.

Natural variations of constituent levels in the West Fork Carson River are extreme. The U. S. Geological Survey has documented constituent levels ten times greater than our present annual average water quality objectives during precipitation runoff events. Maximum numerical objectives would be difficult to establish at levels high enough to prevent their being exceeded as a result of natural events. On the contrary, if maximum value objectives are set excessively high to accommodate natural variations, water quality degradation may occur. For these reasons we are not proposing maximum value numerical objectives.

Nintieth percentile objectives have the same types of disadvantages as discussed above for maximum value objectives, though not as severe. Conversely, 90th percentile objectives lack the principal advantage of maximum objectives, which is that compliance determinations can be made from evaluations of single measurements for maximum value objectives. Since 90th percentile objectives offer no significant advantage as a supplement to mean of monthly means objectives, we are not proposing 90th percentile numerical objectives.

Water quality objectives could also be based upon a reasonable range of values instead of an average based on mean of monthly means. However, since the West Fork Carson River is subject to extreme natural variations during all seasons, the range of acceptable values would also be extreme. This could result in degradation of water quality because constituent levels observed once every 100 years would become acceptable. Numerical objectives are used primarily for detecting future trends toward degradation or enhancement of water quality and conducting wasteload allocations. Objectives based on a range of values can not serve these purposes.

7. Narrative Objectives

Narrative objectives are included with numerical objectives in the recommended plan revisions. These narrative objectives are consistent with the Nondegradation Policy adopted by the State Water Resources Control Board on October 28, 1968. Generally, the narrative objectives do not allow waters to be degraded at a particular location and time. These narrative objectives, in conjunction with waste discharge requirements for specific dischargers as necessary will allow for effective enforcement by the Regional Board.

The most significant differences between the proposed narrative objectives and the narrative objectives which are specified in the existing basin plan involve increased attention to prevention of biostimulation. In the proposed amendments, this is addressed in narrative objectives titled "Biostimulatory Substances", "Algal Growth Potential", and "Species Composition". The importance of prevention of biostimulation is discussed in detail later in this report in the section titled "Justification for Setting Objectives in Accordance With the Non-Degradation Policy".

8. Numerical Objectives

Tables 15 and 16 contain the historical mean of monthly mean values from Table 9, the adjusted (as discussed previously) State Line values, present objectives and proposed objectives. Proposed objectives are based upon actual or adjusted mean of monthly mean values at the Woodfords or State Line Station.

f. Sulfate objectives

A new total sulfate objective is proposed for Woodfords. The existing objective of 1.0 mg/l is proposed to be replaced by an objective of 2.0 mg/l. A State Line sulfate objective is proposed to be added.

Sulfate objectives are based primarily on data obtained at Woodfords. As was previously discussed, the sulfate monitoring conducted at Hope Valley and Paynesville is extremely limited (2 samples). These data should be used for spatial comparisons only. These comparisons indicate that sulfate concentrations change little from point to point long the river. Therefore, long term monitoring at Woodfords was used to establish objectives at both stations.

No data were used in establishing the 1975 Plan 1.0 mg/l objective for sulfate. It appears to have been based upon measurements of other natural surface waters in the region. Actual monitoring indicates that 2.0 mg/l is a representative value. Proposed objectives at Woodfords and State Line correspond to this measured value.

g. Chloride objectives

Proposed objectives for chloride are based upon monitoring conducted at Woodfords and Paynesville. Few data were available to adjust the Paynesville data to State Line. Measured values of 0.8 mg/l and 2.1 mg/l were recorded at Woodfords and Paynesville respectively. No change is proposed for the objective at Woodfords, and a State Line objective of 2.5 mg/l is proposed to be added.

h. Boron objectives

Water quality monitoring at Woodfords was used to establish the boron objective at Woodfords and State Line. No change is proposed for the 0.02 mg/l objective at Woodfords. A State Line objective of 0.02 is proposed to be added.

i. Sodium (percent) objectives

Like boron, sodium was based on data collected at Woodfords. The existing 20% objective at Woodfords, is not proposed to be changed. A State Line objective of 20% is proposed to be added.

9. Justification For Setting Objectives In Accordance With The Non-Degradation Policy

a. Introduction

In establishing water quality objectives, Regional Boards must consider existing and potentially achievable water quality, as well as environmental and socioeconomic factors (Porter-Cologne Act, Section 13241). Objectives are generally set at levels which will protect the most critical beneficial use (that is, the use requiring the most stringent objectives). If there are no overriding socioeconomic conditions to justify permitting the degradation of existing high quality waters, state and federal non-degradation policies (State Board Resolution 68-16 and 40 CFR 35.1550) provide that such high quality shall be maintained.

As discussed previously, all of the proposed numerical and narrative objectives are based on the non-degradation policy, which provides for a very high level of water quality protection. However, since the existing high quality of the waters of the West Fork Carson River Hydrologic Unit is influenced at least to some degree by waste discharges, basing objectives on non-degradation does not provide for the best possible water quality.

Achieving the best possible natural water quality would necessitate a "zero discharge" policy, which would be economically unacceptable at this time. Further, the proposed objectives are generally far below levels where current knowledge indicates that any harm to beneficial uses could occur, as shown in Tables 9 and 18. The only proposed objectives for which there is some reasonable chance that degradation of beneficial uses could occur are the nutrient objectives, and the following discussion addresses this issue.

b. Critical beneficial uses

For many beneficial uses, "criteria" based on scientific research (e.g., bioassays, agricultural experiments and medical records) are available to indicate constituent levels which must not be exceeded if the use is to be protected. Tables 9 and 18 summarize the proposed objectives and criteria for protection of waters used for domestic supply and for irrigated agriculture. The Environmental Protection Agency (EPA) has recently published criteria for 65 "priority pollutants", mostly heavy metals and toxic organic substances which could enter waters via industrial discharges.

There are no industrial discharges in the West Fork watershed, and monitored water quality shows constituent levels well below maximum permissible levels for municipal and agricultural use.

The West Fork Carson River is not officially designated for municipal use, since local water supplies are from domestic wells; however, recreational users probably occasionally drink the water. The West Fork is designated for water contact recreation use, which requires water quality approaching drinking water standards.

The uses of the West Fork requiring the greatest degree of protection are its uses for cold freshwater habitat, and non-water-contact recreation (including aesthetic enjoyment). Although few quantitative biological data are available on the West Fork, it supports an excellent cold water fishery (7) with eight native and four introduced fish species. Its invertebrate fauna is similar to that of other oligotrophic Sierra Nevada rivers (6).

Limited algal productivity data were collected by the U. S. Geological Survey at Woodfords (Table 19). They seem to indicate bloom conditions during some periods, but no interpretation of the data is available; it is not indicated whether these are attached algae or planktonic algae released from small upstream reservoirs. In summary, the West Fork (at least above agricultural diversions) appears to provide generally excellent oligotrophic aquatic habitat.

The West Fork with its scenic watershed, excellent trout fishery, and numerous opportunities for camping, picnicking and outdoor sports, is part of the attraction that draws 2.2 million visitors to Alpine County each year. It has been stated (7) that the West Fork is sufficiently outstanding to be considered for inclusion in the federal Wild and Scenic Rivers system. A California scenic highway parallels the river for much of its course. Aesthetic enjoyment of clear, clean water is certainly part of the visitor's experience.

Increased nutrient loading to the West Fork from point or non-point sources could result in undesirable biostimulation, which would impair both critical beneficial uses. Biostimulation can result in replacement of diatoms by attached filamentous green or blue-green algae, with possible adverse impacts on the stream system as a whole.

Large mats of filamentous algae are aesthetically displeasing; they may snag fishing gear, make rocks slippery to waders, and cause unpleasant tastes or odors. They may be less palatable than diatoms to "fish food" invertebrates. Algae mats may trap sediment and alter the character of the streambed, which is important both for invertebrate survival and fish spawning. Clumps of algae may break loose and clog downstream water intakes or create a downstream biochemical oxygen demand (8). Increases in phosphorus, iron, molybdenum, and other elements required for nitrogen fixation can encourage the growth of N-fixing blue-green algae, some species of which excrete toxic chemicals.

There are few existing sources of nutrients which could cause biostimulation in the West Fork. Most nutrients (e.g., phosphorus, iron and other metals) can be adequately controlled through Best Management Practices to prevent eroded sediment from logging, construction and other activities from entering the river. Nitrogen, particularly nitrate nitrogen, is less controllable, but it is the critical constituent which must be controlled for prevention of biostimulation in the West Fork Carson River in California.

c. Nutrient limitation concepts

The Regional Board staff report for proposed Truckee River Basin Plan amendments (9) included a detailed review of the literature on nutrient limitation in streams, which is summarized and updated below.

The growth of attached algae in streams is controlled byh a complex of interacting physical, chemical, and biological factors. These include light, temperature, current, grazing, and competition, in addition to nutrients. Too much or too little of an environmental factor may be detrimental. If all other factors are favorable, the growth of algae will be limited by the nutrient in shortest supply. However, the limiting nutrient may vary with time or from place to place in the same body of water. In bioassays of waters with very low nutrient concentrations, like those of the Lake Tahoe region, additions of two or more nutrients will stimulate more growth of algae than the limiting nutrient alone. In most fresh waters which have been studied, the limiting nutrient is either nitrogen or phosphorus, although adequate quantities of both are necessary for optional growth. For reasons discussed below, it is apparent that nitrogen is limiting in the West Fork Carson River.

Inorganic nitrogen, particularly nitrate, is the form of nitrogen given most attention in nutrient studies. In aerobic waters, it is the form most easily available to algae. It is also the form most likely to reach surface waters by percolation of groundwater from wastewater disposed to land. If terrestrial vegetation is disturbed, interruption of normal soil nitrogen cycles may also result in the release of large quantities of nitrate to groundwaters, and ultimately to surface waters (10).

However, recent research indicates that nitrogen can be stored and recycled in streams, so that analysis of nitrate in grab samples may not document all the nitrogen available to attached algae. Storage occurs in stream sediments, living and dead organic matter, and in the "epilithon". The latter is the complex community of algae, bacteria, fungi, and small animals, embedded in a polysaccharide matrix, which covers all submerged rocks in streams (11). the "Nutrient Spiralling Concept", is a recent unifying theory which assumes, in contrast to nutrient cycling, that in any reach of a stream, part of the energy and nutrients will be stored, part will be cycled biologically, and part will be exported downstream(12). Spiralling length, "the expected downstream distance of a nutrient atom as it completes a cycle", is dependent on the rate of cycling between organims (or sediment) and water, and the degree to which downstream transport of dissolved or particulate matter is retarded. Application of this concept can provide an index of how efficiently a stream ecosystem uses nutrients in relation to downstream flux.

A tracer experiment in a Humboldt County, California, stream showed a 50 percent loss of injected nitrate over a 327 meter reach in a 24-hour period (13). Sixty-four percent of this loss was attributed to "transient storage" in permeable stream sediments, and 36% to biotic uptake. It was concluded that "the transient storage component may enhance biotic production by retention of nutrients for subsequent uptake, resulting a more efficient internal recycling within a defined reach".

d. Nitrogen limitation in the Carson River

Several types of evidence strongly suggests that the West Fork Carson River is nitrogen limited. Bioassays of waters of the Lake Tahoe and Truckee River systems, which receive precipitation from the same storms as the West Fork, and have similar geology, soils, and vegetation, indicate limitation by nitrogen and in particular by nitrate (9,14,15). Computation of nitrogen:phosphorus ratios from West Fork Carson River monitoring data also supports nitrogen limitation.

The concept of the N:P ratio was developed from bioassay studies, and has been applied mainly to planktonic algae in lakes. However, the concept has also been used in studies of Pacific Northwest rivers (16). Estimates of the "ideal" ratio of nitrogen to phosphorus for growth of algae vary (probably reflecting differences in requirements of different species, and different experimental conditions). However, a ratio of 10:1 or 11:1 is considered "average" (8,9). This means that in waters with concentrations of less than ten or eleven parts nitrogen to every part of phosphorus, nitrogen is limiting. In waters with more than ten or eleven parts nitrogen to one part phosphorus, phosphorus is limiting. The ratios are usually stated in terms of inorganic N and P.

Monitoring data for the West Fork Carson River show ratios of nitrate to total phosphorus of about 1:3. (Total phosphorus concentrations in grab samples are essentially the same as total phosphate.) This ratio indicates definite nitrogen limitation. At the same time, West Fork Carson River phosphorus concentrations (from 0.02 to 0.03 mg/l) appear high enough to support some additional growth of algae if more nitrogen is added. In 1978, primary productivity of Lake Tahoe phytoplankton was highest in May when nitrate and phosphate concentrations were approximately equal at about 4 micrograms (0.004 mg) per liter. When 10 micrograms of nitrate was added to bioassay cultures of this water, productivity increased 20% (14). Although stream periphyton may not react in the same way as lake plankton, this example shows that a very small change in nutrient concentration can produce a significant response. Actually, because current constantly replenishes nutrients, stream algae may be able to attain higher levels of productivity with lower ambient nutrient concentrations than are available to lake algae (8).

e. Critical nitrogen concentration

Assuming then, that addition of nitrogen to the West Fork Carson River would result in some increase in growth of algae, how much nitrogen would be required to produce "nuisance" conditions: Where should the nitrogen objectives be set to prevent such conditions?

Faced with a similar problem during the Truckee River Basin Plan update, Regional Board staff determined that growth of algae in Maris Creek represented clearly undesirable conditions, and calculated the nitrate nitrogen concentration which should prevent similar conditions from occurring in the Truckee River more than 10% of the time (9). The procedure used was as follows:

1. The critical nitrate concentration (mean nitrate concentration in Martis Creek, 0.10 mg/l) was established.

2. The critical concentration was allowed to be reached at the 10% flow (and exceeded at even lower flows).

3. The critical concentration times the 10% flow equalled the total flux (pounds per day) allowed to pass down the river at that site.

4. The natural concentration times the 10% flow equalled the natural flux passing down the river.

5. The difference between 3 and 4 was the assimilative capacity of the river.

6. The assimilative capacity was added to the natural flux passing down the river at the 50% flow to derive the total flux allowed at the 50% flow.

7. This total flux was used to calculate the concentration which would occur at the 50% flow.

8. The calculated concentration at the 50% flow became the recommended objective.

Regional Board staff applied this model to the West Fork Carson River, using the Martis Creek critical concentration of 0.10 mg/l nitrate nitrogen, a 50% flow of 39 cfs and a 10% flow of 16 cfs. The result was a potential recommended nitrate objective of 0.05 mg/l. Compared with monitored historical nitrate concentrtions of 0.01 mg/l at Woodfords and 0.03 mg/l at Paynesville, this calculation suggests that a small amount of additional nitrate could be allowed to reach the river without creating biostimulation comparable to that in Martis Creek. It also indicates that objectives set at historical quality would be more than adequate to prevent biostimulation similar to that in Martis Creek from occurring except at 10% or lower flows. This last point is important in considering whether objectives should be set at "better than historical quality" levels. Monitoring data suggest that agricultural return flows downstream of Woodfords are responsible for a decrease in water quality. Regional Board staff believe that additional monitoring is needed to document the sources of these changes before it can be determined whether improvements in water quality are feasible in this reach.

f. Conclusion

Nitrate nitrogen is the most critical parameter for which water quality objectives must be set in order to prevent biostimulation and protect the beneficial uses of the West Fork Carson River. Existing water quality is excellent for all beneficial uses. Preservation of existing high water quality is important to Alpine County residents, to millions of present and potential recreational visitors, and to downstream water users in Nevada.

Scientific calculations indicate that some change in water quality could be permitted without adversely affecting beneficial uses. However, Regional Board staff are recommending that no degradation be permitted for several reasons. First, the Martis Creek model may be a less than perfect model for the Carson River, and the "critical concentration" may be lower, or other limiting factors (eg., trace metals) may be involved. Second, a margin of safety seems desirable to allow for potential increases in nitrogen loadings which may not be fully controllable (e.g., atmospheric deposition, surface and subsurface flows from new watershed disturbance, increased nutrient mobilization caused by "acid rain"). Third, there seems to be no overriding socioeconomic justification for variance from the mandates of state and federal nondegradation policies. Considering Alpine County's phased growth policy, pressures for large-scale development in the study area are unlikely to occur before the next Basin Plan update. Preservation of existing water quality, with increased chemical and biological monitoring, will provide a sound basis for reconsideration of objectives should socioeconomic conditions at that time make degradation more desirable.

10. Comparison Of Proposed Objectives With Nevada Objectives

Table 17 compares present objectives, proposed objectives, and Nevada objectives. Proposed objectives are consistent with Nevada objectives, except for total phosphorus and percent sodium.

Total phosphorus and total phosphate are equivalent. The proposed Woodfords and State Line objectives of 0.02 and 0.03 respectively for total phosphorus are greater than the Nevada total phosphate objective of 0.016. Nevada monthly monitoring at Paynesville since 1967 indicates that phosphorus levels have been stable on a long-term basis (Table 2) and the mean of monthly means for the period of record is 0.03. It is uncertain what the Nevada objective is based upon.

It appears that the Nevada total phosphate objective is based upon the present Woodfords objective of .015 mg/l. If this is the case, very few data can support this value (4 samples). Based upon the long-term monthly monitoring record at Paynesville for total phosphate, it is recommended to establish the objective on monitored water quality rather than a previously established Nevada objective, unless other justification is presented.

The proposed percent sodium objective of 20 percent as a mean of monthly means is based on a historical data base comprised of 114 samples. The present Nevada objective of 20 percent as a maximum is more restrictive, and it is unclear what this is based upon. Our proposed 20 percent mean objective is well below recommended limits for irrigation, as seen in Table 18.

RATIONALE FOR PROPOSED AMENDMENTS TO CHAPTER 5: PROGRAM OF IMPLEMENTATION

A. CHANGES FROM IMPLEMENTATION PROGRAM IN 1975 PLAN

The proposed implementation program does not differ from that of the 1975 Plan with respect to discharges which it specifically allows or disallows. The principal difference is that the proposed program is more detailed. The proposed program provides detailed discussions of the need to prevent further illegal and objectionable STPUD discharges of domestic wastewater effluent as well as discussions of specific measures which must be specified in waste discharge requirements if STPUD is allowed to implement its proposed plan to change its discharge as follows:

- Cease discharge of tertiary domestic wastewater effluent to Indian Creek Reservoir and commence a new discharge of secondary wastewater effluent to a new reservoir which would have the single purpose of storage of effluent for irrigation.

- Change the locations of agricultural sites receiving wastewater effluent for irrigation, with some sites presently irrigated with tertiary effluent to be irrigated with West Fork Carson River water. This river water would be diverted through Indian Creek Reservoir to maintain the beneficial uses of the reservoir.

It is significant that the proposed program of implementation does not prohibit the proposed STPUD discharge. This is based on the conclusion that, with proper management, a discharge of this type could occur in the West Fork Carson River and Indian Creek watersheds without violating the proposed water quality objectives for Chapter 4, which have been discussed previously. On the other hand, the absence of a discharge prohibition in the implementation program would in no way constitute a permit to discharge. The District would have to satisfy the following requirements before the proposed discharge of secondary effluent could commence:

- Submit a complete report of waste discharge including all site-specific details necessary to assure that the general guidelines for waste discharge requirements which the implementation program specifies would be met.

- Complete all environmental documentation necessary to satisfy the requirements of the California Environmental Quality Act.

- Obtain authorization from the owners of the land where effluent transport, storage and discharge for irrigation would occur.

- Obtain waste discharge requirements from the Regional Board.

The 1975 Plan, on page I-5-42, discusses the need to improve irrigation practices in the West Fork Carson River and Indian Creek watersheds, and it is proposed to leave these discussions unchanged in the revised plan. Further, the proposed implementation program recommends periodic monitoring of individual agricultural return flows.

In summary, the proposed additions to the implementation program specify:

- that the Regional Board, in conjunction with assisting STPUD with facilities improvements grants to the maximum practical extent, continue enforcement actions as necessary: 1) to prevent unauthorized discharges of domestic wastewater effluent, 2) to assure that the legal beneficial uses of Indian Creek Reservoir are maintained, 3) to prevent leakage of effluent from storage and/or conveyance facilities, and 4) to prevent other violations of STPUD's waste discharge requirements.

- that the Regional Board include provisions in STPUD waste discharge requirements to minimize the amount of nutrients leaching into groundwaters from areas irrigated with domestic wastewater effluent.

- that if secondary effluent is disposed by irrigation of agricultural lands, the Regional Board would specify stringent waste discharge requirements and an extensive monitoring program to assure that the public health is adequately protected.

- that the Regional Board conduct periodic monitoring of irrigation return flows entering the West Fork Carson River between Woodfords and Paynesville.

- that Alpine County continue enforcement of zoning regulations to limit densities of septic tank/leachfield systems.

- that Alpine County continue enforcement of ordinances controlling septic tank/ leachfield installations which implement the Criteria for Individual Waste Disposal Systems specified in the Plan.

- that STPUD correct infiltration and inflow (I/I) problems in its sewerage facilities.

- and that Alpine County implement non-point source controls to prevent and mitigate erosion and surface runoff problems.

B. EFFECTS OF PAST AND PRESENT DISCHARGES ON WATER QUALITY

1. Indian Creek Watershed

Since STPUD began discharging domestic wastewater effluent to Indian Creek Reservoir in 1968, the quality of its waters has been dominated by the discharge. Unfortunately, the discharge has had adverse effects on the beneficial uses of the reservoir at least since 1972, when a major fish kill of trout was documented. Subsequently, other fish kills as well as nuisance conditions from excessive aquatic growths occurred periodically.

Presently, the beneficial uses of Indian Creek Reservoir are being maintained, but it is highly doubtful that existing STPUD facilities can continue to provide adequate wastewater treatment. In recognition of this problem, the proposed implementation program specifies that the Regional Board take actions necessary for improvements to STPUD facilities.

It is apparent from the relatively poor quality and from the limited fish population in Indian Creek that this stream has suffered from the activities of man. The improvements to STPUD facilities which the proposed implementation program mandates will cease illegal discharges of STPUD effluent to the creek. Additionally, improvement of irrigation return flows may be warranted.

There have been no significant waste discharges other than the STPUD discharge and irrigation return flows in the Indian Creek watershed. There have been no documented impacts on groundwaters from waste discharges in the watershed.

2. West Fork Carson River Watershed

Discharges of wastes in the West Fork Carson River Hydrologic Unit have principally been comprised of a small number of onsite domestic wastewater systems and irrigation return flows. Most of the irrigation occurs west of the river from Paynesville to the State Line, and the preponderance of the STPUD discharge to agricultural lands has occurred in this area.

As discussed previously with respect to proposed amendments to Chapter 4, control of discharges of nutrients is critical for prevention of biostimulation in surface waters. The most significant nutrient which could enter the river from both onsite domestic wastewater disposal systems and irrigation return flows is nitrogen. To assess the effects of these discharges on the West Fork Carson River, we have used historical data for river nitrogen concentrations and flows to calculate annual average nitrogen flux, in units of pounds of nitrogen flowing down the river per day, for several points along the river. Since such flux is expected to change little from point to point due to natural influences, significant increases would indicate inputs to the river from waste discharges. Further, to facilitate separating contributions from onsite domestic wastewater systems and irrigation return flows, a tabulation of potential nitrogen flux inputs from the domestic systems was performed for the same points along the river. The results are presented in Figure 3, and the details of construction of the Figure are presented in Appendix B.

Examination of Figure 3 shows that waste discharges have contributed nitrogen to the river particularly between Woodfords and Paynesville. Since the calculated flux increase from Woodfords to Paynesville is much greater than could be contributed by existing domestic wastewater systems, it is apparent that irrigation return flows are the primary source of the nitrogen inputs. This is the reason that the proposed implementation program states that the Regional Board should conduct periodic monitoring of irrigation return flows between Woodfords and Paynesville.

There is one more important observation to be made from examination of Figure 3. The flux increase from Paynesville to the State Line is less than ten percent. Even if it were assumed that this entire increase were due to the STPUD discharge, it can be assumed that the STPUD discharge has had a small effect on the river, and a much smaller effect than irrigation return flows from areas not irrigated with STPUD effluent. Actually, it is probable that the increase is predominantly due to irrigation of other lands between Paynesville and State Line which are closer to the river and which have less stringent tailwater controls than those lands which have been irrigated with STPUD effluent.

C. POTENTIAL WATER QUALITY IMPACTS OF PROPOSED STPUD DISCHARGE

1. Consideration Of Changes In Disposal Areas

Since no adverse impacts from irrigation of agricultural lands with STPUD effluent have been documented, it can be concluded that the effluent is currently disposed on desirable areas.

Implementation of stringent tailwater controls, as specified in the proposed implementation plan, will prevent surface flows of effluent into surface waters from new disposal areas. However, the hydrologic and geologic conditions in some new areas may be such that increased subsurface flows of effluent to surface waters occur. The proposed implementation program specifies that monitoring be required to assess whether significant amounts of nutrients were travelling towards the river in subsurface flow. It is further specified, that if significant amounts of such travel were detected, control measures such as increased applications of non-effluent waters between the river and effluent disposal areas or relocation of effluent disposal areas would have to be implemented.

2. Consideration of Increased Nutrient Discharge

Aside from differences in location of effluent disposal by irrigation, the most important difference between the present and the proposed discharge schemes is that the amounts of the nutrients nitrogen and phosphorus which would be discharged would be substantially increased for the latter. The total nitrogen discharge would approximately double, and the phosphorus discharge would increase by approximately an order of magnitude. With proper management of the discharge, this increase in nutrients could result in a net benefit, since the long-term need for purchase and application of fertilizer to the irrigated lands would decrease. To maximize such benefits and prevent possible adverse effects from leaching of nutrients past irrigated crop root zones, the proposed implementation program specifies that the waste discharge requirements for the discharge would have to specify control measures at least as strict as the following:

- Irrigation efficiency must be at least 50 percent in all effluent discharge areas. Higher efficiencies should be mandated for specific areas to the maximum practical extent, based on site limitations and the limitations of available technology.

- Prevention or application of effluent to agricultural lands during the winter period when crops are not growing.

- Minimization of discharge of the nitrate form of nitrogen to agricultural lands to the maximum practical extent.

3. Possible Toxic Substances In STPUD Wastewater

The South Tahoe Public Utility District's proposed conversion from tertiary to secondary treatment has generated public concern that increases will result in toxic substances exported to Alpine County for irrigation purposes. As a result of this concern, STPUD has begun a monitoring program for trace elements (heavy metals), pesticides and herbicides, and trihalomethanes (THMs). Within the STPUD service boundaries, no heavy industry exists which would input large quantities of toxic wastes. However, small private businesses, hospitals, and laboratories may discharge small quantities of waste which could be toxic at high concentrations.

a. Heavy metals

Table 22 presents the results of the heavy metal monitoring conducted in 1979 and 1983. In many cases, constituents were not detectable for both secondary and tertiary effluent. All constituent levels are below drinking water standards, except for manganese. Heavy metal levels in secondary effluent are generally higher than tertiary levels, which is expected. All levels are well below the recommended maximum for irrigation waters.

The drinking water standard for manganese was established on the basis of esthetic and economic considerations rather than physiological hazards. Manganese is undesirable in domestic water supplies because it causes unpleasant tastes, deposits on food during cooking, stains and discolors laundry and plumbing fixtures, and may promote the growth of some micro-organisms in reservoirs, filters, and distribution systems.

EPA studies indicate that 80 to 90 percent of the heavy metals applied to agricultural lands are removed by plant uptake and soil adsorption. Plant uptake is small compared to soil adsorption. Soil adsorption will depend largely on the type and pH of the soil.

The Soil Conservation Service (SCS) monitored the pH of soils proposed to receive STPUD secondary effluent at levels ranging from 5.8 to 7.8. (2). SCS concluded that this range was adequate for heavy metal adsorption. However, STPUD has monitored the same soils at pH values as low as 5.0. Soils with pH values of 5.0 will probably demonstrate lower heavy metal removal percentages than exhibited by EPA studies.

Heavy metal concentrations in STPUD secondary effluent are below drinking water standards necessary to protect public health. Heavy metal concentrations will be reduced by plant uptake and soil adsorption. Dilution will further reduce heavy metals concentrations in wastewater effluent which enters groundwaters. Based upon these facts, heavy metal contamination of domestic water wells is not expected.

Accumulation of heavy metals within the soil profile may occur as soil adsorption removes high percentages of the heavy metals in the applied wastewater. Accumulations may deplete the soil's capacity to adsorb additional heavy metals. However, in many cases it could take several hundred years to deplete the soil's adsorption capacity. The expected life for each soil is quite site specific as it depends on individual soil characteristics.

b. Possible trihalomethanes in STPUD effluent

Table 23 presents the results of the STPUD trihalomethane monitoring conducted in 1983. Five day ultimate concentrations were determined in addition to the instantaneous concentrations. Public health standards are based upon instantaneous concentrations. As shown in Table 23, instantaneous concentrations are considerably less than ultimate concentrations.

In every case, the ultimate 5-day concentration for secondary effluent was less than the tertiary effluent concentrations. This is the result of the large additions of chlorine required for pH control and ammonia-nitrogen removal, both part of tertiary treatment processes. Secondary effluent was chlorinated to the degree necessary for disinfection purposes. Since trihalomethanes are formed from organic substances and chlorine, reduction of chlorine to only the level necessary to disinfect the wastewater will result in lower trihalomethane levels.

Trihalomethane levels for both 5 day ultimate and instantaneous concentrations are below the public health standard. From this monitoring, it appears that the STPUD conversion from tertiary to secondary treatment will result in a reduced public health risk from trihalomethanes contamination.

c. Possible pesticides and herbicides in STPUD effluent

Twenty-five hour composite samples were analyzed for general chlorinated pesticides, general organo-phosphorus pesticides, and general herbicides in raw STPUD effluent, secondary STPUD effluent, and tertiary STPUD effluent. No pesticides or herbicides were detected. Additional pesticide and herbicide monitoring is scheduled for June, 1983.

4. Possible Adverse Effects On Public Health

The proposed program of implementation specifies that STPUD would be subject to the following requirements for protection of the public health:

- Strict effluent limits for Total Coliform Organisms and Turbidity.
- Pre-discharge potential effluent disposal site assessments to assess risks of groundwater contamination.
- Buffer areas to prevent effluent disposal too close to wells and spray disposal too close to dwellings and travelled ways.
- Groundwater monitoring to assess impacts after disposal commences.

As discussed above, sampling has indicated levels of toxic substances in STPUD secondary effluent are not high enough to pose health risks. Further, maximization of irrigation efficiency and strict tailwater controls as specified in the proposed program of implementation would serve to minimize amounts of effluent reaching groundwaters and surface waters.

RATIONALE FOR PROPOSED AMENDMENTS TO CHAPTER 6 (PLAN ASSESSMENT)

The California Environmental Quality Act ("CEQA", Public Resources Code 21000 et seq.) requires state agencies to analyze and mitigate the environmental impacts of their actions. The 1975 Basin Plan also served as an Environmental Impact Report (EIR). Chapter 6 summarized the findings required by CEQA, and Part II of the Plan (which was not formally approved by the State Board and EPA) provided background information on the environmental setting of the North Lahontan Basin. The 1975 analysis of impacts related to the present Carson River planning area was centered on proposed mechanical harvesting of aquatic vegetation in Indian Creek Reservoir (Table 6-2).

Since adoption of the 1975 Basin Plan, CEQA has been amended (Section 21080.5) to permit the preparation of a short "Functional Equivalent Document" (FED) instead of a more detailed EIR for environmental analysis of Basin Plan amendments. The Porter-Cologne Act has also been amended (Section 13241) to require consideration of economic factors and regional housing needs as part of the Basin Plan update process.

For the sake of completeness, the proposed Carson River Basin Plan amendments include revisions to Chapter 6 in relation to the STPUD facilities plan and other recommended control measures. A more complete environmental analysis is contained in a separate FED, which is incorporated into Chapter 6 by reference. Economic considerations and housing needs are discussed below.

ADDITIONAL CONSIDERATIONS

A. ECONOMIC CONSIDERATIONS

1. Lake Tahoe Basin

The economy of STPUD's service areas is discussed in detail in a number of recent reports (22,23,24,25). The area's economy is dependent on casino gaming in Nevada, winter sports, hotels and motels, and related commercial service businesses. The economy is seasonal, involving many low and moderate income employees. The average annual household income was estimated at $19,730 in 1978. Employment is seasonal; winter employment is approximately 25% less than summer employment.

STPUD's customers currently pay a connection fee of $1,330 per sewer for new construction, and an annual service fee of $68.40 per unit. The average single family home uses 3.2 sewer units. Unbuilt lots are also assessed for sewer improvements. Default on property taxes and assessments has been high in recent years.

Implementation of STPUD's facilities plan, which could occur as a result of Basin Plan amendments, would result in cost savings to STPUD, and perhaps eventually to its customers. Operation and maintenance costs would be reduced by conversion from tertiary to secondary treatment, but capital costs of new facilities would be high. Recent and proposed expenditures by STPUD on upgrading of its treatment plant and export facilities are summarized in Table 20.

2. Alpine County

The economy of Alpine County, and the "East Slope" in particular, is discussed in several reports (7,22,23,27,28,29) from which the following discussion is taken. Like the economy of the Tahoe Basin, it is seasonal, and largely dependent on recreational tourism - in this case, on outdoor recreation. the county as a whole receives up to 2.2 million visitors annually, mainly in the summer. Other important components of the economy are agriculture, timber harvesting, and government. The latter category reflects the fact that most of the county is in public ownership.

Alpine County's economy is "dependent". East Slope residents rely on the Carson Valley in Nevada for many basic goods and services, because of the County's small population and geographic isolation.

Like other counties in California, Alpine County has suffered from the nation-wide recession and the loss of property tax revenue following Proposition 13. Per capita income in 1979 was $6,024, compared to a state-wide average of $10,037. Unemployment in the county as a whole was 12.5% in 1981; this includes the West Slope ski resorts which employ seasonal workers.

Implementation of the proposed Basin Plan amendments would involve both costs and benefits to Alpine County residents.

Maintenance of the existing excellent quality of the West Fork Carson River would promote continued recreational uses, and associated commercial services in the county. Improvement of the quality of Indian Creek Reservoir could increase recreational visitation (although the proximity of secondary effluent in Harvey Place Reservoir could decrease visitation to ICR).

Implementation of STPUD's facilities plan could provide temporary construction employment for county residents. It would benefit ranchers by reducing or eliminating fertilizer costs, and by providing a reliable source of water during drought years. By stabilizing the agricultural economy, it could provide benefits to service industries. On the other hand, ranchers would experience "costs", including 1) increased regulation of the timing, methods, and rates of irrigation; 2) risks of groundwater and soil degradation; and 3) loss of opportunities to develop their property for residential or commercial use.

Owners of residential property near the areas proposed for irrigation with effluent have expressed concern that the presence of effluent nearby will adversely affect property values. Assuming that human health risks from effluent can be minimized, the effect on property values would be largely a matter of subjective aesthetics, and would be difficult to quantify.

Alpine County could receive other cash or "in kind" benefits as part of the mitigation package under negotiation with STPUD. These could include mitigation fees, financing for an independent monitoring program, or reserved capacity in Harvey Place Reservoir for treated effluent from development in Alpine County. In taking advantage of this capacity, the county would of course have to go to the expense of constructing or expanding sewage collection and treatment facilities. The county could also incur increased costs in dealing with adverse impacts of the STPUD plan, if mitigation measures should prove inadequate.

The Regional Board and other regulatory agencies could incur increased costs in monitoring and oversight activities if the STPUD proposal is implemented.

B. HOUSING CONSIDERATIONS

1. Lake Tahoe Basin

Housing needs in the Lake Tahoe Basin are discussed in detail in References 22,23,30,and 31. Basically housing problems common elsewhere in California are aggravated by the Basin's special economic and environmental conditions. The Nevada casinos hire large numbers of low and moderate income workers, many of whom seek housing in California. They must compete for rental housing with "vacation rental" visitors, who can generally afford to pay more. There is a trend toward conversion of apartments and motels into "timeshare" condominiums, further reducing the supply of "affordable" housing. Many available units are older homes which were constructed as summer cabins and which may be substandard for year-round occupancy. Other housing problems identified for STPUD's service area include overpayment and overcrowding (30). High construction costs, needs for additional weatherization and environmental mitigation measures, and general market conditions present little incentive for the construction of affordable housing. However, the major constraint on building all types of housing in recent years has been a shortage of wastewater treatment capacity.

The Tahoe Regional Planning Agency is considering a Regional Plan alternative which would encourage redevelopment of several "substandard" areas in the city of South Lake Tahoe, and would include a phased growth system with annual permit allocations reserved for "affordable" housing. This plan would require further expansion of STPUD's treatment plant, involving further waste discharge permit and environmental review, grant funding and mitigation requirements.

The proposed Basin Plan amendments, by permitting STPUD to convert to secondary treatment, could facilitate additional residential development in the Tahoe Basin in that expansion of a secondary treatment plant is easier and less expensive than expansion of an advanced wastewater treatment plant.

2. Alpine County

Housing needs in the Carson River Basin Planning area are discussed in Alpine County's 1980 General Plan Housing Element (27). This plan acknowledges that Alpine County is a desirable place to live, and that many people might like to move there; however, it concentrates on the housing needs of existing residents. Housing problems identified in the plan include:

1. A shortage of unsubdivided private land which is suitable for construction of homes with private wells and septic tank/leachfield systems. (Most of Alpine County is in public ownership, and much of the private land is environmentally sensitive.)

2. A high percentage (actually involving a small number of units) of substandard housing. A survey found 14.3% of the housing in the Woodfords/Markleeville area to be in need of repair; most of this need was attributed to elderly residents unable to perform the maintenance needed in the area's severe climate.

3. Ongoing Indian housing needs. Approximately 116 of the Basin Planning area's inhabitants are Native Americans. Contruction of the Dutch Valley Indian Community has alleviated much of a previous substandard Indian housing problem, and the community has capacity for 21 additional units. However, adequate Indian housing is still perceived as a county-wide problem.

"Affordable" housing is perceived as less of a problem than the availability of housing (see #1, above). The problem of large numbers of resort employees seeking rentals in a resort/second home market is more prevalent near West Slope ski areas than in the Basin Planning area. The vacancy rate for the county as a whole was high in 1980, but when second homes were excluded, very few units were actually for rent or sale.

Overcrowding is not considered a problem; only 3.6% of Alpine County housing units were overcrowded in 1970.

The County Plan identifies a need to study ways to increase the use of manufactured housing. Unfortunately, the severe climate makes strict building codes necessary for mobile homes, and manufactured housing which meets these codes may not be "affordable".

Alpine County's 1982 General Plan (28) (which incorporates the 1980 Housing Element) includes zoning which would allow up to 11,468 residents in the Woodfords-Markleeville area by the year 2019. It also includes policies which would phase growth by limiting annual approvals of new development to about 10% of existing development, and which would require developers to bear the costs of new public services. These policies, together with market conditions, high construction costs, and the desire of many current county residents to preserve their rural lifestyle, will probably result in relatively slow growth.

The proposed Basin Plan amendments will not prevent the construction of housing to meet Alpine County's presently documented housing needs.

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APPENDIX A

TO: ROY C. HAMPSON, EXECUTIVE OFFICER

FROM: Judith E. Unsicker, E.S. IV

DATE: February 17, 1983

SIGNATURE: Judith E. Unsicker

SUBJECT: HISTORY OF IRRIGATED AGRICULTURE IN THE WEST FORK CARSON RIVER HYDROLOGIC UNIT

During the January 1983 public workshop in Alpine County on the proposed Basin Plan update for the West Fork Carson River and Indian Creek watersheds, a comment was made to the effect that agricultural return flows have been reaching the river for years with no adverse impacts on beneficial uses. At the direction of Michael James, I have done a brief literature survey to document the history of irrigation in this area.

The first permanent white settlement in the West Fork Carson River watershed was in 1847 at what is now the community of Woodfords. Woodfords Canyon became a major travel route for emigrants crossing the Sierra Nevada to the California gold fields. Trading posts, hotels, and settlements grew up to serve travelers "every two or three miles along the route through Woodfords, Hope Valley, and on beyond the summit" (Lang, 1964). Other activities in the watershed in the 1850's and 60's included dairying, ranching, and the operation of a sawmill, shingle mills, and toll roads.

> "Traders and station keepers along the Carson River Route began, as early as 1852, to cut the banks and spread the waters in an effort to increase the growth of grass in the natural meadows along its banks and generally to extend the meadow area" (Dangberg, 1975).

This early irrigation was done primarily to increase the fodder available to travelers' livestock. The number of new acres brought under cultivation each year in the 1850's and 60's bore a direct relationship to the number of people coming to or through the valley each year. Dangberg outlines an increase from 260 acres under irrigation in the West Fork watershed in 1852 to a total of 6565 acres in 1866. Increases were slower over the next half century; the total irrigated area in the West Fork watershed in 1975, including both California and Nevada, was 10,744 acres. The U.S. Department of Agriculture (1975) reported a total of 7,906 irrigated acres in the Alpine County portion of the Carson River Basin, 5,796 of them in the West Fork watershed.

Mud Lake reservoir was completed on Indian Creek in Nevada in 1879, and several small reservoirs were constructed near the headwaters of the West Fork in the early twentieth century (USDA, 1975). During several wet years in the nineteenth century, the East Fork Carson River left its banks and flooded lands tributary to the West Fork. This induced ranchers to build and maintain their own small flood control dams (Dangberg, 1975).

All of these historic activities, involving construction, land disturbance, and the addition of human and animal wastes and of chemical fertilizers to the watershed, must have affected the quality of surface waters. Water quality monitoring records go back only to 1960, and I have not found statistics on the history of fertilizer use or on the annual numbers of animals pastured in the watershed. It is probable that chemical fertilizers were not used until after 1900, when they became relatively cheaper to buy, transport, and appl-

The Carson River Basin Council of Governments (CRBCOG, 1977) identified surface and subsurface agricultural return flows as major nonpoint sources of water pollution to the river in Nevada. The attached table from the CRBCOG study summarizes the results of water quality measurements by the University of Nevada, Reno on surface return flows from two Carson Valley soils. For each constituent, "head water" and "tail water" concentrations are given in milligrams per liter, and a "concentration factor" is computed. Thus the nitrate nitrogen concentration in the "head water" applied to the Sarman-Witt soil was 0.25 mg/l, and the concentration in "tail water" leaving the soil was 0.40 mg/l. The "tail water" concentration was 1.6 times greater than that of the "head water".

Surface water data for the West Fork Carson River in California, reviewed by Regional Board staff in preparation for the Basin Plan update, show increases in several constituents between Woodfords and Paynesville, and between Paynesville and the state line. Staff have tentatively attributed these increases to agricultural return flows. We are now researching current literature on water quality criteria in order to determine the potential impacts of present and future return flows on beneficial uses.

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Attachment

Table 7

REGIONAL BOARD CHEMICAL WATER QUALITY[1] FOR THE

WEST FORK CARSON RIVER (1981–1982)

Constituent	Units	Number of samples	Hope Valley	Woodfords	Paynesville
Total filterable residue	mg/l	11	49	53	60
Electrical conductivity	µmhos/cm	11	62	64	72
Sulfate	mg/l	2	3.5	3.0	4.0
Total Phosphorus	mg/l	13	0.02	0.02	0.03
Nitrate NO_3-N	mg/l	13	0.01	0.01	0.03
Kjeldahl Nitrogen	mg/l	13	0.12	0.13	0.15
Total Nitrogen	mg/l	13	0.13	0.14	0.18

[1] mean of monthly means

TABLE 13
SOUTH TAHOE PUBLIC UTILITY DISTRICT CHEMICAL WATER QUALITY DATA FOR INDIAN CREEK IN DIAMOND VALLEY 1981 AND 1982

Constituent	Units	Number of Samples	Mean[1]	Maximum Value
Total Filterable Residue	mg/l	16	195	389
Electrical Conductivity	umho/cm	15	279	620
Chloride	mg/l	2	22	40
Alkalinity	mg/l	16	63	96
Total Phosphorus	mg/l	16	0.08	0.25
Nitrate NO_3-N	mg/l	16	0.52[2]	1.79
Kjeldahl Nitrogen	mg/l	16	0.38	0.90
Total Nitrogen	mg/l	16	0.90	2.28

1 Mean of monthly means

2 Adjusted nitrate values due to the use of the Brucine analytical method.

TABLE 14
SPATIAL COMPARISON OF INDIAN CREEK
1981 IRRIGATION SEASON (JUNE - SEPTEMBER)
South Tahoe Public Utility District Monitoring

Constituent	Units	Indian Creek Above Snowshoe #1	Diamond Valley	Dutch Valley Near State Line
Total Filterable Residue	mg/l	119	322	246
Electrical Conductivity	umho/cm	162	506	338
Alkalinity	mg/l	59	87	89
Total Phosphorus	mg/l	0.08	0.09	0.12
Nitrate NO_3-N	mg/l	0.22	1.13	0.07[1]
Ammonia NH_3-N	mg/l	0.08	0.05	0.05
Organic Nitrogen	mg/l	0.35	0.42	0.57
Total Nitrogen	mg/l	0.65	1.60	0.69[2]

1 Adjusted nitrate values due to the use of the Brucine analytical method.

2 Nitrate values used to determine total nitrogen values were adjusted as mentioned in No 1 above.

Water quality data obtained from monitoring conducted at Paynesville, State Line, and 2 miles north of State Line were used to determine the adjusted State Line value. It was desirable to adjust the Paynesville data because they represent the best long term data available on the West Fork Carson River. Monitoring at the State Line station and the station 2 miles north of State Line was conducted for one year at each station. Using the spatial changes between each of these stations and the Paynesville station and adjusting the long term Paynesville data, representative values can be obtained for the State Line.

The adjusted State Line values were determined as follows:

1. The State Line/Paynesville value ratio for each constituent was determined from Table 11 for the year 1981.

2. Since no 1982 data for State Line are available, 1982 values for State Line were estimated using recorded 1982 values for Paynesville and the station two miles downstream of State Line.

3. Using the estimated 1982 State Line values and the 1982 Paynesville data from Table 11, the 1982 State Line/Paynesville constituent ratios were determined.

4. The 1981 and 1982 ratios for each constituent were averaged to project the long-term ratio.

5. The long term estimated State Line value was determined by multiplying the long term Paynesville constituent value by the ratio determined in No. 4 above.

For the following proposed numerical objectives, the annual average value and 90 percentile value will no longer be used. All proposed objectives will be expressed in terms of the mean of monthly means value. A comparison of water quality monitoring data, present objectives, and proposed objectives is presented in Tables 15 and 16.

a. Total filterable residue objectives

The total filterable residue objective for the river at Woodfords will remain esentially the same as in the 1975 Plan. A new objective of 70 mg/l is proposed at the State Line station. This value results from adjusting the Paynesville data to State Line, as discussed previously.

b. Nitrate objectives

Nitrate objectives are proposed to be added to both the Woodfords and State Line stations. No objectives presently exit for nitrate. Although the sample mean value for nitrate is 0.01 at Woodfords, the proposed objective is 0.02. This difference is to account for limitations in the accuracy of nitrate analyses at levels below 0.02 mg/l. At State Line, the proposed objective corresponds with the adjusted State Line value of 0.03 mg/l.

c. Kjeldahl nitrogen objectives

The addition of a Kjeldahl nitrogen objective is also proposed at both the Woodfords and State Line stations. The proposed Woodfords objective corresponds to the measured value obtained from monitoring conducted at Woodfords. The proposed State Line objective of 0.22 is slightly higher than the adjusted State Line value of 0.19. This is to compensate for possible inaccuracies with the adjustment procedure and additional consideration of the measured value of 0.22 for 1981.

d. Total nitrogen objectives

A new total nitrogen objective is proposed for Woodfords. The existing objective of 0.20 mg/l is proposed to be replaced to an objective of 0.15 mg/l. A State Line total nitrogen objective of 0.25 mg/l is proposed to be added.

Total nitrogen objectives established at Woodfords as specified in the 1975 Plan were based upon very few data. Eleven nitrate samples were taken from 1961-70 and no Kjeldahl nitrogen records were available. Nitrate analyses conducted before 1970 are highly questionable due to the analytical technique used at that time. Therefore, the present Woodfords total nitrogen objective is proposed to be revised.

Because the nitrite form of nitrogen is usually found at undetectably low concentrations in natural waters, the proposed total nitrogen objectives are the sum of the nitrate objectives and the Kjeldahl nitrogen objectives.

e. Total phosphorus objectives

A new total phosphorus objective is proposed for Woodfords. The existing objective of 0.015 mg/l is proposed to be replaced by an objective of 0.02. A State Line total phosphorus objective of 0.03 mg/l is proposed to be added.

The 1975 Woodfords objective was based upon very few data. Only four analyses had been conducted. Nevertheless, this objective is fairly representative. Recent monitoring indicates that it does need to be modified.

As shown previously in Table 2, annual mean phosphorus levels in the West Fork appear to be stable. Monitoring conducted during 1981 and 1982, at Woodfords should be representative of existing water quality. The proposed Woodfords objective of 0.02 corresponds to the measured values.

The proposed total phosphorus objective of 0.03 mg/l at State Line is based upon the adjusted State Line value of 0.03 mg/l; this value was determined from monthly phosphorus data dating back to 1967. Therefore, it is representative of total phosphorus levels between Woodfords and State Line.

Table 8

U.S. GEOLOGICAL SURVEY WATER QUALITY DATA[1] OBTAINED DURING PRECIPITATION RUNOFF EVENTS

	Units	Number of samples	Annual mean[2]	Maximum value
Total filterable residue	mg/l	19	47	59
Specific conductance	μmhos/cm	29	60	81
pH	SU	16	7.6	7.0-7.8[3]
Dissolved oxygen	mg/l	18	10.4	8.5-12.0[3]
Orthophosphate	mg-P/l	15	0.02	0.06
Total phosphorus	mg/l	16	0.04	0.23
Nitrate NO_3-N	mg/l	18	0.03	0.08
Kjeldahl Nitrogen	mg/l	16	0.63	1.71
Total Nitrogen	mg/l	15	0.63	1.8

[1] Monitoring conducted during 1980 water year

[2] Mean of monthly means

[3] Minimum - Maximum values

Table 9

ACTUAL WEST FORK CARSON RIVER WATER QUALITY[1] FOR THE PERIOD OF RECORD

		Hope Valley	Woodfords	Paynesville	State Line	Dressler Rd.	USPHS recommended limit[4]
Total dissolved solids	mg/l	48	52	62	70	68	500
Nitrate[2]	mg/l	.01	.01	.03	-	-	10
Kjeldahl Nitrogen	mg/l	.11	.13	.18	-	-	-
Total nitrogen[3]	mg/l	.12	.14	.21	.25	.27	-
Total phosphate	PO_4-P mg/l	-	-	.03	-	-	-
Total phosphorous	mg/l	.02	.02	.03	.03	.07	-
Sulfate	mg/l	3.5	2.0	4.0	-	-	250
Chloride	mg/l	-	.8	2.1	2.0	2.0	250
Boron	mg/l	-	.02	-	-	-	-
Sodium Percent	%	-	20	-	-	-	-

[1] Mean of monthly mean value determined from data collected by the Regional Board, South Tahoe Public Utility District, Department of Water Resources, Nevada Division of Environmental Protection, and University of Nevada Reno.

[2] Mean of monthly mean value determined from Regional Board data only, omitting all Brucine Method measurements.

[3] Mean of monthly mean value adjusted to reflect differences in nitrate analysis.

[4] U.S. Public Health Service recommended limits for domestic water use.

Table 10

ANNUAL AVERAGE NITRATE VALUES[1] FOR MULTI-YEAR MONITORING PROGRAMS

South Tahoe Public Utility District (STPUD) monitoring

Nevada Division of Environmental Protection (NDEP) monitoring

	Year	Woodfords	Paynesville	Stateline	2 Miles north of State Line
STPUD	1981	0.06	0.09	0.08	-
	1982	0.08	0.09	-	0.10
NDEP	1980	-	0.05	-	-
	1981	-	0.04	-	-
	1982	-	0.05	-	-

[1] Equivalent to an annual mean of monthly means value as monitoring was conducted monthly.

TABLE 11

SPATIAL COMPARISON OF CHEMICAL WATER QUALITY

WEST FORK CARSON RIVER
Regional Board Monitoring
South Tahoe Public Utility District (STPUD) Monitoring
Annual Average Values[1]

Monitor	Year	Number of Samples	Hope Valley	Woodfords	Paynesville	State Line	2 Miles Downstream of State Line
Total Filterable Residue (mg/l)							
Regional Board	1982	8	47	52	57	—	—
STPUD	1982	8	—	50	50	—	69
	1981	8	—	56	64	70	—
Nitrate (NO_3-N mg/l)							
Regional Board	1982	11	0.01	0.01	0.03	—	—
STPUD[2]	1982	8	—	0.08	0.09	—	0.10
	1981	8	—	0.06	0.09	0.08	—
Total Nitrogen (mg/l)							
Regional Board	1982	11	0.12	0.12	0.16	—	—
STPUD[3]	1982	8	—	0.10	0.23	—	0.27
	1981	7	—	0.20	0.24	0.25	—
Total Phosphorus (mg/l)							
Regional Board	1982	11	0.02	0.02	0.03	—	—
STPUD	1982	8	—	0.02	0.04	—	0.07
	1981	8	—	0.02	0.04	0.03	—
Sulfate (SO_4 mg/l)							
Regional Board	1981	2	3.5	3.0	4.0	—	—

1 Equivalent to an annual mean of monthly means value because monitoring was conducted on a monthly basis.

2 The Brucine analytical method was used to determine nitrate concentrations. Values are high due to inaccuracies in the Brucine method at low concentrations. Thus, Comparisons of STPUD data and Regional Board data should not be made for nitrate here.

3 Total nitrogen values were adjusted to compensate for

TABLE 12

SOUTH TAHOE PUBLIC UTILITY DISTRICT 1982

CHEMICAL WATER QUALITY DATA FOR INDIAN CREEK RESERVOIR

Constituent	Units	Annual Mean[1]	Maximum Value
Total Filterable Residue	mg/l	369	422
Electrical Conductivity	µmho/cm	588	685
Chloride	mg/l	84	95
pH	SU[2]	—	7.47 – 9.74[3]
Alkalinity as $CaCO_3$	mg/l	93	109
TOTAL Phosphorus	mg/l	0.55	0.77
Nitrate NO_3-N	mg/l	4.58	7.21
Kjeldahl Nitrogen	mg/l	2.25	4.31
Total Nitrogen	mg/l	6.88	10.0

1 Mean of monthly means determined from 32 samples

2 Standard Units

TABLE 15

WEST FORK CARSON RIVER MONITORING AND OBJECTIVES

AT AND UPSTREAM OF WOODFORDS

Constituent	Units	Hope Valley[1]	Woodfords[1]	Woodfords California Objectives[2]	Proposed Woodfords California Objectives[3]
Total Filterable Residue	mg/l	48	52	55/70	55
Nitrate (NO_3-N)	mg/l	0.01	0.01	no objective	0.02
Kjeldahl Nitrogen	mg/l	0.11	0.13	no objective	0.13
Total Nitrogen	mg/l	0.12	0.14	0.20/0.40	0.15
Total Phosphorus	mg/l	0.02	0.02	0.015/0.02	0.02
Sulfate	mg/l	—	2.0	1.0/2.0	2.0
Chloride	mg/l	—	0.8	1.0/2.0	1.0
Boron	mg/l	—	0.02	0.02/0.10	0.02
Sodium	%	—	20	20/25	20

1 Mean of monthly means as determined in Table 9

2 Annual average / 90 percentile value

3 Mean of monthly means

TABLE 16

WEST FORK CARSON RIVER MONITORING AND OBJECTIVES
AT PAYNESVILLE AND STATE LINE

Constituents	Units	Paynesville[1]	State Line[1]	2 Miles Downstream of State Line[1]	Adjusted State Line[2]	Proposed California State Line Objectives[3]
Total Filterable Residue	mg/l	62	70	68	70	70
Nitrate (NO_3-N)	mg/l	0.03	–	–	0.03	0.03
Kjeldahl Nitrogen	mg/l	0.18	0.22	0.24	0.19	0.22
Total Phosphorus	mg/l	0.03	0.03	0.07	0.03	0.03
Sulfate	mg/l	–	–	–	2.0	2.0
Chloride	mg/l	2.1	–	–	2.0	2.5
Boron	mg/l	–	–	–	0.02	0.02
Sodium	%	–	–	–	20	20

1 Mean of monthly means as determined in Table 9.

2 Adjusted mean of monthly means from data collected at Paynesville, State Line, and Two miles downstream of State Line.

3 Mean of monthly means.

TABLE 17

CALIFORNIA AND NEVADA NUMERICAL OBJECTIVES

Constituent	Units	Woodfords California objectives[1]	Proposed Woodfords California Objectives[2]	Proposed California State Line Objectives[2]	Nevada Objectives[3]
Total Filterable Residue	mg/l	55/70	55	70	70/110
Nitrate (NO_3-N)	mg/l	—	0.02	0.03	0.11/0.29
Kjeldahl Nitrogen	mg/l	—	0.13	0.22	0.46/0.92
Total Nitrogen	mg/l	.20/.40	0.0	0.25	—
Total Phosphate	(PO_4-P) mg/l	—	—	—	0.016/0.03
Total Phosphorus	mg/l	.015/.02	0.02	0.03	—
Sulfate	mg/l	1.0/2.0	2.0	2.0	—
Chloride	mg/l	1.0/2.0	1.0	2.0	3.0/8.0
Boron	mg/l	0.02/0.10	.02	.02	—
Sodium	%	20/25	20	20	—/20

1 Annual average / 90 percentile

2 Mean of monthly means

3 Annual mean / maximum value

Table 18

PROPOSED OBJECTIVES COMPARED TO CRITERIA FOR IRRIGATED AGRICULTURE

Parameter and Station	Proposed objective[1]	Recommended Criteria[2,3]
Total Filterable Residue (mg/l)		
Woodfords	55	
State Line	70	525-1400
Indian Creek Reservoir	305	
Sulfate (mg/l)		
Woodfords	2.0	
State Line	2.0	336-576
Indian Creek Reservoir	—	
Chloride (mg/l)		
Woodfords	1.0	
State Line	2.0	62-177
Indian Creek Reservoir	—	
Boron (mg/l)		
Woodfords	0.02	
State Line	0.02	0.5
Indian Creek Reservoir	—	(for sensitive crops)

Table 18 cont

	Proposed Objective[1]	Recommended Criteria[2,3]
Sodium (Percent)		
Woodfords	20	less than 30%
State Line	20	to less than 60%
Indian Creek Reservoir	--	

1 Annual average (mean of monthly means)

2 McKee and Wolf, 1971 (Reference 18)

3 State Water Resources Control Board, 1981 (Reference 19)

TABLE 19
WATER QUALITY OF THE WEST FORK CARSON RIVER
WOODFORDS, OCTOBER 1979- SEPTEMBER 1980[1]

Parameter	Number of Samples	Mean Concentration	Maximum Concentration	Minimum Concentration
Total Kjeldahl N	18	0.62 mg/l	1.70	0.22
Total Ammonia	18	0.03 mg/l	0.12	0.00
NO_3-N (dissolved)	13	0.02 mg/l	0.06	0.00
NO_3-N (total)	7	0.04 mg/l	0.08	0.00
Total Phosphorus	18	0.06 mg/l	0.23	0.01
Dissolved Organic Carbon	18	3.7 mg/l	8.4	1.5
Total algae	10	891	3500	13
Chlorophyla	17	0.57 mg/l	5.25	0.39

1 U.S. Geological Survey Special Study - report not yet published.

TABLE 20

PAST AND PROPOSED EXPENDITURES BY STPUD ON FACILITIES IMPROVEMENTS

A. Treatment Plant Improvements

1. Expenses to date	Local Funds	Grant Funds
Improvements recommended by Consulting panel	$ 800,000	—
Facility Planning	$ 78,000	$ 500,000
"Head Start" Program		
Design	$ 38,000	$ 270,000
Construction and inspection	$ 1,100,000	$ 4,420,000
Plant Conversion Design	$ 150,000	$ 1,100,000
Totals	$ 2,166,000	$ 6,290,000

2. Proposed Expenses	Local Funds	Grant Funds
Plant Conversion construction and inspection[2]	$ 5,000,000	$ 19,500,000
Plant Expansion	$ 3,000,000	—

TABLE 20 continued

B EXPORT SYSTEM IMPROVEMENTS

1. Expenses to date	Local Funds	Grant Funds
Repair of leaks pipeline replacement and upgrading	$ 1,662,000	-0-
Engineering consultants	$ 239,000	-0-
Litigation	$ 340,000	-0-
Total	$ 2,241,000	-0-

2. PROPOSED EXPENSES	Local Funds	Grant Funds
Pipeline replacement	$ 5,000,000	-0-

C. TOTAL EXPENSES TO DATE	$ 4,407,000	$ 6,290,000
D. TOTAL PROPOSED EXPENSES	$ 13,000,000	$ 19,500,000

1 Data provided by STPUD staff, March 1983.

2. Includes construction of facilities in Alpine County.

Table 21

LOCATION[1] AND QUANTITY[3] OF POTENTIAL SEPTIC TANK/LEACHFIELD TOTAL NITROGEN INPUTS TO THE WEST FORK CARSON RIVER[2]

	SFU factor	SFU[4]	Loading, lb/day
Hope Valley[2]			
20 campground units	.25	5	.32 lb/day
0 motel/hotel	.50		0
1 residential	1.0		.06
Total loading[3]			.38
Woodfords[2]			
84 campground units	.25	21	1.34
13 motel/hotel	.50	6.5	0.42
35 residential	1.0	35	2.24
Total loading[3]			4.80
Paynesville[2]			
84 campground units	.25	21	1.34
33 motel/hotel	.50	16.5	1.06
85 residential	1.0	85	5.44
Total loading[3]			7.84
State Line[2]			
84 campground units	.25	21	1.34
33 motel/hotel	.50	16.5	1.06
127 residential	1.0	127	8.13
Total loading[3]			10.5 lbs/day

[1] Assumes all discharge from septic tank/leachfield systems enters river

[2] Water quality monitoring stations

[3] Cumulative total nitrogen inputs from septic tank/leachfield systems which would enter river upstream of monitoring station

[4] Equivalent number of single family dwelling units

Table 22

SOUTH TAHOE PUBLIC UTILITY DISTRICT TRACE ELEMENT LEVELS[2]

	Number of samples	Secondary effluent[1]	Final effluent[1]	Drinking water standard[3]	Livestock standard[4]
Aluminum	1	.0854/.0854	.160/.160	–	5
Arsenic	2	/<.004	/<.004	.05	0.2
Barium	2	.009/.01	/<.01	1.0	–
Beryllium	1	<.001/<.001	<.001/<.001	–	–
Cadmium	4	.002/.004	<.001/<.001	.010	.05
Chromium	2	<.02/<.02	<.02/<.02	.05	1.0
Copper	4	.02/.03	<.02/<.02	1.0	0.5
Iron	2	.11/.21	<.03/<.03	0.3	–
Lead	2	<.01/<.01	<.01/<.01	.05	0.1
Magnesium	3	3.03/3.15	2.75/2.90	–	–
Manganese	2	.04/.06	<.01/<.01	.05	–
Mercury	2	<.001/<.001	<.001/<.001	.002	.01
Molybdenum	3	<.01/<.01	<.01/<.01	–	–
Nickel	4	<.005/<.01	<.005/<.01	–	–
Selenium	2	<.005/<.005	<.005/<.005	.01	.05
Silver	2	<.001/<.001	<.001/<.001	.05	–
Vanadium	1	<.002/<.002	<.002/<.002	–	0.1
Zinc	4	.05/.06	.015/.02	5.0	25

[1] Average/Maximum, in mg/l

[2] Data Collected in 1979 and 1983

[3] USPHS standards

[4] US EPA recommended levels for livestock

Table 23

TRIHALOMETHANE MONITORING 1983

South Tahoe Public Utility District

	Number of samples	5-day ultimate concentrations[1] PPB[2] Secondary effluent	Tertiary effluent	Public Health standard
Chloroform	5	8/9	47/79	
Bromodichloromethane	5	1/1	5/6	
Chlorodibromomethane	5	2/4	2/3	
Bromoform	5	<1/<1	<1/<1	
Total		11/14	54/87	100[4]

		Instantaneous concentrations, PPB Secondary effluent	Tertiary effluent	Public Health standard
Chloroform	5	-	22	
Bromodichloromethane	5	-	2	
Chloro di bromo methane	5	-	1	
Bromoform	5	-	<1	
Total			25	100[4]

[1] Analysis conducted 5 days after sample taken to allow additional trihalomethane formation to occur

[2] Parts per billion

[3] Average/maximum

[4] USEPA maximum contaminant level (Federal Register, 1979)

FIGURE 1
U.S.G.S. Annual Water Flow
West Carson River
Woodfords Station
1939-1982

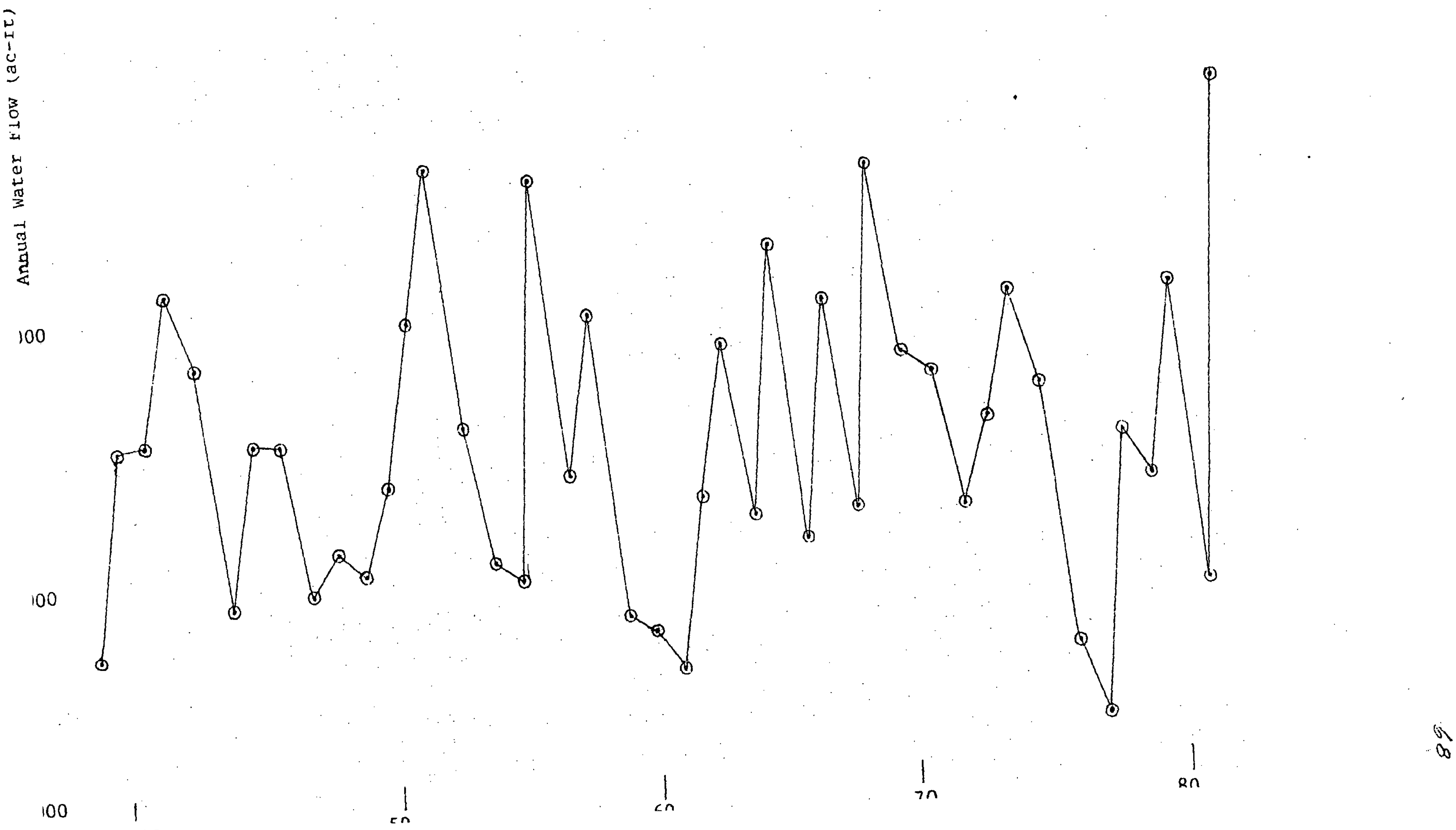


FIGURE 2
South Tahoe Public Utility District Monitoring
Indian Creek

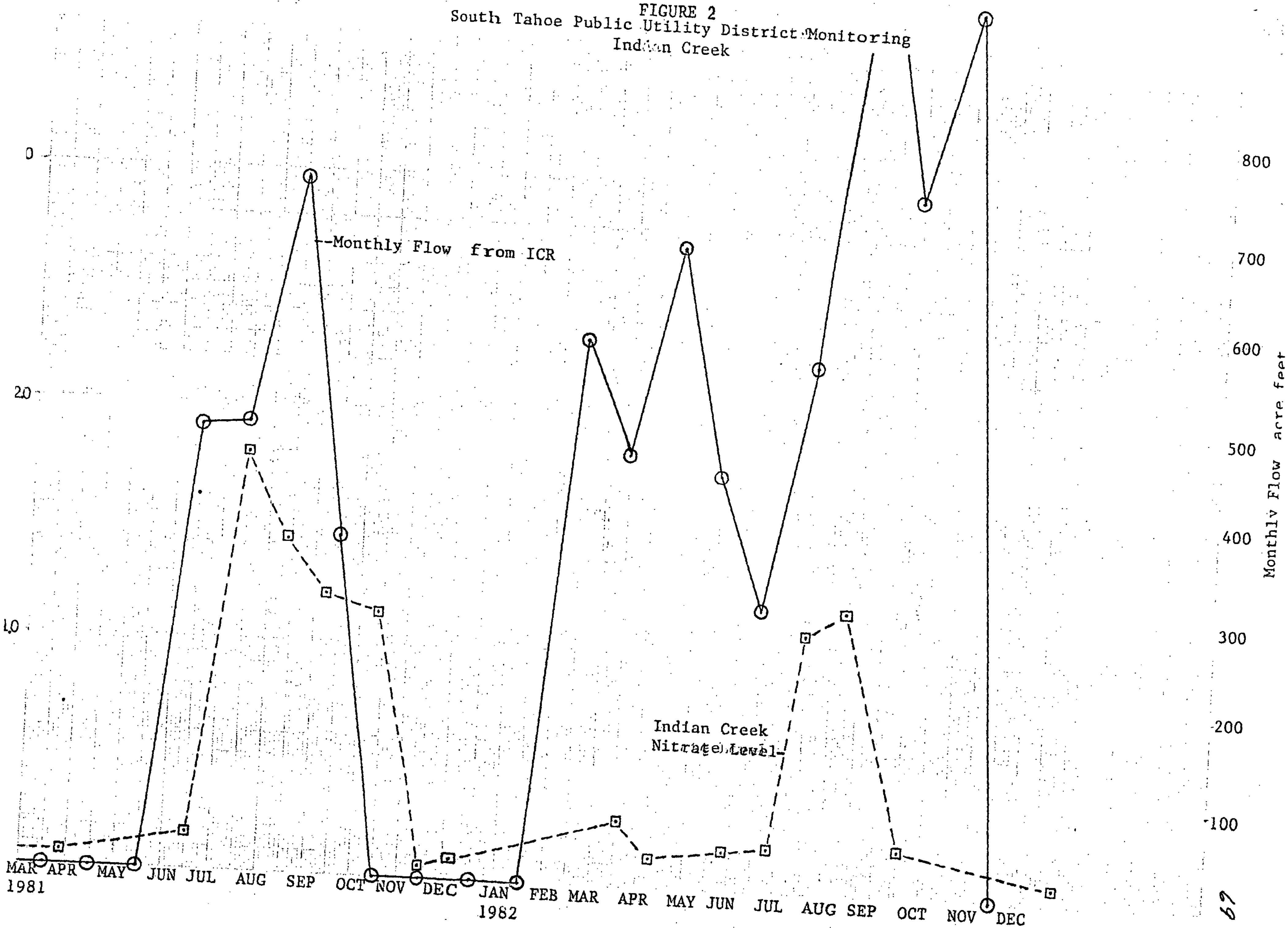
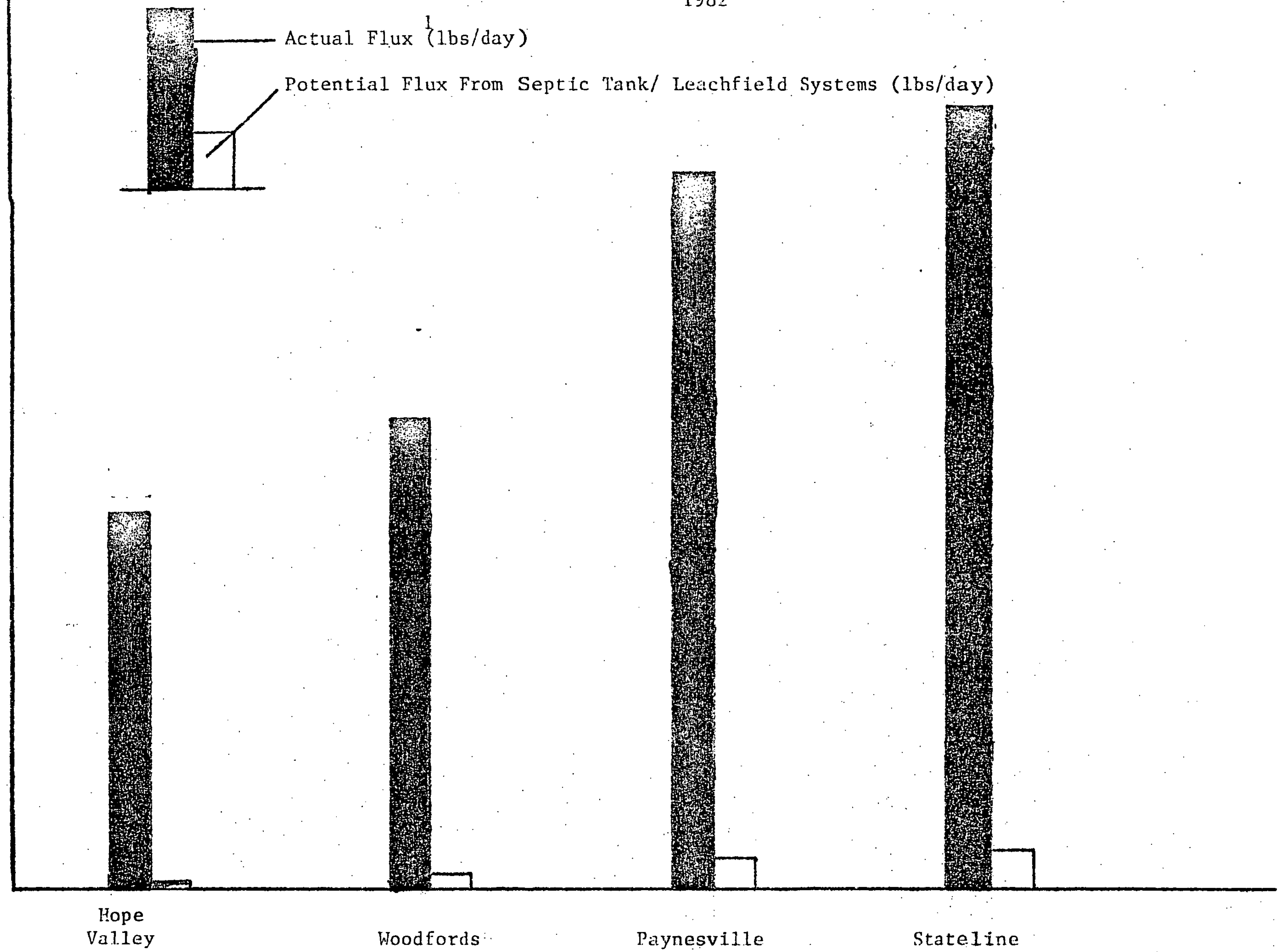


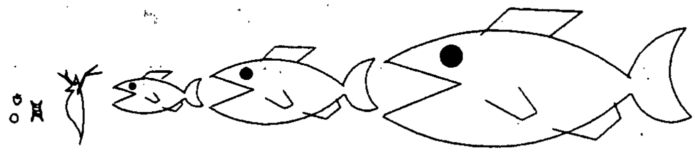
FIGURE 3
TOTAL NITROGEN LOADING TO THE WEST FORK CARSON RIVER
1982



[1] Calculated annual average flux.

DRAFT REPORT

WASTELOAD ALLOCATION STUDY
MONITOR CREEK, EAST FORK CARSON RIVER



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Excerpts from longer report.

FEB 28

CONTENTS:

ABSTRACT

A one-year duration, water quality monitoring study of Monitor Creek, Alpine County, California, was performed. The study included monthly samples of major chemical constituents, physical parameters and measurements of periphyton and benthic invertebrate colonization of artificial substrates at 7 sampling sites in Monitor Creek, extending from downstream of Heenan Lake to the junction with the East Carson River. Two additional sampling sites were established on the Carson River upstream and downstream of Monitor Creek. Lower sections of Monitor Creek have been greatly disturbed by mining activities, with runoff from mine and tailings piles entering the stream in many areas. Sampling sites were selected in relation to areas associated with historic gold and silver mining activities in the Monitor Creek Basin in an attempt to identify major sources of pollutants if possible.

In general, Monitor Creek has substantially poorer quality water than the Carson River, including particularly high concentrations of total dissolved solids, sulfate, and iron, although arsenic concentrations are lower in Monitor Creek than the Carson River. Values of pH were sometimes low (<5) in areas downstream from the major mining impacts, and nitrate and ammonia concentrations tended to be higher in downstream areas. Dissolved orthophosphate concentrations were higher in upstream areas in Monitor Creek. Water quality criteria for maintenance of aquatic life are violated more than twice as frequently in Monitor Creek than in the Carson River. Although most heavy metals are not implicated as the primary causal agent, downstream sections of Monitor Creek have greatly reduced rates of colonization by benthic invertebrates and periphyton algae. The most heavily impacted section of Monitor Creek seasonally contains relatively large amounts of non-photosynthetic organic material, most likely a fungus growth, and very little algae. Upstream sites relatively little affected by mining sustain abundant populations of benthic invertebrates and periphyton algae.

Primary production bioassays indicated that the impacts of water from different areas in Monitor Creek on primary production can vary seasonally and between sites. Most frequently however, water from the lower sites adversely affects primary production.

Overall, most available data is consistent with the suggestion that mining has had strong negative impacts on physical and chemical conditions and on stream biota in Monitor Creek. An intensive survey of an area between two sampling sites in lower Monitor Creek suggests that ~~most of~~ the impacts in that reach result from non-point sources and disturbance, and that identifying specific sites associated with the origin of most pollutant materials in Monitor Creek will be difficult. Major impacts of Monitor Creek were not detected in the Carson River, though electrtical conductivity was enhanced downstream.

THERE ARE NO POINT SOURCES UNLESS YOU CONSIDER TAILINGS PILES

ACKNOWLEDGEMENTS

This project has been funded wholly or in part by the United States Environmental Protection Agency using Section 205(j) (2) grant funds under cooperative agreement C- 060000-29-2 to the State Water Resources Control Board And by Contract 9-143-160-0 in the amount of $57,647 to the Board of Regents of the University of Nevada System on behalf of the University of Nevada Reno, Biology Department.

We wish to thank Ranjit Gill and Jason Churchill of the staff of the Lahontan Regional Water Quality Board for their help and cooperation. University of Nevada, Reno graduate students who assisted in this project include; Douglas Yowell, Hua Du, Yingchuan Yu, Jianguo Wang, and Donald Eaton.

pH

Monitor creek exhibited substantial temporal and site-specific variation in pH over the course of the study (Figure 9, Appendix Table A5). Although Carson River pH values were relatively more stable than those observed in Monitor Creek, there was an unexplained general tendency for pH to increase at all sites (both Carson River and Monitor Creek) during the study. This may have reflected the impact of the continuing drought during the study (Welsh and Stewart 1989), and the reduction of surface runoff, however it is not possible to identify the cause at this time.

M-2

The general increase in pH was insufficient to mask a dramatic pH decrease in Monitor Creek during the summer. Levels of pH in Monitor Creek were highest during the winter and lowest during the summer. Minimum pH values were seen during August and September at site ~~M3~~, when values of 4.2 and 4.3, respectively, were observed. With the exception of a pH of 6.2 at site ~~M3~~ in July, all other recorded pH values were above neutrality, and most were above 8. The lowest average pH value for Monitor Creek occurred during the July sample when all values were below 7.8.

M-2

NO SUCH VALUE RECORDED IN TABLE A-5 FOR M-3, but it's for M-2

Paired t-tests using data from the Carson River sites upstream and downstream from the mouth of Monitor Creek (C1 and C2) revealed no significant difference in pH between the sites (df=14, t= 0.495, p= 0.628).

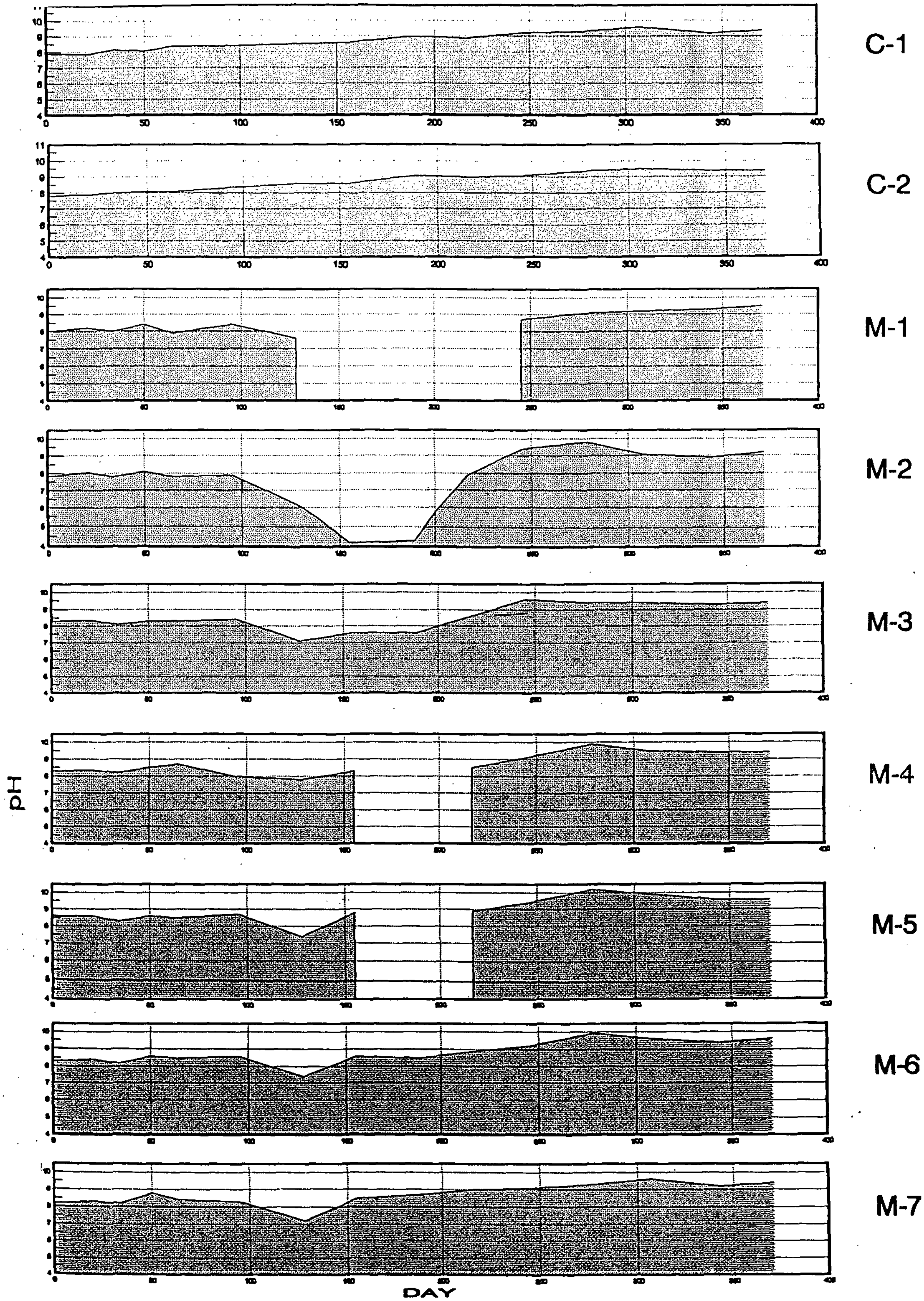


Figure 9. Values of pH measured at sites on Monitor Creek (M1 - M7) and the Carson River (C1, C2) during the study.

Sulfate

Sulfate concentrations were always much higher in Monitor Creek than in the Carson River (Figure 27, Appendix A; Table A9). Seasonally, sulfate concentrations tended to reach maximum levels in late summer, with minimum values found in the winter and spring.

Concentrations in Monitor Creek increased consistently and significantly from the upper to lower sample sites (Figure 28, linear regression; $n=99$, $t= -6.699$, $r^2= 0.316$, $p<0.001$). Highest sulfate concentrations were observed at site M3, though levels nearly as high were also observed at M1, M3 and M4.

Significant increases in sulfate concentration were observed during the study in both Monitor Creek (linear regression; $n=99$, $t= 5.952$, $r^2= 0.268$, $p<0.001$) and the Carson River (linear regression; $n=29$, $t= 4.902$, $r^2= 0.471$, $p<0.001$). In both cases, the observed increases are likely associated with the widespread progress of the drought rather than the result of localized factors specific to Monitor Creek.

Paired t-tests of data from Carson River sites upstream and downstream from the mouth of Monitor Creek (site C1 and site C2) revealed no significant difference in sulfate concentration between the sites ($df=13$, $t= -1.345$, $p= 0.202$). Sulfate concentrations in the Carson River were generally higher in the summer than those in the spring or autumn, though the differences are small.

Examination of the mass-balance relationships for sulfate in

Monitor Creek (Figure 29) shows increases over intervals between all sampling sites. The intervals between site M5 and site M4 and between site M3 and M2 are receiving the highest total loadings and highest loading rates. These two intervals contributed by far the largest amounts of sulfate to Monitor Creek. Both these reaches are immediately downstream from large mine or mill tailings piles and, in the case of the interval from site M3 to site M2, also receiving drainage from the Zaca Mine adit. Sulfate loading seems to be very strongly linked to the historic mining disturbance in the area.

$SO_4^=$ LEVELS WILL [illegible] [illegible] [illegible] [illegible]
w/o THIS [illegible] [illegible] IT LOOKS [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible] OF [illegible]
[illegible] [illegible]

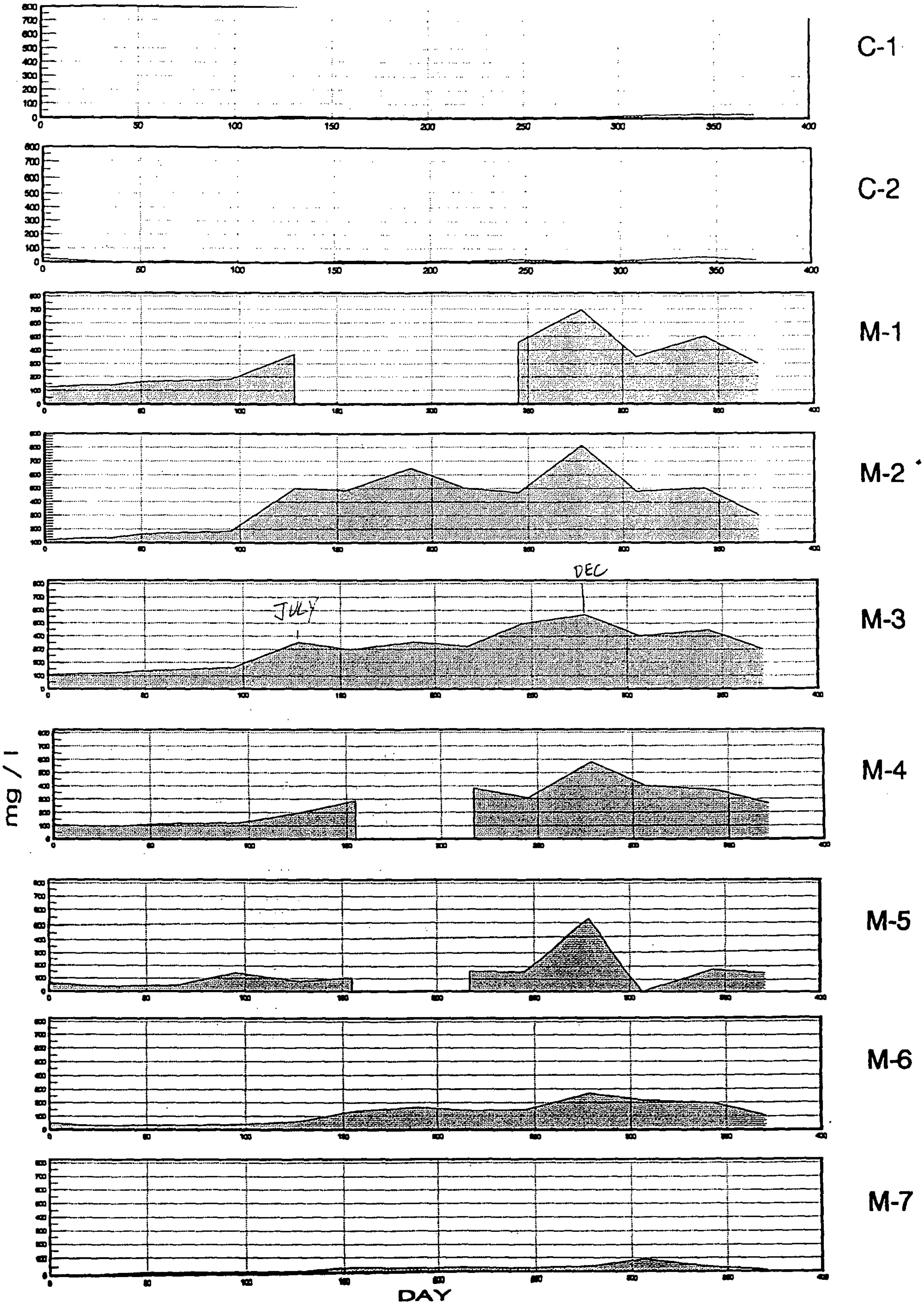


Figure 27. Sulfate concentrations (mg l^{-1}) determined from water collected at sites on Monitor Creek (M1 - M7) and the Carson River (C1, C2) during the study.

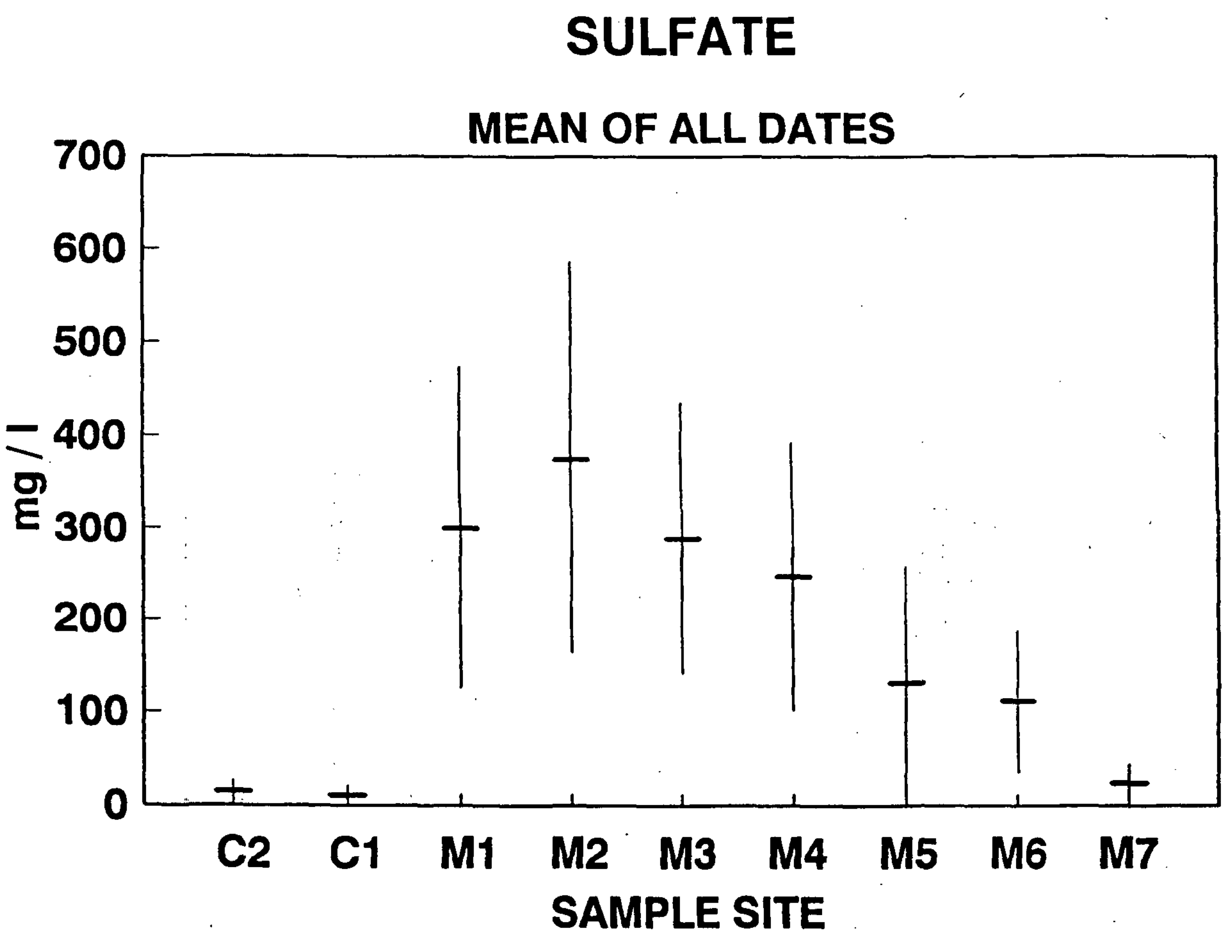


Figure 28. Average sulfate concentration values for all sample sites during the study. Horizontal bars are mean values from all samples, vertical bars indicate plus and minus one standard deviation.

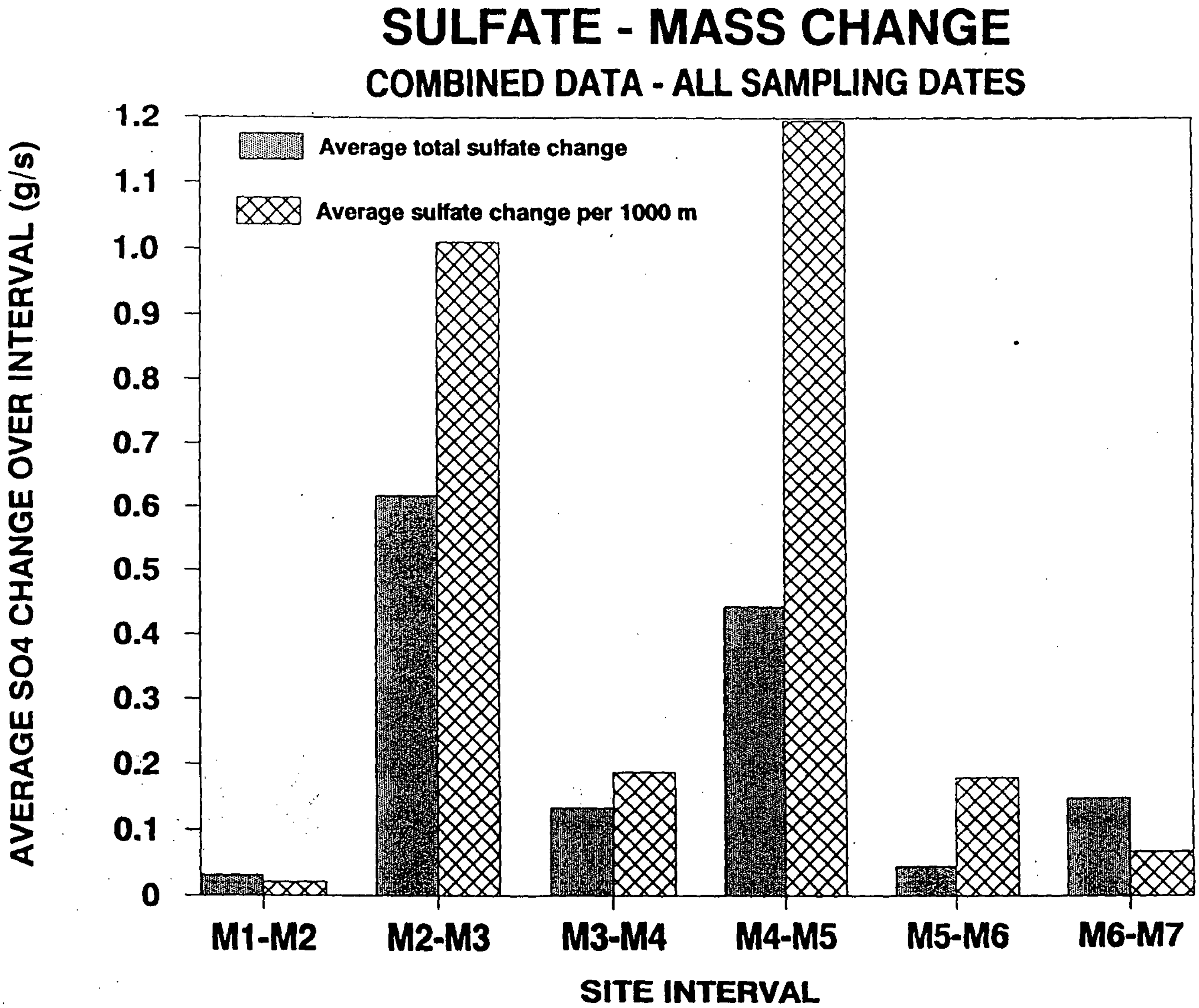


Figure 29. Sulfate average mass change between sites (mg s^{-1}). Sulfate mass values for each site were computed as the product of concentration and discharge at the site. Values of average sulfate mass change presented here are the differences of mass values at adjacent pairs of sites. Average values per 1000 m represent the total average change divided by the length of the section between sample sites. Positive values indicate increases in total mass moving downstream.

Biologically active iron.

Biologically active iron (Figure 30, Appendix A; Table A10) also increased dramatically in lower Monitor Creek. Site M2 yielded highest concentrations throughout the study, generally having concentrations approximately double the next highest site. Although little seasonality is apparent in the concentrations observed in lower Monitor Creek, the upper sites (M5, M6, and M7) generally reach their highest concentrations in the autumn. Seasonality in the Carson River followed a pattern of relatively high concentrations during the summer and winter, with lower concentrations observed during the summer. Linear regression detected significant increases in concentrations of biologically active iron over the course of the study ($n=99$, $t= 0.208$, $r^2< 0.001$, $p<0.001$). By far, the highest concentrations of biologically active iron were observed at site M2. This site had concentrations often exceeding the others by an order of magnitude.

The plot of average biologically active iron concentrations for all sample dates (Figure 31) shows very clearly the high levels present at site M2, and the relatively low levels seen at site M5. Concentrations at Carson River sites, C1 and C2, were no different from the other Monitor Creek sites.
Carson River sites C1 and C2 showed no increase in concentration of biologically active iron over the study (linear regression; $n=30$, $t= 0.806$, $r^2= 0.023$, $p=0.427$). Paired t-tests of data from Carson River sites upstream and downstream from the mouth of Monitor Creek (C1 and C2) revealed no significant difference in

biologically active iron concentrations between these sites (df=13, t= 1.303, p= 0.215).

Mass-balance relationships for biologically active iron indicate (Figure 32) that the interval between sites M3 and M2 was overwhelmingly responsible for the addition of iron to Monitor Creek. This reach receives impacts resulting from the presence of several tailings piles and from drainage from the Zaca Mine adit. The sediment characteristics in this reach are heavily affected by the accumulation of what is apparently a reddish precipitate, possibly comprising ferric sulfate, and a luxuriant growth of non-photosynthetic fungus (see below).

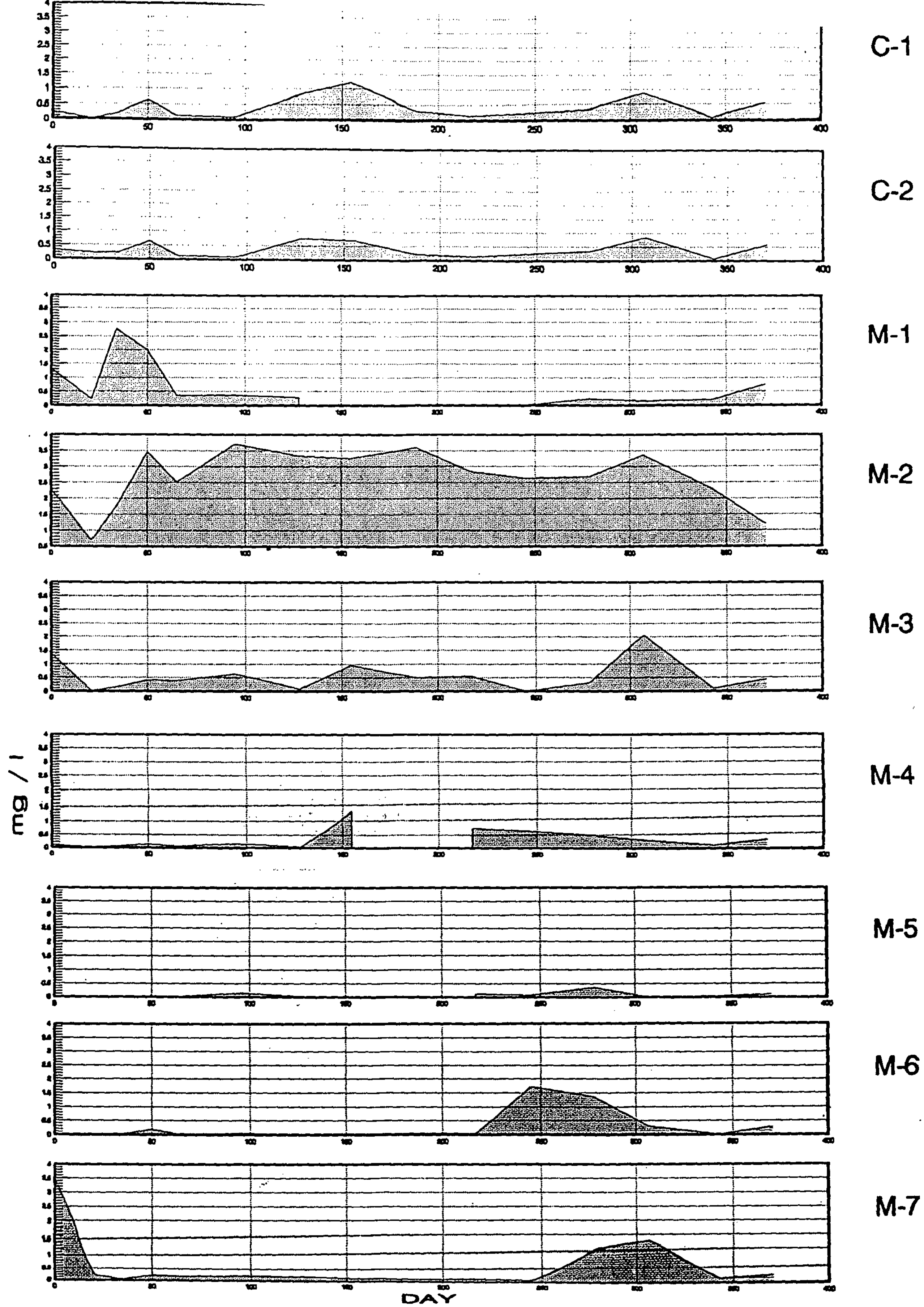


Figure 30. Biologically active iron concentrations (mg l^{-1}) determined from water collected at sites on Monitor Creek (M1 - M7) and the Carson River (C1, C2) during the study.

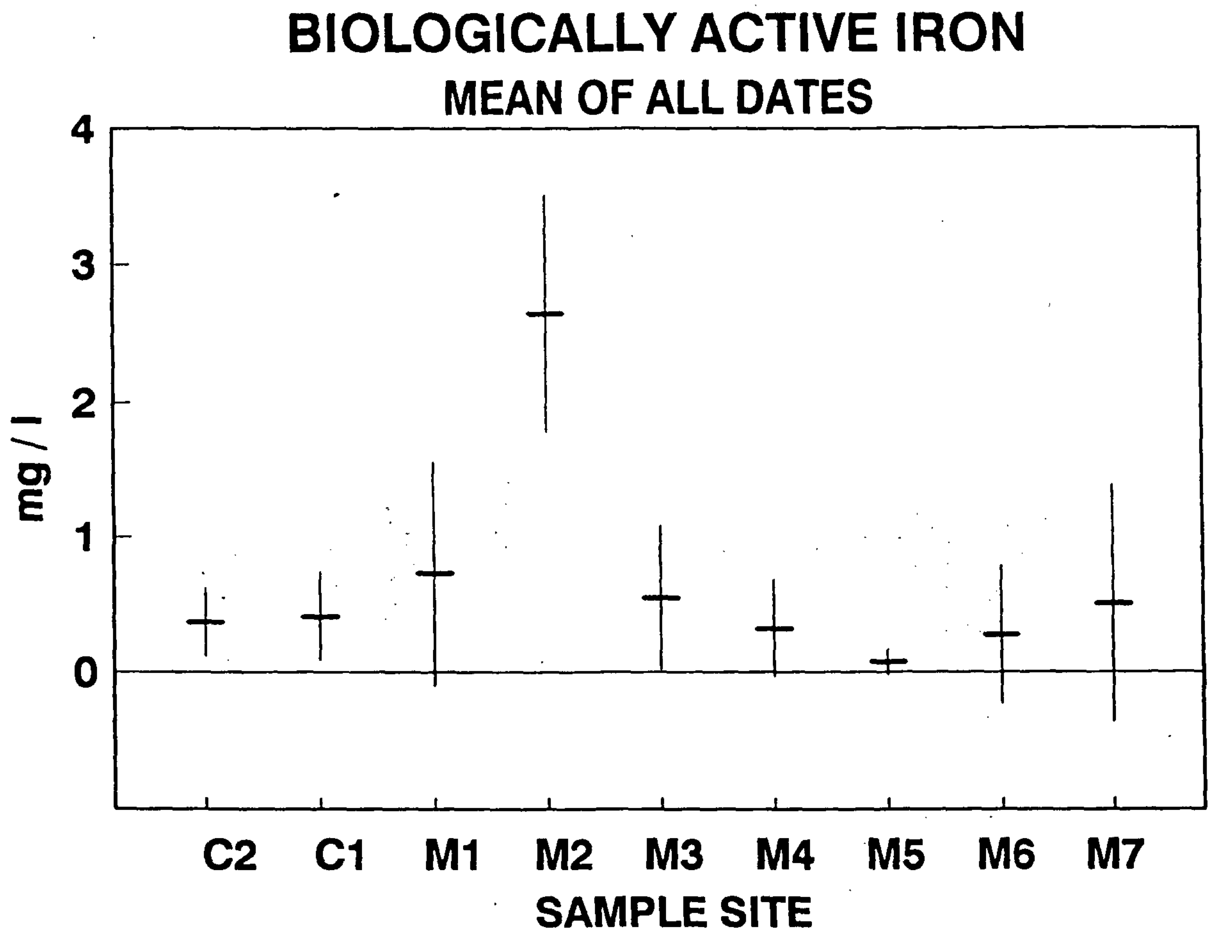


Figure 31. Average biologically active iron concentration values for all sample sites during the study. Horizontal bars are mean values from all samples, vertical bars indicate plus and minus one standard deviation.

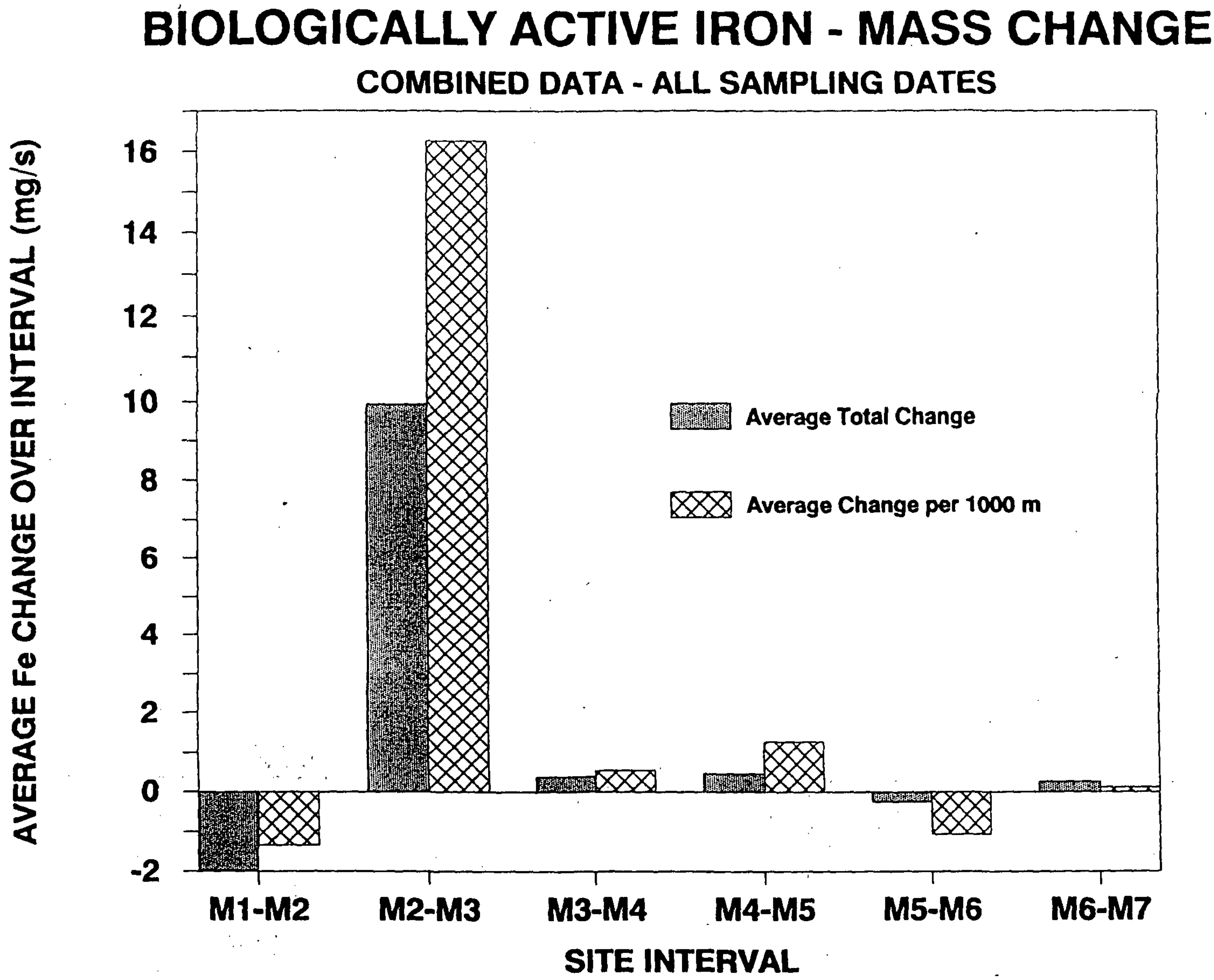


Figure 32. Biologically active iron average mass change between sites (mg s^{-1}). Biologically active iron mass values for each site were computed as the product of concentration and discharge at the site. Values of average biologically active iron mass change presented here are the differences of mass values at adjacent pairs of sites. Average values per 1000 m represent the total average change divided by the length of the section between sample sites. Positive values indicate increases in total mass moving downstream.

Total Dissolved Solids

Total dissolved solids (TDS) concentrations at all sites in Monitor Creek were higher than those in the Carson River (Figure 33, Appendix A; Table A11). Highest total dissolved solids levels were observed during mid summer at site M2, with values there reaching nearly 1800 mg l^{-1}. In contrast, TDS concentrations in the Carson River never exceeded 200 mg l^{-1}. Higher concentrations were always found in the lower section of Monitor Creek, with sites M1 or M2 having highest levels. Seasonally, peak concentrations were observed during low discharge periods in late summer, with lower values before and after. Seasonal variation was larger in the downstream sites relative to upstream. Linear regression of total dissolved solids concentrations from all sites in Monitor Creek showed a significant negative correlation with distance upstream (linear regression; n=99, t= -5.187, r^2= 0.217, p<0.001).

A significant increasing trend in TDS concentrations over time was also detected in Monitor Creek (linear regression; n=99, t= 3.721, r^2= 0.125, p<0.001). Significant increases in TDS were also noted in the Carson River during the study (linear regression; n=29, t= 2.666, r^2= 0.208, p=0.013). As with conductivity and sulfate, these observations are probably affected by the continuation of the drought. Comparison of the TDS concentrations upstream and downstream from Monitor Creek (sites C1 and C2) showed generally increased concentrations below the mouth of Monitor Creek. However, paired t-tests revealed the magnitude difference to be slightly greater than the 0.05

probability level (mean difference= 9.043, df=13, t= 2.053, p= 0.061).

Examination of the average concentration values for all samples (Figure 34) shows the Carson River sites to have significantly lower TDS values than any of the Monitor Creek sites. There is also an apparent difference within Monitor Creek Sites. The downstream sites (M1, M2, M3, M4) seem to form a natural group having relatively high TDS concentrations. The upstream sites (M5, M6, M7) have intermediate concentrations above those found in the Carson River, but below levels in the downstream sites.

Increases in total dissolved solids occurred over the entire length of Monitor Creek. Examination of the total dissolved solids average mass-balance (Figure 35) shows the greatest rate of increase and largest total loadings in the intervals between sites M5 and M4 and between sites M3 and M2. This pattern is nearly identical to the mass loading of sulfate (Figure 29).

Stepwise multiple linear regression of total dissolved solids against all other chemical parameters indicates that the best predictors of total dissolved solids are sulfate, pH, NO3, TKN and PO4 (Table 4).

A strong positive correlation was observed between concentrations of sulfate and total dissolved solids values for Monitor Creek (Figure 36). In conjunction with the results of the stepwise regression this indicates that a relatively large proportion of the total dissolved solids loading observed in Monitor Creek is accounted for by sulfate.

Table 4 Results of stepwise multiple linear regression of chemical variables against total dissolved solids (r^2= 0.875, F= 240.076).

Variable	Coefficient	Std. Error	T	P (2 tail)
Constant	60.596	21.933	2.763	0.007
SO_4	1.500	0.081	18.475	<0.001
pH	4.094	0.296	13.807	<0.001
NO_3-N	2.288	0.549	4.168	<0.001
TKN	-161.825	51.228	-3.159	0.002
PO_4-P	0.603	0.516	1.168	0.245

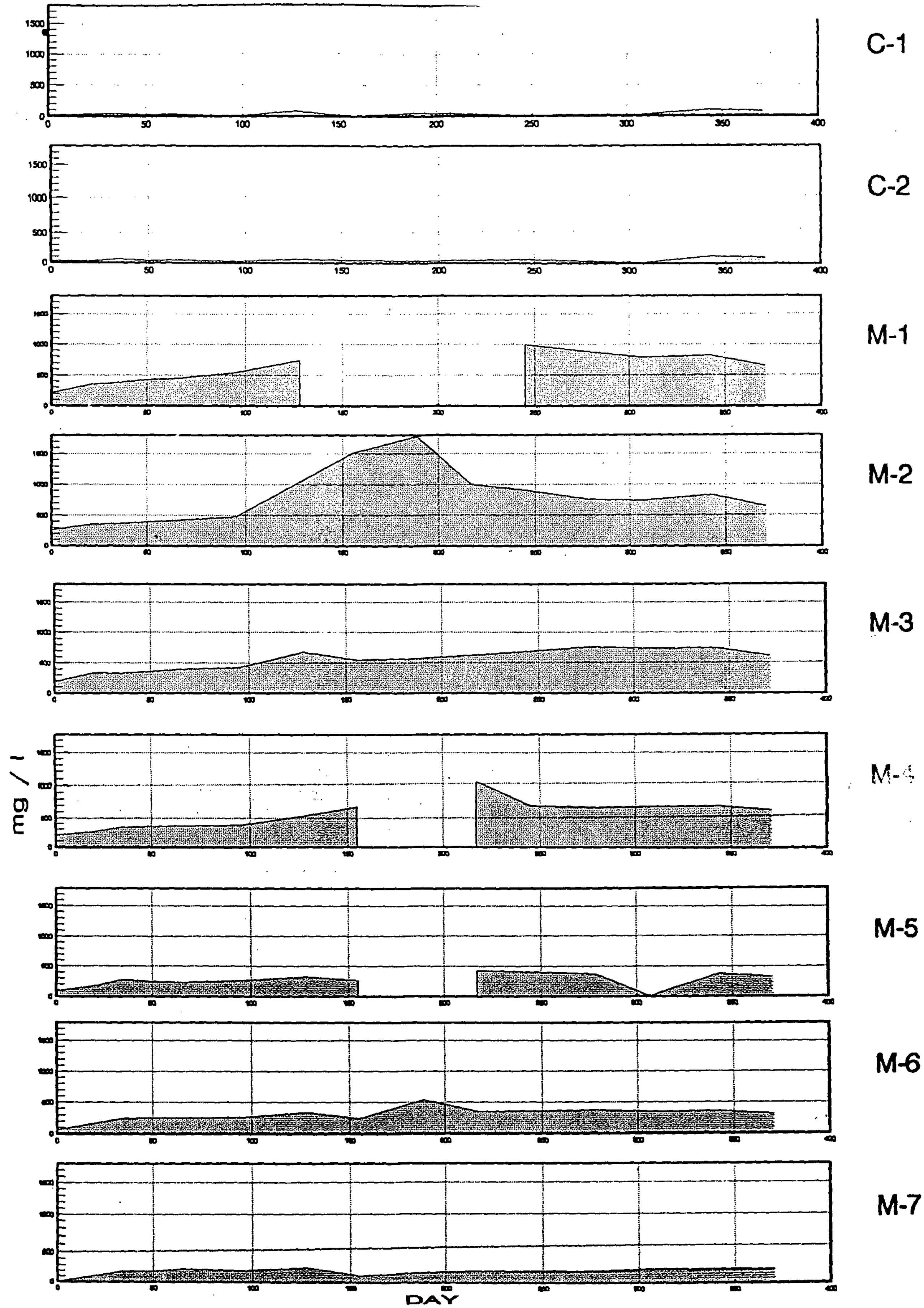


Figure 33. Total dissolved solids concentrations (mg l^{-1}) determined from water collected at sites on Monitor Creek (M1 - M7) and the Carson River (C1, C2) during the study.

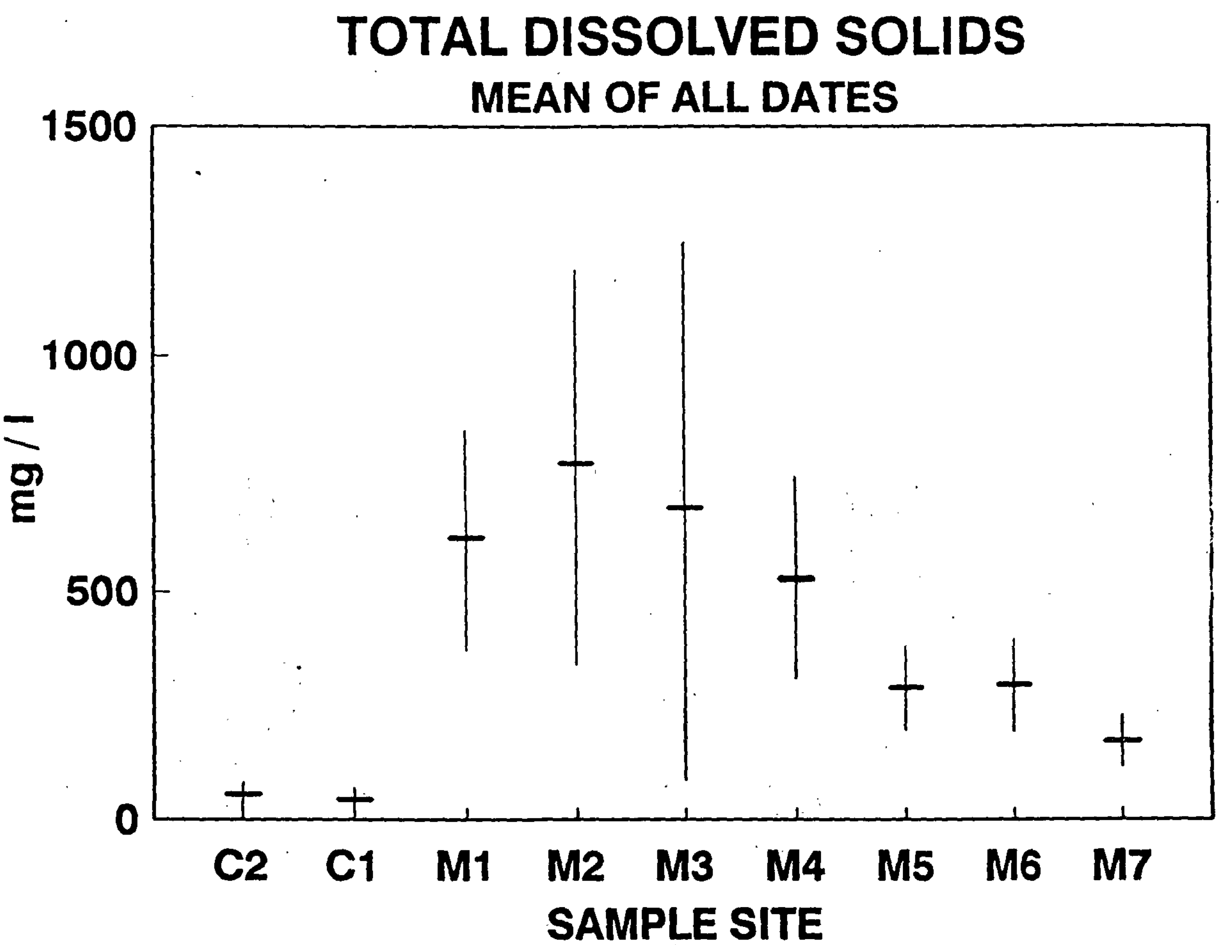


Figure 34. Average total dissolved solids concentration values for all sample sites during the study. Horizontal bars are mean values from all samples, vertical bars indicate plus and minus one standard deviation.

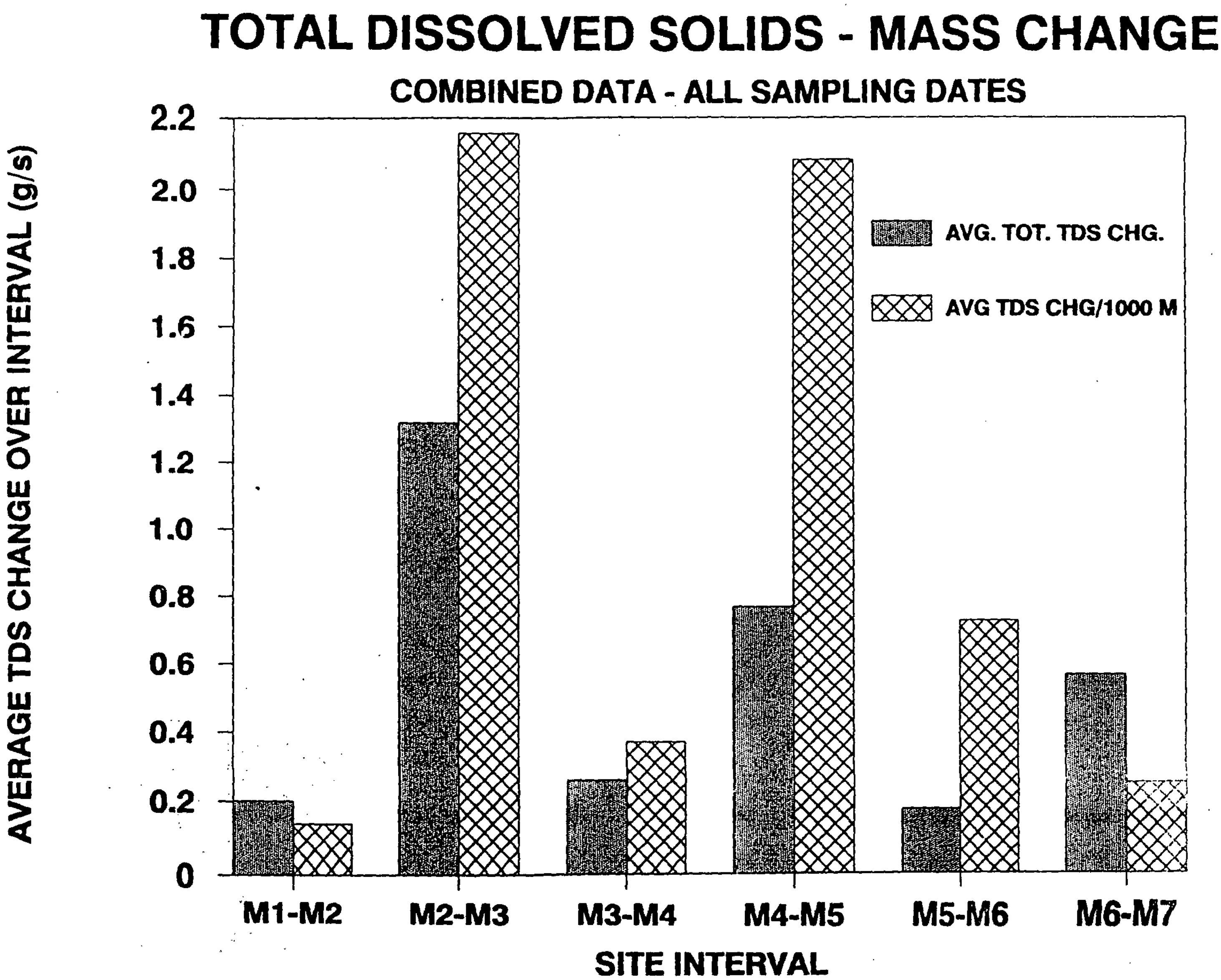


Figure 35. Total dissolved solids (TDS) average mass change between sites (mg s^{-1}). Mass values for TDS for each site were computed as the product of concentration and discharge at the site. Values of average TDS mass change presented here are the differences of mass values at adjacent pairs of sites. Average values per 1000 m represent the total average change divided by the length of the section between sample sites. Positive values indicate increases in total mass moving downstream.

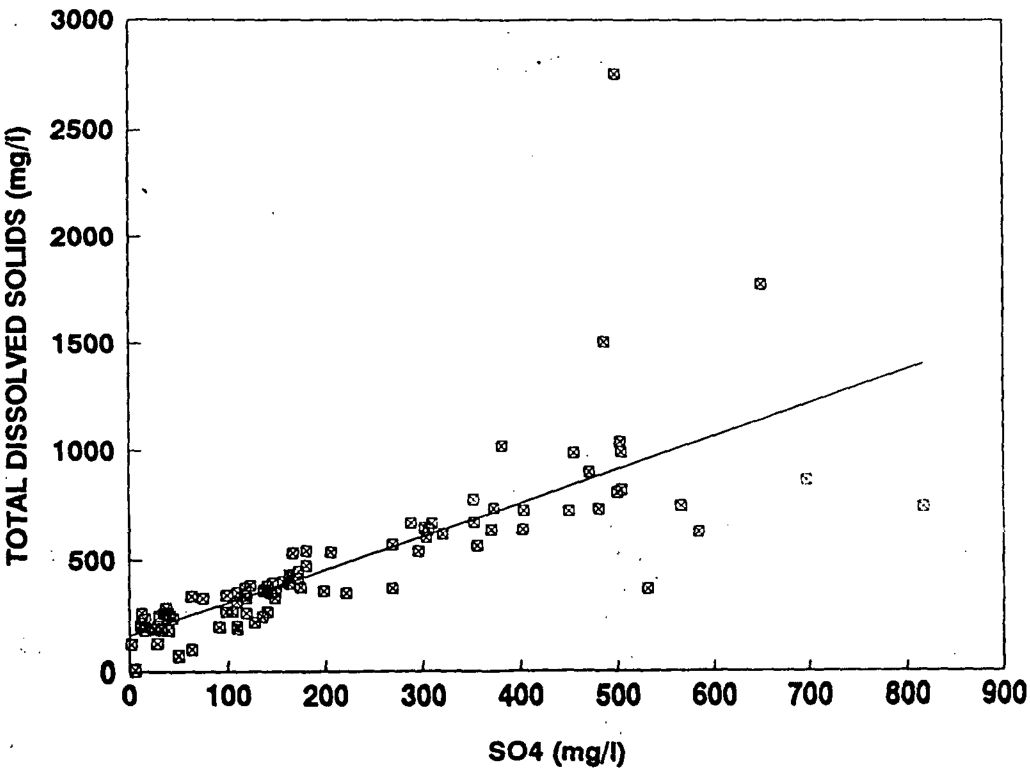


Figure 36. Plot of total dissolved solids concentrations versus sulfate concentration for all observations from Monitor Creek during the study. The plotted line (TDS = 100.9 + (1.67 * SO_4)) is derived by linear regression (n=126, f=240.1, r^2=0.656)

METALS

Analyses of heavy metal concentrations in Monitor Creek and the Carson River were preformed on samples from 17 March 1990, 19 July 1990, 22 September 1990 and 23 March 1991 (Appendix A; Table A15). Species included in the analyses were silver, arsenic, cadmium, cobalt, chromium, copper, iron, lead and mercury. The first analysis tested whether there were significant differences between concentrations at Carson River sites C1 and C2 (Table 5). No significant differences were detected, indicating no detectable change in the Carson River attributable to inputs from Monitor Creek.

TABLE 5 Results of analyses of heavy metal concentration data. Contrast between Carson River sites, C1 and C2. Values below detection limits set to 0.0. Insufficient data for analysis of values from cadmium.

is this a regression analysis?

Species	n	f	p	r^2
Silver	3	0.231	0.715	0.188
Arsenic	8	1.441	0.275	0.194
Cobalt	8	1.000	0.356	0.143
Chromium	6	0.827	0.415	0.171
Copper	8	0.351	0.575	0.055
Iron	7	0.003	0.956	0.001
Lead	4	1.370	0.362	0.407
Mercury	7	0.714	0.437	0.125

An additional analysis was performed to assess whether there were significant differences between drainage (i.e. between combined sites on Monitor Creek and the Carson River). Results of this analysis (Table 6) indicate that significant differences between drainages are apparent only in arsenic concentration (Figure 56).

On the sample date, the Carson River sites had significantly higher concentrations of arsenic (avg = 4.33 mg l^{-1}) than did the Monitor Creek sites (avg = 0.42 mg l^{-1}).

μg/l

TABLE 6 Results of analyses of heavy metal concentration data. Contrast compares combined Carson River sites to combined Monitor Creek sites. Values below detection limits set to 0.0.

Species	n	f	p	r^2
Silver	12	0.728	0.413	0.068
Arsenic	33	73.898	<0.001***	0.704
Cadmium	9	0.676	0.483	0.088
Cobalt	33	0.440	0.512	0.014
Chromium	27	0.027	0.872	0.001
Copper	33	1.503	0.229	0.046
Iron	32	0.321	0.575	0.011
Lead	18	0.863	0.367	0.051
Mercury	25	2.760	0.110	0.107

Within Monitor Creek on the sample date there was no trend apparent with regard to arsenic concentration. Of the other heavy metal species considered, cadmium and chromium show little variation among any samples except for single high concentrations detected at site M7 (Figures 57, 58). Similar single high concentrations on a background of little variation are seen at site M3 for silver, cobalt and iron (Figures 59, 60, 61). Although concentrations for copper and lead (Figures 62, 63) are somewhat more variable, they still show little variation and a few isolated high concentrations. Very little in the way of interpretable concentration pattern emerges from any of these data with the single exception of arsenic.

Additional statistical analyses were performed to assess whether significant differences appeared when data from sites on Monitor Creek were compared (Table 7). As suggested by the graphical presentation in Figures 57-63, no significant differences were detected between sites within Monitor Creek.

TABLE 7 Results of analyses of heavy metal concentration data. Contrast between Monitor Creek sites, M1-M7. Values below detection limits set to 0.0. Insufficient data for analysis of values from cadmium and mercury.

Species	n	f	p	r^2
Silver	9	0.064	0.996	0.161
Arsenic	25	0.426	0.852	0.124
Cobalt	25	0.928	0.498	0.236
Chromium	21	1.832	0.383	0.331
Copper	25	0.593	0.732	0.165
Iron	25	0.927	0.499	0.236
Lead	14	0.499	0.792	0.300

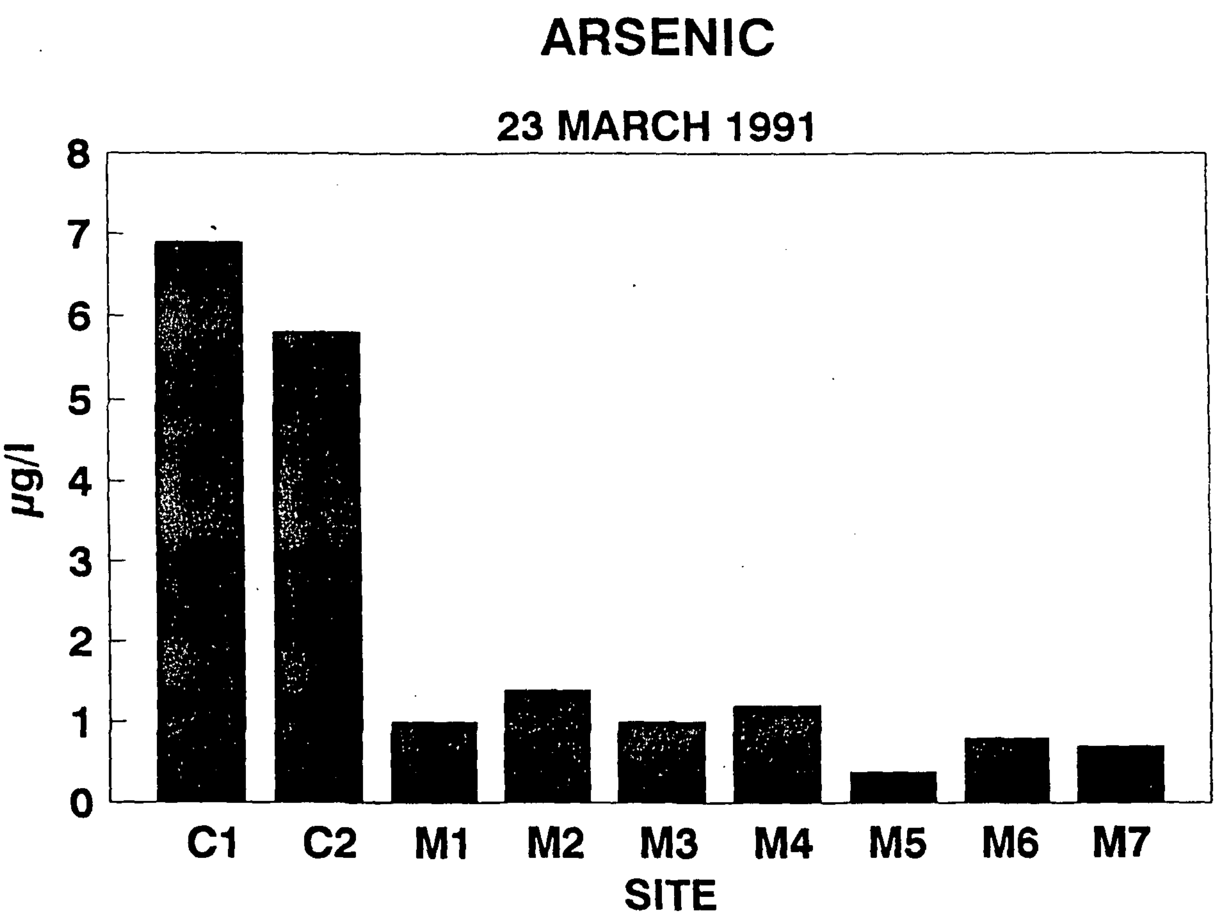


Figure 56. Concentrations of arsenic detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 23 March 1991.

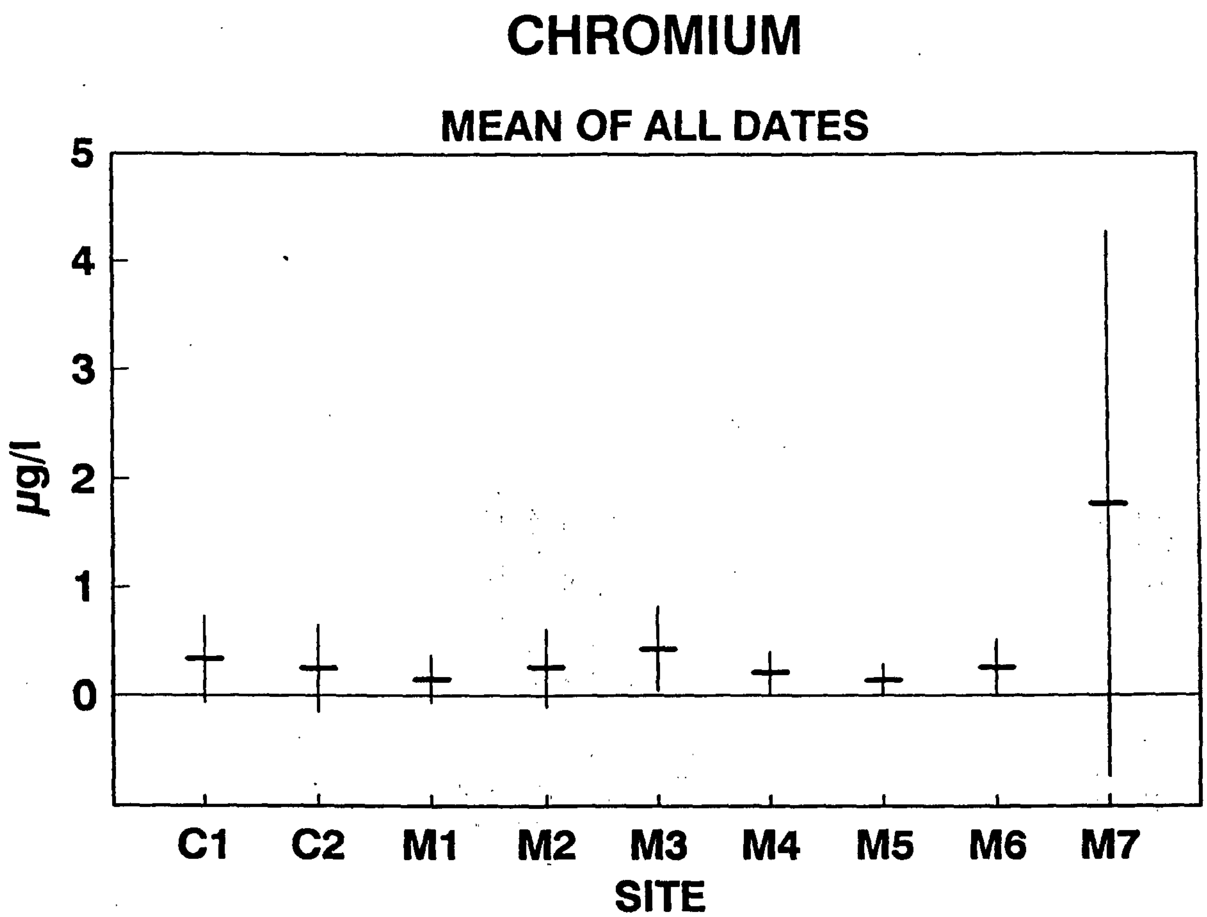


Figure 57. Average concentrations of chromium detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 17 March 1990, 19 June 1990, and 23 March 1991. Horizontal bar indicates mean value, vertical bars extend one standard deviation above and below mean.

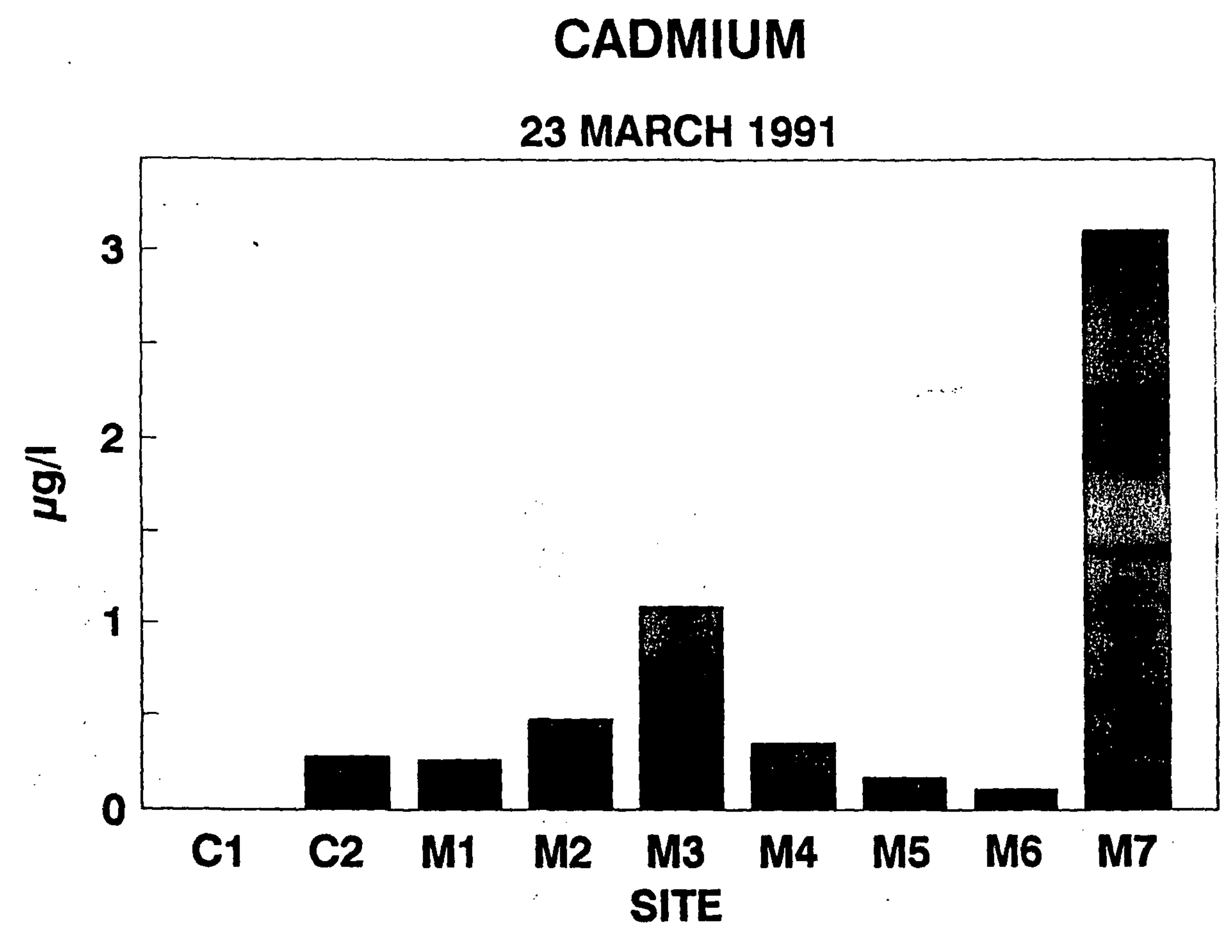


Figure 58. Concentrations of cadmium detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 23 March 1991.

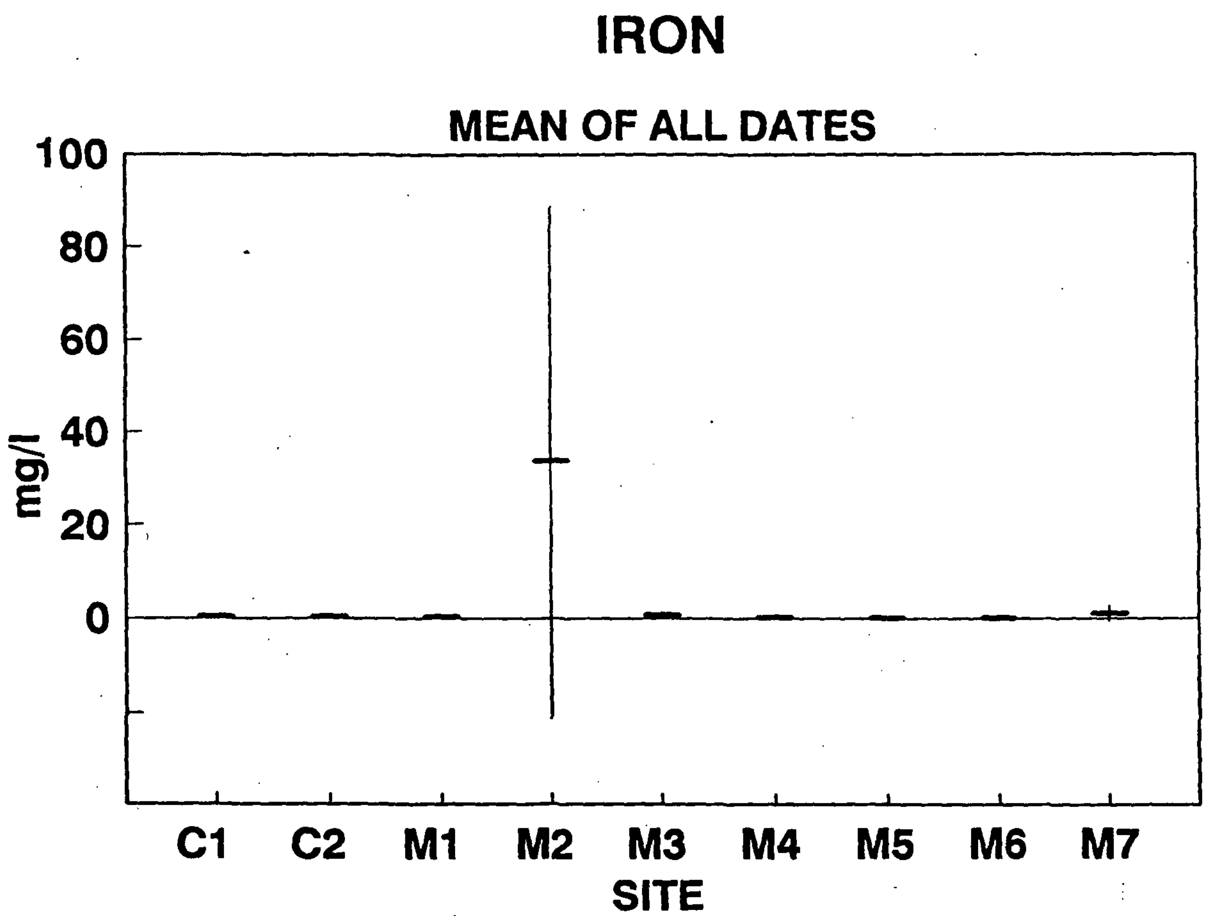


Figure 59. Average concentrations of iron detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 17 March 1990, 19 June 1990, 22 September, and 23 March 1991. Horizontal bar indicates mean value, vertical bars extend one standard deviation above and below mean.

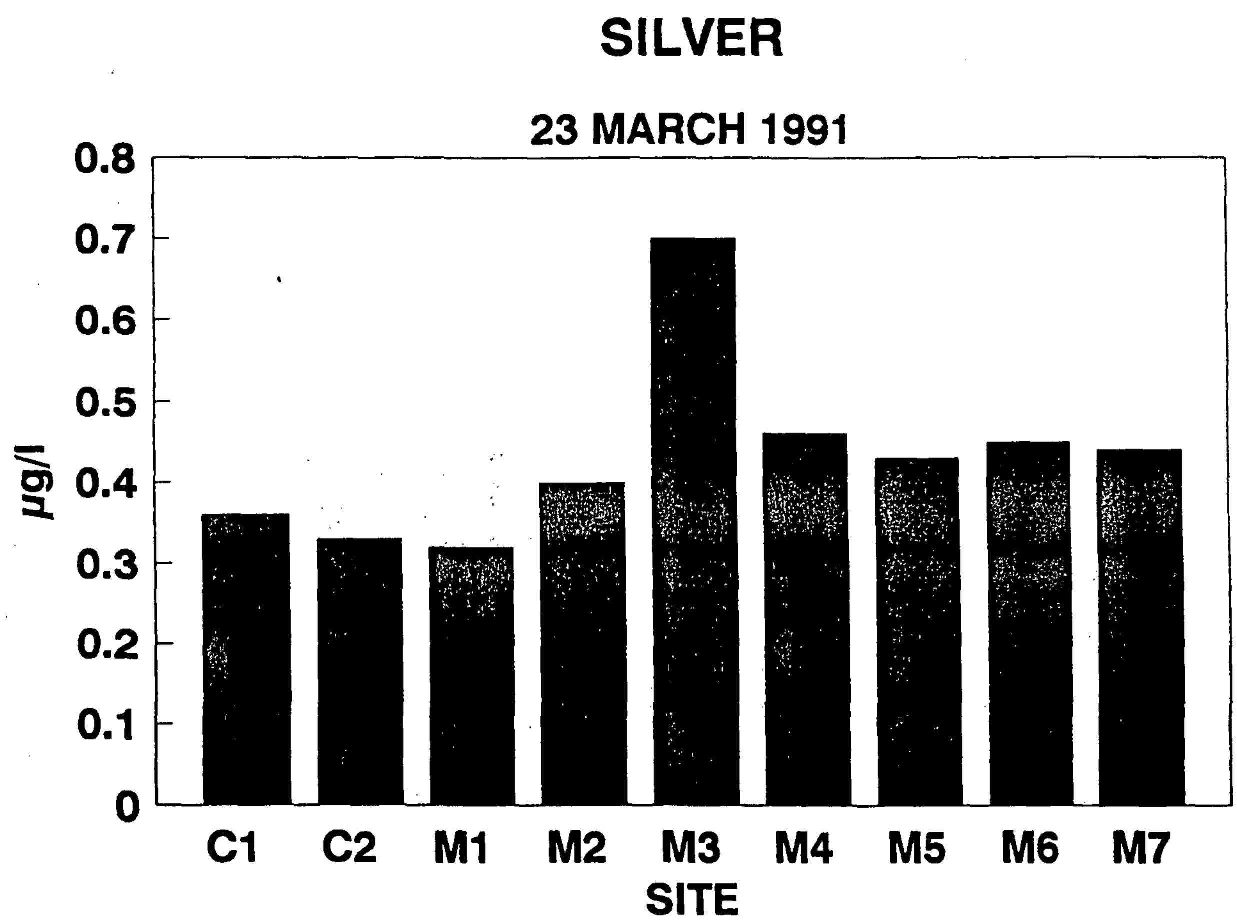


Figure 60. Concentrations of silver detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 23 March 1991.

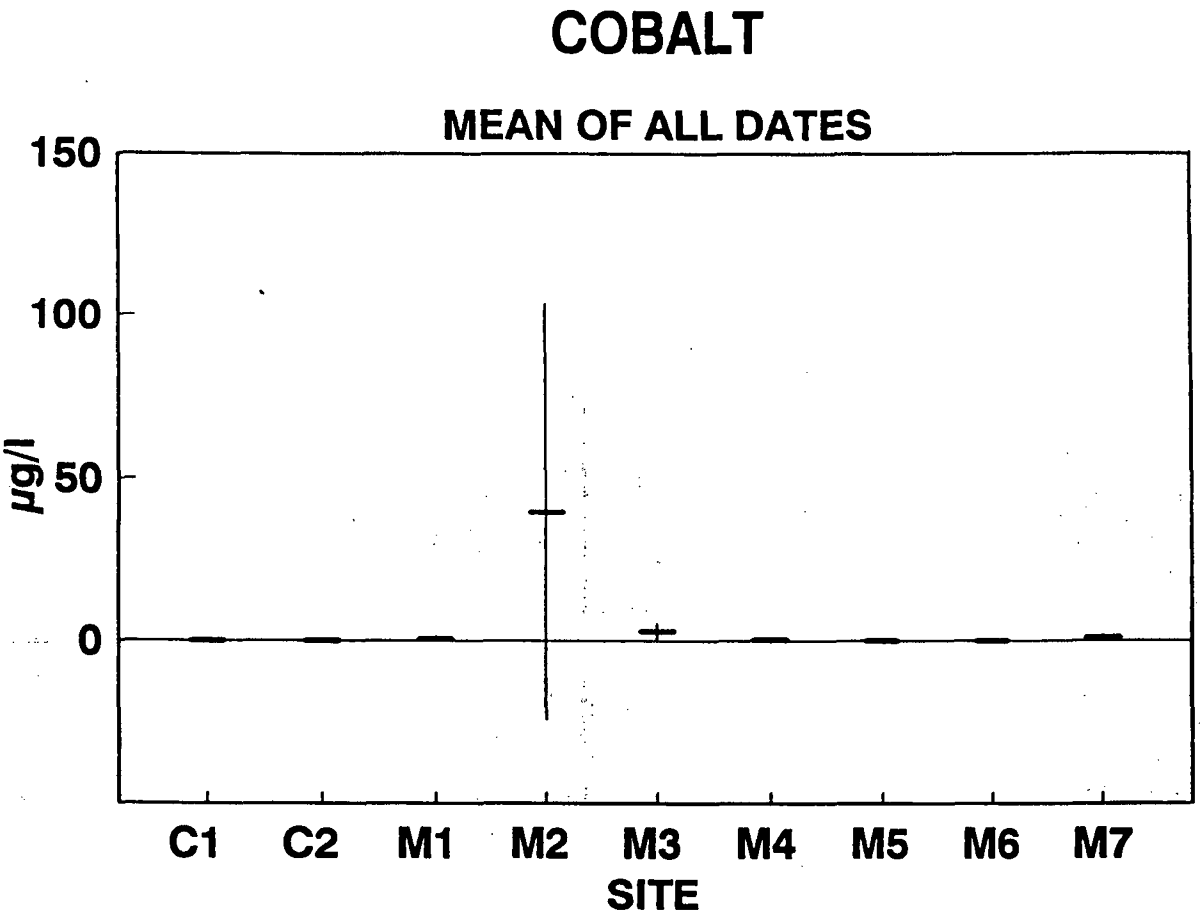


Figure 61. Average concentrations of cobalt detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 17 March 1990, 19 June 1990, 22 September, and 23 March 1991. Horizontal bar indicates mean value, vertical bars extend one standard deviation above and below mean.

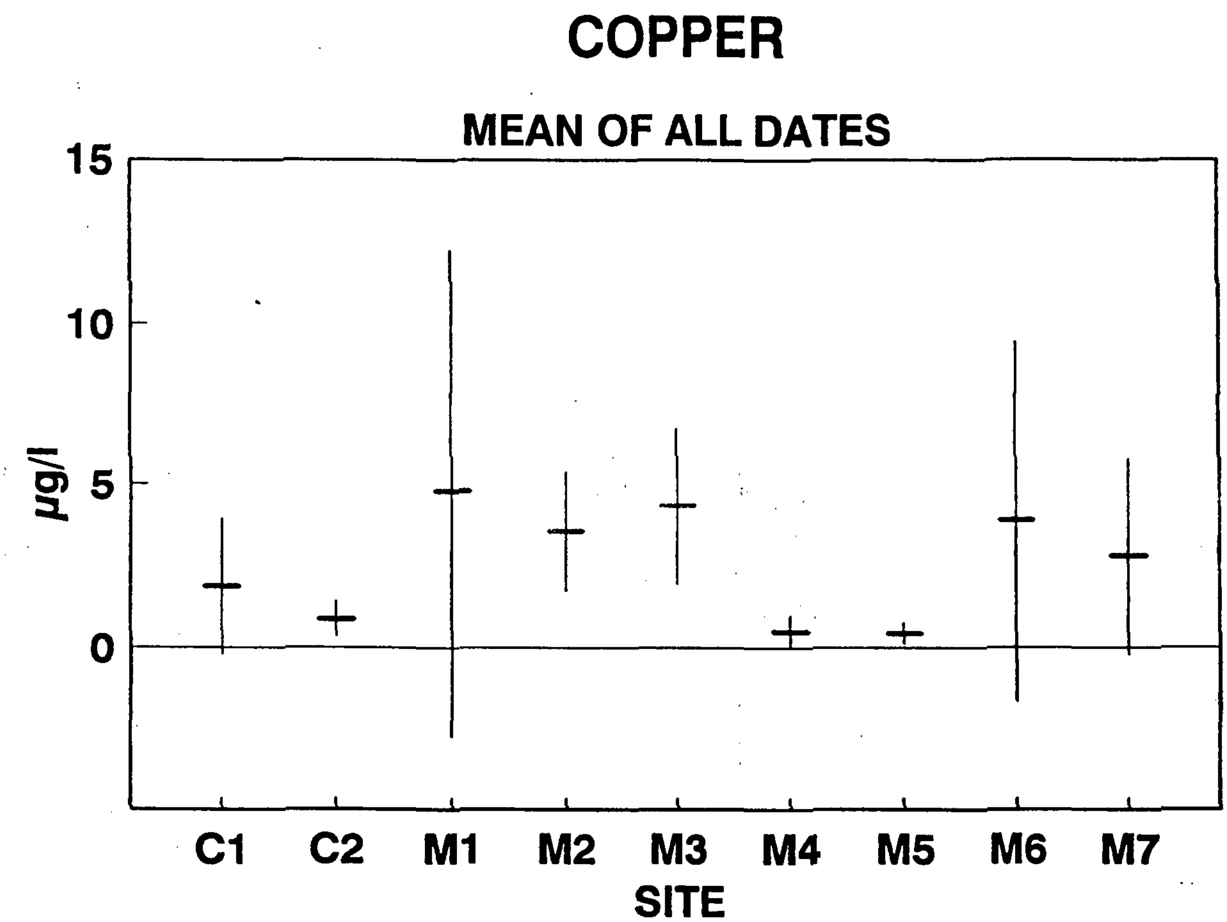


Figure 62. Average concentrations of copper detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 17 March 1990, 19 June 1990, 22 September, and 23 March 1991. Horizontal bar indicates mean value, vertical bars extend one standard deviation above and below mean.

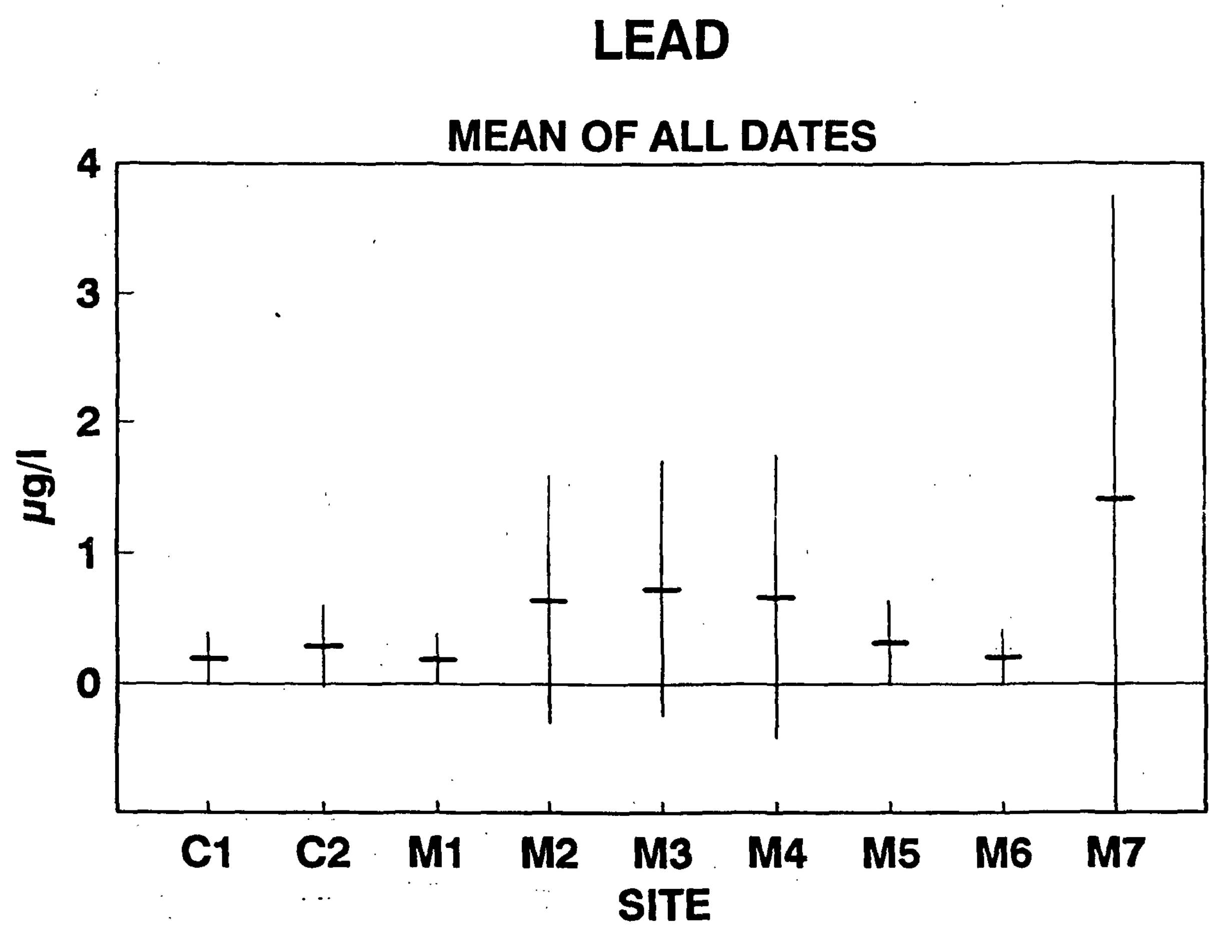


Figure 63. Average concentrations of lead detected in samples collected from Monitor Creek (M1 - M7) and the Carson River (C1, C2) on 17 March 1990 and 19 June 1990. Horizontal bar indicates mean value, vertical bars extend one standard deviation above and below mean.

BENTHIC INVERTEBRATES

Patterns of benthic invertebrates species richness and abundance found in the Hester-Dendy artificial substrate samplers show large differences between the Carson River and Monitor Creek (Figures 64, 65, Appendix B). Both species richness and total invertebrate counts were always higher in the Carson River than Monitor Creek. Seasonally, there was a pronounced peak of invertebrate density and species richness in the Carson River sites during spring and early summer. A similar, though less extreme, pattern was also observed in Monitor Creek. Among the Monitor Creek sites, site M6 generally had the greatest densities of benthic invertebrates. The range of variation in the total count of individuals in the samplers was also least variable at this site.

Combining of data from all sites over the experiment (Figure 66) shows clearly that the Carson River sites have a much higher species diversity and greater numbers of benthic invertebrates present than did any of the Monitor Creek sites. It is also clear from this figure that site M2 has the lowest species richness and total numbers of any of the sites in Monitor Creek. This site was nearly devoid of benthos during most samples. Of the remaining sites in Monitor Creek, there is a high degree of similarity between all except M6. This site had substantially more taxa and greater numbers of invertebrates. These data suggest that the impacts of mining are felt most severely at site M2.

It is also likely that the impacts of the intermittent drying which may have occurred several times in the last few years may also have had impacts on benthic invertebrate populations. Although Delucchi and Peckarsky (1991) report that life history patterns of benthic insects do not differ greatly in intermittent streams relative to permanent ones, it has been shown that some relatively specialized characteristics are often found in insects inhabiting these streams (Harper 1990). It has also been demonstrated that populations of several different taxa can be greatly reduced in streams which become intermittent (Woolhouse and Chandiwana 1990, Boulton and Lake 1990, Towns 1991, McElravy et al 1989), that competitive interactions may be affected by such disturbance (Hempill 1991), and that the recolonization of intermittent streams upon recovery of water is strongly affected by substrate size and quality (Brooks and Boulton 1991). Diversity of populations of benthic insects inhabiting intermittent streams have been found to be less than that in more permanent streams, though populations are often quite high (Harper 1990), and they may utilize a variety of types of refugia to endure periods of desiccation (Boulton 1989). It has also been observed that populations of benthic invertebrates in intermittent streams are less able to process particulate matter (leaves) efficiently (Hill et al. 1988, Cuffney et al 1990).

All these factors have probably contributed to the patterns of benthic invertebrate populations seen in Monitor Creek. Populations of these animals have clearly been adversely affected by the disturbances associated with mining, but also by the impacts of the intermittent flow regime.

EFFECTS ON THE CARSON RIVER

Paired t-tests were used to compare data from site C1 and site C2 (Table 8). Significant differences between the two sites were detect for only a single parameter; electrical conductivity. This indicates that the impacts of Monitor Creek on the Carson River was relatively minor during the period of the study. However, the continuation of the drought precluded overland flow from Monitor Creek into the river for several months during the summer when concentrations were highest in Monitor Creek. The total effects of this circumstance are problematic and more significant effects might have been detected under different conditions.

Table 8. Results of comparisons (paired t-tests) of water quality parameters between Carson River sites.

Significant differences between sites C1 and C2 were detected only for electrical conductivity.

Variable	avg dif	T	df	P
Total dissolved Solids	-9.04	-2.05	13	0.061
Total suspended solids	-1.08	-0.53	11	0.609
PO4-P	0.037	0.018	14	0.986
NH3-N	0.655	0.062	12	0.952
NO3-N	4.025	0.688	5	0.522
SO4	-3.376	-1.345	13	0.202
Fe	0.050	1.303	13	0.215
Dissolved oxygen	-0.099	-1.514	13	0.154
Oxygen % sat.	-1.179	-2.002	13	0.067
Electrical conductivity	-13.333	-3.761	14	0.002**
pH	0.017	0.495	14	0.628
Turbidity	1.585	0.930	12	0.371
Dry weight	-0.022	-1.954	10	0.079
Ash free mass	-0.017	-1.475	10	0.171
Percent organic	0.004	0.001	10	1.000
Chlorophyll a	-0.062	-0.774	10	0.547
Carotenoids	-0.026	-0.392	10	0.703
Phaeopigments	-0.130	-0.476	9	0.646

O.K.

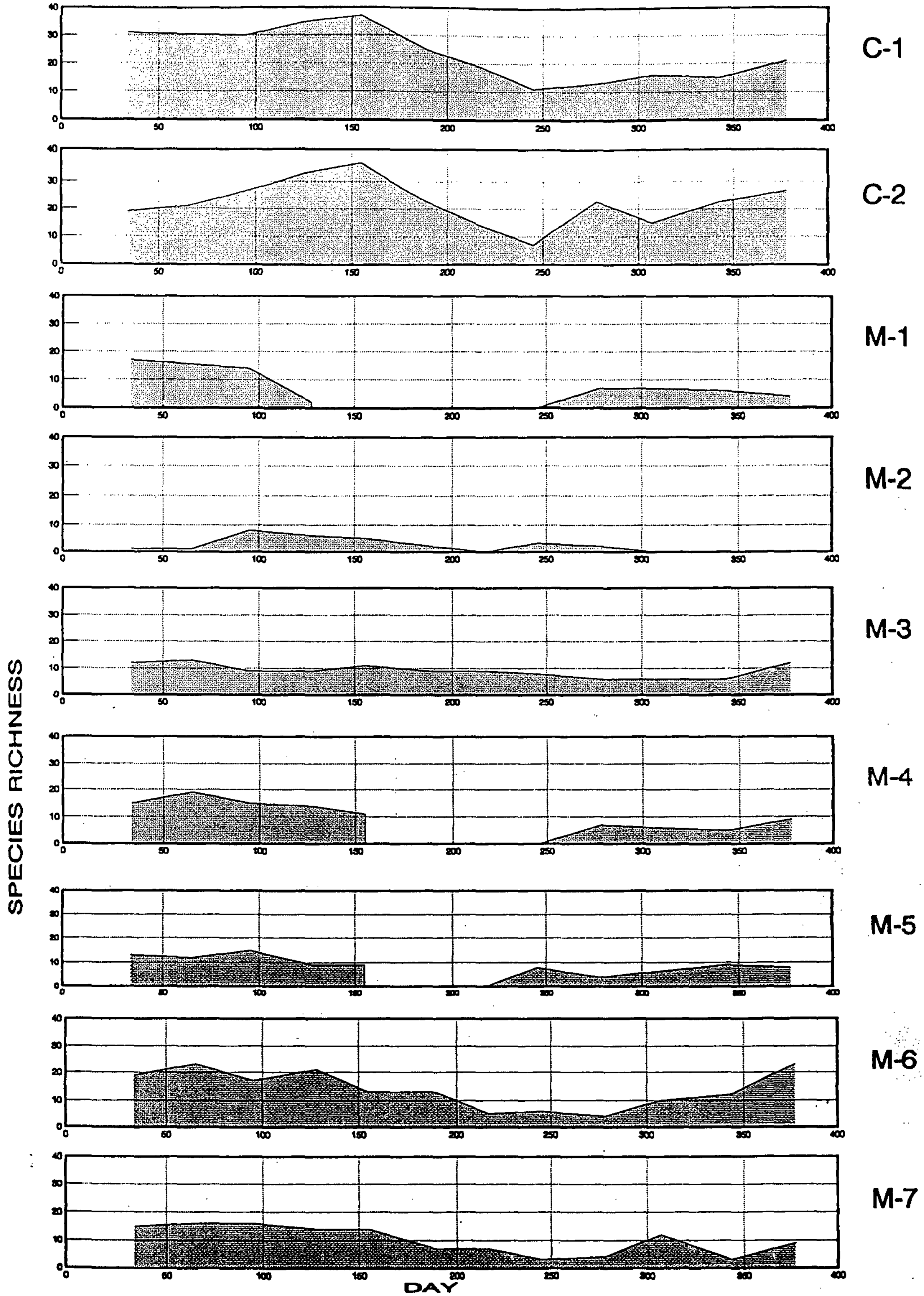


Figure 64. Average species richness determined from invertebrate colonizers collected from two Hester-Dendy artificial substrate samplers from each sample site on Monitor Creek (M1 - M7) and the Carson River (C1, C2). Samplers were allowed to colonize for 1 month prior to examination.

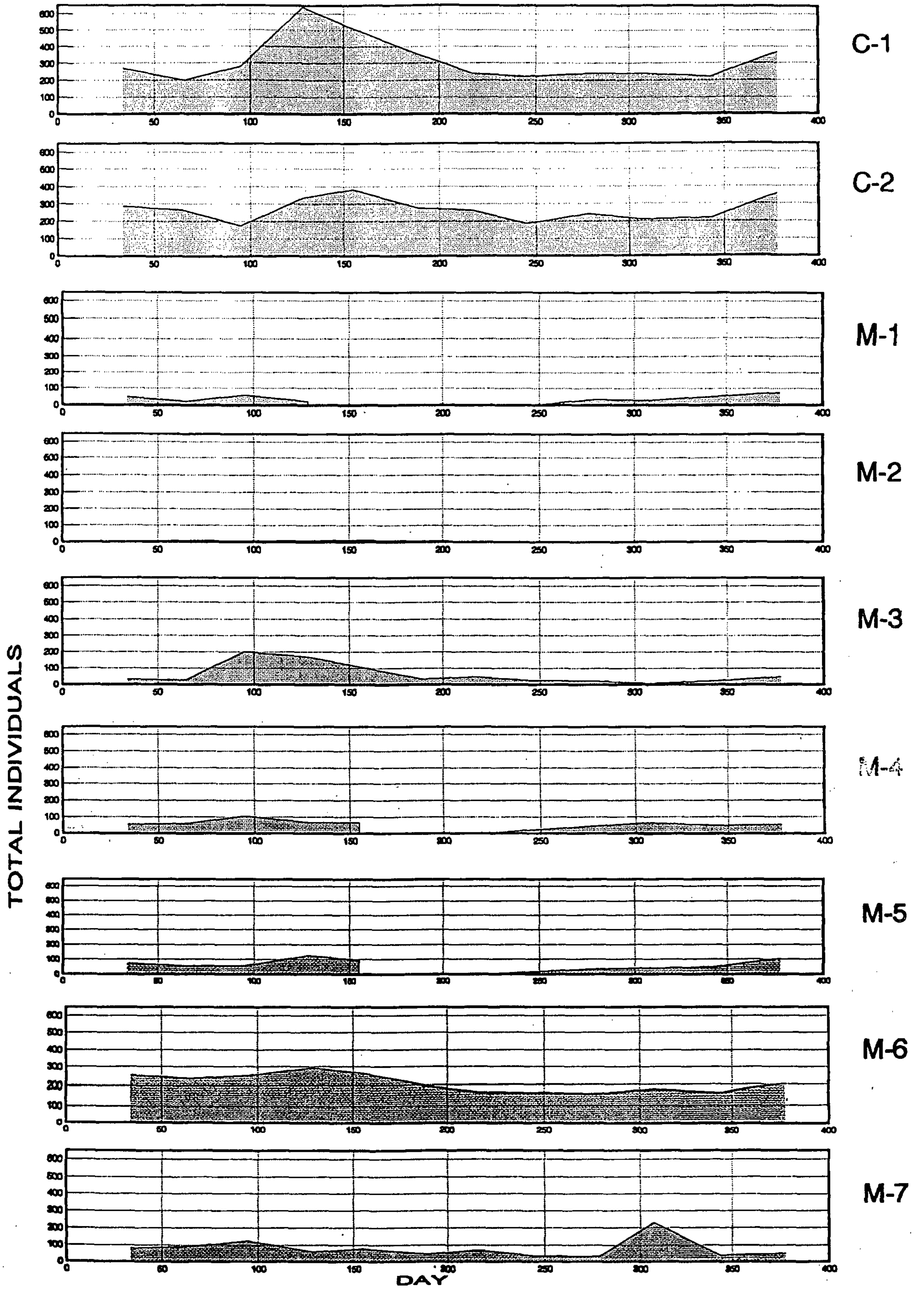


Figure 65. Average invertebrate density determined from invertebrate colonizers collected from two Hester-Dendy artificial substrate samplers from each sample site on Monitor Creek (M1 - M7) and the Carson River (C1, C2). Samplers were allowed to colonize for 1 month prior to examination.

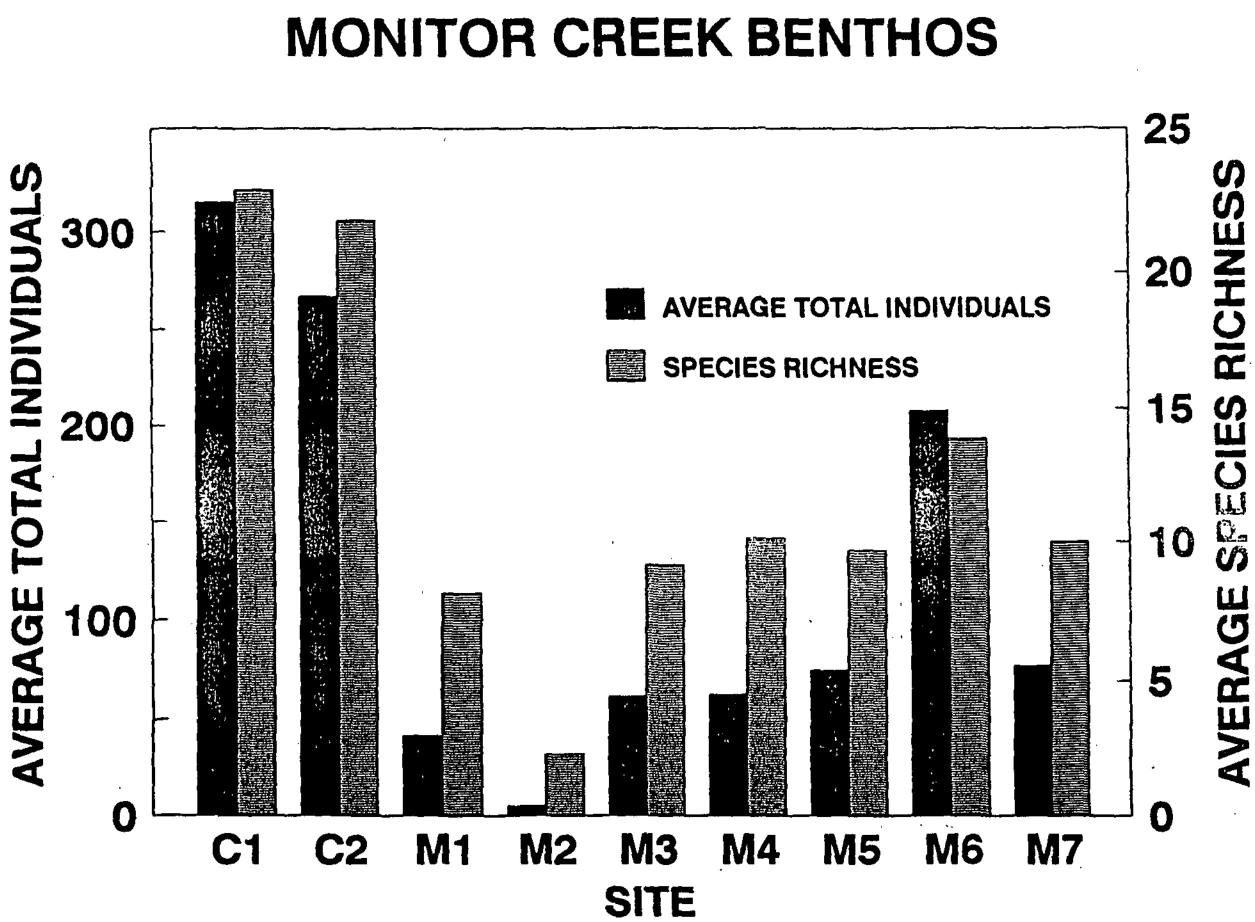


Figure 66. Average total invertebrate density and species richness for all artificial substrate samplers from each site during the study.

Table 11 Comparison of water quality parameters in Monitor Creek and the Carson River with recommended levels derived from sources listed below. Where necessary values were computed assuming hardness (as $CaCO_3$) =150 mg/l. Values in parentheses indicate number of observations exceeding criteria and total number of observations included in the comparison. Sources: 1 = Lahontan Regional Water Quality Control Board (1991), 2= State of California (1991), 3 = U.S.E.P.A. (1986)

Crit. to pro. aquatic life

1979 (as amended)

levels to protect aquatic life?

Material	units	level	ref	average period	Carson	Monitor
Arsenic	µg/l	190	2	4 day	(0/8)	(0/25)
	µg/l	360	2	1 hr	(0/8)	(0/25)
Cadmium	µg/l	1.56	2	4 day	(0/1)	(1/7)
	µg/l	6.2	2	1 hr	(0/1)	(0/7)
Chromium (VI	µg/l	11	2	4 day	(0/6)	(0/21)
	µg/l	16	2	1 hr	(0/6)	(0/21)
Copper	µg/l	16.72	2	4 day	(0/8)	(1/25)
	µg/l	26.6	2	1 hr	(0/8)	(0/25)
Lead	µg/l	5.33	2	4 day	(0/4)	(1/14)
	µg/l	136.8	2	1 hr	(0/4)	(0/14)
Mercury	µg/l	2.4	2	1 hr	(0/6)	(0/18)
Silver	µg/l	8.15	2	inst.max.	(0/2)	(0/7)
Sulfate	mg/l	4.0	1	annual	(20/29)	(98/99)
TFR (TDS)	mg/l	80	1	annual	(3/29)	(97/99)
Total N	µg/l	200	1	annual	(10/30)	(52/99)
Total P	µg/l	20	1	annual	(12/30)	(42/99)
Ammonia-N	µg/l	(varies)	3	4 day	(0/30)	(4/96)
Iron	mg/l	1.0	3	chronic	(0/8)	(6/25)

CONCLUSION

Overall, it very clear from our data that stream conditions in the lower reaches of Monitor Creek have been strongly and adversely affected by the long history of mining activity within the basin. Much of this activity took place before adequate environmental controls were in place, and the results have clearly been detrimental for the conditions within the stream. Because Monitor Creek is such a small stream, the impacts have been magnified.

Site M2 consistently shows the most extreme evidence of disturbance, although other sites in the lower section of Monitor Creek including M1 through M4, also exhibit chemical, physical or biological characteristics reflecting a high level of disturbance and disruption from mining activity. Site M2 shows the highest concentrations of ammonia, nitrate, sulfate, iron, total dissolved solids, total suspended solids, turbidity. At the same time, site M2 had the lowest concentrations of photosynthetic pigments, exceptional growth of fungi, the lowest levels of primary production and the least numerous and least speciose populations of benthic invertebrates. Site M2 is immediately downstream from the Zaca Mine adit, and receives drainage from several different tailings piles. The inputs of mining pollutants into Monitor Creek are mainly from diffuse sources. These include primarily mine and mill tailings piles, both in and adjacent to the stream bed. This combination of point and non-point source pollutants is typical of old mining areas.

?

WHAT ABOUT SUBSURFACE AMD?

The intensive survey done between site M2 and the upstream site M3 revealed that there were no dramatic changes in water quality within the reach suggestive of point-source influences, so we must conclude that non-point sources generate the poor conditions in the stream.

The upstream sites M5 through M7 are relatively less affected by the disturbance in the basin, and again this is evident from most of the chemical and biological measurements. These upstream sites typically had the highest concentrations of orthophosphate, the most abundant growths of periphyton algae and highest colonization rates by benthic invertebrates. Although there are clear differences between the first order stream conditions of upper Monitor Creek and the higher order Carson River, these areas are often more similar to each other than to the intervening sites on the lower Monitor Creek.

Many lines of evidence can be used to separate sites into groups sharing similar sets of characteristics. This is seen clearly in the results of the discriminant function analysis, but is also apparent from examination of most chemical, physical and biological measurements.

It is not clear what the impacts of the current and continuing drought were on the outcome of our study. Trends for increased pH and sulfate concentrations in both the Carson River and Monitor Creek indicate that some impacts are occurring, others are more problematic, and would require additional work during more normal water years for comparison. Because of the exceptionally low discharge from the basin during the sample period, it seems likely that the low water year may have reduced the magnitude of impacts from Monitor Creek on the Carson River. In spite of these potential problems we are confident that the low water year does not alter the overall conclusions of our study and that the impacts we identify here are credible. Additional data collection during more normal conditions would be necessary to verify this, however.

No - Toxicity of Total Ammonia increases with increasing pH as more un-ionized is formed...

Monitor Creek is experiencing pollutant loadings which include relatively high concentrations of dissolved sulfates and iron compounds, and which seasonally greatly reduce the ambient pH in affected areas. This has substantial negative impacts on the water quality in the stream, and also greatly reduces ~~the~~ habitat quality for benthic invertebrates in the stream. Reduction in pH can increase the toxicity of ammonia, which was also at peak values in the sites having low pH. During more productive water years it is likely that Monitor Creek will have more clearly defined impacts on the Carson River. Though it may be the case that additional precipitation may dilute inputs from Monitor Creek, it is also possible that increased discharge might carry more dissolved materials out of the basin.

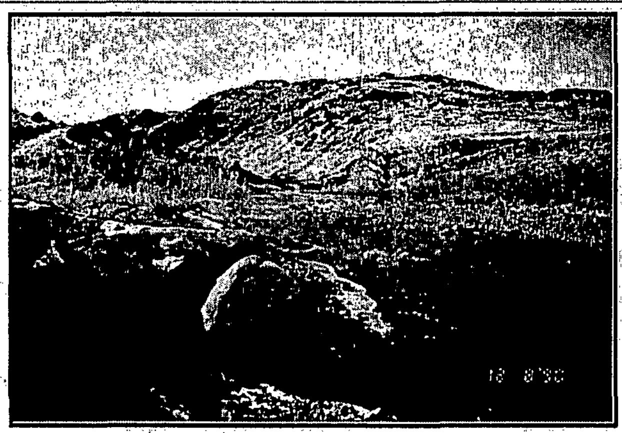
"i.e. loads would probably increase"

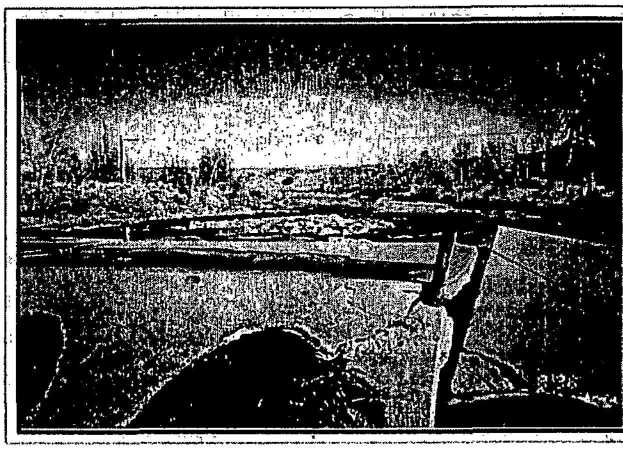
Although we found little effect of Monitor Creek on the Carson River, it was not delivering surface flow to the river during much of the summer when water quality conditions in Monitor Creek were at their lowest values. The current challenge will be to establish whether impacts from Monitor Creek constitute a threat to water quality in the Carson River, and whether guidelines can be developed for mitigation and reversal of adverse mining impacts in Monitor Creek..pa

STATE OF NEVADA
SURFACE WATER MONITORING NETWORK

Carson River Basin

Stream Name = East Fork Carson River
Sampling Location Name = East Fork Carson River @ Riverview
Sampling Location ID = C9





Sampling Location Description

Standards apply from California state line downstream to Riverview Mobile Home Park. To find the site, drive south from Carson City, NV on US Hwy 395 through the town of Gardnerville. Take the next road to the right after passing the road to Riverview Mobile Home Park. Collect samples at bridge. Control Point for East Fork at Highway 395, South of Garnerville (Riverview).

Beneficial Uses = Irrigation, Watering of livestock, Recreation involving contact with the water, Recreation not involving contact with the water, Industrial supply, Municipal or domestic supply, Propagation of wildlife, Propagation of aquatic life.

Sampling Location = Douglas County

Hydrologic Unit = 16050201
Latitude 38 52 33 ***Longitude*** 119 41 20
Township 12N ***Range*** 20E ***Section*** 25
Elevation 4921 ft

Data Table (pdf format) *Data Table (Excel xls format)* *NAC Standards for Water Quality*
Metals (pdf format) *Metals (Excel xls format)*
Return to Carson Basin Map

Return to Water Quality Planning's Home Page | NDEP's Site Map | Back to NDEP's Home Page

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PLANNING
GRAB/SURFACE WATER SAMPLES
PROVISIONAL RECORDS

C= CALCULATED
O= SAMPLED BUT ANALYSIS NOT PERFORMED

STATION NAME	STATION ID	STORET ID	DATE	TIME	P00010 TEMP	P00299 DISS O2	P00095 CONDUCT UM/CM	P00403 pH LAB	P00406 pH FIELD	P82079 TURBID NTU	P00080 COLOR PL-CO	P00515 TDS PPM	P00530 TSS PPM	P00440 BICARB as HCO3 MG/L	P00445 CO3 as CO3 MG/L	P39036 ALKAL as CaCO3 MG/L
East Fork @ Riverview	C9	310011	18-Jan-89	1330	0.2	13.8	236			1	5	156	7	90	0	74
East Fork @ Riverview	C9	310011	27-Feb-89	1440	11	10.2	93			1.7	15	68	5	46	0	38
East Fork @ Riverview	C9	310011	29-Mar-89	1420	8	13	96			3.1	25	66	26	46	0	38
East Fork @ Riverview	C9	310011	24-Apr-89	1450	5	10.4	78			3.4	12	64	13	41	0	34
East Fork @ Riverview	C9	310011	24-May-89	1425	10	10.6	70			4.4	7	52	12	32	0	26
East Fork @ Riverview	C9	310011	27-Jun-89	1525	17.5	8.7	73			10	7	54	33	37	0	30
East Fork @ Riverview	C9	310011	25-Jul-89	1342	22	8.4	125			2.3	10	88	13	39	10	48
East Fork @ Riverview	C9	310011	15-Aug-89	1220	17	8.7	166			2.7	7	105	9	59	5	56
East Fork @ Riverview	C9	310011	19-Sep-89	0	13.8	9	155			4.3	12	105	13	56	5	54
East Fork @ Riverview	C9	310011	23-Oct-89	910	6.5	10.2	209			1.7	5	133	2	81	0	66
East Fork @ Riverview	C9	310011	28-Nov-89	1330	0	12.5	267			3.3	7	176	10	85	0	70
East Fork @ Riverview	C9	310011	19-Dec-89	1345	0	13.5	193			2.4	3	131	8	76	0	62
East Fork @ Riverview	C9	310011	24-Jan-90	1325	-3	13.4	203			4.5	5	131	20	81	0	66
East Fork @ Riverview	C9	310011	22-Feb-90	1350	-3.5	13.8	185			6.3	3	123	77	71	0	58
East Fork @ Riverview	C9	310011	27-Mar-90	1352	6	10.8	111			6	7	80	24	51	0	42
East Fork @ Riverview	C9	310011	24-Apr-90	1421	6.6	11.5	83			2.5	12	61	8	41	0	34
East Fork @ Riverview	C9	310011	30-May-90	1327	8.5	10.6	100			3	5	71	18	46	0	38
East Fork @ Riverview	C9	310011	26-Jun-90	1105			115			1.6	3	78	7	49	0	40
East Fork @ Riverview	C9	310011	31-Jul-90	1430	24	6.7	182			6.9	10	114	16	61	7	62
East Fork @ Riverview	C9	310011	28-Aug-90	1405	19.3	7.5	186			4.2	7	118	13	56	7	58
East Fork @ Riverview	C9	310011	18-Sep-90	1435	18.5	8.7	227			3	7	146	6	66	10	70
East Fork @ Riverview	C9	310011	23-Oct-90	955	8.3	10.8	243			2.3	7	155	4	73	10	76
East Fork @ Riverview	C9	310011	19-Nov-90	1435	7	12	245			2.8	3	160	5	81	5	74
East Fork @ Riverview	C9	310011	18-Dec-90	1400	1.3	11.7	277			5.4	3	174	16	93	5	84
East Fork @ Riverview	C9	310011	23-Jan-91	1431	0.5	12.5	286			7.5	5	179	35	85	7	82
East Fork @ Riverview	C9	310011	20-Feb-91	1447	8	10.4	262			2.7	3	163	8	78	5	72
East Fork @ Riverview	C9	310011	26-Mar-91	1420	3.3	11.3	239			3.5	3	158	8	81	0	66

East Fork @ Riverview	C9	310011	16-Apr-91	1417	9.5	10.2	145			5.3	12	90	14	54	5	52
East Fork @ Riverview	C9	310011	21-May-91	1335	11	9.8	91			3.6	15	63	16	44	0	36
East Fork @ Riverview	C9	310011	25-Jun-91	1400	15.3	8.3	93			3.8	3	66	16	44	0	36
East Fork @ Riverview	C9	310011	16-Jul-91	1433	21.3	9.2	145			3.5	3	99	15	39	12	52
East Fork @ Riverview	C9	310011	27-Aug-91	1445	18.3	8.3	177			13	5	118	26	61	7	62
East Fork @ Riverview	C9	310011	24-Sep-91	1426	16.5	8.7	208			6.6	7	137	14	88	0	72
East Fork @ Riverview	C9	310011	22-Oct-91	1425	13.2	6.5	264			3.2	7	164	7	95	0	78
East Fork @ Riverview	C9	310011	26-Nov-91		6	10.1	180			2.3	17	118	8	71	0	58
East Fork @ Riverview	C9	310011	17-Dec-91		1	11.2	205			0.3	7	137	2	81	0	66
East Fork @ Riverview	C9	310011	22-Jan-92	1535	1	10.8	213	8.1	7.77	4.7	10	134	17	83	0	68
East Fork @ Riverview	C9	310011	19-Feb-92	1600	7.8	7.3	225	8.3	7.81	3.1	5	141	9	73	5	68
East Fork @ Riverview	C9	310011	25-Mar-92	1600	11.3	9.3	157	8.2	7.53	3.4	7	103	12	73	0	60
East Fork @ Riverview	C9	310011	21-Apr-92	1525	12.2	10.9	70	8.3	7.8	13	15	54	29	17	12	34
East Fork @ Riverview	C9	310011	19-May-92	1530	15.5	7.6	75	8.2	7.81	6.4	10	50	26	27	5	30
East Fork @ Riverview	C9	310011	24-Jun-92	1738	19.8	9.2	136	8.3	8.03	180	35	112	484	49	5	48
East Fork @ Riverview	C9	310011	28-Jul-92	1535	25.5	9.1	188	8.8		16	12	121	19	49	14	64
East Fork @ Riverview	C9	310011	25-Aug-92	1515	19.3	7.1	236	8.9	8.34	3.9	5	155	9	66	12	74
East Fork @ Riverview	C9	310011	22-Sep-92	1540	20	8.1	259	8.9	7.81	4.1	7	171	8	66	12	74
East Fork @ Riverview	C9	310011	27-Oct-92	1517	13	8.6	255	8.3	8.77	4.2	12	160	6	68	12	76
East Fork @ Riverview	C9	310011	24-Nov-92	1720	0.9	11.9	247	8.3	7.96	2.6	7	171	3	78	5	72
East Fork @ Riverview	C9	310011	17-Feb-93	1525	4	9.5	233	8.2	8.09	3.2	17	158	6	78	5	72
East Fork @ Riverview	C9	310011	23-Mar-93	1510	6.3	13	126	7.9	7.15	18	25	99	33	59	0	48
East Fork @ Riverview	C9	310011	20-Apr-93	1530	10.5	5.7	122	8	7.31	7.8	15	83	17	61	0	50
East Fork @ Riverview	C9	310011	26-May-93	1440	8.2	11.4	56	7.8	7.26	29	17	42	78	29	0	24
East Fork @ Riverview	C9	310011	29-Jun-93	1350	13.5	12.2	57	8	7.34	8.3	10	34	36	32	0	26
East Fork @ Riverview	C9	310011	27-Jul-93	1713	22	8.4	90	8.1	7.86	3.2	15	63	24	46	0	38
East Fork @ Riverview	C9	310011	17-Aug-93	1640	21.5	7.8	126	8.4	8.53	2.1	12	84	9	41	7	46
East Fork @ Riverview	C9	310011	28-Sep-93	1700	18	7.9	175	8.8	8.64	2.1	7	118	6	59	7	60
East Fork @ Riverview	C9	310011	13-Oct-93	1600	13.5	9.2	182	8.4	8.11	1.8	12	125	4	59	7	60
East Fork @ Riverview	C9	310011	23-Nov-93	1640	4.5	9.5	196	8.3	7.6	2.2	7	135	3	68	5	64
East Fork @ Riverview	C9	310011	14-Dec-93	1545	2	10.5	197	8.2	7.14	2	7	123	2	71	5	66
East Fork @ Riverview	C9	310011	19-Jan-94	1605	3.5	10.3	221	8	7.09	4.9	5	142	7	71	0	58
East Fork @ Riverview	C9	310011	22-Mar-94	1527	8	11	160	8.1		3.3	12	98	9	68	0	56
East Fork @ Riverview	C9	310011	19-Apr-94	1350	10	9.4	65	7.9	8.13	21	25	47	58	32	0	26
East Fork @ Riverview	C9	310011	17-May-94	1557	10	10.6	73	8	9	3.4	15	43	10	37	0	30
East Fork @ Riverview	C9	310011	15-Jun-94	1150	13.8	9.9	81	8		2.1	12	51	6	44	0	36
East Fork @ Riverview	C9	310011	19-Jul-94	1535	24	7.4	159	8.9	9.1	2.5	5	103	10	46	12	58
East Fork @ Riverview	C9	310011	23-Aug-94	1500	22	7.8	190	8.9	9	2.6	15	117	11	56	7	58
East Fork @ Riverview	C9	310011	20-Sep-94	1500	19	8.3	346	8.2	8.49	3.5	7	226	8	85	7	82
East Fork @ Riverview	C9	310011	18-Oct-94	1440	10.8	10	304	8.3	8.18	2	12	197	3	81	5	74
East Fork @ Riverview	C9	310011	29-Nov-94	1455	0.8	11.2	262	8.1	7.72	8	15	172	24	83	0	68
East Fork @ Riverview	C9	310011	20-Dec-94	1445	4.5	10.8	242	8.1		2.2	15	169	1	85	0	70

East Fork @ Riverview	C9	310011	10-Jan-95	1445	3.5	11.9	141	7.9		28	70	135	122	49	0	40
East Fork @ Riverview	C9	310011	21-Mar-95	1415	5	12	135	7.8		14	35	103	22	61	0	50
East Fork @ Riverview	C9	310011	16-May-95	1445	9.5	10.8	127	7.8	7.98	15	25	90	31	59	0	48
East Fork @ Riverview	C9	310011	18-Jul-95	1445	11.4	11.5	57	7.7	7.9	7.9	25	45	24	27	0	22
East Fork @ Riverview	C9	310011	26-Sep-95	1400	16	8.3	141	8		3.8	15	95	5	63	0	52
East Fork @ Riverview	C9	310011	7-Nov-95	1450	10	9.5	180	7.7		0.9	15	117	3	73	0	60
East Fork @ Riverview	C9	310011	9-Jan-96	1415	6		179	8.1	8.44	1.6	12	128	3	71	0	58
East Fork @ Riverview	C9	310011	19-Mar-96	1355	9	10.9	145	7.6	7.84	12	25	98	13	63	0	52
East Fork @ Riverview	C9	310011	21-May-96	1110	7.8	13.2	73	7.7		60	45	52	253	39	0	32
East Fork @ Riverview	C9	310011	9-Jul-96	1100	16.9		76	7.8	8.01	3.5	10	48	14	41	0	34
East Fork @ Riverview	C9	310011	17-Sep-96	1410	14.8	9.2	169	8.2		2.2	12	112	2	68	0	56
East Fork @ Riverview	C9	310011	13-Nov-96	1410	9.5	10.1	204	8.1	8.28	0.7	5	129	2	78	0	64
East Fork @ Riverview	C9	310011	12-Mar-97	1210	6	10.6	153	8	8.06	15.6	7	101	15	71	0	58
East Fork @ Riverview	C9	310011	28-May-97	1425	13.5	8.9	69	7.8	8.19	20	10	44	42	34	0	28
East Fork @ Riverview	C9	310011	22-Jul-97	1510	21.6	7.7	123	8.3	8.39	21.3	12	72	51	46	7	50
East Fork @ Riverview	C9	310011	16-Sep-97	1245	15	8.8	207	8.5	8.7	1.5	5	125	2	81	2	70
East Fork @ Riverview	C9	310011	12-Nov-97	920	3	10.8	224	8.2	8.45	1.3	5	134	5	88	0	72
East Fork @ Riverview	C9	310011	14-Jan-98	1230	3	11.7	224	8.1	8.23	2.6	5	137	3	83	0	68
East Fork @ Riverview	C9	310011	17-Mar-98	925	4.7	11.1	178	7.7	8.66	34	30	114	41	68	0	56
East Fork @ Riverview	C9	310011	26-May-98	915	4.9	11.7	82	7.3	8.24	13.4	12	43	22	39	0	32
East Fork @ Riverview	C9	310011	21-Jul-98	1045	14.9	11.4			7.95			49	19			25
East Fork @ Riverview	C9	310011	15-Sep-98	1035	17	8.1			8.5			116	10			75
East Fork @ Riverview	C9	310011	17-Nov-98	1100	4.2	11.2	190	7.9	8.31	3.1	5	114	6	71	0	58
East Fork @ Riverview	C9	310011	12-Jan-99	10:45	0.7	16	198	7.69	8.42	3.1	5	114	6	71	0	58
East Fork @ Riverview	C9	310011	16-Mar-99	11:00	5.8	12.5	200	7.85	8.1	5.7	7	110	8	76	0	62
East Fork @ Riverview	C9	310011	25-May-99	14:55	10.1	8.66	54	7.02	7361	86.3	25	36	212	24	0	20
East Fork @ Riverview	C9	310011	20-Jul-99	10:50	15.7	9.25	106	7.4	7.99	4.6	10	75	13	44	0	36
East Fork @ Riverview	C9	310011	14-Sep-99	10:30	14.6		184	7.74	8.52	2.3	10	112	1	73	0	60
East Fork @ Riverview	C9	310011	22-Nov-99	11:20	1.8	11.66	215	7.62	8.43	6.1	7	122	2	76	0	62
East Fork @ Riverview	C9	310011	11-Jan-00	10:35	3.6	16.41	236	7.74	8.51	3.5	5	140	4	81	0	66
East Fork @ Riverview	C9	310011	13-Mar-00	9:30	6.6	12.13	204	7.65	8.37	6.9	17	128	12	81	0	66
East Fork @ Riverview	C9	310011	23-May-00	10:40	9.1	9.6	50	7.4	7.27	32	15	37	68	27	0	22
East Fork @ Riverview	C9	310011	18-Jul-00	11:05	18	8.2	141	8.39	8	2.6	5	96	4	56	2	50
East Fork @ Riverview	C9	310011	12-Sep-00	10:15	15	9.4	213	8.33	8.39	2.5	5	129	0	76	2	66
East Fork @ Riverview	C9	310011	20-Nov-00	10:05	0.25	16	227	8	8.19	3.4	5	156	2	85	0	70
East Fork @ Riverview	C9	310011	9-Jan-01	10:15	1.5	8.56	223	8.01	8.23	1.2	5	140	0	83	0	68
East Fork @ Riverview	C9	310011	20-Mar-01	10:10	7.7	10.28	172	8.03	7.54	55	10	115	111	71	0	58
East Fork @ Riverview	C9	310011	29-May-01	10:50	12.5	9.52	70	7.66	6.32	7.2	5	54	13	32	0	26

P00425 ALKAL BICARB as CaCO3 MG/L	P00430 ALKAL CARB as CaCO3 MG/L	P00600 N TOTAL MG/L	P00613 NITRITE as N MG/L		P00618 NITRATE as N MG/L	P00608 N,AMMON DISS MG/L N		P00625 N-TOTAL KJELDAHL MG/L	P00665 P TOT MG/L	P00671 P DISS PO4 MG/L P	P00941 CHLORIDE DISS MG/L	P00946 SULFATE DISS MG/L SO4	P31679 FECAL STREP #/100ML		P31613 FECAL COLI #/100ML		P31648 E COLI #/100ML	FLOW CFS	P71851 NITRATE NITROGEN DISS as NO3 MG/L
74	0	0.24	0.01	K	0.05	0.1	K	0.18	0.02	0.01	8		10	K	10	K		46	0.2
38	0	0.39	0.01	K	0.07	0.1	K	0.31	0.03	0.01	3		10		30			256	0.3
38	0	0.3	0.01	K	0.06	0.1	K	0.23	0.04	0.02	1		10	K	10	K		592	0.3
34	0	0.24	0.01	K	0.02	0.1	K	0.21	0.03	0.01	0		10		10	K		616	0.09
26	0	0.19	0.01	K	0.03	0.01	K	0.15	0.03	0.01	1		20		10	K		664	0.1
30	0	0.2	0.01	K	0.04	0.1	K	0.15	0.07	0.02	0		250		60			465	0.2
32	16	0.3	0.01	K	0.01	0.1	K	0.29	0.04	0.01	2		30		270			135	0.04
48	8	0.23	0.01	K	0.04	0.1	K	0.18	0.04	0.01	3		30		10	K		80	0.2
46	8	0.28	0.01	K	0.03	0.1	K	0.24	0.04	0.01	4		100		60			119	0.1
66	0	0.21	0.01	K	0.03	0.1	K	0.17	0.02	0.01	5		20		10			78	0.1
70	0	0.23	0.01	K	0.05	0.1	K	0.17	0.03	0.01	10		10	K	10	K		65	0.2
62	0	0.28	0.01	K	0.03	0.1	K	0.24	0.02	0.01	5		10	K	10	K		78	0.1
66	0	0.19	0.01	K	0.03	0.1	K	0.15	0.03	0.01	5		10		10	K		71	0.1
58	0	0.38	0.01	K	0.04	0.1	K	0.33	0.06	0.01	5		10		10	K		100	0.2
42	0	0.23	0.01	K	0.02	0.1	K	0.2	0.03	0.02	1		10	K	10	K		358	0.1
34	0	0.25	0.01	K	0.04	0.1	K	0.2	0.03	0.01	0		20		10	K		445	0.2
38	0	0.6	0.01	K	0.03	0.1	K	0.56	0.03	0.01	1		20		10	K		274	0.2
40	0	0.22	0.01	K	0.04	0.1	K	0.17	0.02	0.01	1		70		200			147	0.2
50	12	0.47	0.01	K	0.05	0.1	K	0.41	0.05	0.01	4		40		10	K		62	0.2
46	12	0.24	0.01	K	0.03	0.1	K	0.2	0.03	0.01	5		20		10			50	0.2
54	16	0.25	0.01	K	0.03	0.1	K	0.21	0.03	0.01	8		20		10	K		40	0.1
60	16	0.31	0.01	K	0.01	0.1	K	0.29	0.02	0.01	8		10		10			41	0.04
66	8	0.2	0.01	K	0.02	0.1	K	0.17	0.02	0.01	8		10	K	10	K		38	0.09
76	8	0.25	0.01	K	0.03	0.1	K	0.21	0.04	0.02	10		10		10	K		60	0.1
70	12	0.24	0.01	K	0.02	0.1	K	0.21	0.06	0.01	11		20		10	K		94	0.1
64	8	0.22	0.01	K	0	0.1	K	0.21	0.03	0.01	10		10	K	10	K		42	0.01
66	0	0.36	0.01	K	0.07	0.1	K	0.28	0.04	0.01	6		10	K	10	K		79	0.3

44	8	0.19	0.01	K	0.03	0.1	K	0.15	0.03	0.02	2		20		10	K			238	0.1
36	0	0.24	0.01	K	0.02	0.1	K	0.21	0.04	0.01	0		10		10	K			428	0.09
36	0	0.23	0.01	K	0.02	0.1	K	0.2	0.05	0.02	1		40		10				283	0.1
32	20	0.3	0.01	K	0.02	0.1	K	0.27	0.04	0.01	3		60		10	K			121	0.08
50	12	0.39	0.01	K	0.03	0.1	K	0.35	0.07	0.01	3		60		10				82	0.1
72	0	0.36	0.01	K	0.02	0.1	K	0.33	0.04	0.01	5		10	K	10				53	0.09
78	0	0.29	0.01	K	0.01	0.1	K	0.27	0.03	0.01	9		10		10				33	0.05
58	0	0.16	0.01	K	0	0.1	K	0.15	0.03	0.01	5		20		10	K			102	0
66	0	0.51	0.01	K	0	0.1	K	0.5	0.03	0.01	6		10	K	10	K			83	0
68	0	0.27	0.01	K	0	0.1	K	0.26	0.03	0.01	5	26	10	K	10	K			65	0.02
60	10	0.34	0.01	K	0	0.1	K	0.33	0.03	0.01	6		10	K	10	K			83	0.02
60	0	0.22	0.01	K	0.04	0.1	K	0.17	0.04	0.01	5		40		10	K			132	0.2
14	20	0.28	0.01	K	0.04	0.1	K	0.23	0.06	0.01	0		740		10	K			511	0.2
22	8	0.38	0.01	K	0.02	0.1	K	0.35	0.05	0.02	0		10		10	K			346	0.09
40	8	1.16	0.01	K	0.08	0.1	K	1.07	0.44	0.05	3		1000	L	600	L			106	0.4
40	24	0.26	0.01	K	0.02	0.1	K	0.23	0.06	0.01	6	26	230		10	K			57	0.1
54	20	0.2	0.01	K	0.02	0.1	K	0.17	0.04	0.01	8		10		30				35	0.1
54	20	0.59	0.01	K	0.05	0.1	K	0.53	0.04	0.01	11		10		10				32	0.2
56	20	0.41	0.01	K	0.04	0.1	K	0.36	0.02	0.01	10		10	K	20				38	0.2
64	8	0.22	0.01	K	0.04	0.1	K	0.17	0.01	0.01	10		10		10	K			37	0.2
64	8	0.23	0.01	K	0.05	0.1	K	0.17	0.03	0.01	6		10		10	K			101	0.2
48	0	0.35	0.01	K	0.05	0.1	K	0.29	0.08	0.03	1		10	K	10	K			824	0.2
50	0	0.2	0.01	K	0.02	0.1	K	0.17	0.05	0.02	0		10		10				586	0.07
24	0	0.6	0.01	K	0.05	0.1	K	0.54	0.14	0.02	0		10		10	K			1890	0.2
26	0	0.27	0.01	K	0.03	0.1	K	0.23	0.04	0.02	0		1000	L	10		10		1020	0.1
38	0	0.16	0.01	K	0.06	0.1	K	0.09	0.03	0.02	0	7	50		20		20		289	0.3
34	12	0.24	0.01	K	0.08	0.1	K	0.15	0.07	0.02	2		20		10		10	K	147	0.4
48	12	0.19	0.01	K	0.01	0.1	K	0.17	0.02	0.01	6		10	K	10	K	10	K	72	0.04
48	12	0.28	0.01	K	0.1	0.1	K	0.17	0.02	0.01	5		20		10	K	10		75	0.4
56	8	0.12	0.01	K	0.03	0.1	K	0.09	0.03	0.01	6		10		10	K	10	K	68	0.1
58	8	0.15	0.01	K	0.02	0.1	K	0.12	0.02	0.01	6		10		10	K	10	K	70	0.1
58	0	0.16	0.01	K	0.06	0.1	K	0.09	0.02	0	6	38	20		10	K	10	K	69	0.3
56	0	0.77	0.01	K	0.01	0.1	K	0.75	0.03	0.02	3		10		10	K	10	K	170	0.06
26	0	0.67	0.01	K	0.06	0.1	K	0.6	0.15	0.01	0		140		30		10		841	0.3
30	0	0.38	0.01	K	0.01	0.1	K	0.36	0.04	0.02	0		10		10		10	K	505	0.06
36	0	0.2	0.01	K	0.01	0.1	K	0.18	0.03	0	0		40		20		10	K	334	0.04
38	20	0.44	0.01	K	0.02	0.1	K	0.41	0.04	0.01	4	17	30		10	K	10		87	0.09
46	12	0.43	0.01	K	0.01	0.1	K	0.41	0.04	0.01	8		40		20		10		49	0.05
70	12	0.25	0.01	K	0.03	0.1	K	0.21	0.03	0.01	13		20		10	K	10		43	0.1
66	8	0.28	0.01	K	0	0.1		0.27	0.02	0.01	9		10	K	10	K	10	K	55	0
68	0	0.21	0.01	K	0.03	0.1	K	0.17	0.04	0.01	7		30		10	K	10	K	91	0.1
70	0	0.38	0.01	K	0.02	0.1	K	0.35	0.02	0.01	7		10		10	K	10	K	84	0.07

				Nitrite		Nitrate	Ammonia Dis		TKN													
	40	0	1.35	0.01	K	0.18	0.1	K	1.16	0.3	0.08	2	29	320		60		70		729	0.8	
	50	0	0.33	0.01	K	0.06	0.1	K	0.26	0.07	0.04	0		10	K	10		10	K	909	0.3	
	48	0	0.28	0.01	K	0.07	0.1	K	0.2	0.1	0.02	0		10	K	10	K	10	K	1100	0.3	
	22	0	0.72	0.01	K	0.03	0.1	K	0.68	0.06	0.02	0	3	70		10		10	K	1510	0.1	
	52	0	0.23	0.01	K	0.02	0.1	K	0.2	0.04	0.02	2		10		10	K	10	K	184	0.08	
	60	0	0.4	0.01	K	0.16	0.1	K	0.23	0.02	0.01	4		10	K	10	K	10		97	0.7	
	58	0	0.67	0.01	K	0	0.1	K	0.66	0.02	0.01	4	26	10	K	10	K	10	K	138	0.01	
	52	0	0.24	0.01	K	0.02	0.1	K	0.21	0.09	0.03	2	17	20		10	K	10	K	694	0.07	
	32	0	0.16	0.01	K	0.01	0.1	K	0.14	0.41	0.03	0	4	130		10	K	10	K	1660	0.05	
	34	0	0.18	0.01	K	0.03	0.1	K	0.14	0.06	0.02	1	6	100				10	K	549	0.1	
	56	0	0.4	0.01	K	0.01	0.1	K	0.38	0.03	0.01	3	18	10				10	K	111	0.03	
	64	0	0.36	0.01	K	0.03	0.1	K	0.32	0.02	0.01	5	26	10	K			10	K	85	0.1	
997	58	0	0.26	0.01	K	0.07	0.1	K	0.18	0.04	0.03	2	16	50				10	K	419	32	
	28	0	0.26	0.01	K	0	0.1	K	0.25	0.1	0.03	1	4	70				164		1120	0	
	38	12	0.23	0.01	K	0.02	0.1	K	0.2	0.23	0.03	2	10	10	K			10		236	0.07	
	66	4	0.28	0.01	K	0.01	0.1	K	0.26	0.03	0.02	4	23	10	K			10	K	83	0.06	
	72	0	0.23	0.01	K	0	0.1	K	0.22	0.04	0.02	5	28	10				10		89	0	
	68	0	0.42	0.01	K	0	0.1	K	0.41	0.03	0.02	5	27	10	K			10	K	106	0	
	56	0	0.38	0.01	K	0	0.1	K	0.37	0.18	0.03	3	21	60				10	K	357	0	
	32	0	0.55	0.01	K	0.02	0.1	K	0.52	0.1	0.02	1	5	50				10		1100	0.09	
	25	20		0.02	K		0.06		0.21	0.08	0.06	1	3.8	70				31		799	0.02	K
	75	20		0.02	K		0.05		0.26	0.05	0.06	3	16.1	60				640		134	0.02	K
	58	0	0.46	0.01	K	0	0.1	K	0.45	0.03	0.03	4	19	10	K			10	K	111	0	
	58	0	0.59	0.01	K	0.09	0.1	K	0.49	0.04	0.03	3	18	20				10	K	122	0.4	
	62	0	0.38	0.01	K	0.01	0.1	K	0.36	0.03	0.03	3	20	10	K			10	K	226	0.04	
	20	0	0.57	0.01	K	0.03	0.1	K	0.54	0.32	0.04	0	2	20				20		2490	0.13	
	36	0	0.45	0.01	K	0	0.1	K	0.44	0.06	0.03	2	7	40				31		269	0	
	60	0	0.29	0.01	K	0	0.1	K	0.28	0.04	0.03	4	17			10	K	10	K	105	0	
	62	0	0.3	0.01	K	0	0.1	K	0.29	0.04	0.02	5	24			10	K	10	K		0	
	66	0	0.37	0.01	K	0.04	0.1	K	0.35	0.03	0.02	6	29			10	K	10			0.18	
	66	0	0.24	0.01	K	0	0.1	K	0.23	0.05	0.02	4	22			10		10	K		0	
	22	0	0.17	0.01	K	0.02	0.1	K	0.14	0.18	0.02	1	2			10	K	10			0.09	
	46	4	0.15	0.01	K	0	0.1	K	0.14	0.03	0.02	3	12			10	K	10			0	
	62	4	0.16	0.01	K	0	0.1	K	0.15	0.03	0	5	25			30		87			0	
	70	0	0.21	0.01	K	0	0.1	K	0.2	0.02	0.01	6	27			10	K	10	K		0	
	68	0	0.12	0.01	K	0	0.1	K	0.11	0.03	0.02	6	28			10	K	10	K		0	
	58	0	0.5	0.01	K	0	0.1	K	0.49	0.21	0.02	4	19			10	K	20			0	
	26	0	0.17	0.01	K	0.01	0.1	K	0.15	0.05	0.01	1	5			10	K	20			0.04	

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PLANNING
GRAB/SURFACE WATER SAMPLES
PROVISIONAL RECORDS

STORET ID 310008

DATE	14-Jan-97	12-Mar-97	28-May-97	22-Jul-97	16-Sep-97	12-Nov-97	14-Jan-98	17-Mar-98	26-May-98	21-Jul-98	15-Sep-98	17-Nov-98
TIME	1440	1125	1400	1430	1155	955	1145	1000	955	1120	1105	1145
TEMP as C	0	5.5	13	19.2	11.5	3	3.5	4	3.6	15.1	17	5.1
DISS O2	12.6	10.6	8.6	9.4	8.9	10.2	11.2	11.2	11.2	10.8	7.1	9.2
CONDUCTIVITY UM/CM	66	67	49	72	84	88	91	85	48			87
pH LAB	7.5	7.6	7.7	7.9	8.1	8.1	7.9	7.6	7			7.7
pH FIELD		7.89	8.21	8.08	8.23	8.35	8.19	8.42	8.43	7.81	8.4	8.31
TURBID NTU	26	2.5	2.4	1.4	1	0.7	1.9	2.1	5			2.2
COLOR PL -CO	35	7	10	10	3	5	3	10	10			7
TDS PPM	53	42	31	37	50	59	65	53	26	35	67	57
TSS PPM	31	5	4	6	0	1	1	6	13	< 10	< 10	6
BICARB as HCO3	34	39	27	44	46	49	49	41	24			41
CO3 as CO3	0	0	0	0	0	0	0	0	0			0
ALKAL as CaCO3	28	32	22	36	38	40	40	34	20	30	50	34
ALKAL BICARB	28	32	22	36	38	40	40	34	20	30	50	34
ALKAL CARB	0	0	0	0	0	0	0	0	0	< 20	< 20	0
N TOTAL	0.5	0.42	0.32	0.37	0.53	0.24	0.54	0.26	0.43			0.5
NITRITE as N	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01
NITRATE MG/L	0.07	0.07	0.01	0.06	0.05	0.04	0.1	0	0.03			0
N,AMMON DISS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	0.05	< 0.1
NH3-NH3 UNIONZD	0.0002	0.0006	0.001	0.003	0.003	0.001	0.0009	0.0004	0.0001	0.0005	0.004	0.0006
N-TOTAL KJELDAHL	0.42	0.34	0.3	0.3	0.5	0.19	0.43	0.25	0.39	0.19	0.35	0.49
P TOTAL	0.06	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.05	0.04	0.04	0.03
P DISS PO4	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0	0.01	< 0.06	< 0.06	0.02
CHLORIDE DISS	1	1	0	1	2	1	2	3	1	0.6	1	1
SULFATE DISS	2	2	1	2	2	2	3	2	1	1.1	1.9	2
FECAL STREP	< 10	< 10	30	170	10	40	< 10	< 10	20	230	110	40
E. COLI	< 10	10	10	99	31	< 10	< 10	31	< 10	87	530	75
USGS Flow Data cfs	150	128	271	67	27							

NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER QUALITY PLANNING
GRAB/SURFACE WATER SAMPLES
PROVISIONAL RECORDS

STORET ID 310152

DATE	14-Jan-97	12-Mar-97	28-May-97	22-Jul-97	16-Sep-97	12-Nov-97	14-Jan-98	17-Mar-98	26-May-98	21-Jul-98	15-Sep-98	17-Nov-98
TIME	1415	1105	1345	1410	1135	1015	1125	1030	1015	1135	1130	1200
TEMP as C	0	7	14	23.5	16	5.5	2	7.2	6.3	17.5	17.5	7.5
DISS O2	10.3	11.2	8.1	13.9	9.5	13	10.8	12.4	10.5	11.5	9.4	12.1
CONDUCTIVITY UM/CM	152	164	73	220	243	229	229	182	87			195
pH LAB	7.6	8	7.8	8.2	8.1	8.5	8.1	7.9	7.4			8.3
pH FIELD		8.32	8.25	7.78	7.71	9.03	8.1	8.28	8.42	7.76	7.7	8.77
TURBID NTU	21	40	25	4.7	1	1.1	2.9	42	14.7			4.6
COLOR PL -CO	25	12	20	7	3	3	5	25	10			5
TDS PPM	99	107	37	136	155	142	150	121	51	52	145	118
TSS PPM	31	76	54	14	1	2	6	79	30	20	< 10	9
BICARB as HCO3	63	73	37	98	112	76	83	71	41			73
CO3 as CO3	0	0	0	5	0	7	0	0	0			0
ALKAL as CaCO3	52	60	30	88	92	74	68	58	34	30	95	60
ALKAL BICARB	52	60	30	80	92	62	68	58	34	30	95	60
ALKAL CARB	0	0	0	8	0	12	0	0	0	< 20	< 20	0
N TOTAL	0.57	0.29	0.66	0.95	0.8	0.33	0.45	0.34	0.48			0.58
NITRITE as N	< 0.01	< 0.01	< 0.01	0.02	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.02	< 0.02	< 0.01
NITRATE MG/L	0.15	0.02	0.02	0.58	0.29	0.01	0	0	0.07			0
N,AMMON DISS	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.03	0.07	< 0.1
NH3-NH3 UNIONZD	0.0003	0.002	0.002	0.008	0.004	0.004	0.001	0.001	0.0003	0.0006	0.001	0.003
N-TOTAL KJELDAHL	0.41	0.26	0.63	0.35	0.5	0.31	0.44	0.33	0.4	0.14	0.49	0.57
P TOTAL	0.08	0.07	0.11	0	0.02	0.03	0.04	0.22	0.1	0.06	0.02	0.04
P DISS PO4	0.03	0.03	0.02	0.01	0	0.01	0.02	0.03	0.04	< 0.06	< 0.06	0.02
CHLORIDE DISS	2	2	1	3	3	5	5	3	1	1	4	4
SULFATE DISS	15	18	4	18	20	28	28	22	5	4.4	20.1	20
FECAL STREP	< 10	30	10	810	50	20	< 10	30	60	110	50	10
E. COLI	< 10	< 10	10	10	31	< 10	< 10	10	10	164	99	< 10
USGS Flow Data cfs	150	128	271	67	27							

NAC 445A.150 Carson River: East Fork at Highway 395, south of Gardnerville.

STANDARDS OF WATER QUALITY
Carson River

Control Point for East Fork at Highway 395, South of Gardnerville (Riverview). The limits of this table apply from Riverview Mobile Home Park to the state line.

PARAMETER	REQUIREMENTS TO MAINTAIN EXISTING HIGHER QUALITY	WATER QUALITY STANDARDS FOR BENEFICIAL USES	BENEFICIAL USES
Temperature °C-Maximum ΔT[a]	 ΔT = 0°C	Nov.-May: ≤13°C June: ≤17°C July: ≤21°C Aug.-Oct.: ≤22°C ΔT ≤2°C	Aquatic life[b] and water contact recreation.
pH Units	7.5 - 8.6 --	S.V.: 6.5 - 9.0 ΔpH: ±0.5 Max.	Water contact recreation[b], wildlife propagation[b], aquatic life, irrigation, stock watering, municipal or domestic supply and industrial supply.
Total Phosphates (as P) - mg/l	-- --	A-Avg.: ≤0.10	Aquatic life[b], water contact recreation[b], municipal or domestic supply and noncontact recreation.
Nitrogen Species (N) - mg/l	Total Nitrogen A-Avg.: ≤0.4 S.V.: ≤0.5	Nitrate S.V.: ≤10 Nitrite S.V.: ≤.06 Ammonia S.V.: ≤.02 (un-ionized)	Aquatic life[b], municipal or domestic supply[b], water contact recreation, stock watering, wildlife propagation and noncontact recreation.
Dissolved Oxygen - mg/l	-- --	S.V.: Nov.-May: ≥6.0 Jun.-Oct.: ≥5.0	Aquatic life[b], water contact recreation, wildlife propagation, stock watering, municipal or domestic supply and noncontact recreation.
Suspended Solids - mg/l	-- --	S.V.: ≤80	Aquatic life[b].
Turbidity - NTU	-- --	S.V.: ≤10	Aquatic life[b] and municipal or domestic supply.
Color - PCU	d	S.V.: ≤75	Municipal or domestic supply[b].
Total Dissolved Solids - mg/l	A-Avg.: ≤120 S.V.: ≤175	A-Avg.: ≤500	Municipal or domestic supply[b], irrigation and stock watering.
Chlorides - mg/l	A-Avg.: ≤6 S.V.: ≤10	S.V.: ≤250	Municipal or domestic supply[b], wildlife propagation, irrigation and stock watering.
Sulfate - mg/l	-- --	S.V.: ≤250	Municipal or domestic supply[b].
Sodium - SAR	A-Avg.: ≤2	A-Avg.: ≤8	Irrigation[b] and municipal or domestic supply.
Alkalinity (as $CaCO_3$) - mg/l	-- --	less than 25% change from natural conditions	Aquatic life[b] and wildlife propagation.
Fecal Coliform-No./100 ml	A.G.M.: ≤20 S.V.: ≤85	≤200/400[c]	Water contact recreation[b], noncontact recreation, municipal or domestic supply, irrigation, wildlife propagation and stock watering.

a. Maximum allowable increase in temperature above water temperature at the boundary of an approved mixing zone, but the increase must not cause a violation of the single value standard.
b. The most restrictive beneficial use.
c. Based on the minimum of not less than 5 samples taken over a 30-day period, the fecal coliform bacterial level may not exceed a geometric mean of 200 per 100 ml nor may more than 10 percent of the total samples taken during any 30-day period exceed 400 per 100 ml.
d. Increase in color must not be more than 10 PCU above natural conditions.

[Environmental Comm'n, Water Pollution Control Reg. part § 4.2.5, Table 4, eff. 5-2-78; A 1-25-79; 8-28-79; 1-25-80; 12-3-80]—(NAC A 12-3-84; 9-15-94)

State of
Nevada
Carson River
Standards

FILE MEMORANDUM

FILE: Markleeville PUD; WDID No. 6A020008000

Date: 12/12/00

Prepared by: Jason Churchill

Subject: Status of Monitoring Program at Markleeville PUD

The Monitoring & Reporting Program (MRP) No. 95-22, for this facility requires the installation of three groundwater monitoring wells by August 31, 1995. However, according to my supervisor, Alan Miller, an agreement was reached (considering the site's topography, hydrology, and geography) informally between Regional Board staff and the MPUD to substitute the following for the required groundwater monitoring program on an experimental basis: There is a seep on the hillside which faces Markleeville Creek, below the MPUD ponds. A seep monitoring station was apparently developed sometime in October, 1997. A trench was excavated into the seep, and a perforated pipe was installed in the trench, which was then filled with gravel. Water is collected from the pipe on a quarterly basis and analyzed for the following constituents: pH, Total N, Nitrate-N, Total P, Clorides and TDS. Coupled with quarterly monitoring of Markleeville Ck. up- and downstream of the facility, this monitoring is to serve as an indicator of groundwater quality and as a method to detect potential leakage of sewage from the ponds. I did a review of the files (summary attached), but found that neither the project file or MRP file contains much information about how this arrangement has been implemented, or about the current status of the groundwater monitoring program.

Last week, I contacted the MPUD Board of Director's chairman, Dave Peets, to get more information. There is currently no certified operator overseeing operations of the facility. However, Mr. Peets contacted the former operator, Jim Funge, and reported to me that personnel from the South Tahoe Public Utility District (STPUD) take samples on a quarterly basis at four stations: the oxidation pond, Markleeville Ck. upstream, Markleeville Ck. downstream, and the "seep" monitoring station (analysis results for the latter station have been reported on self-monitoring reports as "MPUD test well", even though no actual groundwater monitoring well has been installed on the property. Mr. Peets stated that according to Mr. Funge, initial water samples from Markleeville Creek had indicated that there was "more nitrogen [presumably referring to nitrates] *upstream* of the facility than downstream...," which Mr. Funge believes may indicate contamination from the Marklee Village development septic system upstream.

However, my review of recent monitoring reports indicates nitrogen and phosphorus levels upstream and downstream of the Markleeville PUD facility are approximately equivalent. There is limited data from the seep monitoring station, but values for nitrogen and phosphorus range from fairly low, to as high as 1.5 mg/L for nitrate, 1.8 mg/L for total nitrogen, and 0.9 mg/L for total phosphorus. The trends are currently being monitored and will be looked at in more detail once the annual report is received in January. The data should give the Regional Board a better idea of any future action needed with regards to the test well effectiveness and whether installing monitoring wells will be required.

Staff will continue evaluating trends in the monitoring data, and consider updating WDRs in the year 2001, to address inconsistencies between the actual monitoring program, and that required in Board Order No. 6-95-22.

Attached: File review notes; 12/15/89 – 5/26/99.

Markleeville PUD
File Review

(10/3/00) Jason Churchill, ES III

purpose: To determine whether the file contains any record of an agreement for a groundwater monitoring program. There are currently no "monitoring wells" for the facility. However, a seeping hillside underlies the ponds. Alan Miller believes that a gravel-filled trench was installed toward the base of the hill to collect "groundwater." He believes there may have been an agreement reached, on an experimental basis, to substitute sampling from this trench for monitoring of groundwater wells.

The project files show:

A Compliance Inspection Report (pink cover page) recording an inspection of 12/15/89. The second page of this report (a white page) contains a recommendation that monitoring wells be required and that WDR update include requirement for monitoring wells.

Facilities Inspection Report of 6/30/94 indicates that effluent may be surfacing at base of hill below ponds.

Field notes from inspection of 8/3/94 state that "seeps on hillside below ponds not associated with sewage (based on past coliform testing), but lush growth..."

A Request for Technical Information to update waste discharge requirements was mailed on October 5, 1994. Information relating to monitoring wells or an alternative was not requested. The response was issued on November 18, 1994 and did not describe the monitoring program.

File memorandum dated 12/12/94 notes that tentative updated WDRs will require groundwater monitoring wells to be installed. The memo noted that the chairman of MPUD Mr. Funge was unsure how USFS would respond if wells needed to be placed on adjacent property.

Green sheet for updated WDRs during Feb. 1995 Board Meeting state: "This Board Order includes a time schedule for the District to install a groundwater monitoring system...by October 1, 1996."

File Memo of 1/9/95 states that MPUD Chairman Funge "understands need [for 3 test wells] but would like direction/technical assistance to develop locations..."

A letter from MPUD Chairman Funge dated 1/12/95 states under the heading "Ground Water Monitoring" that "Due to the topography of the area and the proximity of the Markleeville Creek it may not be possible to access the area or even install wells that would not be influenced by the creek itself. There are monetary restraints to also consider...quarterly samples may also be beyond our physical capacity to pay for."

Revised WDRs adopted 2/9/95. The MRP requires installation of GW monitoring wells by August 31, 1995.

File Memo dated 5/16/95 shows discharger's concerns about feasibility of access for drill rig.

File Memo dated 5/17/95 describes MPUD Chairman Funge's proposal to bring in a backhoe and "dig out the seep at the base of the hill below the treatment plant."

March 24, 1995. A "Scope of Work And Cost Estimate for Groundwater Monitoring" was sent by Hydro-Search Inc. to MPUD Chairman Funge. The document describes two "Options" for Groundwater Monitoring. Option A is designed as an alternative to drilling GW monitoring wells, and proposed hydro-punching to collect GW samples from seeps in the bluff below the ponds. Samples were to be collect on two occasions (high and low flows) to be analyzed for chloride, TN, nitrate-N, TP, and TDS. This option is based on the arguments that 1) shallow bedrock below the oxidation ponds should capture any liquid infiltrating from the ponds, and 2) sampling of the seeps together with surface water sampling in Markleeville Creek should be sufficient to characterize the influence of the ponds on groundwater quality. The other proposal, Option B, involves the drilling of three GW monitoring wells.

June 20, 1995. A "Proposed Plan of Action for Groundwater Monitoring" is mailed to MPUD by Hydro-Search Inc. The proposal is to develop a French Drain collection system to monitor GW quality in a seep downhill from the ponds. If measured water quality is determined to be unsatisfactory, development of an upgradient seepage face for monitoring is recommended.

File Memo 8/25/95 by Alan Miller indicates attempts are being made to delimit property boundaries for siting of GW monitoring systems. Under "Action Required," the memo states "Call ACOE to get input on whether area may be wetland. Amend MRP to include alternative if project can be approved (no wetland)." I.e., the memo appears to recognize that installation of an alternative GW monitoring system instead of wells would require revision of theMRP.

File Memo 11/1/95 by Alan Miller states that the discharger "will be getting the property surveyed. Would still like to implement French drain monitoring alternative. I indicated that although I didn't think the subject project area is wetland (or rather, may be 'ag-induced' exempt wetland), I would like to get a second opinion by qualified personnel." Under "Action Required," the memo states, "Seek wetland advice from ACOE. Revise or amend WDRs/MrO to allow alternative monitoring program."

An undated handwritten summary of events on lined white paper has an entry for 10/97, recording "Seep development – see letter in file – instead of groundwater monitoring system."
not found?

A Compliance Inspection Report for 5/26/99 by Diana Henry states "WDRs require 3 wells, but they only have one...we may have approved this—need to check file & ask Jerry [Peacock]...Looks from file as though we let them put in one 'seep monitoring' point—kind of a french drain...Talked to Alan Miller 8/4/99—he says we approved the single monitoring point since seepage was occurring there anyway—see what it showed, then decide if further monitoring was necessary—should update MRP to reflect this."

MONITORING & REPORTING TRACKING FORM

WDID No. 6A 02000800 0 Return to Cheryl by 4 / 2 1.26.01 CH

Board Order No. 6- 95-22 Date SMR Received 3 / 2 / 01

Report Frequency : Q Staff: JC Reviewed By: TL

Report Type: M Review Date: 3/8/01
(Monitoring, Pretreatment, Sludge, Other)

Date Report Due: (DAY/MONTH/YEAR) 1-15-01

Facility Markleeville PUD

Compliance ____YES √ NO

REMINDER: PLEASE COMPLETE VIOLATION FORM ON REVERSE SIDE FOR NONCOMPLIANCE

Comments: (Do you want this entered on Program comment line? Y/N)

MBAS data for effluent were not provided (pond), and sludge removal or "non-issue" was not mentioned. This not considered a significant violation.

If not in compliance, what is the recommended action?

Staff called discharger to ensure monitoring report is completely followed in the future.

Supervisor reviewed? Yes ______ No ______

FYI (Current entry on program comment line - Do you want this deleted? Y/N)

REV. 11/00:\WDRFORMS\M&R.FRM

South Tahoe Public Utility District

"Basic Services For A Complex World"

1275 Meadow Crest Drive • South Lake Tahoe • CA 96150
Phone 530 544-6474 • Fax 530 541-0614

January 15, 2001

Markleeville PUD
Post Office Box 222
Markleeville, CA 96120

Attention: Dave Peets

Customer#: **1004**

Sample Date: 1/9/01

Site	ID	Temp C	pH	TDS mg/L	Cl mg/L	Filtered BOD mg/L	TotalP mg/L		TKN mg/L		NO2 as N mg/L		NO3 as N mg/L	Total N mg/L
Markleeville Cr; Upstream	20010110-06	1.0	8.04	146	7.85		0.022	<	0.100	<	0.010	<	0.010	0.120
Markleeville PUD Pond	20010110-07	0.0	7.48	215	24.5	13.1								
Markleeville PUD Test Well	20010110-08	3.0	6.72	242	28.2		0.292		0.284	<	0.010		0.010	0.304
Markleeville Cr; Downstream	20010110-09	1.0	8.00	145	7.89		0.020	<	0.100	<	0.010	<	0.010	0.120

Methods:
pH, by EPA 150.1
TDS, by EPA 160.1
Chloride, by EPA 325.2
BOD, Standard Methods, 18th ed, Method 5210 B
Total Phosphorous, by EPA 365.1
Total Kjeldahl Nitrogen, by EPA 351.1
Nitrite, by EPA 353.2
Nitrate, by EPA 353.2
Total Nitrogen, by Calculation

Report Approved by: [signature]
ELAP ID#: 1569

Month/Year	Monthly Flow	M.G.M. Flow	Average Daily Flow	M.G.D. Flow	Pond Freeboard (In Feet) Pond #1	Pond #2	Pond #3
Jan-00	224,100	0.224	7,229	0.007	3.5 feet	8 feet	empty
Feb-00	216,450	0.216	7,464	0.007	3.5 feet	8 feet	empty
Mar-00	194,400	0.194	6,271	0.006	3.5 feet	8 feet	empty
Apr-00	269,100	0.269	8,970	0.009	3.5 feet	8 feet	empty
May-00	496,350	0.496	16,011	0.016	3.5 feet	8 feet	empty
Jun-00	174,150	0.174	5,805	0.006	3.5 feet	8 feet	empty
Jul-00	381,150	0.381	12,295	0.012	3.5 feet	8 feet	empty
Aug-00	259,650	0.26	8,376	0.008	3.5 feet	8 feet	empty
Sep-00	264,150	0.264	8,805	0.009	3.5 feet	8 feet	empty
Oct-00	231,300	0.231	7,461	0.007	3.5 feet	8 feet	empty
Nov-00	268,650	0.269	8,955	0.009	3.5 feet	8 feet	empty
Dec-00	265,500	0.266	8,565	0.009	3.5 feet	8 feet	empty
Jan-01	235,350	0.235	7,592	0.008	3.5 feet	8 feet	empty

MONITORING & REPORTING TRACKING FORM

4-17-01
CH

WDID No. 6A020038000

Return to Cheryl by 4 / 8 / 01

Board Order No. 6-95-22

Date SMR Received 3 / 8 / 01

Report Frequency : A

Staff: JC

Reviewed By: TL

Report Type: M

(Monitoring, Pretreatment, Sludge, Other)

Review Date: 3/20/01

Date Report Due: (DAY/MONTH/YEAR) 1-15-2000

Facility Markleeville PUD

Compliance ✓ YES ____ NO

REMINDER: PLEASE COMPLETE VIOLATION FORM ON REVERSE SIDE FOR NONCOMPLIANCE

Comments: (Do you want this entered on Program comment line? Y/N)

Trend analysis was not provided for most required parameters.

If not in compliance, what is the recommended action?

Not significant violation, no action taken.

Supervisor reviewed? Yes ______ No ______

FYI (Current entry on program comment line - Do you want this deleted? Y/N)

REV. 11/00:\WDRFORMS\M&R.FRM

MARKLEEVILLE PUBLIC UTILITY DISTRICT

BOARD

Dave Peets-Chairman
Kevin McLaughlin
Wayne Matlock

March 6, 2001

Lahontan Region
Attn: Jason Churchill
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150

Dear Jason:

I've included with this letter the yearly report required by your agency. I hope that this report meets your satisfaction. If you need changes, please contact my office and I will attempt to make the necessary changes. I did send in my quarterly report on 3/5/01.

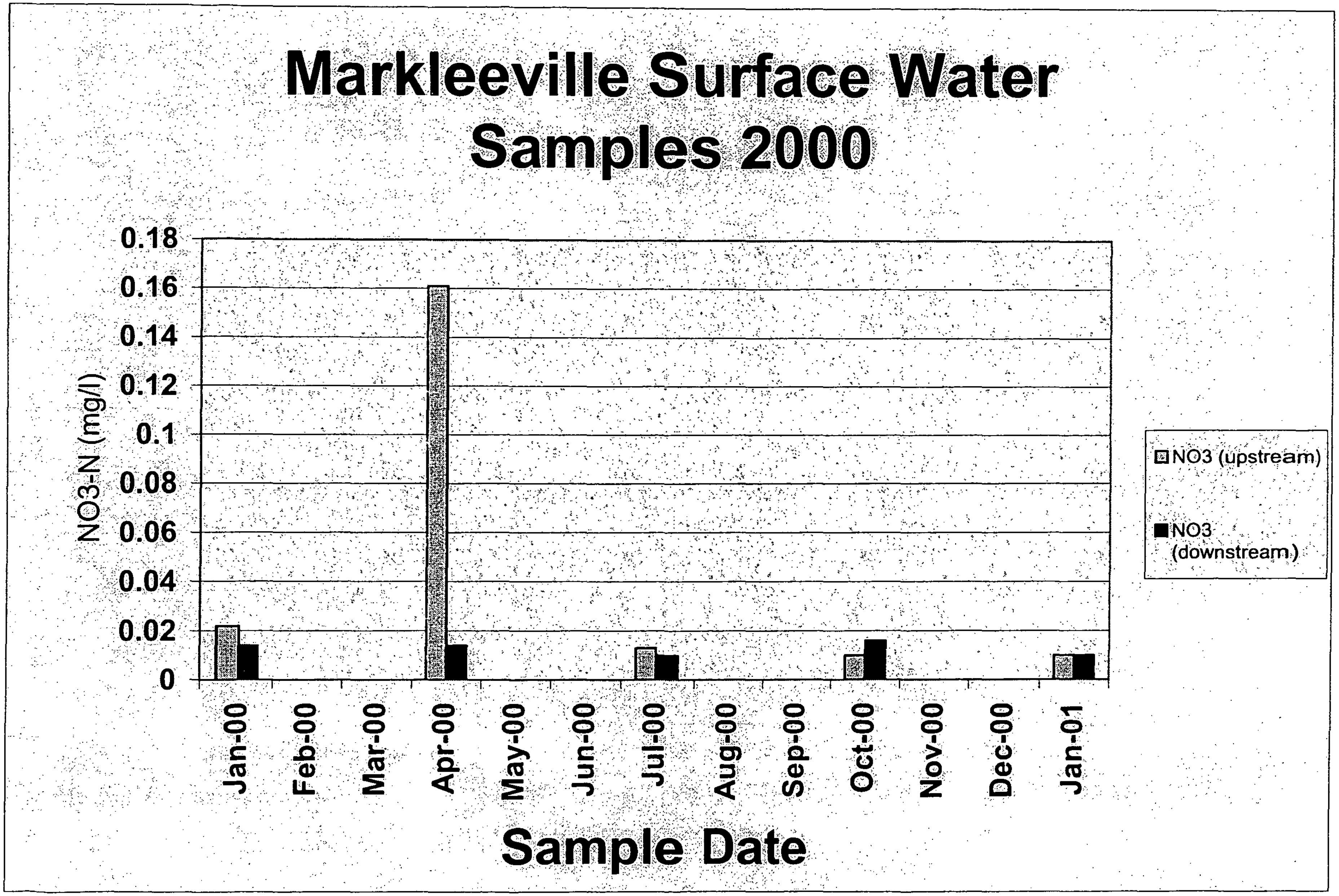
We have a new maintenance person taking care of the everyday duties, and he is also studying to take his plant operator license. We hope to add this person to our Board. (I'm grooming him to be the new Chairman upon my retirement.)

Should you have questions, please don't hesitate to call.

Sincerely,

Dave Peets

Dave Peets
MPUD Chairperson


Markleeville Surface Water Samples 2000
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
NO3-N (mg/l)
Jan-00
Feb-00
Mar-00
Apr-00
May-00
Jun-00
Jul-00
Aug-00
Sep-00
Oct-00
Nov-00
Dec-00
Jan-01
Sample Date
NO3 (upstream)
NO3 (downstream)

Markleeville PUD Annual Compliance Report 2000

sample date 1/5/00	pH		TDS		Cl		BOD		Total P		TKN		NO2-N		NO3-N		TOTAL N		TEMP	
Site	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence
Markleeville Cr; upstream	> 6.5 < 8.5		80	X	4.0		*		0.02	X	*		*		*		0.2		*	
Markleeville PUD Pond	< 6.0 > 9.0		*		*		30		*		*		*		*		*		*	
Markleeville PUD Test Well	> 6.5 < 8.5		500		250		*		*		*		1		10		*		*	
Markleeville CR; Downstream	> 6.5 < 8.5		80	X	4.0		*		0.02	X	*		*		*		0.2		*	

* = N/A
X = Exceedence

sample date 4/4/00	pH		TDS		Cl		BOD		Total P		TKN		NO2-N		NO3-N		TOTAL N		TEMP	
Site	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence
Markleeville Cr; upstream	> 6.5 < 8.5		80		4.0		*		0.02	X	*		*		*		0.2	X	*	
Markleeville PUD Pond	< 6.0 > 9.0		*		*		30		*		*		*		*		*		*	
Markleeville PUD Test Well	> 6.5 < 8.5		500		250		*		*		*		1		10		*		*	
Markleeville CR; Downstream	> 6.5 < 8.5		80		4.0		*		0.02	X	*		*		*		0.2		*	

* = N/A
X = Exceedence

sample date 7/5/00	pH		TDS		Cl		BOD		Total P		TKN		NO2-N		NO3-N		TOTAL N		TEMP	
Site	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence
Markleeville Cr; upstream	> 6.5 < 8.5		80	X	4.0		*		0.02	X	*		*		*		0.2	X	*	
Markleeville PUD Pond	< 6.0 > 9.0		*		*		30		*		*		*		*		*		*	
Markleeville PUD Test Well	> 6.5 < 8.5		500		250		*		*		*		1		10		*		*	
Markleeville CR; Downstream	> 6.5 < 8.5		80	X	4.0		*		0.02	X	*		*		*		0.2	X	*	

* = N/A
X = Exceedence

sample date 10/4/00	pH		TDS		Cl		BOD		Total P		TKN		NO2-N		NO3-N		TOTAL N		TEMP	
Site	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence
Markleeville Cr; upstream	> 6.5 < 8.5		80	X	4.0		*		0.02	X	*		*		*		0.2	X	*	
Markleeville PUD Pond	< 6.0 > 9.0		*		*		30	X	*		*		*		*		*		*	
Markleeville PUD Test Well	> 6.5 < 8.5		500		250		*		*		*		1		10		*		*	
Markleeville CR; Downstream	> 6.5 < 8.5		80	X	4.0		*		0.02	X	*		*		*		0.2	X	*	

* = N/A
X = Exceedence

sample date 1/9/01	pH		TDS		Cl		BOD		Total P		TKN		NO2-N		NO3-N		TOTAL N		TEMP	
Site	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence	limit	exceedence

Markleeville Cr; upstream	> 6.5 < 8.5		80	**X**	4.0	**X**	*		0.02	**X**	*		*		*		0.2		*	
Markleeville PUD Pond	< 6.0 > 9.0		*		*		30		*		*		*		*		*		*	
Markleeville PUD Test Well	> 6.5 < 8.5		500		250		*		*		*		1		10		*		*	
Markleeville CR; Downstream	> 6.5 < 8.5		80	**X**	4.0	**X**	*		0.02		*		*		*		0.2		*	

* = N/A
X = Exceedence

Data collected by South Tahoe PUD for Markleeville PUD. From Markleeville PUD Discharger Self monitoring files.

SOUTH TAHOE PUBLIC UTILITY DISTRICT

"Basic Services for a Complex World"

SEWER • 1950 • WATER A PUBLIC AGENCY

1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • Fax (916) 541-0614

October 10, 1997

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream	Markleeville PUD Test Well
Date:	09-29-97	09-29-97	09-29-97	09-29-97
ID#:	970930-07	970930-06	970930-08	970930-09
Total Dissolved Solids, mg/L	219	144 ✓	135 ✓	200
Chlorides, mg/L:	29.0	9.86 ✓	9.85 ✓	23.9
Surfactants, mg/L:	0.021			
BOD, filtered, mg/L:	26.2			
pH	7.29	8.24	8.28	6.98
Total Kjeldahl Nitrogen, mg/L		0.359	0.100	0.251
Nitrite, as N, mg/L		< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L		0.010	0.015	0.014
Total Nitrogen, mg/L		0.379 ✓	0.125	0.275
Total Phosphorus, mg/L		0.036 ✓	0.046 ✓	0.392

Report Approved by: Terry Powers
ELAP ID #: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT
"Basic Services for a Complex World"
SEWER • 1950 • WATER A PUBLIC AGENCY
1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • Fax (916) 541-0614

October 9, 1996

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream
Date:	10-01-96	10-01-96	10-01-96
ID#:	961001-07	961001-06	961001-08
Total Dissolved Solids, mg/L:	203	139	131
Chlorides, mg/L:	26.4	5.00	4.96
Surfactants, mg/L:	0.04		
BOD, filtered, mg/L:	2.4		
pH	7.22		
Total Kjeldahl Nitrogen, mg/L		0.360	0.198
Nitrite, as N, mg/L		0.010	0.010
Nitrate, as N, mg/L		< 0.01	< 0.010
Total Nitrogen, mg/L		0.380	0.218
Total Phosphorus, mg/L		0.059	0.029

Report Approved by: R. Cowles
ELAP ID #: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT
"Basic Services for a Complex World"
SEWER • 1950 • WATER A PUBLIC AGENCY
1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • Fax (916) 541-0614

July 23, 1996

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream
Date:	07-15-96	07-15-96	07-15-96
ID#:	960716-21	960716-20	960716-22
Total Dissolved Solids, mg/L:	172	88	63
Chlorides, mg/L:	24.5	1.78	1.62
Surfactants, mg/L:	0.251		
BOD, filtered, mg/L:	7.71		
pH	7.20		
Total Kjeldahl Nitrogen, mg/L		0.088	0.112
Nitrite, as N, mg/L		< 0.010	< 0.010
Nitrate, as N, mg/L		0.014	0.010
Total Nitrogen, mg/L		0.112	0.132
Total Phosphorus, mg/L		0.022	0.023

Report Approved by: Terry Powers
ELAP ID #: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT
"Basic Services for a Complex World"
SEWER · 1950 · WATER A PUBLIC AGENCY
1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • Fax (916) 541-0614

April 12, 1996

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream
Date:	04-04-96	04-04-96	04-04-96
ID#:	960404-07	960404-06	960404-08
Total Dissolved Solids, mg/L:	191	71	62
Chlorides, mg/L:	22.7	1.2	1.2
Surfactants, mg/L:	0.15		
BOD, filtered, mg/L:	15.6		
pH	7.97		
Total Kjeldahl Nitrogen, mg/L		0.219	0.206
Nitrite, as N, mg/L		< 0.010	< 0.010
Nitrate, as N, mg/L		< 0.010	< 0.010
Total Nitrogen, mg/L		0.239	0.226
Total Phosphorus, mg/L		0.037	0.014

Report Approved by: Larry Powers
ELAP ID #: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT
"Basic Services for a Complex World"
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1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • Fax (916) 541-0614

January 19, 1996

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream
Date:	01-08-96	01-08-96	01-08-96
ID#:	960108-07	960108-08	960108-09
Total Dissolved Solids, mg/L:	234	104 ✓	103 ✓
Chlorides, mg/L:	27.2	3.5	3.6
Surfactants, mg/L:	0.05		
BOD, filtered, mg/L:	11.2		
pH	7.38		
Total Kjeldahl Nitrogen, mg/L		0.090	0.094
Nitrite, as N, mg/L		0.021	0.022
Nitrate, as N, mg/L		0.010	0.053
Total Nitrogen, mg/L		0.121	0.169
Total Phosphorus, mg/L		0.010	0.010

Report Approved by: Dennis Sanders
ELAP ID #: 1569

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION
MONITORING AND REPORTING PROGRAM NO. 94-108
FOR
MARKLEEVILLE PUBLIC UTILITY DISTRICT
WASTEWATER SYSTEM
ALPINE COUNTY
BOARD ORDER NO. 6-95-22
WDID NO. 6A020008000

	Markleeville Creek Upstream						
Sample Date	Total Dissolved Solid, mg/L	Chlorides, mg/L	Total Kjeldahl Nitrogen, mg/L	Nitrite, as N, mg/L	Nitrate, as N, mg/l	Total Nitrogen, mg/L	Total Phosphorus, mg/L
1/7/98	136	6.9	0.327	0.01	0.01	0.347	0.022
1/13/98							
4/6/98	82	1.48	0.1	0.01	0.012	0.122	0.022
7/20/98	59	0.742	0.432	0.01	0.01	0.452	0.026
10/6/98	88	4.17	0.549	0.01	0.037	0.596	0.02
1/5/99	160	3.45	0.858	0.01	0.026	0.894	0.016
4/14/99	96	1.81	0.209	0.01	0.01	0.229	0.044
8/3/99	92	1.67	0.49	0.01	0.093	0.593	0.054
10/5/99	128	4.58	0.212	0.01	0.025	0.247	0.022
Maximum	160	6.9 ?	0.858	0.01	0.093	0.894	0.054 ✓
Average	105.13 ✓	3.10	0.40	0.01	0.03	0.44 ✓	0.03

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION
MONITORING AND REPORTING PROGRAM NO. 94-108
FOR
MARKLEEVILLE PUBLIC UTILITY DISTRICT
WASTEWATER SYSTEM
ALPINE COUNTY
BOARD ORDER NO. 6-95-22
WDID NO. 6A020008000

	Markleeville Creek Downstream						
Sample Date	**Total Dissolved Solid, mg/L**	**Chlorides, mg/L**	**Total Kjeldahl Nitrogen, mg/L**	**Nitrite, as N, mg/L**	**Nitrate, as N, mg/l**	**Total Nitrogen, mg/L**	**Total Phosphorus, mg/L**
1/7/98	136	6.85	0.307	0.01	0.01	0.327	0.05
1/13/98							
4/6/98	81	1.46	0.125	0.01	0.036	0.171	0.022
7/20/98	54	0.715	0.261	0.01	0.016	0.287	0.03
10/6/98	125	3.73	0.33	0.01	0.038	0.378	0.018
1/5/99	108	3.42	0.192	0.01	0.013	0.215	0.01
4/14/99	96	1.75	0.182	0.01	0.01	0.202	0.05
8/3/99	97	1.97	0.376	0.01	0.019	0.405	0.04
10/5/99	128	4.15	0.238	0.01	0.017	0.265	0.032
Maximum	136	6.85	0.376	0.01	0.038	0.405	0.05
Average	103.13	3.01	0.25	0.01	0.02	0.28	0.03

SOUTH TAHOE PUBLIC UTILITY DISTRICT

"Basic Services for a Complex World"

SEWER • 1950 • WATER   A PUBLIC AGENCY

1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • Fax (916) 541-0614

General Manager
ROBERT G. BAER

Directors
JAMES R. JONES
ROBERT MASON
MARY LOU MOSBACHER
CHRIS STROHM
DUANE WALLACE

January 19, 1998

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream
Date:	01/07/98	01/13/98	01/07/98	01/07/98
ID#:	980107-07	980113-18	980107-06	980107-08
Total Dissolved Solids, mg/L	223		136	136
Chlorides, mg/L:	29.0		6.90	6.85
Surfactants, mg/L:	0.031			
BOD, filtered, mg/L:		7.08		
pH	7.72			
Total Kjeldahl Nitrogen, mg/L			0.327	0.307
Nitrite, as N, mg/L			< 0.010	< 0.010
Nitrate, as N, mg/L			0.010	0.010
Total Nitrogen, mg/L			0.347	0.327
Total Phosphorus, mg/L			0.022	0.050

Report Approved by: [signature]
ELAP ID #: 1569

April 27, 1998

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Mailed 5/6/98

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream	Markleeville PUD Test Well
Date:	04/06/98	04/06/98	04/06/98	04/06/98
ID#:	980407-07	980407-06	980407-09	980406-08
Total Dissolved Solids, mg/L	169	82	81	199
Chlorides, mg/L:	23.3	1.48	1.46	19.3
Surfactants, mg/L:	0.054			
BOD, filtered, mg/L:	16.4			
pH	7.98			
Total Kjeldahl Nitrogen, mg/L		< 0.100	0.125	0.258
Nitrite, as N, mg/L		< 0.010	< 0.010	0.023
Nitrate, as N, mg/L		0.012	0.036	1.500
Total Nitrogen, mg/L		0.122	0.171	1.781
Total Phosphorus, mg/L		0.022	0.022	0.270

Report Approved by: ____________________
ELAP ID #: 1569

SOUTH TAHOE
PUBLIC UTILITY DISTRICT

1275 Meadow Crest Drive • South Lake Tahoe, CA 96150
Phone: (530) 544-6474 • Facsimile: (530) 541-0614

July 27, 1998

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream	Markleeville PUD Test Well
Date:	07/20/98	07/20/98	07/20/98	07/20/98
ID#:	980721-26	980721-25	980721-28	980721-27
Total Dissolved Solids, mg/L	204	59	54	176
Chlorides, mg/L:	23.7	0.742	0.715	8.59
Surfactants, mg/L:	< 0.025			
BOD, filtered, mg/L:	16.7			
pH	7.65			
Total Kjeldahl Nitrogen, mg/L		0.432	0.261	0.367
Nitrite, as N, mg/L		< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L		< 0.010	0.016	< 0.010
Total Nitrogen, mg/L		0.452	0.287	0.387
Total Phosphorus, mg/L		0.026	0.030	0.648

Report Approved by:
ELAP ID #: 1569

SOUTH TAHOE
PUBLIC UTILITY DISTRICT
1275 Meadow Crest Drive • South Lake Tahoe, CA 96150
Phone: (530) 544-6474 • Facsimile: (530) 541-0614

October 20, 1998

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

TO JIM 10/22/98

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream	Markleeville PUD Test Well
Date:	10/06/98	10/06/98	10/06/98	10/06/98
ID#:	981006-08	981006-07	981006-09	981006-10
Total Dissolved Solids, mg/L	224	88	125	204
Chlorides, mg/L:	27.1	4.17	3.73	13.3
Surfactants, mg/L:	0.038			
BOD, filtered, mg/L:	17.7			
pH	6.98			
Total Kjeldahl Nitrogen, mg/L		0.549	0.330	0.736
Nitrite, as N, mg/L		< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L		0.037	0.038	0.048
Total Nitrogen, mg/L		0.596	0.378	0.794
Total Phosphorus, mg/L		0.020	0.018	0.891

Report Approved by:
ELAP ID #: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT

Sewer .1950 . Water A PUBLIC AGENCY

1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • FAX (916) 541-0614

January 12, 1999

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream	Markleeville PUD Test Well
Date:	01/05/99	01/05/99	01/05/99	01/05/99
ID#:	990106-06	990106-08	990106-09	990106-07
Total Dissolved Solids, mg/L	216	160	108	200
Chlorides, mg/L:	24.6	3.45	3.42	22.5
Surfactants, mg/L:	0.070			
BOD, filtered, mg/L:	4.65			
pH	7.51			
Total Kjeldahl Nitrogen, mg/L		0.858	0.192	1.111
Nitrite, as N, mg/L		< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L		0.026	0.013	0.023
Total Nitrogen, mg/L		0.894	0.215	1.144
Total Phosphorus, mg/L		0.016	0.010	0.675

Report Approved by: [signature]
ELAP ID #: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT

Sewer . 1950 . Water

A PUBLIC AGENCY

1275 Meadow Crest Drive • South Lake Tahoe, California 96150

Phone (916) 544-6474 • FAX (916) 541-0614

April 26, 1999

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream	Markleeville PUD Test Well
Date:	04/14/99	04/20/99	04/14/99	04/14/99	04/14/99
ID#:	990414-06	990420-15	990414-08	990414-09	990414-07
Total Dissolved Solids, mg/L	179		96	96	199
Chlorides, mg/L:	18.2		1.81	1.75	18.5
Surfactants, mg/L:	< 0.025				
BOD, filtered, mg/L:		21.8			
pH	8.33				
Total Kjeldahl Nitrogen, mg/L			0.209	0.182	0.318
Nitrite, as N, mg/L			< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L			0.010	< 0.010	< 0.010
Total Nitrogen, mg/L			0.229	0.202	0.338
Total Phosphorus, mg/L			0.044	0.050	0.422

To Jim 4/28/99

Report Approved by: [signature]
ELAP ID #: 1569

SOUTH TAHOE
PUBLIC UTILITY DISTRICT

August 13, 1999

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Jim Fungi,

Site:	Markleeville PUD Oxidation Pond	Markleeville PUD Test Well	Markleeville Cr. Upstream	Markleeville Cr. Downstream
Date:	08/03/99	08/03/99	08/03/99	08/03/99
ID#:	990804-07	990804-08	990804-06	990804-09
Total Dissolved Solids, mg/L	183	159	92	97
Chlorides, mg/L:	21.7	5.16	1.67	1.97
BOD, filtered, mg/L:	20.5			
pH	7.52			
Total Kjeldahl Nitrogen, mg/L		0.404	0.490	0.376
Nitrite, as N, mg/L		< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L		< 0.010	0.093	0.019
Total Nitrogen, mg/L		0.424	0.593	0.405
Total Phosphorus, mg/L		1.180	0.054	0.040

Report Approved by:
ELAP ID #: 1569

(530) 544-6474
Fax (530) 541-0614

1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

SOUTH TAHOE
PUBLIC UTILITY DISTRICT

October 15, 1999

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Jim Fungi,

Site:	Markleeville PUD Oxidation Pond	Markleeville PUD Test Well	Markleeville Cr. Upstream	Markleeville Cr. Downstream
Date:	08 10/05/99	10/05/99	10/05/99	10/05/99
ID#:	991006-07	991006-08	991006-06	991006-09
Total Dissolved Solids, mg/L	197	196	128	128
Chlorides, mg/L:	25.1	14.4	4.58	4.15
BOD, filtered, mg/L:	24.7			
pH	8.01			
Total Kjeldahl Nitrogen, mg/L		0.321	0.212	0.238
Nitrite, as N, mg/L		< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L		0.019	0.025	0.017
Total Nitrogen, mg/L		0.350	0.247	0.265
Total Phosphorus, mg/L		0.740	0.022	0.032

Report Approved by: [signature]
ELAP ID #: 1569

(530) 544-6474 · Fax (530) 541-0614
1275 Meadow Crest Drive · South Lake Tahoe, CA 96150

SOUTH TAHOE
PUBLIC UTILITY DISTRICT

1275 Meadow Crest Drive • South Lake Tahoe, CA 96150
Phone: (530) 544-6474 • Facsimile: (530) 541-0614

July 27, 1998

Markleeville P.U.D.
Post Office Box 222
Markleeville, CA 96120

Attn: Marvin Steinman,

Site:	Markleeville PUD Oxidation Pond	Markleeville Cr. Upstream	Markleeville Cr. Downstream	Markleeville PUD Test Well
Date:	07/20/98	07/20/98	07/20/98	07/20/98
ID#:	980721-26	980721-25	980721-28	980721-27
Total Dissolved Solids, mg/L	204	59	54	176
Chlorides, mg/L:	23.7	0.742	0.715	8.59
Surfactants, mg/L:	< 0.025			
BOD, filtered, mg/L:	16.7			
pH	7.65			
Total Kjeldahl Nitrogen, mg/L		0.432	0.261	0.367
Nitrite, as N, mg/L		< 0.010	< 0.010	< 0.010
Nitrate, as N, mg/L		< 0.010	0.016	< 0.010
Total Nitrogen, mg/L		0.452	0.287	0.387
Total Phosphorus, mg/L		0.026	0.030	0.648

Report Approved by: [signature]
ELAP ID #: 1569

MARKLEEVILLE PUBLIC UTILITY DISTRICT

BOARD

Dave Peets-Chairman
Kevin McLaughlin
Wayne Matlock

December 8, 2000

Lahontan Region
Attn: Jason Churchill
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150

Dear Jason:

I've compiled data that should bring up to current the quarterly reporting that is required of the MPUD. I apologize for the tardiness and hope that this will not continue. Should you have problems with this report, please let me know.

Sincerely,

Dave Peets

Dave Peets
MPUD Chairman

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION
MONITORING AND REPORTING PROGRAM NO. 94-108
FOR
MARKLEEVILLE PUBLIC UTILITY DISTRICT
WASTEWATER SYSTEM
ALPINE COUNTY
BOARD ORDER NO. 6-95-22
WDID NO. 6A020008000

	Monthly	M.G.M.	Average	M.G.D.	Pond Freeboard (In Feet)		
Month/Year	Flow	Flow	Daily Flow	Flow	Pond #1	Pond #2	Pond #3
Jan-00	224,100	0.224	7,229	0.007	3.5 feet	8 feet	empty
Feb-00	216,450	0.216	7,464	0.007	3.5 feet	8 feet	empty
Mar-00	194,400	0.194	6,271	0.006	3.5 feet	8 feet	empty
Apr-00	269,100	0.269	8,970	0.009	3.5 feet	8 feet	empty
May-00	496,350	0.496	16,011	0.016	3.5 feet	8 feet	empty
Jun-00	174,150	0.174	5,805	0.006	3.5 feet	8 feet	empty
Jul-00	381,150	0.381	12,295	0.012	3.5 feet	8 feet	empty
Aug-00	259,650	0.26	8,376	0.008	3.5 feet	8 feet	empty
Sep-00	264,150	0.264	8,805	0.009	3.5 feet	8 feet	empty
Oct-00	231,300	0.231	7,461	0.007	3.5 feet	8 feet	empty

SOUTH TAHOE PUBLIC UTILITY DISTRICT

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1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (916) 544-6474 • Fax (916) 541-0614

January 17, 2000

Markleeville PUD
Post Office Box 222
Markleeville, CA 96120

Attention: Dave Peets

Customer#: **1004**

Sample Date: 1/5/00

Site	ID	pH	TDS mg/L		Cl mg/L	BOD mg/L	TotalP mg/L		TKN mg/L		NO2-N mg/L	NO3-N mg/L	Total N mg/L	TEMP
Markleeville Cr; Upstream	20000106-06		148	<	.5		0.030	<	0.100	<	0.010	0.022	0.132	-1°C
Markleeville PUD Pond	20000106-07	7.47	212		24.9	24.8								
Markleeville PUD Test Well	20000106-08	7.04	214		22		0.720		0.169	<	0.010	0.019	0.198	
Markleeville Cr; Downstream	20000106-09		147		7.35		0.033		0.118	<	0.010	0.014	0.142	-1°C

Methods: pH, by EPA 150.1
TDS, by EPA 160.1
Chloride, by EPA 325.2
BOD, Standard Methods, 18th ed, Method 5210 B
Total Phosphorous, by EPA 365.1
Total Kjeldahl Nitrogen, by EPA 351.1
Nitrite, by EPA 353.2
Nitrate, by EPA 353.2
Total Nitrogen, by Calculation

Report Approved by: [signature]
ELAP ID#: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT

1950-2000 **50 YEARS OF EXCELLENCE**

1275 Meadow Crest Drive • South Lake Tahoe, California 96150
Phone (530) 544-6474 • Fax (530) 541-0614

April 10, 2000

Markleeville PUD
Post Office Box 222
Markleeville, CA 96120

Attention: Dave Peets

Customer#: **1004**

Sample Date: 4/4/00

Site	ID	pH	TDS mg/L	Cl mg/L	Filtered BOD mg/L	TotalP mg/L		TKN mg/L		NO2-N mg/L	NO3-N mg/L	Total N mg/L	TEMP
Markleeville Cr; Upstream	20000405-06	7.60	54	.88		0.086	<	0.100	<	0.010	0.161	0.271	7.0°
Markleeville PUD Pond	20000405-07	7.13	209	21.2	15.6								
Markleeville PUD Test Well	20000405-08	6.85	206	19.1		0.340	<	0.100	<	0.010	0.025	0.135	
Markleeville Cr; Downstream	20000405-09	7.67	56	.69		0.100		0.174	<	0.010	0.014	0.198	7.0°C

Methods:
pH, by EPA 150.1
TDS, by EPA 160.1
Chloride, by EPA 325.2
BOD, Standard Methods, 18th ed, Method 5210 B
Total Phosphorous, by EPA 365.1
Total Kjeldahl Nitrogen, by EPA 351.1
Nitrite, by EPA 353.2
Nitrate, by EPA 353.2
Total Nitrogen, by Calculation

Report Approved by: Terry Powers
ELAP ID#: 1569

SOUTH TAHOE PUBLIC UTILITY DISTRICT
1950-2000 50 YEARS OF EXCELLENCE
1275 Meadow Crest Drive • South Lake Tahoe,California 96150
Phone (530) 544-6474 • Fax (530) 541-0614

July 12, 2000

Markleeville PUD
Post Office Box 222
Markleeville, CA 96120

Attention: Dave Peets

Customer#: **1004**

Sample Date: 7/5/00

Site	ID	pH	TDS mg/L	Cl mg/L	Filtered BOD mg/L	TotalP mg/L	TKN mg/L		NO2-N mg/L		NO3-N mg/L	Total N mg/L	TEMP
Markleeville Cr; Upstream	20000706-06	8.10	91	1.72		0.024	0.258	<	0.010		0.013	0.281	16.0°
Markleeville PUD Pond	20000706-07	7.36	233	28.1	28.1								
Markleeville PUD Test Well	20000706-08	7.33	167	5.73		0.990	0.333	<	0.010	<	0.010	0.353	
Markleeville Cr; Downstream	20000706-09	8.08	93	1.68		0.022	0.531	<	0.010	<	0.010	0.551	15.0°C

Methods: pH, by EPA 150.1
TDS, by EPA 160.1
Chloride, by EPA 325.2
BOD, Standard Methods, 18th ed, Method 5210 B
Total Phosphorous, by EPA 365.1
Total Kjeldahl Nitrogen, by EPA 351.1
Nitrite, by EPA 353.2
Nitrate, by EPA 353.2
Total Nitrogen, by Calculation

Report Approved by: [signature]
ELAP ID#: 1569

General Manager
Robert G. Baer

Directors
Christopher H. Strohm
James R. Jones
Mary Lou Mosbacher
Duane Wallace
Pembroke Gochnauer

"Basic Services For A Complex World"

South Tahoe Public Utility District

1275 Meadow Crest Drive • South Lake Tahoe • CA 96150
Phone 530 544-6474 • Fax 530 541-0614

October 17, 2000

Markleeville PUD
Post Office Box 222
Markleeville, CA 96120

Attention: Dave Peets

Customer#: **1004**

Sample Date: 10/4/00

Site	ID	pH	TDS mg/L	Cl mg/L	Filtered BOD mg/L	TotalP mg/L		TKN mg/L		NO2-N mg/L		NO3-N mg/L	Total N mg/L	TEMP
Markleeville Cr; Upstream	20001005-06	8.14	144	3.6		0.032	<	0.100	<	0.010	<	0.010	0.120	13.0°C
Markleeville PUD Pond	20001005-07	7.22	258	31.8	40.3									
Markleeville Cr; Downstream	20001005-08	8.15	137	3.34		0.024	<	0.010	<	0.010		0.016	0.036	12°C

Methods:
pH, by EPA 150.1
TDS, by EPA 160.1
Chloride, by EPA 325.2
BOD, Standard Methods, 18th ed, Method 5210 B
Total Phosphorous, by EPA 365.1
Total Kjeldahl Nitrogen, by EPA 351.1
Nitrite, by EPA 353.2
Nitrate, by EPA 353.2
Total Nitrogen, by Calculation

TEST WELL
NO FLOW 10/4/00

Report Approved by: Daniel Arce
ELAP ID#: 1569

Internal Memo
Lahontan Regional Water Quality Control Board

To: Judith Unsicker, ES IV

From: John Steude, WRCE John Steude
Alan Miller, SWRCE Alan Miller

Date: 6/7/01

Subject: Summary of water quality analysis for potential CWA 303(d) listing of the lower of the West Fork of the Carson River, Alpine County.

Introduction

This memo presents the results of a statistical analysis of water quality data for the West Fork of the Carson River. Specifically, the Mean of Monthly Means (MOMM) for nine water quality parameters were calculated and plotted for twenty years (1981 – 2000) of data obtained for the lower reaches of the West Fork of the Carson River. MOMM values represent the grand annual average of all monthly values for a specific sampling location obtained in a particular month (typically, one sample per month). The water quality parameters analyzed (i.e., TDS, Cl, SO_4, TP, B, % Na, TN, TKN, and NO_3) correspond to the water quality objectives for the Carson River in the *Water Quality Control Plan for the Lahontan Region* (Basin Plan). Table 3-14 of the Basin Plan contains numeric water quality objectives by reach for each of the parameters listed above (Appendix I). This memo presents a comparison of the objectives and the statistical data.

Five-year moving averages of the MOMM data for each parameter were also analyzed to aid in the identification of any trends in water quality. The first five-year moving average was calculated by averaging the first five years of MOMM results. For each subsequent year, a new average was calculated after subtracting the oldest year and adding the next year.

The purpose of this evaluation is to determine whether water quality objectives are being met in the West Fork of the Carson River and to determine if these waters should be considered for listing as impaired under the Clean Water Act Section 303(d) requirements.

The South Tahoe Public Utility District (STPUD) routinely conducts monthly sampling and analyzes water from the lower reaches of the West Fork of the Carson River. The STPUD sampling points of interest in this evaluation, SW-01 and SW-05, are located near Woodfords, California (T 11 N, R 19 E) and Paynesville, California (T 11 N, R 20 E), respectively. The locations are shown on Figures 1 and 2. STPUD also conducts monitoring at Stateline (SW-06) and Dressler (SW-09) located on the Carson River in Nevada. These locations, however, are typically not monitored during winter months and would produce skewed MOMM values. The location at Dressler is only sampled during May and November each year. Hence, no MOMM results are presented here for Stateline and Dressler.

At Paynesville, the Nevada Division of Environmental Protection (NDEP) also conducts sampling and analyses of water quality. No map has been provided for this sampling location and it should be noted that NDEP does not analyze all of the parameters corresponding to water quality objectives in California. Since 1995, NDEP has conducted their sampling and analysis every two months, instead of monthly, as was the case before 1995. Nevertheless, data obtained from Nevada can be used to supplement and correlate the data from California.

Results

The results of MOMM calculations for the past 20 years indicate that TDS and Cl values are within objective values. However, values for SO4, TP, B, % Na, TN, TKN, and NO3 are not meeting objectives. A summary of the MOMM results is shown in the table below. In all cases, the values presented here are in milligrams per liter (mg/L).

SUMMARY OF CALIFORNIA RESULTS FOR THE CARSON RIVER - WEST FORK

Parameter	Woodfords MOMM ('81 – '00)	Woodfords MOMM Objective	Woodford Percent of Objective*	Paynesville MOMM ('81 – '00)	Paynesville MOMM Objective	Paynesville Percent of Objective*
TDS	52	55	94	60	70	85
CL	1.0	1.0	105**	1.7	2.5	67
SO4	**3.4**	2.0	**170**	**4.2**	2.0	**208**
Total P	**0.03**	0.02	**137**	0.03	0.03	111**
B	**0.05**	0.02	**228**	**0.03**	0.02	**140**
% Na	**21.7**	20.0	**109**	**23.0**	20.0	**115**
Total N	**0.22**	0.15	**144**	**0.27**	0.25	**109**
TKN	**0.20**	0.13	**155**	**0.21**	0.22	94
NO3	**0.04**	0.02	**187**	**0.06**	0.03	**191**

* Percent of objective calculated as: (MOMM / Objective) x 100.
** In compliance when using the same number of significant figures as in the objective.

Results of the MOMM calculations for each water quality parameter are tabulated in Appendix II. The results in Appendix II are graphically presented on the following pages for each parameter listed above. The graphs are presented in this order:

- Comparison of MOMM values and five-year moving averages with the objectives for Woodfords. (Figures 3, 6, 9, 12, 15, 18, 21, 24, and 27)

- Comparison of MOMM values and five-year moving averages with the objectives for Paynesville. (Figures 4, 7, 10, 13, 16, 19, 22, 25, and 28)

- A graphical comparison of the Paynesville MOMM values from both STPUD and NDEP. (Figures 5, 8, 11, 14, 17, 20, 23, 26, and 29)

This order was selected for easy comparisons between Woodfords and Paynesville data as well as easy comparisons of STPUD and NDEP data for each parameter (e.g., all TDS results are presented in Figures 3, 4, and 5).

Discussion

Total Dissolved Solids

The MOMM values for TDS at Woodfords and Paynesville over the past twenty years are 52 and 60, respectively. Compared with objectives of 55 for Woodfords and 70 for Paynesville, these MOMM values are within water quality objectives (Figures 3 and 4). Average values for the past five years at Woodfords and Paynesville are 54 and 61 and suggest that current TDS levels are within the objective values. The comparison of California and Nevada data for Paynesville shows close agreement (Figure 5). The 20-year MOMM values from California and Nevada are 60 and 61, respectively.

Chloride Ion

The MOMM values for Cl at Woodfords and Paynesville over the past twenty years are 1.0 and 1.7, respectively. Compared with objectives of 1.0 and 2.5, respectively, the value for Woodfords is at the objective level and the Paynesville value is well below the objective value (Figures 6 and 7). Average values for the past five years are 1.2 and 1.3 indicating that the current trend at Woodfords is above the objective for Cl while, at Paynesville, the current trend is below the objective. The California and Nevada Cl values at Paynesville are also in close agreement and support the determination that Cl levels are within the objective for Paynesville (Figure 8).

Sulfate Ion

The MOMM values for SO4 at Woodfords and Paynesville over the past twenty years are 3.4 and 4.2, respectively. Compared with an objective of 2.0 for both locations, the data indicate that the SO4 MOMM values are consistently above the objective (Figures 9 and 10). Average values for the past five years (2.4 and 2.6) indicate that the current trend is closer to the objective value than the 20-year MOMM, but still above the objective value. The SO4 data from Nevada for the past five years (no earlier SO4 data was reported) indicate that the average SO4 value is 2.0 which is the same as the objective value. In this case, the California and Nevada data are not in close agreement and an unexplained discrepancy is noted (Figure 11).

Total Phosphorus

The MOMM values for TP at Woodfords and Paynesville over the past twenty years are both 0.03. Compared with objectives of 0.02 and 0.03, respectively, the value for Woodfords is above the objective and the value for Paynesville is equal to the objective (Figures 12 and 13). Average values for the past five years of 0.04 and 0.03 indicate that the recent trend is above the objective at Woodfords and equal to the objective at Paynesville. It should also be noted that the recent Woodfords data is heavily weighted by the high TP value for 1997. The Paynesville TP data from California and Nevada is supported by the same MOMM value of 0.03 (Figure 14).

Boron

The MOMM values for B for the past twenty years are 0.05 and 0.03 for Woodfords and Paynesville, respectively. Compared with an objective value of 0.02 for the MOMM, both locations are above the objective value (Figures 15 and 16). It should be noted that the results are heavily weighted by very high annual averages in 1985 for both locations and in 1988 for Woodfords. The five year average values of 0.02 and 0.01 for Woodfords and Paynesville, respectively, indicate that recent trends are within the objectives for both locations. NDEP does not include B in their test series (Figure 17).

Percent Sodium

The MOMM values for % Na are not valid for the entire twenty-year record. Until June 1993, the values of 1.0 reported by STPUD were not reasonable and could not be used in this evaluation. Therefore, only the MOMM values from 1994 forward are considered valid and are utilized for the statistical analysis. The MOMM values for % Na at Woodfords and Paynesville are 21.7 and 23.0, respectively. Compared with an objective of 20.0 at both locations, the MOMM values for % Na are slightly above the objective (Figures 18 and 19). Nevada does not include % Na in their test series (Figure 20).

Total Nitrogen

The MOMM values for TN for the past twenty years at Woodfords and Paynesville are 0.22 and 0.27, respectively. Compared with objective values of 0.15 and 0.25, both locations are above the MOMM objectives (Figures 21 and 22). Average values of 0.24 and 0.26 for the past five years indicate that current trends of TN are above the objectives. The MOMM value for TN from Nevada data is 0.31. This value supports the California data that indicates the MOMM value for TN is above the objective for Paynesville (Figure 23).

Total Kjeldahl Nitrogen

The MOMM values for TKN (organic N) for the past nine years at Woodfords and Paynesville are 0.20 and 0.21, respectively. (No TKN data was reported prior to 1991.) Compared with objectives of 0.13 and 0.22, the MOMM value for Woodfords is above the objective and the Paynesville value is within the objective (Figures 24 and 25). Average MOMM values of 0.19 and 0.20 for the past five years are slightly better than the longer record indicates, but are not significantly different. The MOMM value for TKN in Paynesville is in close agreement with the value of 0.22 determined from Nevada data (Figure 26).

Nitrate Ion

The MOMM values for NO3 for the past twenty years at Woodfords and Paynesville are 0.04 and 0.06, respectively. Compared with objective values of 0.02 and 0.03, both locations have MOMM values for NO3 that are above the objectives (Figures 27 and 28). Average values of 0.04 and 0.05 from the past five years are very similar to the values determined from the twenty-year record. The MOMM value for NO3 determined from Nevada data at Paynesville is 0.08 and is significantly higher than the California data (Figure 29).

Conclusions

With the exceptions of TDS and Cl, all other water quality parameters (i.e., SO4, TP, B, % Na, TN, TKN, NO3) are above the objective MOMM values in the Basin Plan. Given these results, it may be prudent to consider listing the West Fork of the Carson River as impaired with respect to selected water quality parameters.

Enclosures:

Figures 1-29; Graphical Comparisons of Water Quality Statistical Data with Water Quality Objectives

Appendix I: Basin Plan Table 3-14 Water Quality Objectives for East & West Fork Carson River

Appendix II: Tabulated MOMM Results for the West Fork of the Carson River

Figure 1 – Woodfords Sampling Location (SW-01)
(Adapted from USGS Woodfords 7.5' Quadrangle)

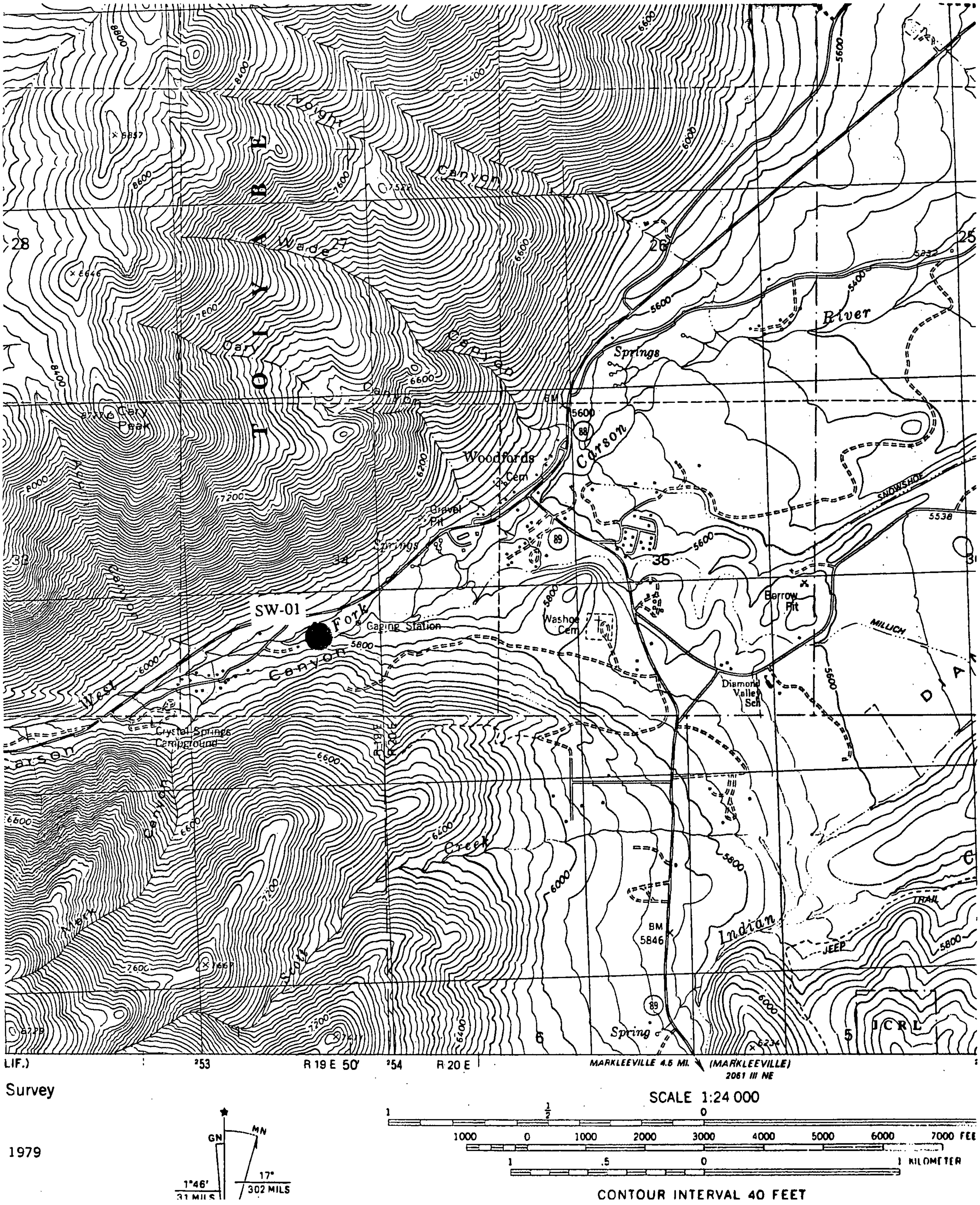


Figure 2 – Paynesville Sampling Location (SW-05)
(Adapted from USGS Woodfords 7.5' Quadrangle)

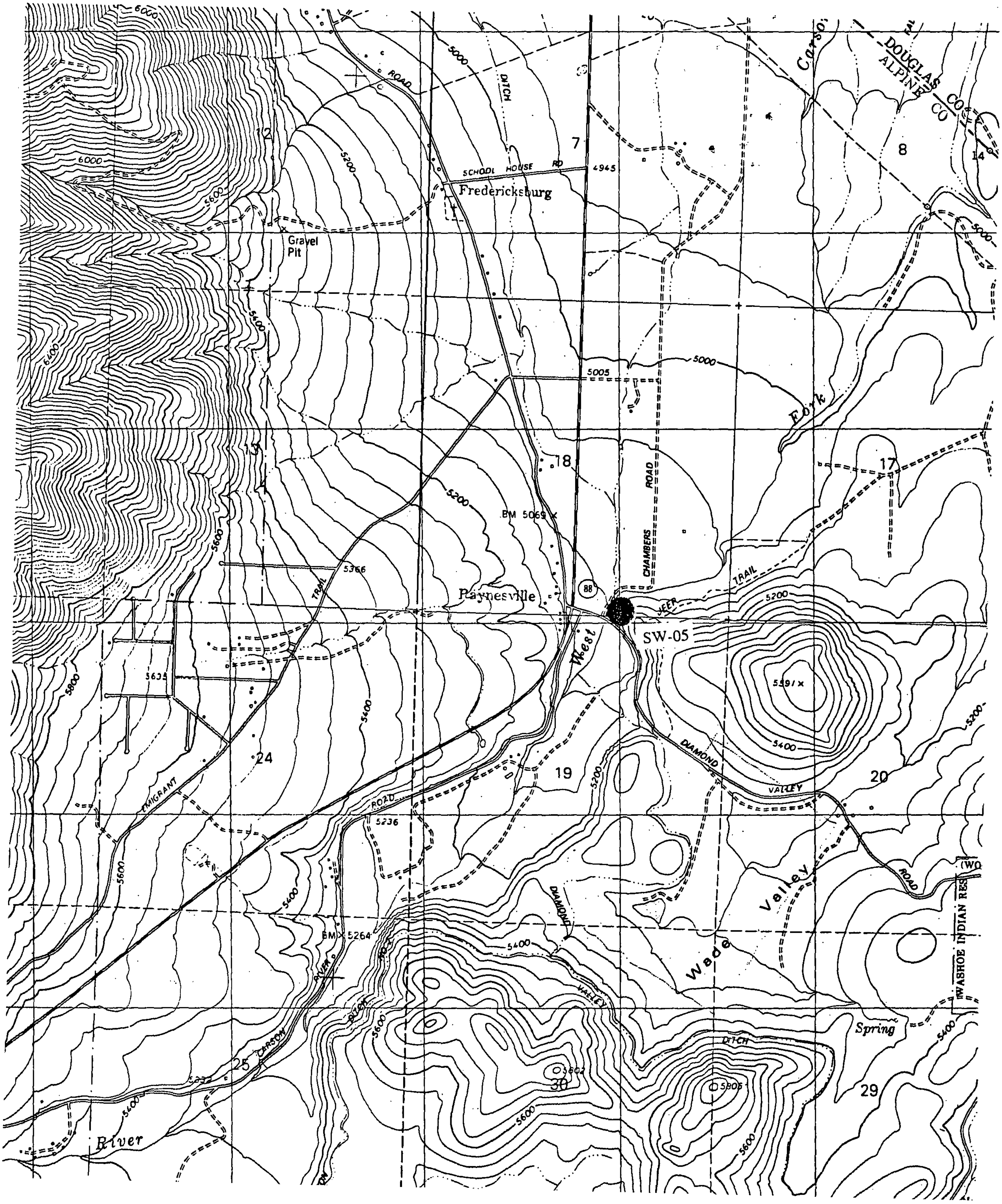


FIGURE 3 - TOTAL DISSOLVED SOLIDS AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

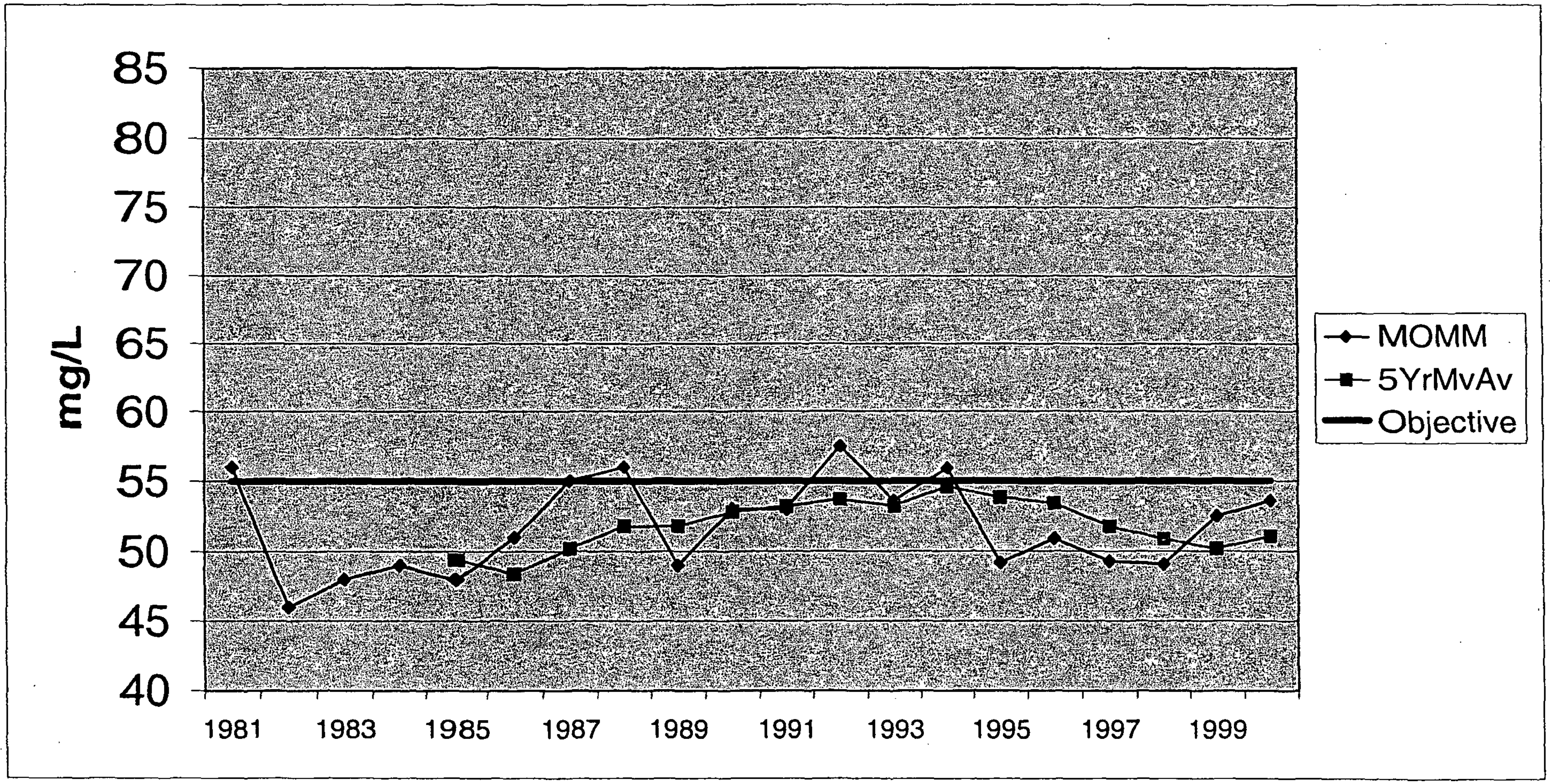


FIGURE 4 - TOTAL DISSOLVED SOLIDS AT PAYNESVILLE

WEST FORK OF CARSOM RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

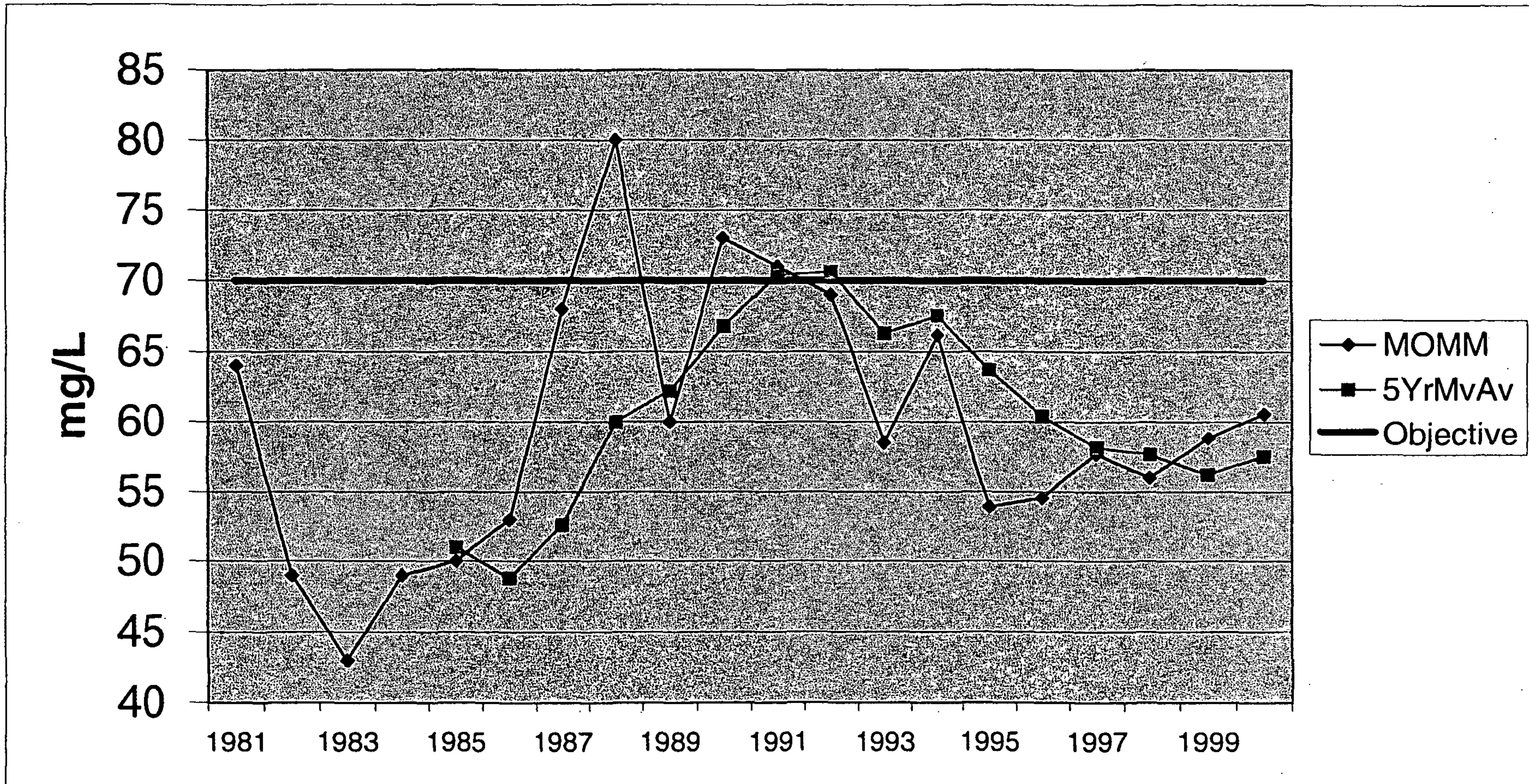


FIGURE 5 - TOTAL DISSOLVED SOLIDS AT PAYNESVILLE

WEST FORK OF CARSON RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEANS DATA
COMPARISON OF CALIFORNIA AND NEVADA DATA WITH THE OBJECTIVE FOR PAYNESVILLE

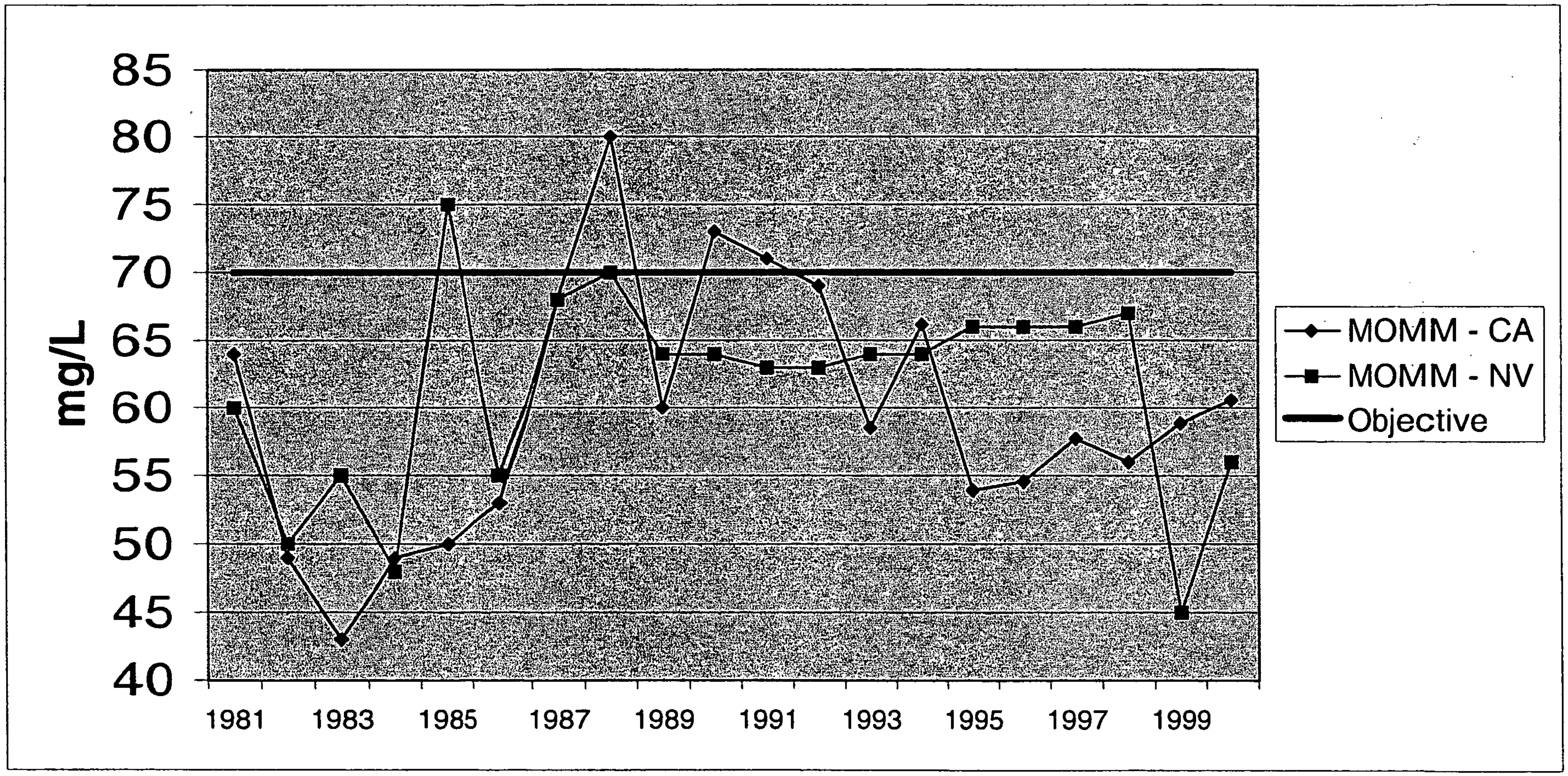


FIGURE 6 - CHLORIDE AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

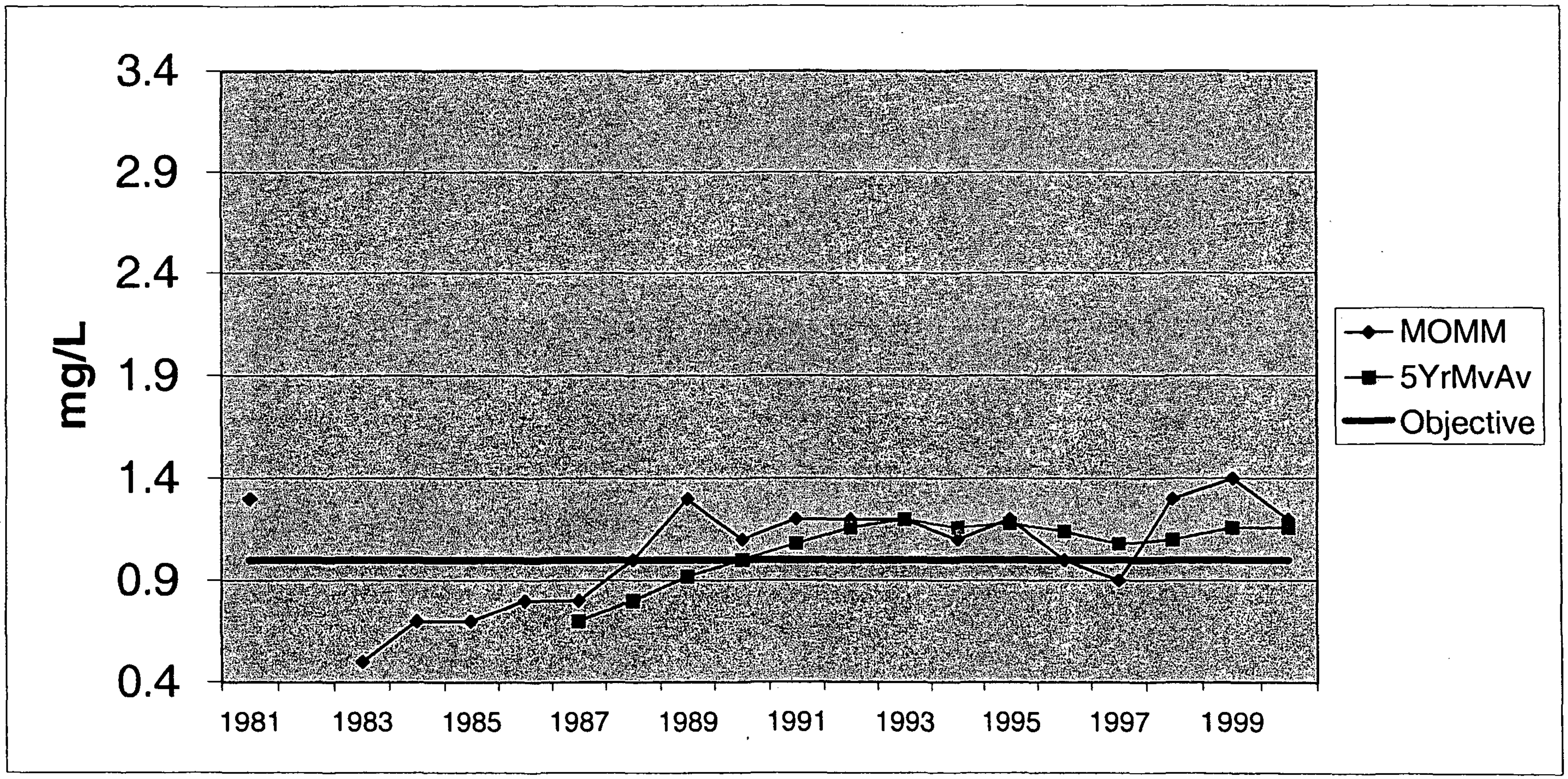


FIGURE 12 - TOTAL PHOSPHORUS AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

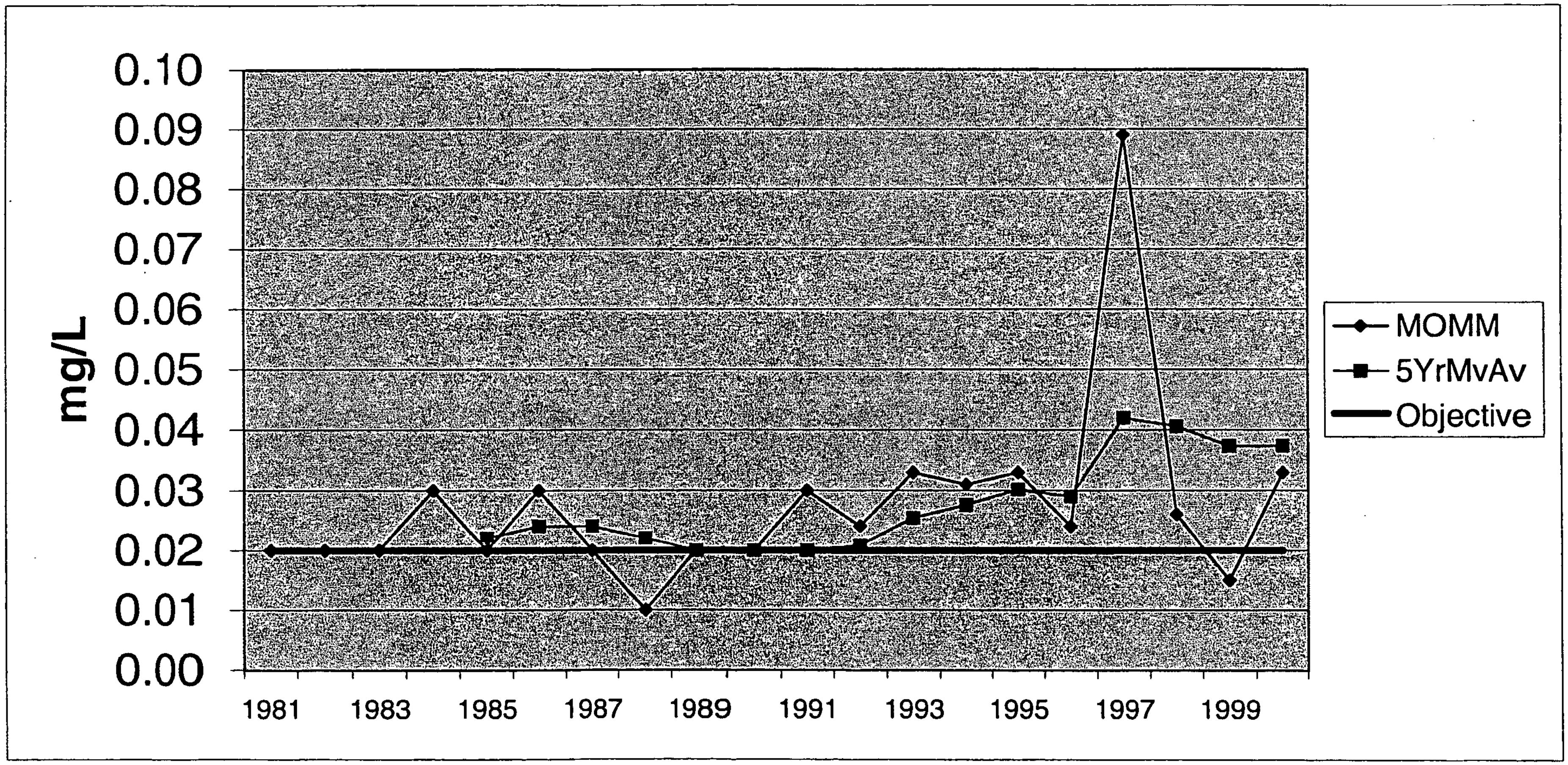


FIGURE 11 - SULFATE AT PAYNESVILLE

WEST FORK OF CARSON RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEANS DATA
COMPARISON OF CALIFORNIA AND NEVADA DATA WITH THE OBJECTIVE FOR PAYNESVILLE

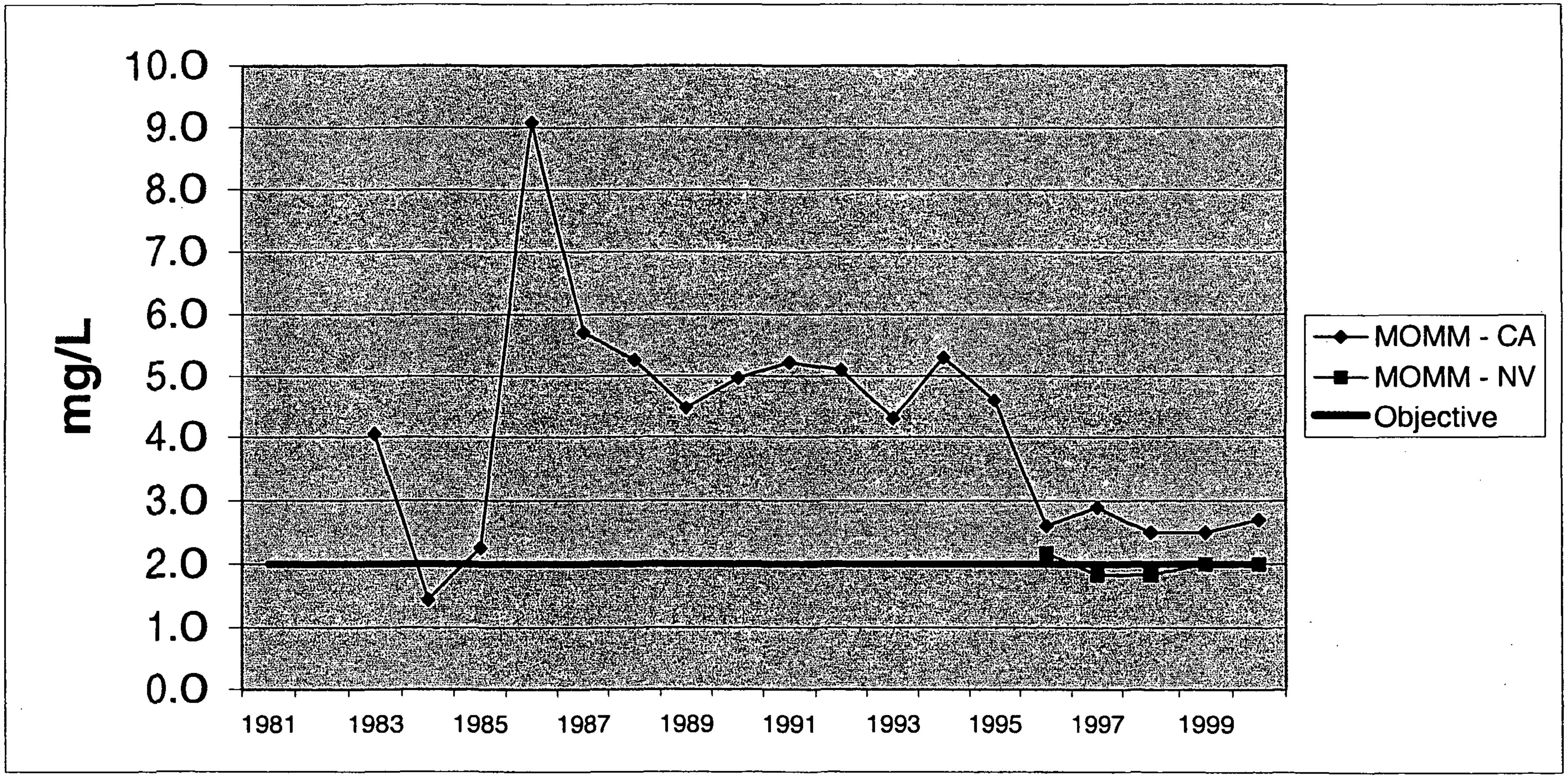


FIGURE 7 - CHLORIDE AT PAYNESVILLE

WEST FORK OF CARSOM RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

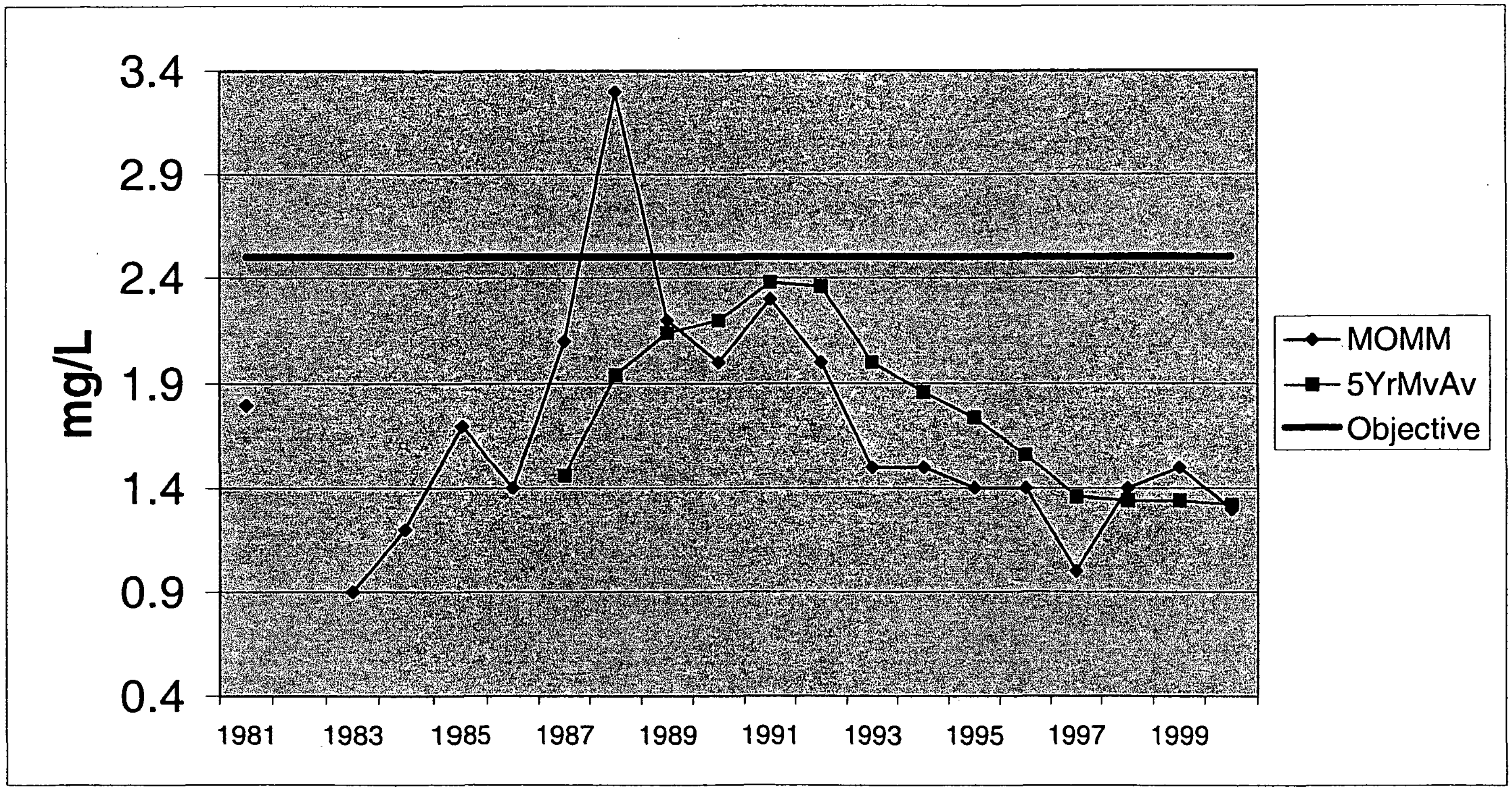


FIGURE 8 - CHLORIDE AT PAYNESVILLE

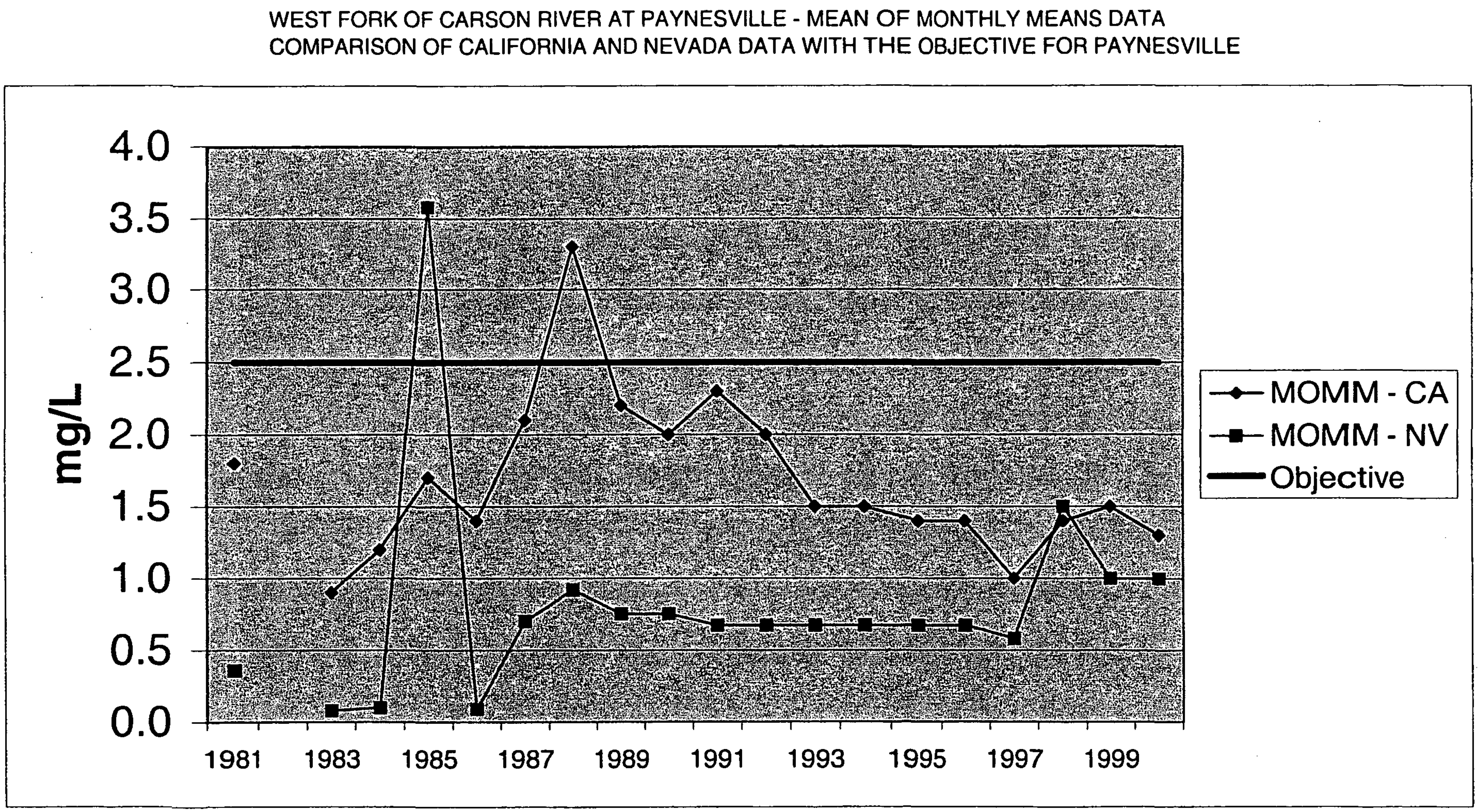


FIGURE 9 - SULFATE AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

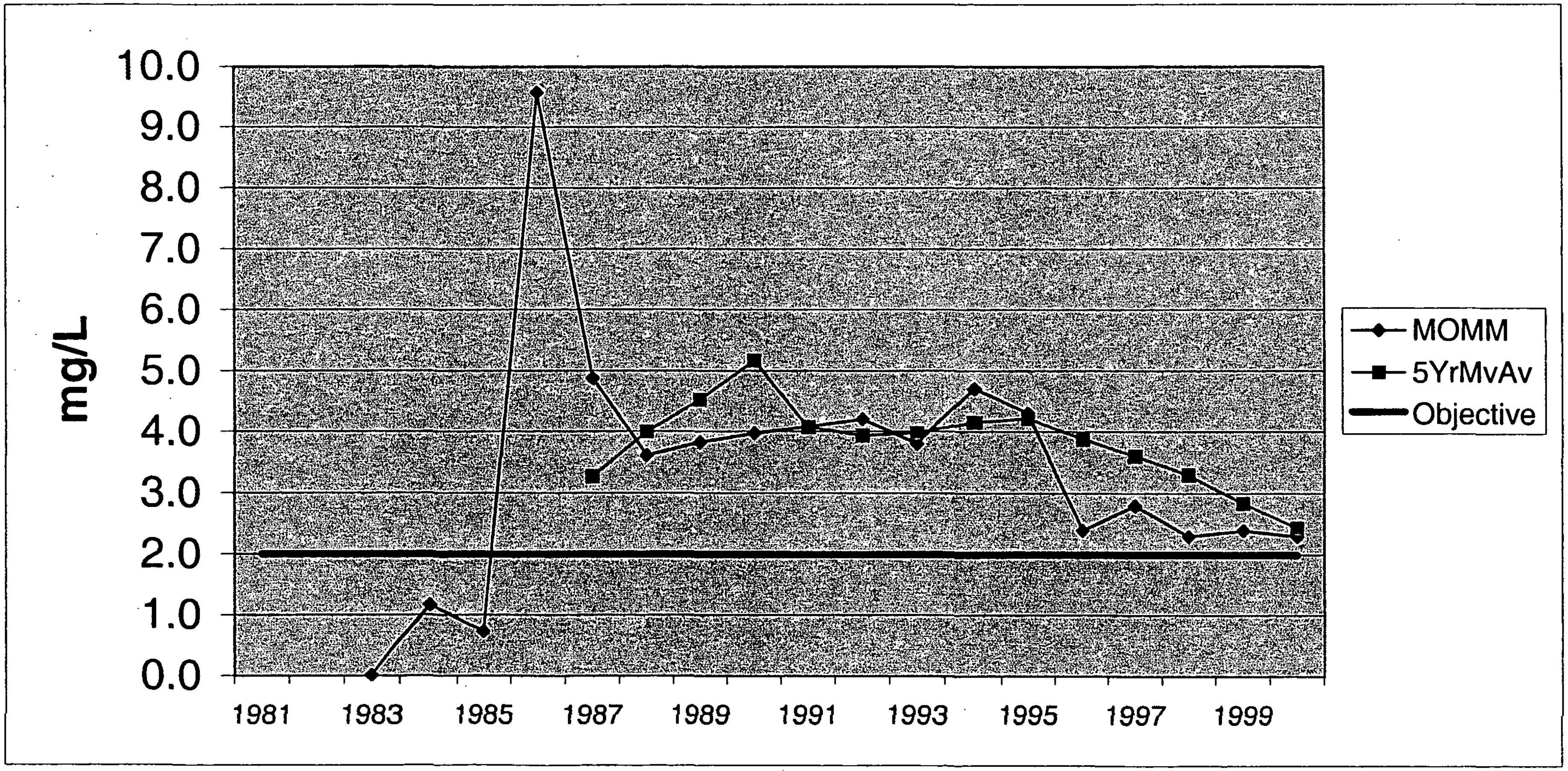


FIGURE 10 - SULFATE AT PAYNESVILLE

WEST FORK OF CARSOM RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

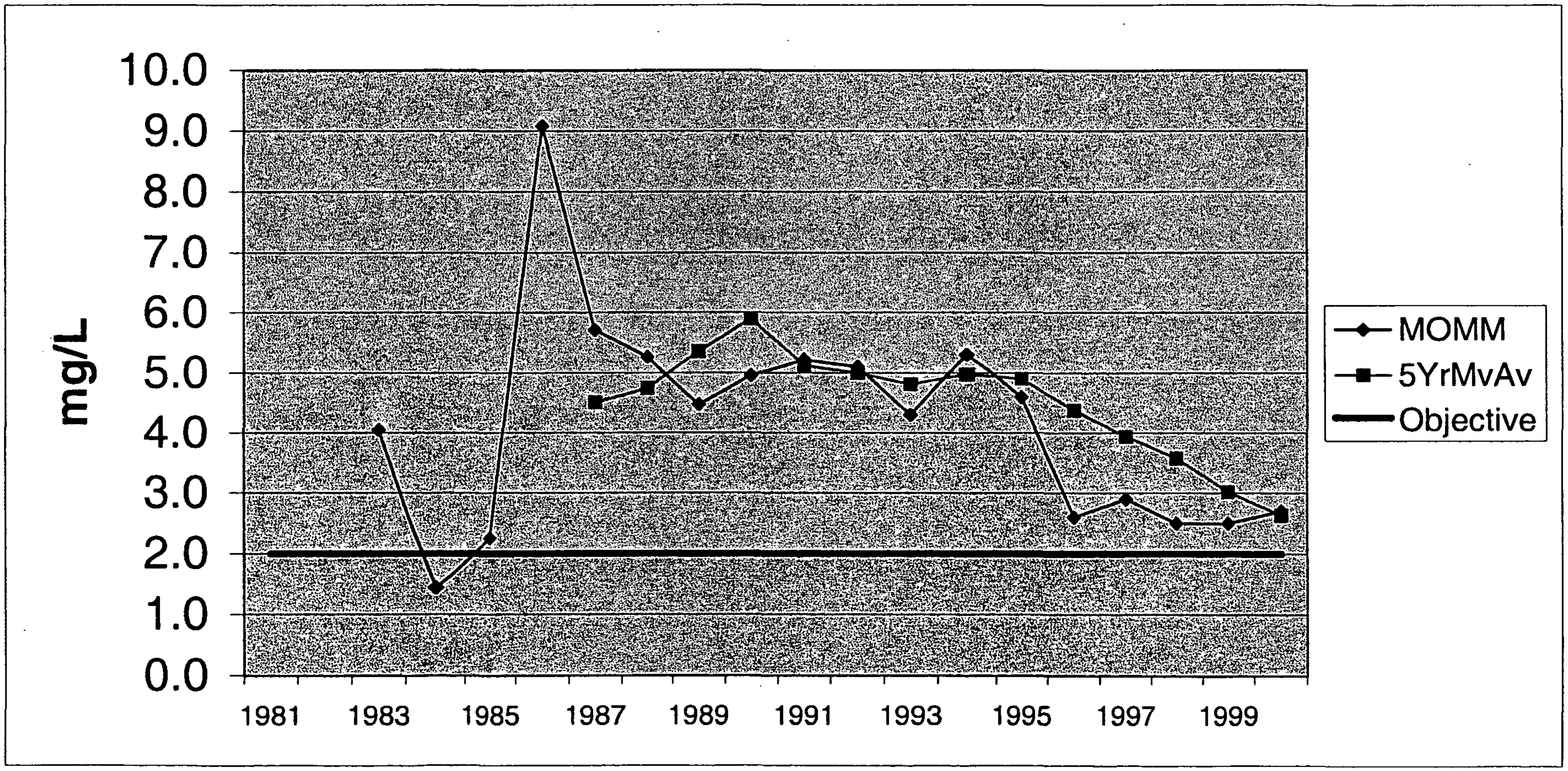


FIGURE 13 - TOTAL PHOSPHORUS AT PAYNESVILLE

WEST FORK OF CARSOM RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

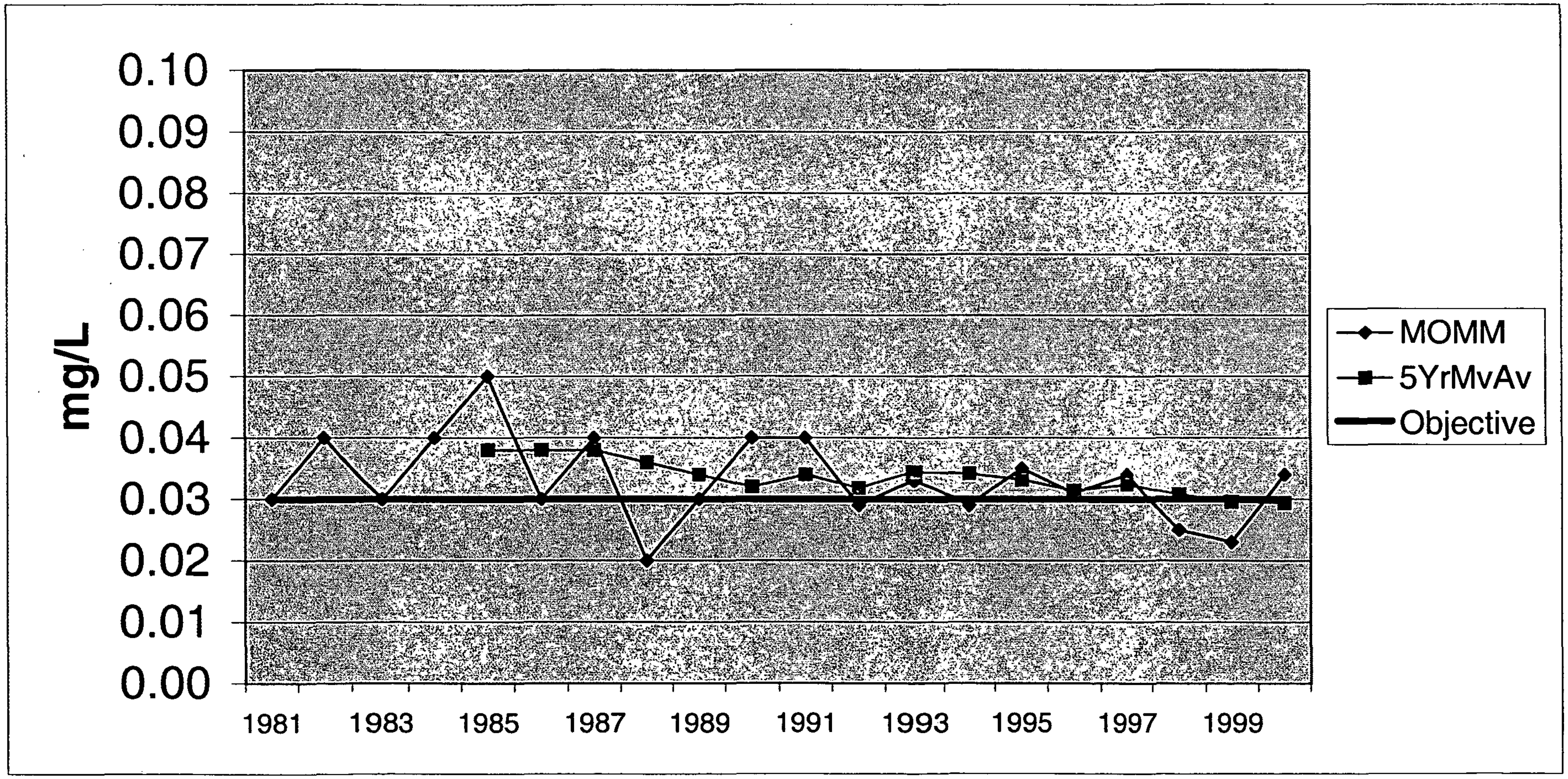


FIGURE 14 - TOTAL PHOSPHORUS AT PAYNESVILLE

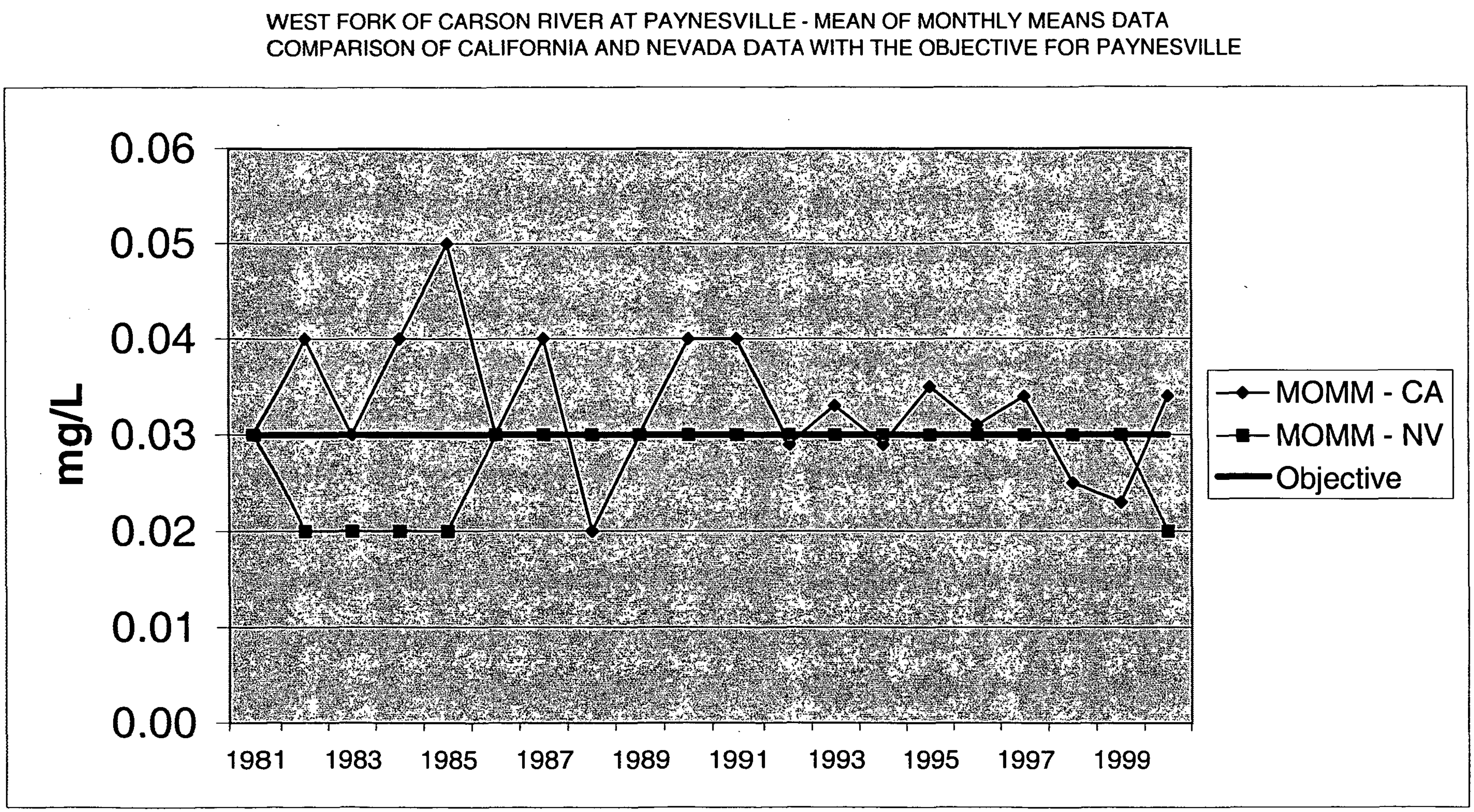


FIGURE 17 - BORON AT PAYNESVILLE

WEST FORK OF CARSON RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEANS DATA
COMPARISON OF CALIFORNIA AND NEVADA DATA WITH THE OBJECTIVE FOR PAYNESVILLE

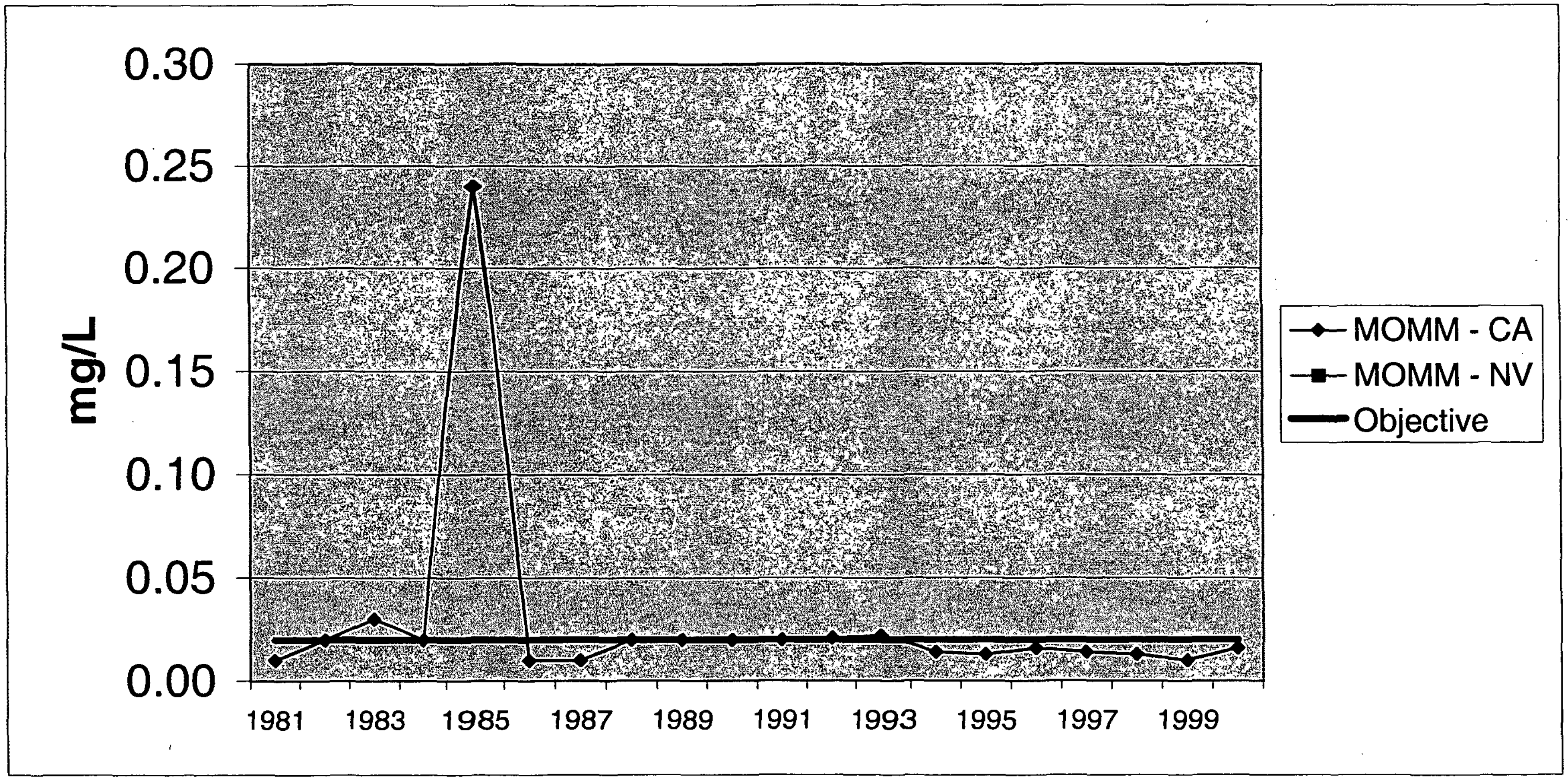


FIGURE 18 - % SODIUM AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

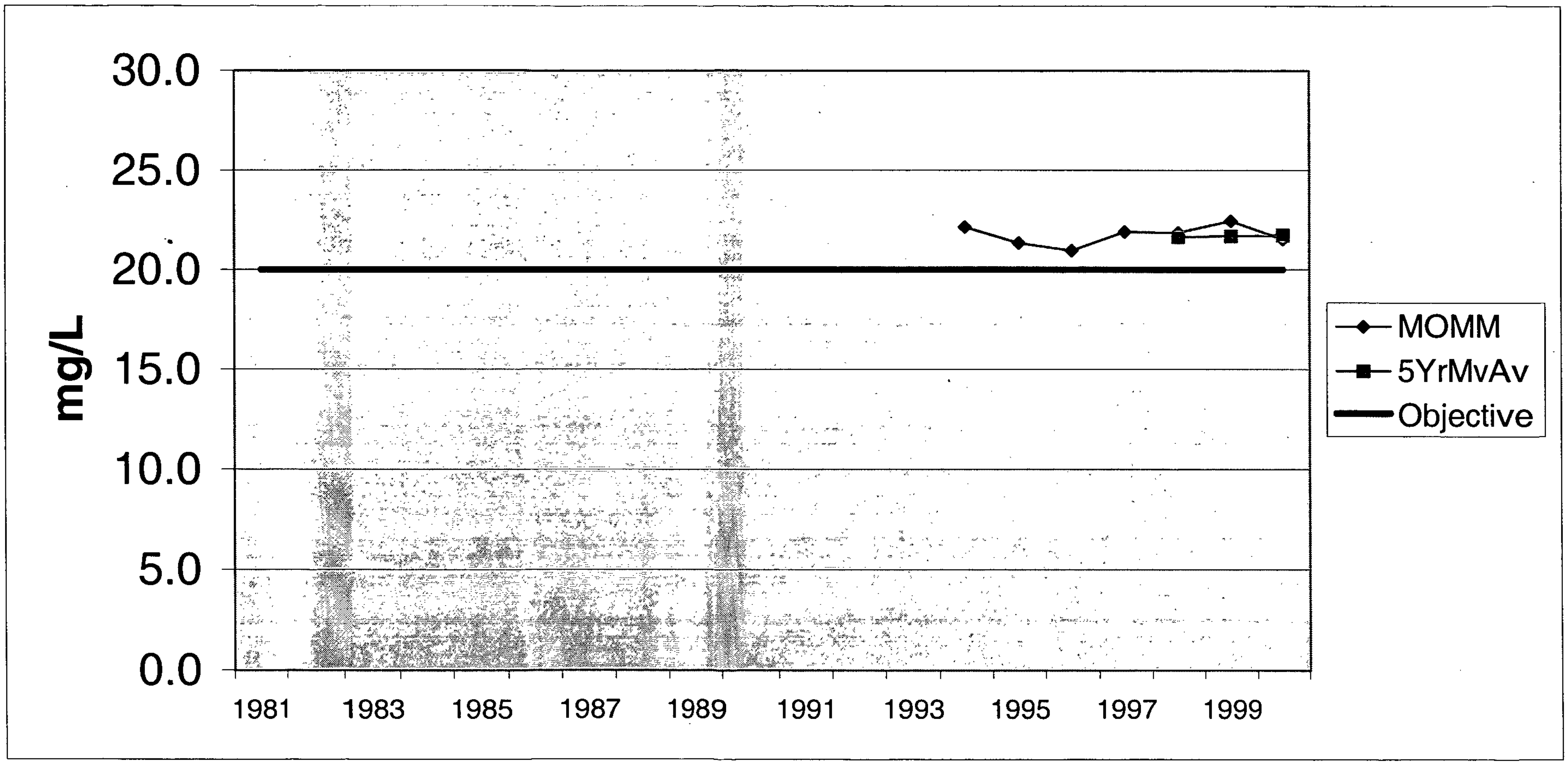


FIGURE 19 - % SODIUM AT PAYNESVILLE

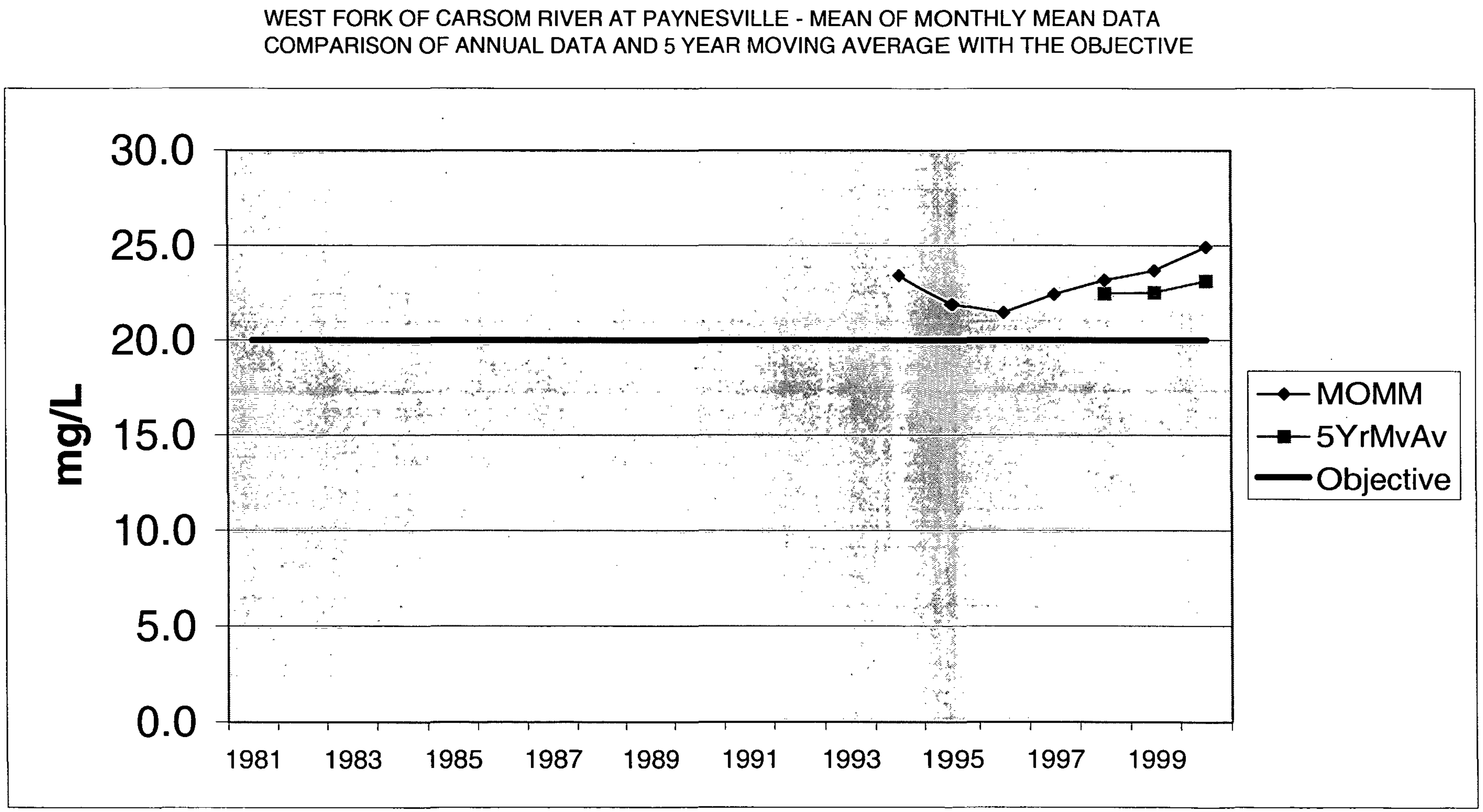


FIGURE 20 - % SODIUM AT PAYNESVILLE

WEST FORK OF CARSON RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEANS DATA
COMPARISON OF CALIFORNIA AND NEVADA DATA WITH THE OBJECTIVE FOR PAYNESVILLE

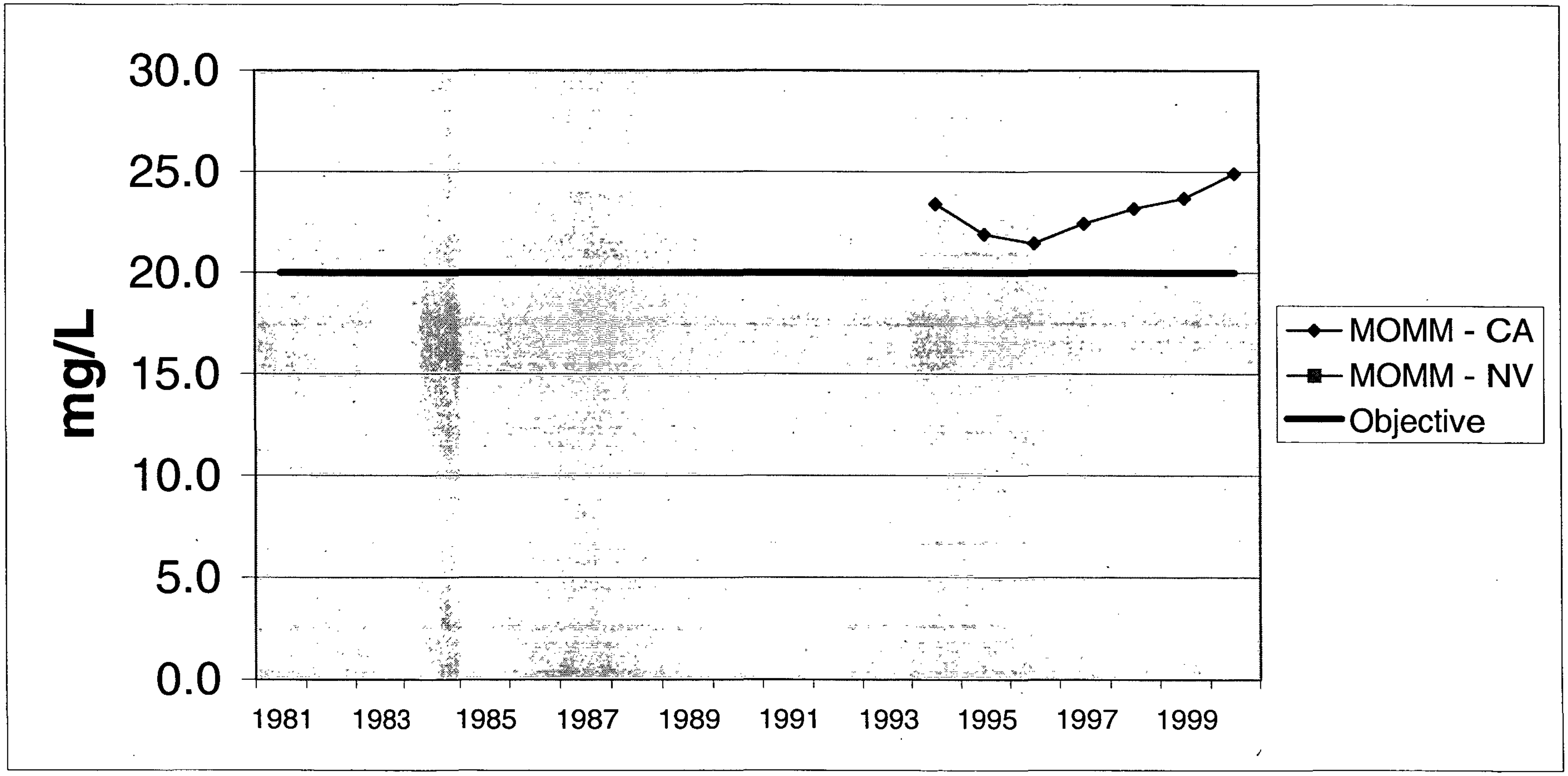


FIGURE 15 - BORON AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

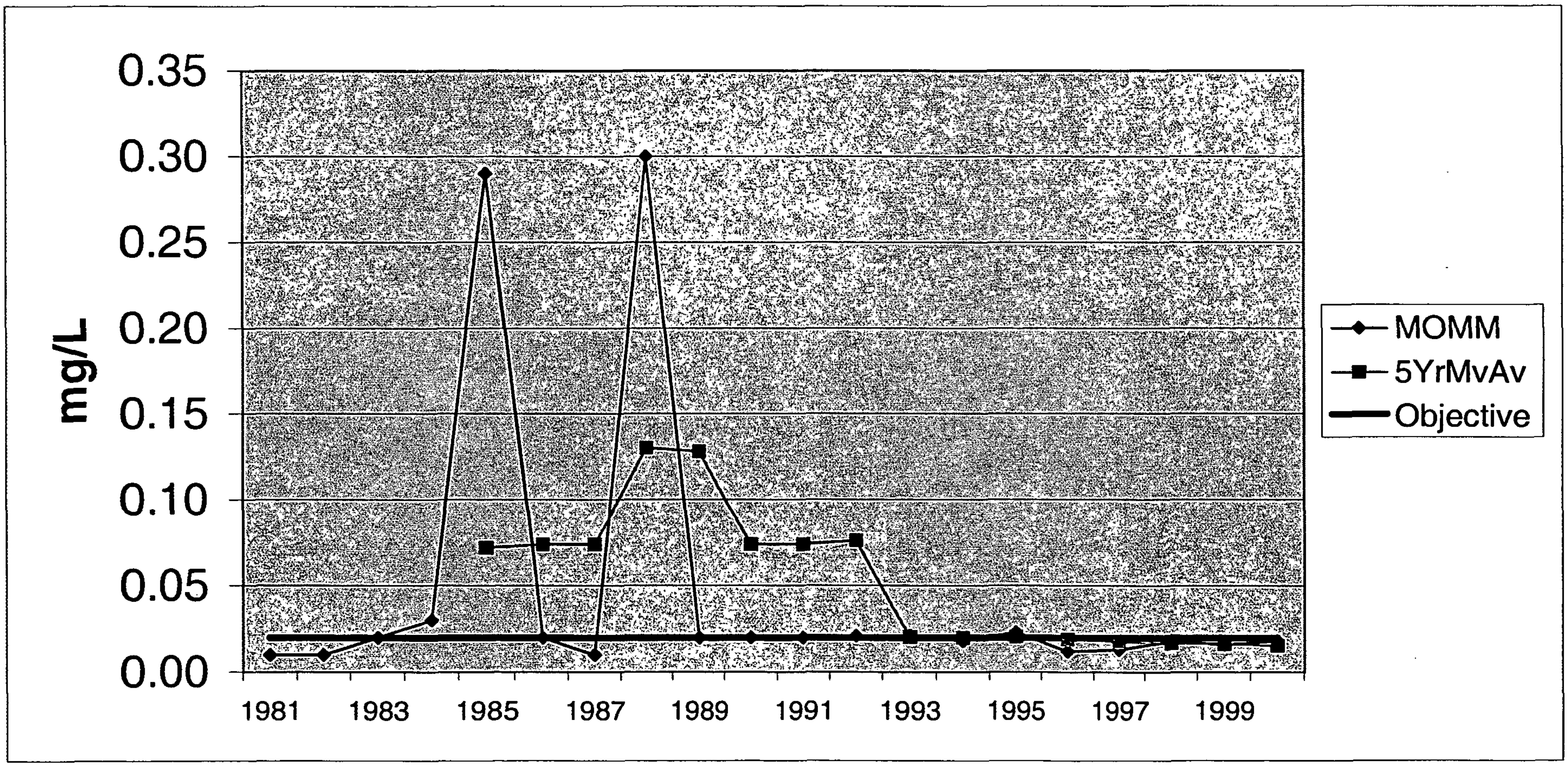


FIGURE 16 - BORON AT PAYNESVILLE

WEST FORK OF CARSOM RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

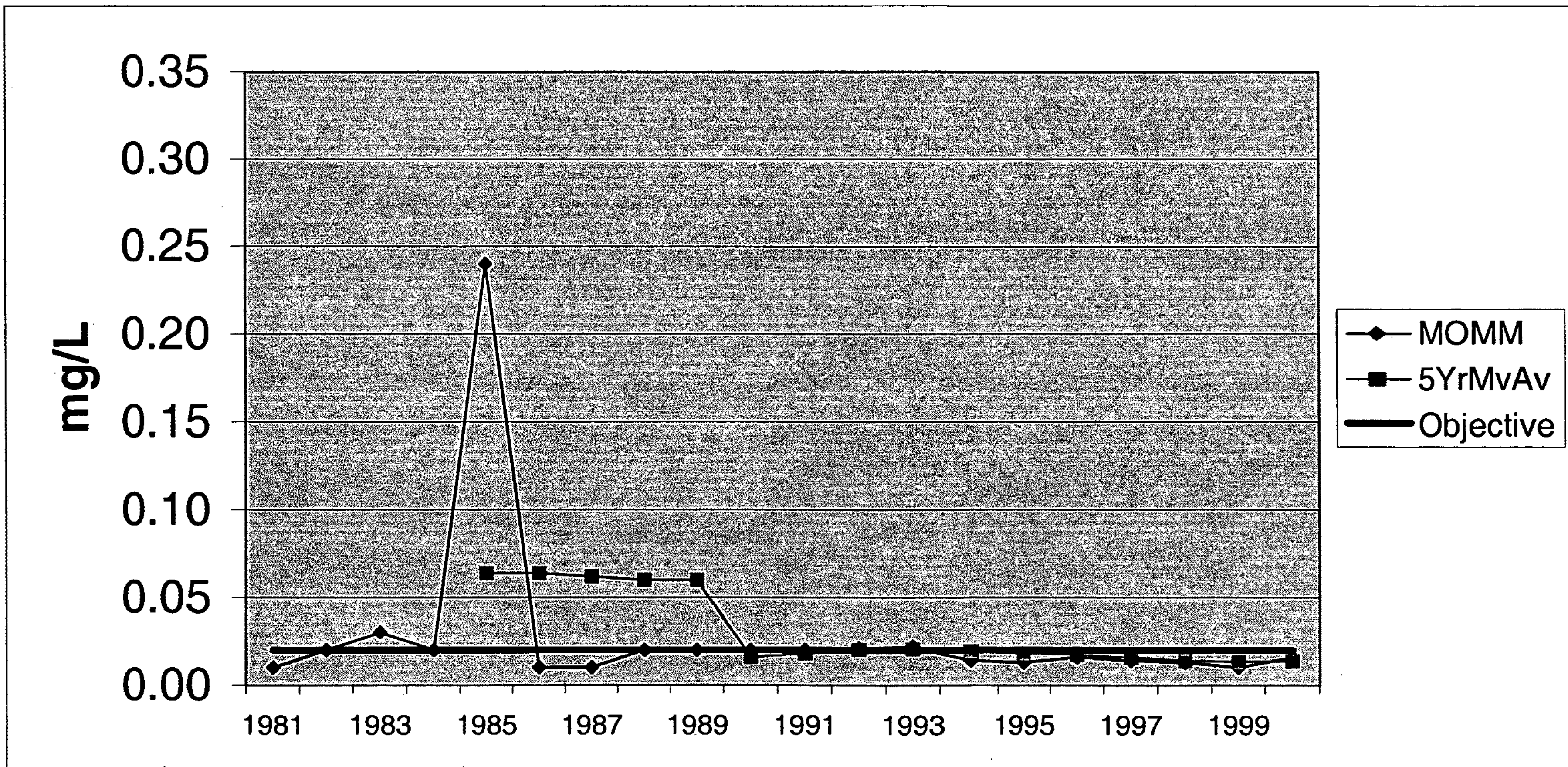


FIGURE 21 - TOTAL NITROGEN AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

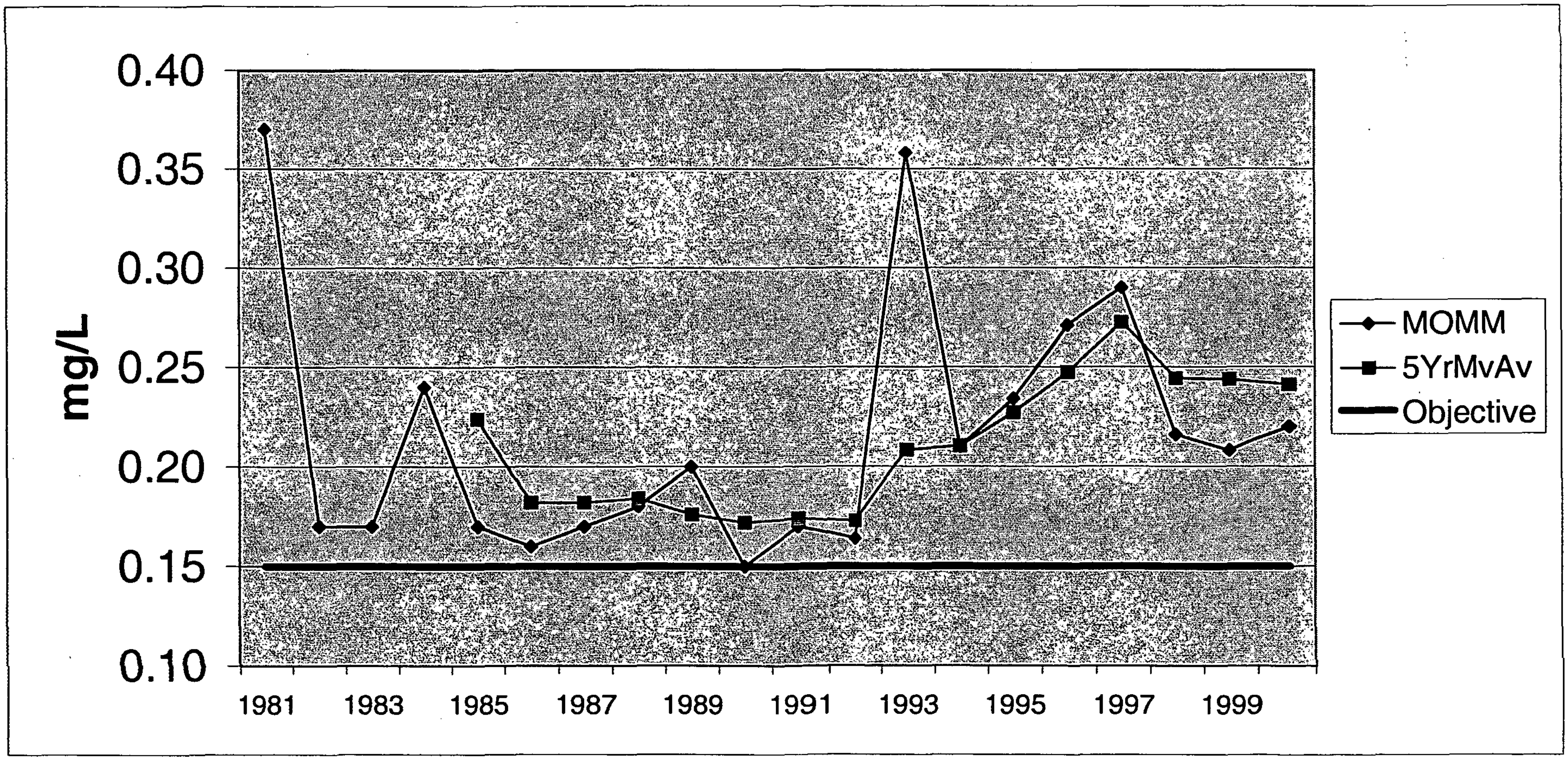


FIGURE 22 - TOTAL NITROGEN AT PAYNESVILLE

WEST FORK OF CARSOM RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

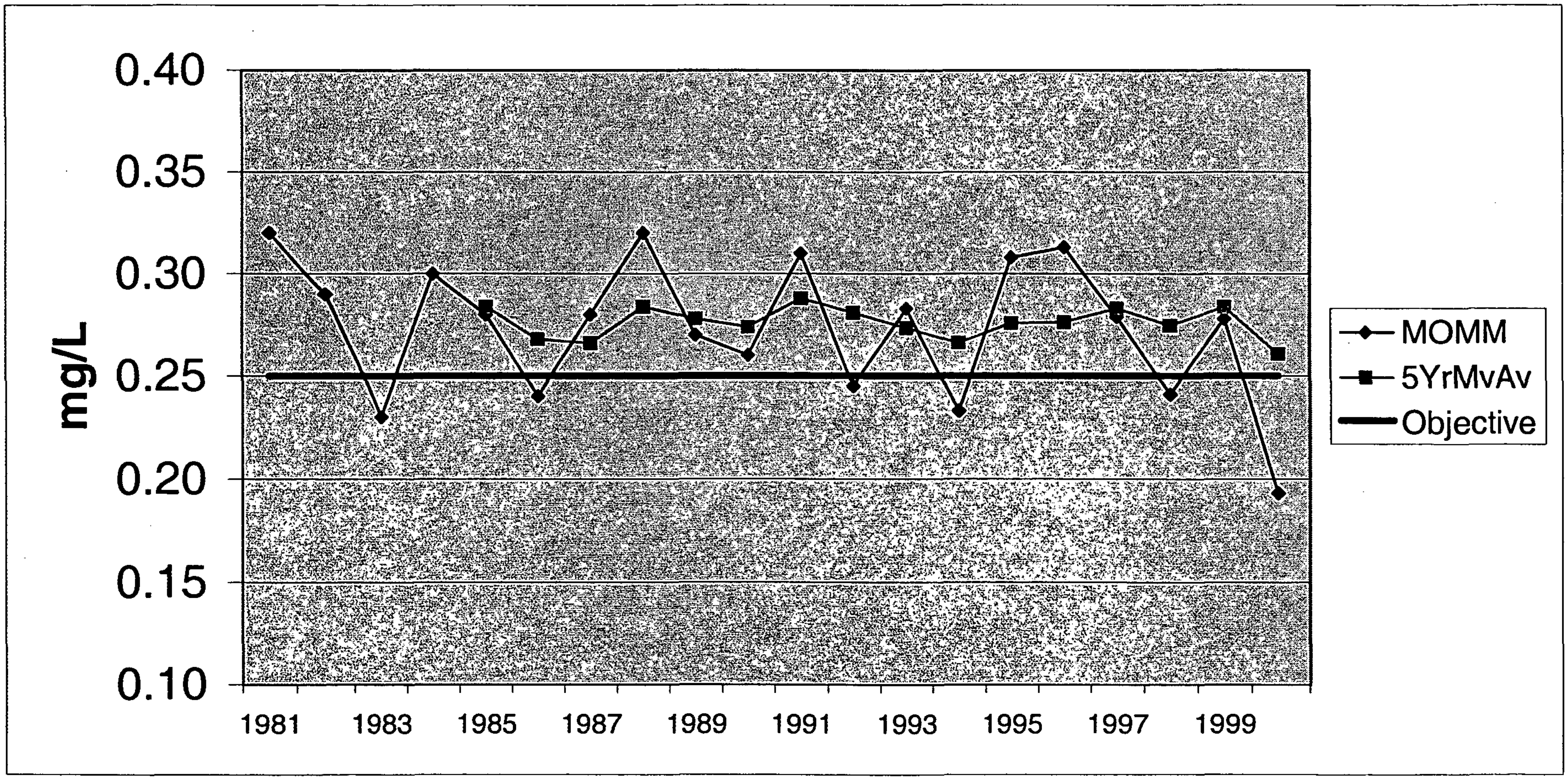


FIGURE 23 - TOTAL NITROGEN AT PAYNESVILLE

WEST FORK OF CARSON RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEANS DATA
COMPARISON OF CALIFORNIA AND NEVADA DATA WITH THE OBJECTIVE FOR PAYNESVILLE

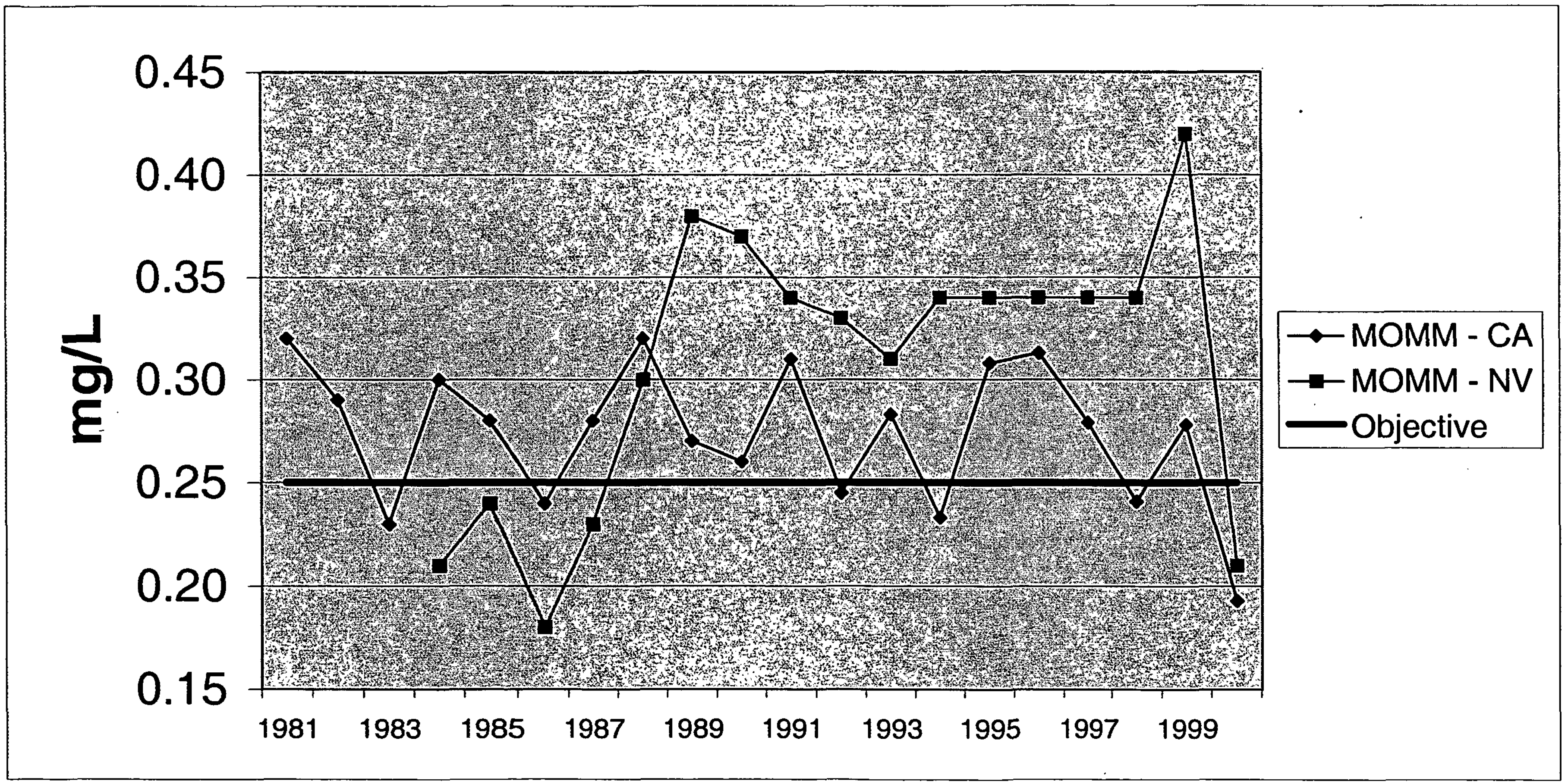


FIGURE 24 - TOTAL KJELDAHL NITROGEN AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

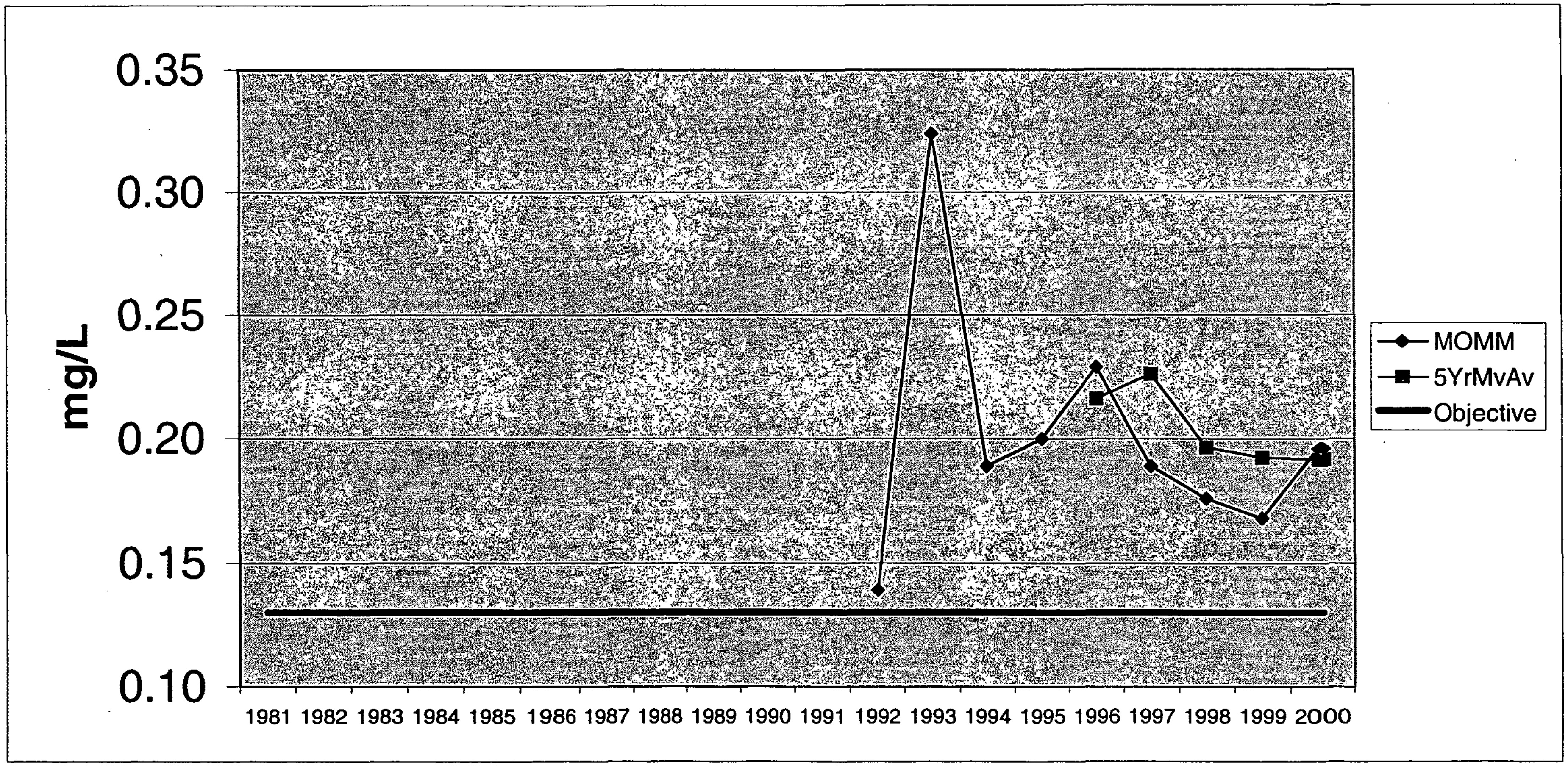


FIGURE 25 - TOTAL KJELDAHL NITROGEN AT PAYNESVILLE

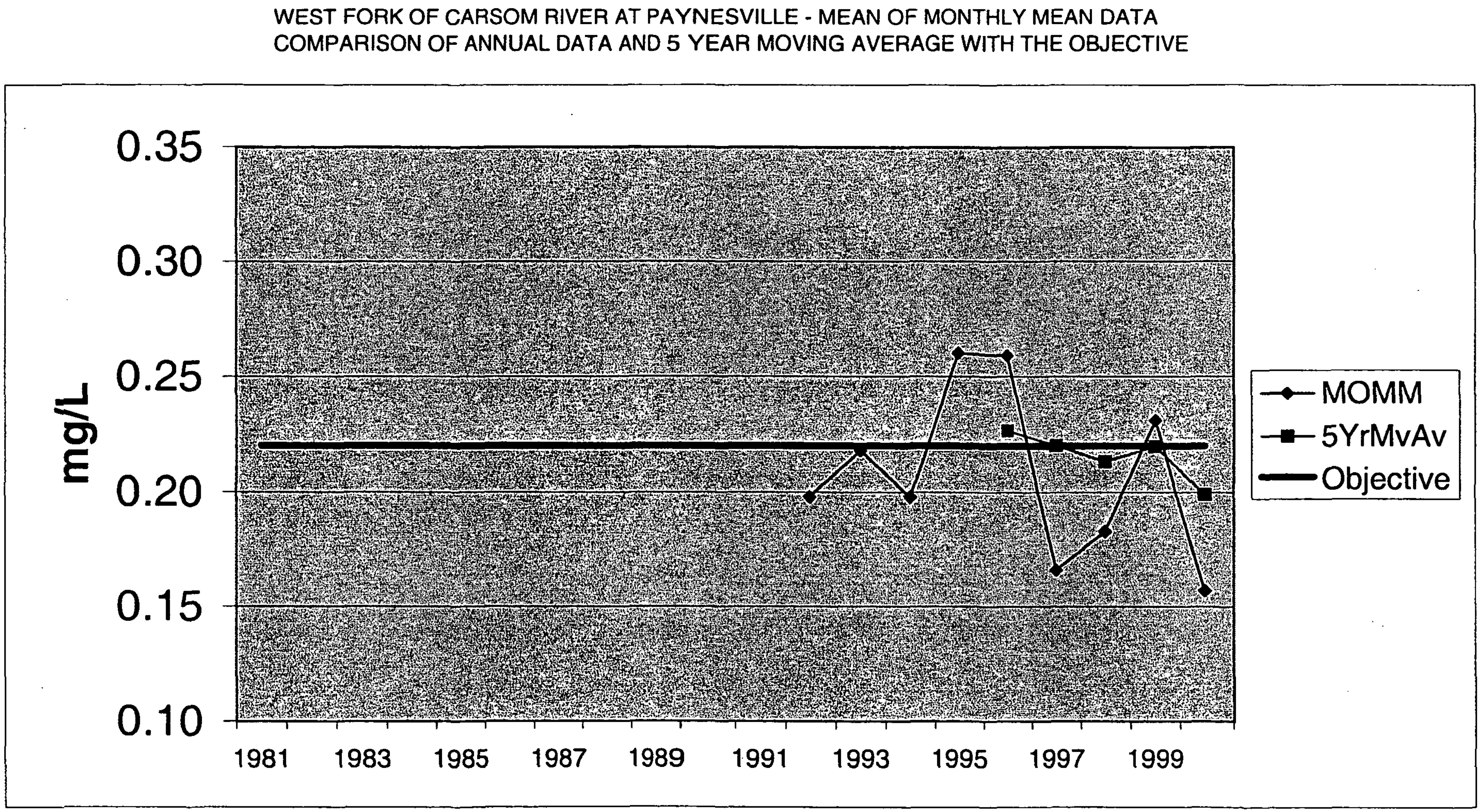


FIGURE 26 - TOTAL KJELDAHL NITROGEN AT PAYNESVILLE

WEST FORK OF CARSON RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEANS DATA
COMPARISON OF CALIFORNIA AND NEVADA DATA WITH THE OBJECTIVE FOR PAYNESVILLE

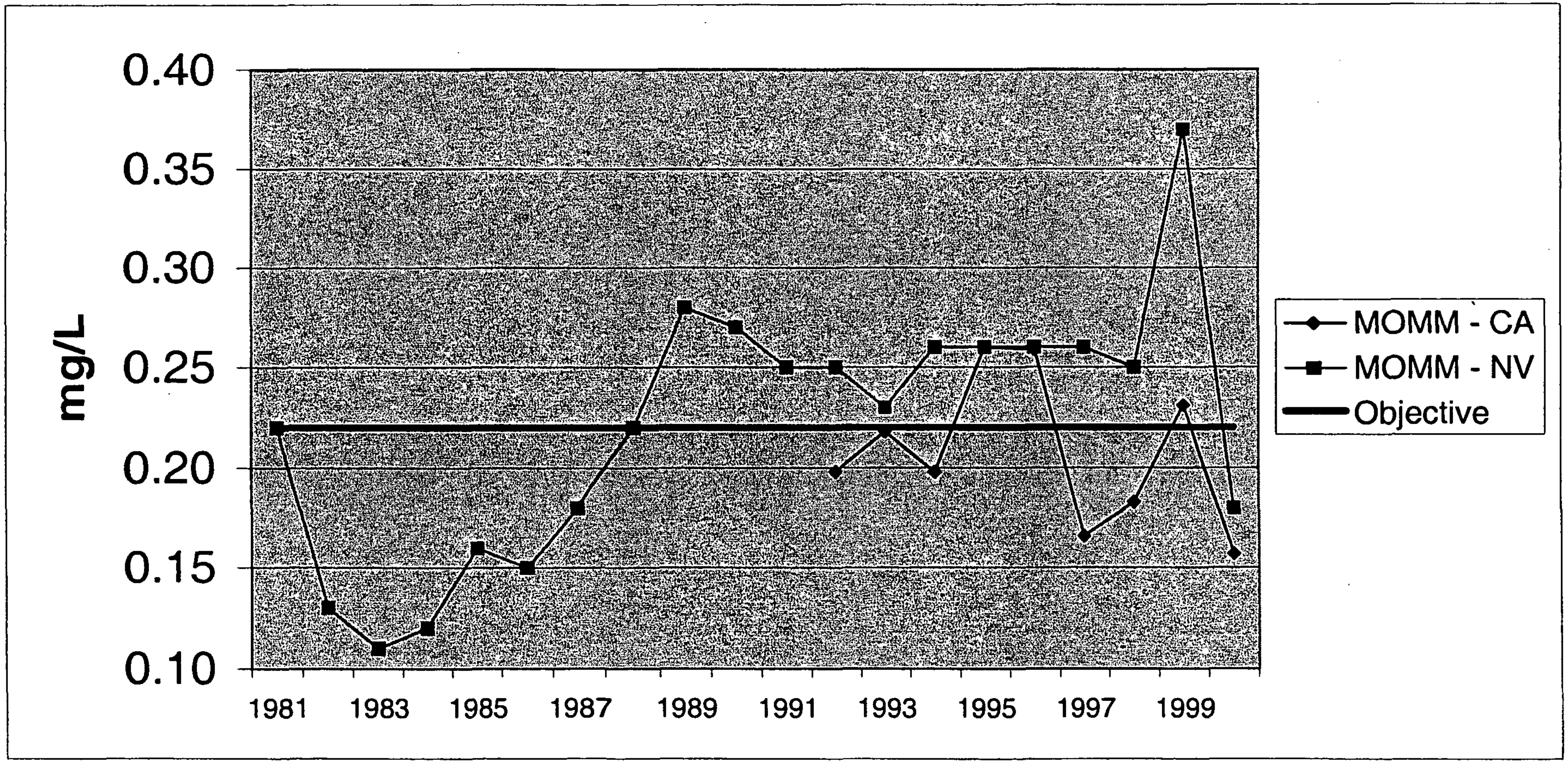


FIGURE 27 - NITRATE AT WOODFORDS

WEST FORK OF CARSON RIVER AT WOODFORDS - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

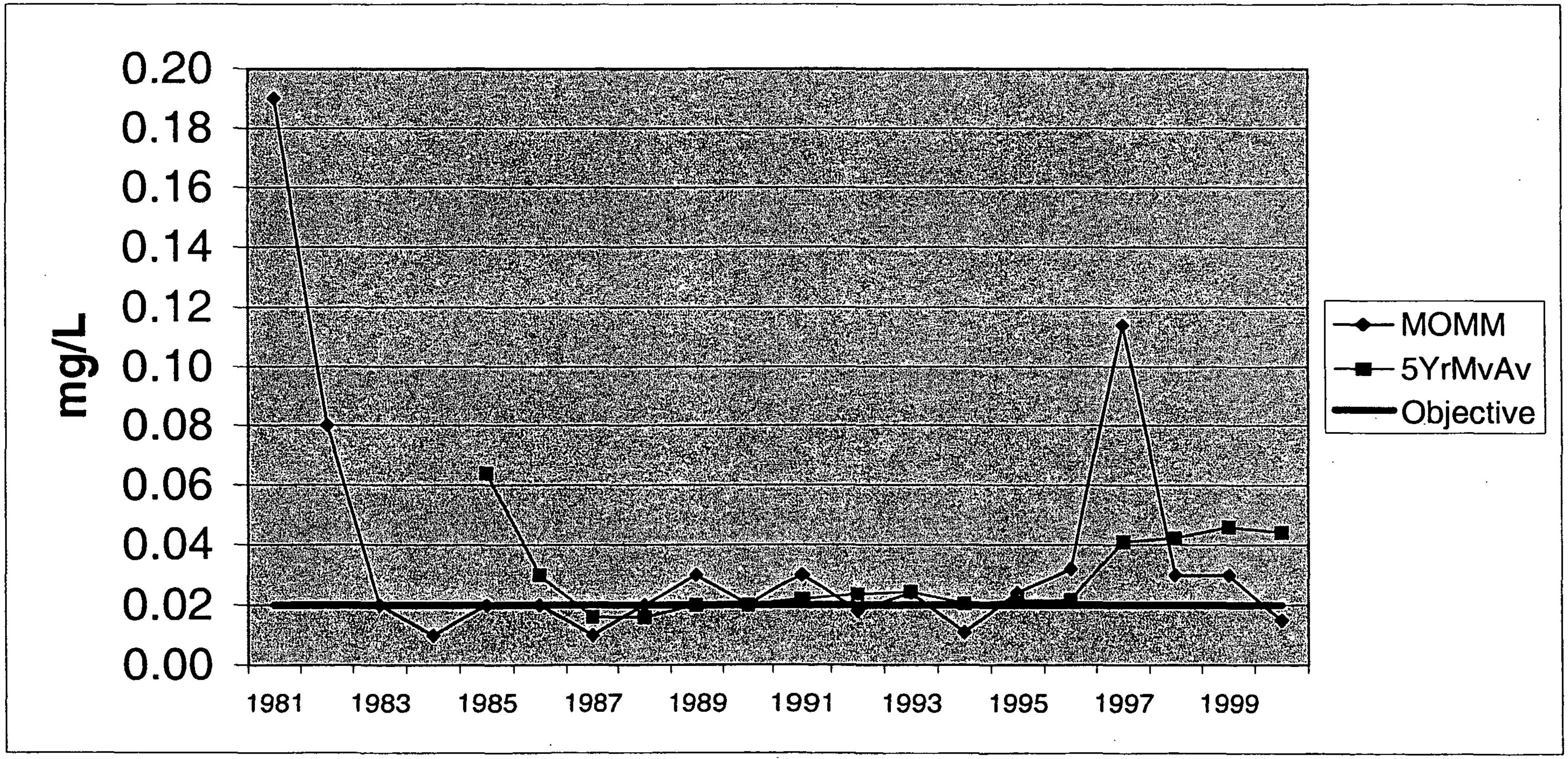


FIGURE 28 - NITRATE AT PAYNESVILLE

WEST FORK OF CARSOM RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEAN DATA
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE WITH THE OBJECTIVE

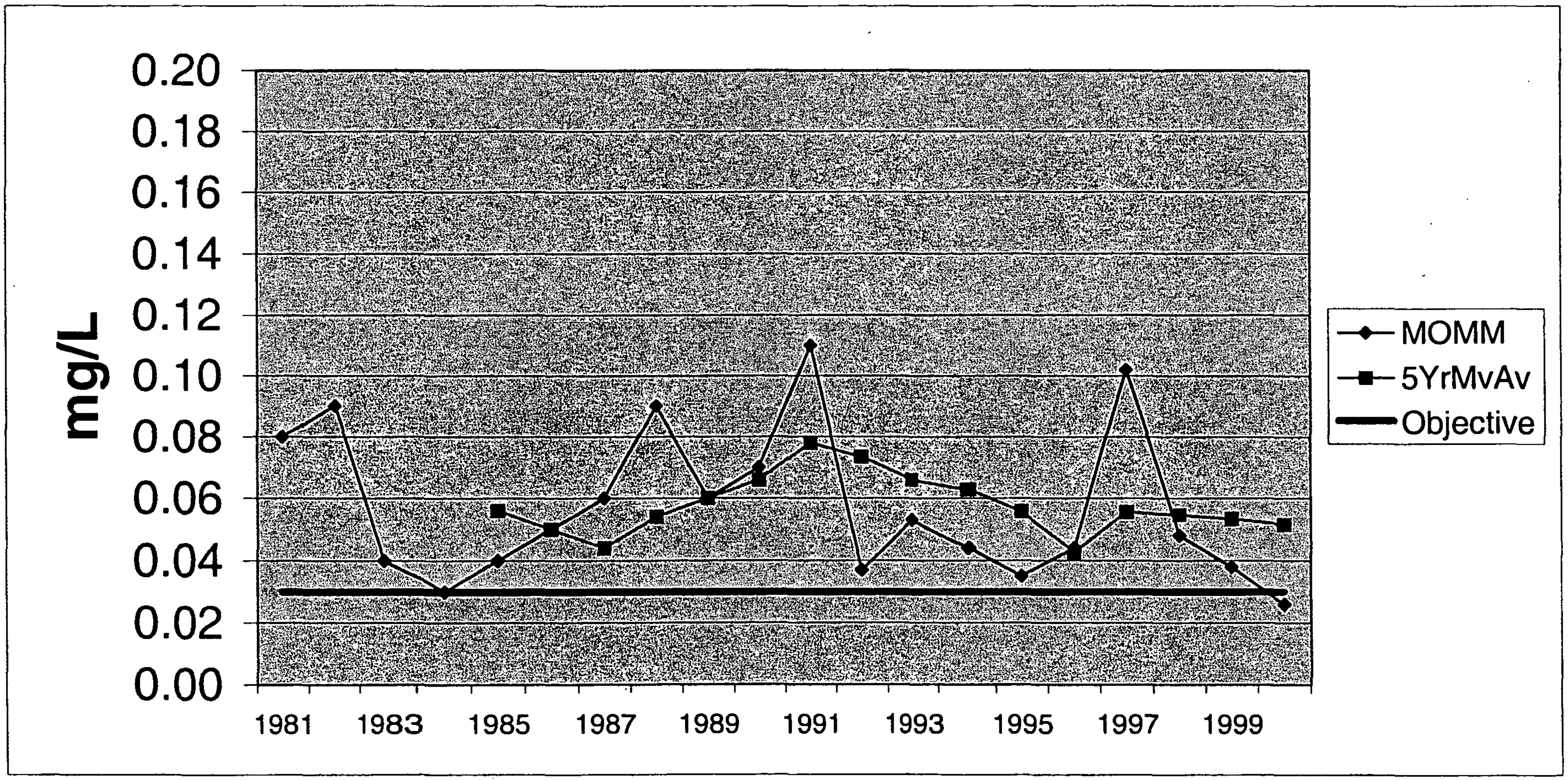
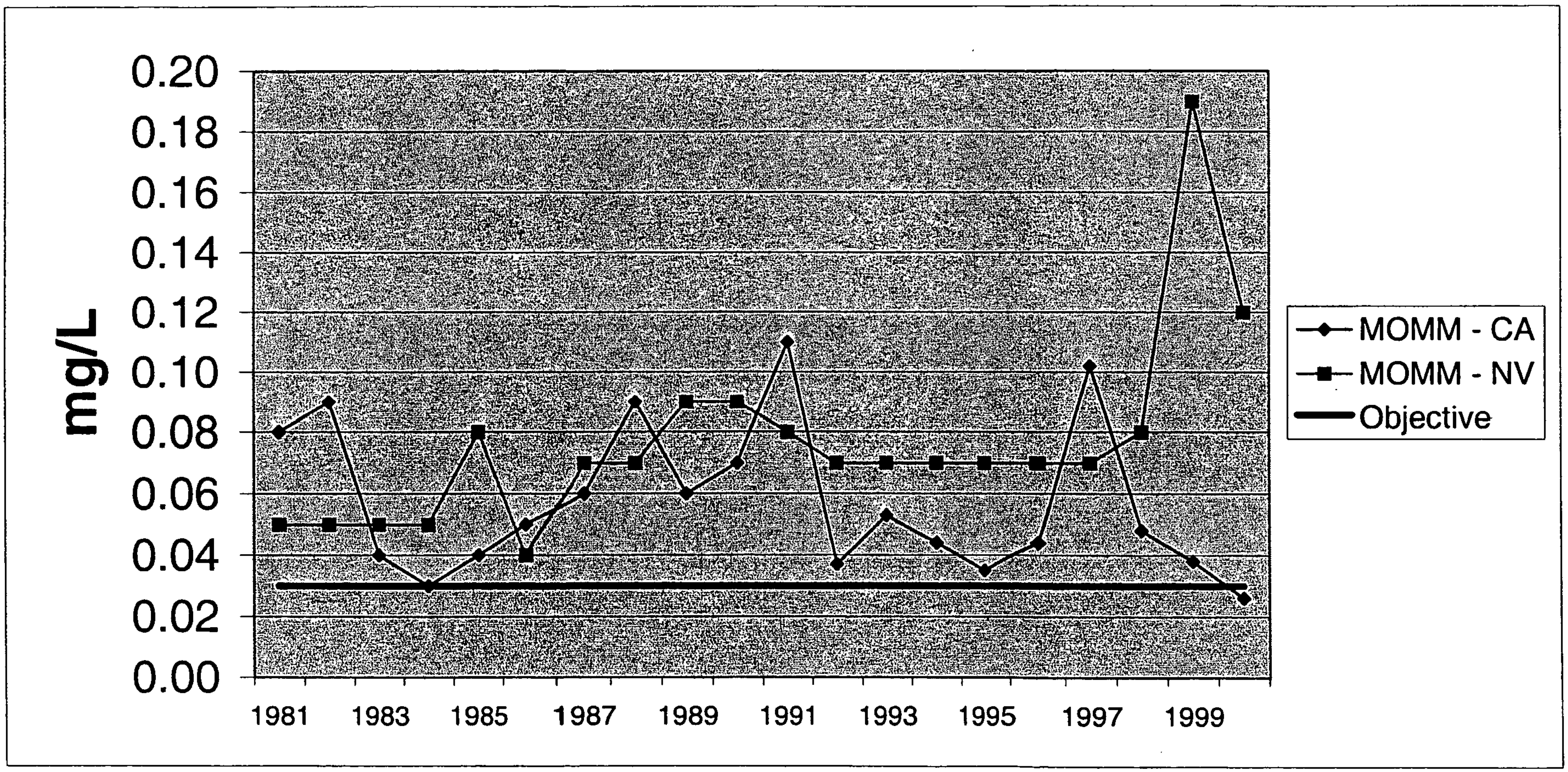


FIGURE 29 - NITRATE AT PAYNESVILLE

WEST FORK OF CARSON RIVER AT PAYNESVILLE - MEAN OF MONTHLY MEANS DATA
COMPARISON OF CALIFORNIA AND NEVADA DATA WITH THE OBJECTIVE FOR PAYNESVILLE



Appendix I

Water Quality Objectives for the Carson River

Table 3-14
WATER QUALITY OBJECTIVES FOR CERTAIN WATER BODIES EAST & WEST FORK CARSON RIVER HYDROLOGIC UNITS

See Fig. 3-7	Surface Waters	Objective (mg/L except as noted)[4]								
		TDS	Cl	SO_4	Total P	B	% Na	Total N	TKN	NO_3-N
1	West Fork Carson River at Woodfords[1]	55	1.0	2.0	0.02	0.02	20	0.15	0.13	0.02
2	West Fork Carson River at Stateline[1]	70	2.5	2.0	0.03	0.02	20	0.25	0.22	0.03
3	Indian Creek Res.[1]	305	24	-	0.04	-	-	4.0	-	-
4	East Fork Carson River[2]	80/100	4.0/6.0	4.0/8.0	0.02/0.03	0.12/0.25	25/30	0.20/0.30	-	-
5	Bryant Creek[2,3]	140/200	15/25	35/50	0.02/0.03	0.20/0.50	-/50	0.20/0.30	-	-

[1] Values shown are mean of monthly mean for the period of record.
[2] Annual average value/90th percentile value.
[3] In addition, the following numerical water quality objectives shall apply specifically to surface waters of the Bryant Creek Basin:

Parameter	Maximum Value (mg/l except as noted)
Turbidity (NTU)	15
Alkalinity, total as $CaCO_3$	70 (minimum)
Acidity, total as $CaCO_3$	10
Dissolved Iron	0.5
Manganese	0.5
Color, PCu	15
Aluminum	0.1
Copper	0.02
Arsenic	0.05

[4] Objectives are as mg/L and are defined as follows:

B	Boron
Cl	Chloride
N	Nitrogen, Total
% Na	Sodium, Percent
NO_3-N	Nitrogen as Nitrate
TKN	Nitrate, Total Kjeldahl
P	Phosphorus, Total

$$\frac{(Na \times 100)}{Na+Ca+Mg+K} = \%Na$$

Na, Ca, Mg, and K expressed as milliequivalents per liter (meq/L) concentrations.

SO_4	Sulfate
TDS	Total Dissolved Solids (Total Filterable Residue)

Appendix II

Tabulated MOMM Results for the West Fork of the Carson River

CARSON RIVER @ WOODFORDS
MEAN OF MONTHLY MEAN DATA**

	TDS	Objective	Cl	Objective	SO4	Objective	Total P	Objective	B	Objective
1981	56	55	1.3	1.0		2.0	0.02	0.02	0.01	0.02
1982	46	55		1.0		2.0	0.02	0.02	0.01	0.02
1983	48	55	0.5	1.0	0.0	2.0	0.02	0.02	0.02	0.02
1984	49	55	0.7	1.0	1.2	2.0	0.03	0.02	0.03	0.02
1985	48	55	0.7	1.0	0.7	2.0	0.02	0.02	0.29	0.02
1986	51	55	0.8	1.0	9.6	2.0	0.03	0.02	0.02	0.02
1987	55	55	0.8	1.0	4.9	2.0	0.02	0.02	0.01	0.02
1988	56	55	1.0	1.0	3.6	2.0	0.01	0.02	0.30	0.02
1989	49	55	1.3	1.0	3.8	2.0	0.02	0.02	0.02	0.02
1990	53	55	1.1	1.0	4.0	2.0	0.02	0.02	0.02	0.02
1991	53	55	1.2	1.0	4.1	2.0	0.03	0.02	0.02	0.02
1992	58	55	1.2	1.0	4.2	2.0	0.02	0.02	0.02	0.02
1993	54	55	1.2	1.0	3.8	2.0	0.03	0.02	0.02	0.02
1994	56	55	1.1	1.0	4.7	2.0	0.03	0.02	0.02	0.02
1995	49	55	1.2	1.0	4.3	2.0	0.03	0.02	0.02	0.02
1996	51	55	1.0	1.0	2.4	2.0	0.02	0.02	0.01	0.02
1997	49	55	0.9	1.0	2.8	2.0	0.09	0.02	0.01	0.02
1998	49	55	1.3	1.0	2.3	2.0	0.03	0.02	0.02	0.02
1999	53	55	1.4	1.0	2.4	2.0	0.02	0.02	0.02	0.02
2000	54	55	1.2	1.0	2.3	2.0	0.03	0.02	0.02	0.02
MOMM	52		1.0		3.4		0.03		0.05	
Objective	55		1.0		2.0		0.02		0.02	
MOMM-Obj					1.4		0.01		0.03	
Objective %	94		105		170		137		228	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.
** Units are mg/L

	% Na*	Objective	Total N	Objective	TKN	Objective	NO3	Objective
1981	1.0	20.0	0.37	0.15		0.13	0.19	0.02
1982	1.0	20.0	0.17	0.15		0.13	0.08	0.02
1983	1.0	20.0	0.17	0.15		0.13	0.02	0.02
1984	1.0	20.0	0.24	0.15		0.13	0.01	0.02
1985	1.0	20.0	0.17	0.15		0.13	0.02	0.02
1986	1.0	20.0	0.16	0.15		0.13	0.02	0.02
1987	1.0	20.0	0.17	0.15		0.13	0.01	0.02
1988	1.0	20.0	0.18	0.15		0.13	0.02	0.02
1989	1.0	20.0	0.20	0.15		0.13	0.03	0.02
1990	1.0	20.0	0.15	0.15		0.13	0.02	0.02
1991	1.0	20.0	0.17	0.15		0.13	0.03	0.02
1992	1.0	20.0	0.16	0.15	0.14	0.13	0.02	0.02
1993	13.3	20.0	0.36	0.15	0.32	0.13	0.02	0.02
1994	22.2	20.0	0.21	0.15	0.19	0.13	0.01	0.02
1995	21.4	20.0	0.23	0.15	0.20	0.13	0.02	0.02
1996	21.0	20.0	0.27	0.15	0.23	0.13	0.03	0.02
1997	21.9	20.0	0.29	0.15	0.19	0.13	0.11	0.02
1998	21.9	20.0	0.22	0.15	0.18	0.13	0.03	0.02
1999	22.5	20.0	0.21	0.15	0.17	0.13	0.03	0.02
2000	21.5	20.0	0.22	0.15	0.20	0.13	0.02	0.02
MOMM	21.7		0.22		0.20		0.04	
Objective	20.0		0.15		0.13		0.02	
MOMM-Obj	1.7		0.07		0.07		0.02	
Objective %	109		144		155		187	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.
** Units are mg/L

CARSON RIVER @ PAYNESVILLE
MEAN OF MONTHLY MEAN DATA**

	TDS	Objective	Cl	Objective	SO4	Objective	Total P	Objective	B	Objective
1981	64	70	1.8	2.5		2.0	0.03	0.03	0.01	0.02
1982	49	70		2.5		2.0	0.04	0.03	0.02	0.02
1983	43	70	0.9	2.5	4.1	2.0	0.03	0.03	0.03	0.02
1984	49	70	1.2	2.5	1.4	2.0	0.04	0.03	0.02	0.02
1985	50	70	1.7	2.5	2.3	2.0	0.05	0.03	0.24	0.02
1986	53	70	1.4	2.5	9.1	2.0	0.03	0.03	0.01	0.02
1987	68	70	2.1	2.5	5.7	2.0	0.04	0.03	0.01	0.02
1988	80	70	3.3	2.5	5.3	2.0	0.02	0.03	0.02	0.02
1989	60	70	2.2	2.5	4.5	2.0	0.03	0.03	0.02	0.02
1990	73	70	2.0	2.5	5.0	2.0	0.04	0.03	0.02	0.02
1991	71	70	2.3	2.5	5.2	2.0	0.04	0.03	0.02	0.02
1992	69	70	2.0	2.5	5.1	2.0	0.03	0.03	0.02	0.02
1993	59	70	1.5	2.5	4.3	2.0	0.03	0.03	0.02	0.02
1994	66	70	1.5	2.5	5.3	2.0	0.03	0.03	0.01	0.02
1995	54	70	1.4	2.5	4.6	2.0	0.04	0.03	0.01	0.02
1996	55	70	1.4	2.5	2.6	2.0	0.03	0.03	0.02	0.02
1997	58	70	1.0	2.5	2.9	2.0	0.03	0.03	0.01	0.02
1998	56	70	1.4	2.5	2.5	2.0	0.03	0.03	0.01	0.02
1999	59	70	1.5	2.5	2.5	2.0	0.02	0.03	0.01	0.02
2000	61	70	1.3	2.5	2.7	2.0	0.03	0.03	0.02	0.02
MOMM	60		1.7		4.2		0.03		0.03	
Objective	70		2.5		2.0		0.03		0.02	
MOMM-Obj					2.2				0.01	
Objective %	85		67		208		111		140	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.
** Units are mg/L

	% Na*	Objective	Total N	Objective	TKN	Objective	NO3	Objective
1981		20.0	0.32	0.25		0.22	0.08	0.03
1982		20.0	0.29	0.25		0.22	0.09	0.03
1983		20.0	0.23	0.25		0.22	0.04	0.03
1984	1.0	20.0	0.30	0.25		0.22	0.03	0.03
1985	1.0	20.0	0.28	0.25		0.22	0.04	0.03
1986	1.0	20.0	0.24	0.25		0.22	0.05	0.03
1987	1.0	20.0	0.28	0.25		0.22	0.06	0.03
1988	1.0	20.0	0.32	0.25		0.22	0.09	0.03
1989	1.0	20.0	0.27	0.25		0.22	0.06	0.03
1990	1.0	20.0	0.26	0.25		0.22	0.07	0.03
1991	1.0	20.0	0.31	0.25		0.22	0.11	0.03
1992	1.0	20.0	0.25	0.25	0.20	0.22	0.04	0.03
1993	13.7	20.0	0.28	0.25	0.22	0.22	0.05	0.03
1994	23.4	20.0	0.23	0.25	0.20	0.22	0.04	0.03
1995	21.9	20.0	0.31	0.25	0.26	0.22	0.04	0.03
1996	21.5	20.0	0.31	0.25	0.26	0.22	0.04	0.03
1997	22.4	20.0	0.28	0.25	0.17	0.22	0.10	0.03
1998	23.2	20.0	0.24	0.25	0.18	0.22	0.05	0.03
1999	23.7	20.0	0.28	0.25	0.23	0.22	0.04	0.03
2000	24.9	20.0	0.19	0.25	0.16	0.22	0.03	0.03
MOMM	23.0		0.27		0.21		0.06	
Objective	20.0		0.25		0.22		0.03	
MOMM-Obj	3.0		0.02				0.03	
Objective %	115		109		94		191	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.

** Units are mg/L

CARSON RIVER @ WOODFORDS MEAN OF MONTHLY MEAN DATA**
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE

	TDS	5YrMvAv	Cl	5YrMvAv	SO4	5YrMvAv	Total P	5YrMvAv	B	5YrMvAv
1981	56		1.3				0.02		0.01	
1982	46						0.02		0.01	
1983	48		0.5		0.0		0.02		0.02	
1984	49		0.7		1.2		0.03		0.03	
1985	48	49	0.7		0.7		0.02	0.02	0.29	0.07
1986	51	48	0.8		9.6		0.03	0.02	0.02	0.07
1987	55	50	0.8	0.7	4.9	3.3	0.02	0.02	0.01	0.07
1988	56	52	1.0	0.8	3.6	4.0	0.01	0.02	0.30	0.13
1989	49	52	1.3	0.9	3.8	4.5	0.02	0.02	0.02	0.13
1990	53	53	1.1	1.0	4.0	5.2	0.02	0.02	0.02	0.07
1991	53	53	1.2	1.1	4.1	4.1	0.03	0.02	0.02	0.07
1992	58	54	1.2	1.2	4.2	3.9	0.02	0.02	0.02	0.08
1993	54	53	1.2	1.2	3.8	4.0	0.03	0.03	0.02	0.02
1994	56	55	1.1	1.2	4.7	4.2	0.03	0.03	0.02	0.02
1995	49	54	1.2	1.2	4.3	4.2	0.03	0.03	0.02	0.02
1996	51	53	1.0	1.1	2.4	3.9	0.02	0.03	0.01	0.02
1997	49	52	0.9	1.1	2.8	3.6	0.09	0.04	0.01	0.02
1998	49	51	1.3	1.1	2.3	3.3	0.03	0.04	0.02	0.02
1999	53	50	1.4	1.2	2.4	2.8	0.02	0.04	0.02	0.02
2000	54	51	1.2	1.2	2.3	2.4	0.03	0.04	0.02	0.02
MOMM	52		1.0		3.4		0.03		0.05	
Objective	55		1.0		2.0		0.02		0.02	
MOMM-Obj					1.4		0.01		0.03	
Objective %	94		105		170		137		228	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.

** Units are mg/L

	% Na*	5YrMvAv	Total N	5YrMvAv	TKN	5YrMvAv	NO3	5YrMvAv
1981	1.0		0.37				0.19	
1982	1.0		0.17				0.08	
1983	1.0		0.17				0.02	
1984	1.0		0.24				0.01	
1985	1.0	1.0	0.17	0.22			0.02	0.06
1986	1.0	1.0	0.16	0.18			0.02	0.03
1987	1.0	1.0	0.17	0.18			0.01	0.02
1988	1.0	1.0	0.18	0.18			0.02	0.02
1989	1.0	1.0	0.20	0.18			0.03	0.02
1990	1.0	1.0	0.15	0.17			0.02	0.02
1991	1.0	1.0	0.17	0.17			0.03	0.02
1992	1.0	1.0	0.16	0.17	0.14		0.02	0.02
1993	13.3	3.5	0.36	0.21	0.32		0.02	0.02
1994	22.2	7.7	0.21	0.21	0.19		0.01	0.02
1995	21.4	11.8	0.23	0.23	0.20		0.02	0.02
1996	21.0	15.7	0.27	0.25	0.23	0.22	0.03	0.02
1997	21.9	19.9	0.29	0.27	0.19	0.23	0.11	0.04
1998	21.9	21.6	0.22	0.24	0.18	0.20	0.03	0.04
1999	22.5	21.7	0.21	0.24	0.17	0.19	0.03	0.05
2000	21.5	21.7	0.22	0.24	0.20	0.19	0.02	0.04
MOMM	21.7		0.22		0.20		0.04	
Objective	20.0		0.15		0.13		0.02	
MOMM-Ot	1.7		0.07		0.07		0.02	
Objective	109		144		155		187	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.
** Units are mg/L

CARSON RIVER @ PAYNESVILLE - MEAN OF MONTHLY MEAN DATA**
COMPARISON OF ANNUAL DATA AND 5 YEAR MOVING AVERAGE

	TDS	5YrMvAv	Cl	5YrMvAv	SO4	5YrMvAv	Total P	5YrMvAv	B	5YrMvAv
1981	64		1.8				0.03		0.01	
1982	49						0.04		0.02	
1983	43		0.9		4.1		0.03		0.03	
1984	49		1.2		1.4		0.04		0.02	
1985	50	51	1.7		2.3		0.05	0.04	0.24	0.06
1986	53	49	1.4		9.1		0.03	0.04	0.01	0.06
1987	68	53	2.1	1.5	5.7	4.5	0.04	0.04	0.01	0.06
1988	80	60	3.3	1.9	5.3	4.7	0.02	0.04	0.02	0.06
1989	60	62	2.2	2.1	4.5	5.4	0.03	0.03	0.02	0.06
1990	73	67	2.0	2.2	5.0	5.9	0.04	0.03	0.02	0.02
1991	71	70	2.3	2.4	5.2	5.1	0.04	0.03	0.02	0.02
1992	69	71	2.0	2.4	5.1	5.0	0.03	0.03	0.02	0.02
1993	59	66	1.5	2.0	4.3	4.8	0.03	0.03	0.02	0.02
1994	66	68	1.5	1.9	5.3	5.0	0.03	0.03	0.01	0.02
1995	54	64	1.4	1.7	4.6	4.9	0.04	0.03	0.01	0.02
1996	55	60	1.4	1.6	2.6	4.4	0.03	0.03	0.02	0.02
1997	58	58	1.0	1.4	2.9	3.9	0.03	0.03	0.01	0.02
1998	56	58	1.4	1.3	2.5	3.6	0.03	0.03	0.01	0.01
1999	59	56	1.5	1.3	2.5	3.0	0.02	0.03	0.01	0.01
2000	61	58	1.3	1.3	2.7	2.6	0.03	0.03	0.02	0.01
MOMM	60		1.7		4.2		0.03		0.03	
Objective	70		2.5		2.0		0.03		0.02	
MOMM-Obj					2.2				0.01	
Objective %	85		67		208		111		140	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.
** Units are mg/L

	% Na*	5YrMvAv	Total N	5YrMvAv	TKN	5YrMvAv	NO3	5YrMvAv
1981			0.32				0.08	
1982			0.29				0.09	
1983			0.23				0.04	
1984	1.0		0.30				0.03	
1985	1.0		0.28	0.28			0.04	0.06
1986	1.0		0.24	0.27			0.05	0.05
1987	1.0		0.28	0.27			0.06	0.04
1988	1.0	1.0	0.32	0.28			0.09	0.05
1989	1.0	1.0	0.27	0.28			0.06	0.06
1990	1.0	1.0	0.26	0.27			0.07	0.07
1991	1.0	1.0	0.31	0.29			0.11	0.08
1992	1.0	1.0	0.25	0.28	0.20		0.04	0.07
1993	13.7	3.5	0.28	0.27	0.22		0.05	0.07
1994	23.4	8.0	0.23	0.27	0.20		0.04	0.06
1995	21.9	12.2	0.31	0.28	0.26		0.04	0.06
1996	21.5	16.3	0.31	0.28	0.26	0.23	0.04	0.04
1997	22.4	20.6	0.28	0.28	0.17	0.22	0.10	0.06
1998	23.2	22.5	0.24	0.27	0.18	0.21	0.05	0.05
1999	23.7	22.5	0.28	0.28	0.23	0.22	0.04	0.05
2000	24.9	23.1	0.19	0.26	0.16	0.20	0.03	0.05
MOMM	23.0		0.27		0.21		0.06	
Objective	20.0		0.25		0.22		0.03	
MOMM-Ob	3.0		0.02				0.03	
Objective '	115		109		94		191	

* % Na data is erroneous until June, 1993: Only 1994 forward is used in average.
** Units are mg/L

CARSON RIVER @ PAYNESVILLE
COMPARISON OF STPUD & NDEP
MEAN OF MONTHLY MEAN DATA**

	California TDS	Nevada TDS	Objective	California Cl	Nevada Cl	Objective	California SO4	Nevada SO4	Objective	California Total P	Nevada Total P
1981	64	60	70	1.8	0.36	2.50			2.0	0.03	0.03
1982	49	50	70			2.50			2.0	0.04	0.02
1983	43	55	70	0.9	0.08	2.50	4.1		2.0	0.03	0.02
1984	49	48	70	1.2	0.10	2.50	1.4		2.0	0.04	0.02
1985	50	75	70	1.7	3.58	2.50	2.3		2.0	0.05	0.02
1986	53	55	70	1.4	0.09	2.50	9.1		2.0	0.03	0.03
1987	68	68	70	2.1	0.70	2.50	5.7		2.0	0.04	0.03
1988	80	70	70	3.3	0.92	2.50	5.3		2.0	0.02	0.03
1989	60	64	70	2.2	0.75	2.50	4.5		2.0	0.03	0.03
1990	73	64	70	2.0	0.75	2.50	5.0		2.0	0.04	0.03
1991	71	63	70	2.3	0.67	2.50	5.2		2.0	0.04	0.03
1992	69	63	70	2.0	0.67	2.50	5.1		2.0	0.03	0.03
1993	59	64	70	1.5	0.67	2.50	4.3		2.0	0.03	0.03
1994	66	64	70	1.5	0.67	2.50	5.3		2.0	0.03	0.03
1995	54	66	70	1.4	0.67	2.50	4.6		2.0	0.04	0.03
1996	55	66	70	1.4	0.67	2.50	2.6	2.2	2.0	0.03	0.03
1997	58	66	70	1.0	0.58	2.50	2.9	1.8	2.0	0.03	0.03
1998	56	67	70	1.4	1.50	2.50	2.5	1.8	2.0	0.03	0.03
1999	59	45	70	1.5	1.00	2.50	2.5	2.0	2.0	0.02	0.03
2000	61	56	70	1.3	1.00	2.50	2.7	2.0	2.0	0.03	0.02
MOMM	60	61		1.7	0.8		4.2	2.0		0.03	0.03
Objective***	70	70		2.5	2.5		2.0	2.0		0.03	0.03
MOMM-Obj							2.2				
Objective %	85	88		67	32		208	98		111	92

* % Na data is erroneous for CA until June, 1993: Only 1994 forward is used in average.
** Units are mg/L
*** Objectives are California objectives only, but Nevada data is compared to the California objective

	Objective	California B	Nevada B	Objective	California % Na*	Nevada % Na*	Objective	California Total N	Nevada Total N	Objective	California TKN	Nevada TKN
1981	0.03	0.01		0.02			20.0	0.32		0.25		0.22
1982	0.03	0.02		0.02			20.0	0.29		0.25		0.13
1983	0.03	0.03		0.02			20.0	0.23		0.25		0.11
1984	0.03	0.02		0.02	1.0		20.0	0.30	0.21	0.25		0.12
1985	0.03	0.24		0.02	1.0		20.0	0.28	0.24	0.25		0.16
1986	0.03	0.01		0.02	1.0		20.0	0.24	0.18	0.25		0.15
1987	0.03	0.01		0.02	1.0		20.0	0.28	0.23	0.25		0.18
1988	0.03	0.02		0.02	1.0		20.0	0.32	0.30	0.25		0.22
1989	0.03	0.02		0.02	1.0		20.0	0.27	0.38	0.25		0.28
1990	0.03	0.02		0.02	1.0		20.0	0.26	0.37	0.25		0.27
1991	0.03	0.02		0.02	1.0		20.0	0.31	0.34	0.25		0.25
1992	0.03	0.02		0.02	1.0		20.0	0.25	0.33	0.25	0.20	0.25
1993	0.03	0.02		0.02	13.7		20.0	0.28	0.31	0.25	0.22	0.23
1994	0.03	0.01		0.02	23.4		20.0	0.23	0.34	0.25	0.20	0.26
1995	0.03	0.01		0.02	21.9		20.0	0.31	0.34	0.25	0.26	0.26
1996	0.03	0.02		0.02	21.5		20.0	0.31	0.34	0.25	0.26	0.26
1997	0.03	0.01		0.02	22.4		20.0	0.28	0.34	0.25	0.17	0.26
1998	0.03	0.01		0.02	23.2		20.0	0.24	0.34	0.25	0.18	0.25
1999	0.03	0.01		0.02	23.7		20.0	0.28	0.42	0.25	0.23	0.37
2000	0.03	0.02		0.02	24.9		20.0	0.19	0.21	0.25	0.16	0.18
MOMM		0.03			23.0			0.27	0.31		0.21	0.22
Objective* **		0.02			20.0			0.25	0.25		0.22	0.22
MOMM-Obj		0.01			3.0			0.02	0.06			
Objective %		140			115			109	123		94	100

	Objective	California NO3	Nevada NO3	Objective
1981	0.22	0.08	0.05	0.03
1982	0.22	0.09	0.05	0.03
1983	0.22	0.04	0.05	0.03
1984	0.22	0.03	0.05	0.03
1985	0.22	0.04	0.08	0.03
1986	0.22	0.05	0.04	0.03
1987	0.22	0.06	0.07	0.03
1988	0.22	0.09	0.07	0.03
1989	0.22	0.06	0.09	0.03
1990	0.22	0.07	0.09	0.03
1991	0.22	0.11	0.08	0.03
1992	0.22	0.04	0.07	0.03
1993	0.22	0.05	0.07	0.03
1994	0.22	0.04	0.07	0.03
1995	0.22	0.04	0.07	0.03
1996	0.22	0.04	0.07	0.03
1997	0.22	0.10	0.07	0.03
1998	0.22	0.05	0.08	0.03
1999	0.22	0.04	0.19	0.03
2000	0.22	0.03	0.12	0.03
MOMM		0.06	0.08	
Objective* **		0.03	0.03	
MOMM-Obj		0.03	0.05	
Objective %		191	255	

Data collected by STPUD.
Table used in technical
Staff reports (2000 - 2001)
for Indian Creek Reservoir
TMDL.

West Fork Carson River

lonth	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Median
anuary						0.01	0.04	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.025*	0.01	0.02	0.02	0.01	0.02
ebruary						0.02	0.02	0.01	0.01	0.02	0.02	0.03	0.02	0.03	0.02		0.04	0.02	0.02	0.02	0.02
larch		0.01	0.01	0.02	0.04	0.01	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.01	0.02	0.02	~	0.03	0.02	0.02
pril			0.01		0.03	0.03	0.02	0.02	0.02	0.06	0.04	0.02	0.04	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.02
lay			0.07		0.04	0.03	0.04	0.02	0.01	0.04	0.02	0.07	0.03	0.06	0.02	0.14	0.03	0.05	0.03	0.02	0.03
une		0.08	0.03	0.05	0.05	0.02	0.07	0.02	0.01	0.02	0.03	0.04	0.03	0.07	0.02	0.06	0.04	0.02	0.05	0.03	0.03
uly	0.01	0.02	0.02		0.02	0.03	0.02	0.03	0.01	0.01	0.03	0.03	0.02	0.03	0.02	0.03	0.01	0.02	0.02	0.04	0.02
ugust		0.03	0.02		0.02	0.02	0.02	0.01	0.01	0.03	0.01	0.02	0.02	0.03	0.02	0.02	0.04	0.02	0.02	0.02	0.02
eptember		0.01	0.01	0.01	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.04	0.01	0.01	0.02	0.03	0.02	0.02	0.02
)ctober		0.02			0.01	0.01	0.05	0.01	0.01	0.01	0.02	0.01	0.01	0.03	0.01	0.01	0.02	0.02	0.02	0.02	0.01
lovember		0.01			0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.03	0.01	0.01	0.02	0.01	0.02	0.01
lecember		0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.04	0.01	0.02	0.02	0.01	0.01	0.03	0.02	0.01	0.02	0.02	0.02

Indian Creek

lonth	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Median
anuary									0.02	0.02	0.01		0.03	0.04	0.02	0.035*	0.03	0.04	0.03		0.03
ebruary									0.02	0.02	0.02	0.04	0.1	0.03	0.03		0.07	0.02	0.02		0.025
larch		0.02			0.04				0.02	0.02	0.03	0.03	0.02	0.03	0.04	0.03	0.03	0.02	0.02	0.02	0.02
pril				0.025	0.03				0.01	0.02	0.02	0.05	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.02	0.02
lay					0.03				0.02	0.01	0.02	0.03	0.1	0.03	0.03	0.02	0.03	0.05	0.02	0.03	0.03
une		0.05		0.02	0.04					0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.04	0.03	0.02	0.03
uly	0.03	0.1											0.04	0.03		0.03	0.02	0.07	0.04	0.03	0.03
ugust												0.04		0.04		0.02	0.07	0.07	0.05	0.04	0.04
eptember				0.03										0.06		0.04	0.04	0.05	0.03	0.02	0.04
)ctober																0.04	0.03	0.04	0.04	0.03	0.04
lovember					0.02					0.01						0.02	0.02	0.03	0.03	0.02	0.02
lecember				0.02				0.02	0.02	0.01		0.02	0.04	0.05	0.02	0.04	0.04	~			0.02

monthly average
high value thrown out

Table 6.

Data Collected by South Tahoe Public Utility District and made available to Regional Board staff in electronic format.

Carson River @ Woodfords (SW 01)

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total P	PO4-P	TKN	Org-N	NH3-	NO2-N	NO3-N	Total N	SO4	Har	COD	BOD	O&	Boron	Ca	Mg	Na	K	SAR	%Na	Total Col	Fecal Col	Fecal Strep
Carson R Woodfords	7/8/80	9.5	7.8	40		44	6	0.1	21	1.4	0.01			0.09	0.04		0.06	0.19			4	1	1	0.04				0.71			130	7	
Carson R Woodfords	3/28/81	4	7.6			69	2	1.3	33	0.6	0.01			0.16	0.15		0.06	0.37			4	1									40	30	
Carson R Woodfords	6/16/81	11	7.8	58		52	3		27	0.8	0.08			0.14	0.09		0.06	0.29			4	1	1	0.01				0.89			40	30	70
Carson R Woodfords	7/14/81	16.5	8	67		45	4		32	0.1	0.02			0.24	0.03		0.07	0.34			7		2	0.01				1.3			430	90	150
Carson R Woodfords	8/11/81	15	7.8	73		50	5		34	1.3	0.03			0.23	0.01		0.06	0.3			8	1	1	0.02				1.53			1500	1500	930
Carson R Woodfords	9/10/81	11	7.7	83		59	1		38	0.6	0.01			0.13	0.01		0.07	0.21			5	2	1	0.01				1.46			150	70	40
Carson R Woodfords	10/13/81	2.5	7.2	76		59	1		32	0.4	0.02			0.02	0.01		1.09	1.12			3	1	1	0.01				1.5			230	30	30
Carson R Woodfords	11/10/81	4	7.7	76		75	1		35	1	0.01			0.03	0.01		0.05	0.09			3	1	1	0.01				1.38			40	30	30
Carson R Woodfords	12/1/81	1	7.8	64		44	2		30	0.7	0.02			0.15	0.01		0.08	0.24			10	1	2	0.02				1.04			30	30	40
Carson R Woodfords	3/17/82	1	7.4	56		75	2		28	0.8	0.01			0.11	0.04		0.08	0.23			6	1		0.01				0.93			40	30	30
Carson R Woodfords	4/7/82	2.5	7.3	63		55	2		29	1.7	0.01			0.07	0.01		0.04	0.12			8	2	1	0.02				0.95			30	30	30
Carson R Woodfords	5/24/82	6.5	7.8	65		28	27		20	5	0.07			0.19	0.04		0.08	0.31			8	1	1	0.02				0.76			40	30	30
Carson R Woodfords	6/23/82	6.9	7.5	28		33	11		19	2.8	0.03			0.05	0.01		0.04	0.1			6	1	1	0.01				0.65			430	40	30
Carson R Woodfords	7/15/82		7.7	43		45	5		21	1.7	0.02			0.04	0.01		0.12	0.17			4	2	1	0.02				0.81			30	30	40
Carson R Woodfords	8/9/82		7.7	54		46	2		27	0.6	0.02			0.01	0.01		0.13	0.15			4	1	1	0.03				1.06			40	30	30
Carson R Woodfords	9/13/82	9.3	7.7	63		46	1		32	0.4	0.01			0.04	0.01		0.12	0.17			4	1	1	0.01				1.34			150	90	30
Carson R Woodfords	12/20/82		7.6	62		45	1		31	0.6	0.02			0.07	0.03		0.05	0.15			13	1	1								230	30	30
Carson R Woodfords	3/23/83	2.1	7.8	70		50	2	1.6	33	1.1	0.02			0.12	0.05		0.02	0.19			5	2	1	0.01				1.13			40	40	30
Carson R Woodfords	6/8/83	5.3	7.5	39		35	21	0.1	20	5	0.05			0.17	0.01		0.03	0.21		20	8	1	1	0.03				0.81			30	30	30
Carson R Woodfords	9/12/83	11.1	7.7	54	8.65	53	3	0.3	28	1.1	0.01			0.1	0.01	0.01	0.02	0.14	10	20	4	1	1	0.01				1.2			930	430	90
Carson R Woodfords	12/12/83		7.6	62	11.1	47	4	0.1	30	1.1	0.02			0.08	0.04	0.01	0.02	0.15	10	35	5	1	1	0.03				0.99			40	40	40
Carson R Woodfords	3/7/84	2	7.6	66	10.4	57	2	1.5	32	1.4	0.04			0.09	0.02	0.01	0.01	0.13	10	28	5	2	1	0.01	6.7	1.8	3.2	1.2	0.28	21.2	30	30	40
Carson R Woodfords	4/11/84	2.5	7.8	56	9.7	52	5	0.2	29	1.6	0.03			0.13	0.03	0.01	0.02	0.19	10	25	26	1	1	0.03	6.1	1.8	2.6	1.07	0.23	19.3	30	30	90
Carson R Woodfords	5/7/84	2.7	7.6	47	9.6	38	10	0.3	24	2.7	0.04			0.12	0.01	0.01	0.01	0.15	10	21	6	1	1	0.01	5.2	1.5	1.9	0.76	0.19	17.1	90	40	90
Carson R Woodfords	6/5/84	5.1	7.1	38	8.5	34	19	0.2	20	5	0.05			0.17	0.1	0.01	0.02	0.3	10	18	8	1	1	0.06	4.1	1.2	1.6	0.72	0.17	17.5	200	40	30
Carson R Woodfords	7/10/84	11.2	7.5	49	7.85	42	5	0.5	28	1.2	0.02			0.19	0.11	0.01	0.01	0.32	10	20	3	1	1	0.03	4.7	1.5	2	0.95	0.21	18.9	430	90	30
Carson R Woodfords	8/6/84	11.2	7.8	61	7.1	54	3	1	31	0.79	0.02			0.15	0.16	0.01	0.01	0.33	10	24	4	1	1	0.02	6.1	1.8	2.7	1.26	0.24	19.5	750	150	30
Carson R Woodfords	9/4/84	11.4	7.8	65	7.9	49	1	0.7	35	0.62	0.03			0.14	0.07	0.01	0.01	0.23	10	25	4	1	1	0.01	7	1.9	3.2	1.42	0.27	20.6	2400	40	70
Carson R Woodfords	10/3/84	7.1	6.5	69	9	60	1	0.8	34	0.93	0.01			0.13	0.06	0.01	0.01	0.21	10	28	3	1	1	0.02	6.8	1.9	3.7	1.48	0.32	23.1	30	30	30
Carson R Woodfords	11/5/84	3	7.7	60	10	45	1	0.5	33	0.92	0.02			0.15	0.08	0.01	0.01	0.25	10	25	6	2	1	0.03	6.8	1.9	3.1	1.41	0.27	20.3	200	70	30
Carson R Woodfords	12/4/84	1	6.8	67	13.7	59	2	0.8	34	0.86	0.02			0.19	0.06	0.01	0.02	0.28	10	31	4	1	1	0.04	6.8	1.9	3.1	1.27	0.27	20.4	30	30	40
Carson R Woodfords	1/14/85	0.2	7.9	72	12.5	50	1	0.2	35	0.65	0.01			0.1	0.03	0.01	0.02	0.16	10	31	3	3	1	0.02	7.6	1.9	3.7	1.32	0.3	21.9	40	30	30
Carson R Woodfords	2/4/85	0.4	7.5	75	10.2	51	1	0.8	34	0.75	0.02			0.15	0.05	0.01	0.03	0.24	10	29	3	2	1	0.33	7.5	2	3.8	1.34	0.31	22.4	230	30	30
Carson R Woodfords	3/12/85	1.9	7.7	70	9	56	2	0.5	35	0.92	0.01			0.11	0.03	0.01	0.01	0.16	10	34	5	1	1	0.08	7.5	1.9	3.3	1.29	0.27	20.2	30	30	30
Carson R Woodfords	4/2/85	2.4	7.6	57	14.4	46	8	0.5	28	2.3	0.03			0.19	0.05	0.01	0.02	0.27	10	22	5	1	1	0.36	6.2	1.6	2.6	1.08	0.24	19.4	40	30	30
Carson R Woodfords	5/7/85	4.8	7.5	42	9.5	43	10	1.3	20	3	0.03			0.12	0.05	0.01	0.03	0.21	10	17	6	1	1	0.53	5.2	1.4	1.8	0.71	0.18	16.6	230	30	30
Carson R Woodfords	6/4/85	9.5	7.7	50	8.7	31	5	0.4	26	1.4	0.02			0.09	0.04	0.01	0.01	0.15	10	22	4	1	1	0.05	5.4	1.5	2	0.86	0.19	17.3	230	30	30
Carson R Woodfords	7/1/85	12.2	7.6	60	8.6	43	4	0.5	30	1.6	0.03			0.13	0.02	0.01	0.01	0.17	10	24	5	1	1	0.01	6.1	1.7	2.4	1.12	0.22	18	430	90	230
Carson R Woodfords	8/5/85	13.1	7.8	70	9.02	46	3	0.5	43	1	0.02			0.14	0.02	0.01	0.01	0.18	10	28	2	1	2	1.5	7.5	2.2	3.3	1.55	0.27	19.4	230	90	40
Carson R Woodfords	9/3/85	10.3	8	75	8.8	55	1	0.6	38	0.6	0.02			0.07	0.03	0.01	0.02	0.13	10	28	3	1	1	0.12	7.6	1.9	3.6	1.63	0.3	21.5	430	90	30
Carson R Woodfords	10/1/85	6.5	7.8	70	9.3	63	1	0.6	37	0.48	0.01			0.04	0.03	0.01	0.1	0.18	10	29	3	1	1	0.5	7.5	2.1	3.6	1.56	0.29	21	30	30	30
Carson R Woodfords	11/4/85	5.7	7.9	74	9.4	46	1	0.9	36	0.48	0.02			0.05	0.02	0.01	0.01	0.09	10	26	3	1	1	0.01	7.2	2	3.8	1.41	0.32	22.8	30	30	30
Carson R Woodfords	12/3/85	2.2	7.4	70	9.6	46	1	1	32	1.2	0.02			0.09	0.03	0.01	0.02	0.15	10	31	4	1	1	0.01	7.4	1.9	3.4	1.37	0.28	20.8	30	30	40
Carson R Woodfords	1/7/86	0.5	8.1	65	11.2	36	2	1.3	32	0.98	0.04			0.18	0.02	0.01	0.03	0.24	10	25	5	1	1	0.01	7.1	1.8	3	1.16	0.26	19.7	40	30	90
Carson R Woodfords	2/3/86	1.4	7.6	65	10.8	78	1	0.5	31	0.79	0.02			0.1	0.05	0.01	0.02	0.18	10	25	1	1	1	0.04	6.7	1.8	3	1.21	0.26	20.3	30	30	40
Carson R Woodfords	3/3/86	1.8	7.7	47	13	52	9	0.5	23	2.3	0.03			0.12	0.05	0.01	0.05	0.23	20	19	7	1	1	0.01	5.5	1.4	2.3	0.96	0.22	19.4	30	30	30
Carson R Woodfords	4/8/86	3.2	7.9	45	8.95	25	6	1.1	21	1.4	0.02			0.11	0.02	0.01	0.01	0.15	10	30	6	2	1	0.01	5.1	2	1.4	0.88	0.13	12.3	30	30	30
Carson R Woodfords	5/6/86	2.6	7.9	45	11.3	41	12	0.5	20	1.9	0.04			0.13	0.02	0.01	0.01	0.17	10	18	4		1	0.01	4.8	1.6	2	0.78	0.19	18	30	30	30
Carson R Woodfords	6/3/86	6.6	7.7	33	10	40	23	0.2	18	5.9	0.07			0.09	0.04	0.01	0.01	0.15	10	15	7	1		0.01	4	1	1.4	0.71	0.16	16.8	90	40	30
Carson R Woodfords	7/8/86	10	7.4	44	8.1	39	3	0.7	22	0.84	0.02			0.1	0.05	0.01	0.01	0.17	10	19	2	1	1	0.05	3.8	1.3	2.4	0.89	0.27	24.6	90	40	430
Carson R Woodfords	8/4/86	12.5	7.1	70	8	55	2	2.6	27	0.79	0.02			0.06	0.03	0.01	0.02	0.12	10	23	1		1	0.01	6	1.7	2.5	1.1	0.23	18.8	1500	30	30

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total P	PO4-P	TKN	Org-N	NH3-	NO2-N	NO3-N	Total	SO4	Har	COD	BOD	O&	Boron	Ca	Mg	Na	K	SAR	%Na	Total Col	Fecal Col	Fecal Strep
Carson R Woodfords	9/10/86	9.8	8	60	9.15	75	2	0.3	30	1.3	0.01			0.14	0.04	0.01	0.01	0.2	10	23	5	1	1	0.01	6.2	1.6	2.4	1.1	0.22	18.2	150	150	230
Carson R Woodfords	10/7/86	6.2	7.4	68	9.9	50	1	0.6	34	0.78	0.05			0.06	0.04	0.01	0.01	0.12	5.5	26	4	1	1	0.07	6.8	1.8	3.3	1.4	0.29	21.5	40	40	200
Carson R Woodfords	11/11/86	1.4	7.5	69	10.9	50	1	0.5	35	0.48	0.01			0.02	0.02	0.01	0.02	0.07	6.7	25	3	1	1	0.01	6.7	1.9	3.6	1.4	0.31	22.9	40	40	30
Carson R Woodfords	12/9/86	0.6	7.5	71	13.7	69	1	0.7	35	0.42	0.02			0.06	0.02	0.01	0.01	0.1	3	27	2	1	1	0.01	6.9	1.9	3.3	1.6	0.28	20.9	30	30	30
Carson R Woodfords	1/6/87	0.5	7.4	72	10.1	56	4	0.6	37	0.41	0.02			0.02	0.04	0.01	0.01	0.08	7	27	5	1	1	0.04	7.6	2	3.3	1.6	0.27	19.7	90	30	30
Carson R Woodfords	2/10/87	2.7	7.6	73	10.7	55	1	0.5	36	0.49	0.01			0.08	0.02	0.01	0.02	0.13	6	26	2	1	1	0.01	6.8	2.1	3.6	1.4	0.3	22.2	30	30	30
Carson R Woodfords	3/10/87	1.8	6.5	77	10.1	76	2	1.6	36	0.8	0.02			0.15	0.08	0.01	0.01	0.25	7	32	4	1	1	0.02	8.4	2.1	3.8	1.6	0.3	20.7	30	30	30
Carson R Woodfords	4/7/87	6.1	7.2	65	10.1	35	6	1.3	31	1.9	0.02			0.22	0.02	0.01	0.02	0.27	2.5	28	7	1	1	0.01	9.2	1.8	3.2	1.3	0.25	17.8	30	30	40
Carson R Woodfords	5/5/87	6.8	7.3	44	9.8	38	6	0.4	22	1.2	0.02			0.14	0.02	0.01	0.01	0.18	4.7	24	3	1	1	0.01	4.4	1.3	1.8	0.7	0.19	18.5	30	30	30
Carson R Woodfords	6/2/87	10.4	6.7	56	8.85	42	3	0.5	27	0.56	0.02			0.12	0.03	0.01	0.01	0.17	7.9	21	4	1	1	0.01	5.2	1.6	2.3	0.9	0.22	19.4	40	40	40
Carson R Woodfords	7/8/87	13.1	7.3	73	8.5	55	2	0.8	36	0.55	0.03			0.14	0.02	0.01	0.02	0.19	5	28	2		1	0.01	7.4	2.1	3.3	1.5	0.27	19.8	90	30	30
Carson R Woodfords	8/4/87	13.3	7.4	78	8.2	50	1	0.6	38	0.4	0.01			0.1	0.02	0.01	0.02	0.15	3.3	30	3	1	1	0.01	7.5	2.2	3.8	1.7	0.31	21.6	390	140	40
Carson R Woodfords	9/1/87	13.8	7.2	80	8.1	57	1	0.8	40	0.37	0.01			0.19	0.02	0.01	0.02	0.24	3.5	30	5	1	1	0.01	6	2.2	3.8	1.7	0.33	24	390	40	40
Carson R Woodfords	10/6/87	7.6	6.8	85	9.6	53	1	0.7	41	0.31	0.01			0.11	0.02	0.01	0.01	0.15	3.5		2	1	1	0.01	7.5	2.3	4.4	1.7	0.36	23.9	40	30	30
Carson R Woodfords	11/4/87	5.2	7.5	80	11.6	73	1	1.3	38	0.47	0.01			0.12	0.02	0.01	0.01	0.16	3.9		5	1	1	0.01	8.4	2.1	4.5	1.7	0.35	23.5	430	430	70
Carson R Woodfords	12/14/87	0.5	7.6	88	11.9	67	1	1	40	0.47	0.01			0.05	0.02	0.01	0.01	0.09	4.1		5	1	1	0.01	9.3	2.6	4.7	1.6	0.35	22.1	90	30	30
Carson R Woodfords	1/12/88	1.1	6.3	70	17.3	62	1	0.9	37	0.64	0.01			0.08	0.02	0.01	0.02	0.13	3.9		5	2	1	0.01	8.7	2.5	4.1	1.7	0.31	20.7	230	30	40
Carson R Woodfords	2/2/88	0.8	6.2	78	11.8	52	1	1.1	36	0.44	0.01			0.07	0.02	0.01	0.01	0.11	3.9		5	2	1	0.01	7.2	2.1	4.1	1.4	0.34	23.9	230	30	30
Carson R Woodfords	3/15/88	2.7	7.5	73	13.3	49	2	1.6	32	0.61	0.02			0.22	0.03	0.01	0.01	0.27	4.3		5	1	1	0.02	7.8	2.2	3.6	1.2	0.29	20.6	30	30	30
Carson R Woodfords	4/12/88	6.3	6.4	53	12.5	49	7	0.9	24	2.1	0.02			0.25	0.04	0.01	0.02	0.32	3.4		5	1	1	0.01	5.8	1.7	2.5	0.9	0.23	19.4	30	30	30
Carson R Woodfords	5/10/88	7.5	6.4	58	12.7	50	3	1.3	27	1.4	0.01			0.12	0.02	0.01	0.01	0.16	3.7		5	1	1	0.04	6.7	1.9	2.3	0.79	0.2	16.4	30	30	40
Carson R Woodfords	6/8/88	6	7.5	55	12	41	2	0.8	26	0.6	0.01			0.07	0.02	0.01	0.01	0.11	3.3		5	1	1	0.01	6.8	2.1	2.8	0.74	0.24	18.6	30	30	150
Carson R Woodfords	7/13/88	18.2	7.9	77		67	2	0.9	37	0.34	0.01			0.09	0.02	0.01	0.02	0.14	3.8		5	1	1	0.01	8	2.2	3.7	1.5	0.29	20.6	40	30	30
Carson R Woodfords	8/10/88	14	7.4	82	8.96	58	1	0.9	41	0.32	0.01			0.1	0.02	0.01	0.02	0.15	3.7		5	1	1	0.01	8.7	2.4	3.9	1.6	0.3	20.1	2400	30	40
Carson R Woodfords	9/7/88	13.3	7.7	90	8.47	50	2	1.1	42	1.3	0.02			0.24	0.05	0.01	0.04	0.34	2.5		5	2	1	0.02	8.7	2.4	4.3	1.7	0.33	21.7	61	30	30
Carson R Woodfords	10/12/88	8.1	7.3	96	9.7	61	1	1.5	42	0.26	0.01			0.04	0.08	0.01	0.02	0.15	3.5		5	1	1		8.7	2.4	4.5	1.5	0.34	22.6	150	30	30
Carson R Woodfords	11/9/88	4.2	7.1	92	10.3	62	1	0.3	40	0.35	0.01			0.06	0.05	0.01	0.01	0.13	3.4		5	2	1	0.04	8.3	2.2	4.1	1.4	0.32	22	70	30	30
Carson R Woodfords	12/19/88	1.5	7.3	79	11.9	75	1	0.8	36	0.36	0.01			0.1	0.02	0.01	0.01	0.14	4		5	1	1	3.1	8.9	2.3	4.4	1.1	0.33	22.4	230	30	30
Carson R Woodfords	1/11/89	1.1	8.3	113	12.6	62	1	0.9	38	0.42	0.01			0.09	0.02	0.01	0.02	0.14	4		6	1	1	0.01	8.2	2.2	4.3	1.3	0.34	23	30	30	30
Carson R Woodfords	2/15/89	0.8	6.8	83	13.5	54	1	1.4	38	0.43	0.02			0.11	0.02	0.01	0.03	0.17	3.9		5	2	1	0.01	8.8	2.2	4.8	1.3	0.37	24.2	30	30	30
Carson R Woodfords	3/1/89	3	7	78	12.8	60	2	4	29	1.3	0.02			0.19	0.02	0.01	0.12	0.34	5.4		13	1	1	0.03	8.1	2.1	3.8	1.3	0.3	21.3	430	30	30
Carson R Woodfords	4/11/89	5.7	6.7	62	10.5	31	31	0.7	20	5.6	0.06			0.25	0.02	0.01	0.06	0.34	3.5		5	1	1	0.01	4.6	1.3	1.7	0.65	0.18	17.3	90	30	70
Carson R Woodfords	5/10/89	5.1	7.8	40	9.8	36	13	0.5	19	3.6	0.04			0.17	0.02	0.01	0.01	0.21	3		9	1	1	0.01	4.3	1.2	1.6	0.6	0.17	17.4	230	40	230
Carson R Woodfords	6/7/89	5.1	7.6	52	8.7	46	7	0.5	20	1.8	0.02			0.14	0.02	0.01	0.01	0.18	2.9		5	1	1	0.03	4.6	1.2	1.2	0.56	0.12	13.2	230	40	150
Carson R Woodfords	7/12/89	12.8	7.3	59	7.2	46	3	0.8	30	0.69	0.01			0.07	0.02	0.01	0.01	0.11	3.2		15	1	1	0.03	6	1.7	1.9	1.1	0.17	15	230	30	230
Carson R Woodfords	8/2/89	13.4	8.1	65	8.1	50	3	2.4	29	1.1	0.03			0.2	0.02	0.01	0.01	0.24	4.3		6	1	1	0.01	6.7	1.9	2.7	1.2	0.23	18.4	1500	230	2400
Carson R Woodfords	9/19/89	8.3	6.7	72	9.4	68	2	1.6	34	1.3	0.02			0.14	0.06	0.01	0.06	0.27	4.3		5	1	1	0.05	6.4	2.1	3.1	10.5	0.27	15	70	30	90
Carson R Woodfords	10/3/89	7.6	8.3	73	8.95	53	1	1.1	36	0.7	0.01			0.07	0.04	0.01	0.01	0.13	3.5		5	1	1	0.01	7.3	2	3.3	1.4	0.27	20.2	90	30	40
Carson R Woodfords	11/1/89	3.4	7.7	75	10.5	42	1	0.8	33	0.48	0.01			0.06	0.06	0.01	0.02	0.15	4		5	1	1	0.01	8.4	1.9	3.3	1.2	0.26	19.1	90	30	30
Carson R Woodfords	12/5/89	2.1	8.4	78	10.6	45	1	0.7	32	0.45	0.04			0.1	0.02	0.01	0.02	0.15	4		5	1	1	0.02	7.7	2	3.5	1.3	0.29	20.7	230	30	90
Carson R Woodfords	1/3/90	1.3	8.3	162	10.5	54	1	1	36	0.5	0.02			0.03	0.02	0.01	0.02	0.08	4.1		5	1	1	0.01	8.5	2.2	3.8	1.4	0.3	20.5	90	30	40
Carson R Woodfords	2/7/90	1.3	6.6	80	10.7	47	1	1.4	35	0.38	0.02			0.05	0.02	0.01	0.06	0.14	4.6		5	1	1	0.02	7.6	1.9	3.3	1.3	0.27	20.1	90	30	30
Carson R Woodfords	3/6/90	1.7	8.9	82	10.5	45	2	2.5	34	0.6	0.02			0.07	0.02	0.01	0.03	0.13	4.2		6	1	1	0.03	8	2.1	4.2	1.3	0.34	23.2	200	40	40
Carson R Woodfords	4/3/90	6.4	6.6	48	10.8	38	12	0.9	25	3.3	0.04			0.16	0.02	0.01	0.04	0.23	3.5		5	1	1	0.02	6.5	1.7	2.9	0.9	0.26	20.5	40	30	430
Carson R Woodfords	5/1/90	4	7.6	54	10.8	45	5	1.2	25	1.4	0.02			0.11	0.04	0.01	0.02	0.18	3.3	22	5	1	1	0.01	6.1	1.7	2.2	0.83	0.2	17	40	30	430
Carson R Woodfords	6/5/90	10.8	7.7	49	8.55	34	5	0.6	23		0.03			0.02	0.02	0.01	0.01	0.06	3.7		5	1	1	0.02	5.7	1.6	1.9	0.76	0.18	15.9	230	230	150
Carson R Woodfords	7/10/90	15.6	7.7	68	7.2	59	2	0.7	31	0.49	0.03	0.01		0.05	0.02	0.01	0.05	0.13			5	1	1	0.03							90	40	90
Carson R Woodfords	8/7/90	18.2	7.8	78	6.6	57	2	1	37	0.64	0.01	0.02		0.16	0.02	0.01	0.01	0.2	4.1		5	1	1	0.02	8.2	2.3	3.7	1.7	0.29	20	150	30	
Carson R Woodfords	9/5/90	11.5	8	85	7.85	61	1	1.1	39	0.47	0.02	0.01		0.1	0.02	0.01	0.01	0.14	4.1		5	1	1	0.01	8.2	2.4	4	1.7	0.31	21.1	750	30	
Carson R Woodfords	10/2/90	12.1	7.8	92	8	64	17	1.5	39	1.6	0.02	0.01		0.17	0.02	0.01	0.01	0.21	4			1	1	0.01	8.6	2.4	4	1.7	0.31	20.6	90	40	
Carson R Woodfords	11/1/90	3.8	7.9	80	9.6	62	1	1.1	38	0.3	0.02	0.01		0.12	0.02	0.01	0.02	0.17	4	28	5	1	1	0.03	7.4	2.1	4.1	1.6	0.34	23.4	30	30	40

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total P	PO4-P	TKN	Org-N	NH3-	NO2-N	NO3-N	Total	SO4	Har	COD	BOD	O&	Boron	Ca	Mg	Na	K	SAR	%Na	Total Col	Fecal Col	Fecal Strep
Carson R Woodfords	12/4/90	1.8	7.2	84	9.9	67	1	0.7	37	1	0.01	0.01		0.08	0.02	0.01	0.01	0.12	4			1	1	0.02	7.8	2.1	4.2	1.6	0.34	23.2	150	40	
Carson R Woodfords	1/8/91	0.8	6.7	80	9.45	52	1	0.8	37	0.48	0.02	0.01		0.09	0.02	0.01	0.12	0.24	4			1	1	0.02	7.6	2.1	3.3	1.6	0.27	19.5	30	30	
Carson R Woodfords	2/6/91	16.5	9	75	9.25	54	1	2	36	0.43	0.03	0.01		0.07	0.02	0.01	0.02	0.12	4.3			1	1	0.02	7.5	2.1	4.4	1.5	0.36	24.5	30	30	
Carson R Woodfords	3/14/91	1.9	9.7	83	10.2	69	1	1.9	35	0.78	0.02	0.01		0.16	0.02	0.01	0.02	0.21	4.7			1	1	0.03	8.6	2.2	3.8	1.5	0.29	20.3	230	40	
Carson R Woodfords	4/3/91	4.5	8.5	115	8.9	51	1	3	34	1	0.02	0.01		0.12	0.02	0.01	0.03	0.18	4.7			1	1	0.04	8.1	2.4	4.1	1.3	0.32	21.9	90	40	
Carson R Woodfords	5/9/91	2.6	6.7	56	8.55	37	29	1	20	5.3	0.07	0.01		0.23	0.05	0.03	0.01	0.32	3.8	17	13	2	1	0.02	5.3	1.8	3	0.74	0.28	23.2	230	90	40
Carson R Woodfords	6/4/91	6.5	9.4	42	9.4	34	17	0.4	17	5.3	0.04	0.01		0.13	0.04	0.01	0.01	0.19	2.9			1	1	0.02	4.4	1.2	1.6	0.55	0.17	17.3	930	30	
Carson R Woodfords	7/9/91	13.6	7.6	63	7.85	46	6	0.7	31	0.88	0.03	0.01		0.1	0.03	0.01	0.01	0.15	3.7			1	1	0.01	7.2	1.9	3	0.99	0.25	19.4	90	30	
Carson R Woodfords	8/6/91	13.2	8.1	76	7.05	58	2	0.8	36	0.43	0.02	0.01		0.05	0.03	0.01	0.02	0.11	4			1	1	0.01	8.4	2.2	4	1.4	0.31	21.4	30	30	
Carson R Woodfords	9/3/91	14.2	7.2	75	8.1	57	1	0.8	37	0.35	0.02	0.01		0.08	0.03	0.01	0.02	0.14	3.7			1	1	0.02	7.6	2	2.7	1.6	0.22	16.7	40	30	
Carson R Woodfords	10/1/91	13.7	7.1	78	7.35	59	1	0.8	39	0.19	0.01	0.01		0.06	0.02	0.01	0.01	0.1	4.1			1	1	0.01	8.1	2.1	4	1.5	0.32	22	30	30	
Carson R Woodfords	11/5/91	5.1	6	79	9	61	1	1.3	36	0.69	0.01	0.01		0.02	0.05	0.01	0.01	0.09	4.6	29	5	1	1	0.02	7.6	1.9	3.7	1.6	0.31	21.8	30	30	40
Carson R Woodfords	12/10/91	0.9	7.1	75	12.2	59	1	1.1	34	0.57	0.02	0.01		0.08	0.02	0.01	0.02	0.13	4.5			1	1	0.01	7.9	2.1	3.6	1.5	0.29	20.5	70	30	
Carson R Woodfords	1/8/92	2	8.7	89	11	45	1	0.9	36	0.42	0.02	0.01		0.08	0.04	0.01	0.02	0.15	4.3			1	1	0.02	9.4	2	4.5	1.4	0.34	22.6	30	30	
Carson R Woodfords	2/4/92	1	8.4	84	11.6	61	1	1.4	37	0.52	0.02	0.01		0.06	0.03	0.01	0.01	0.11	4.4			2	1	0.05	8.2	2	4.3	1.4	0.34	23.4	14	3	
Carson R Woodfords	3/3/92	3.6	7.4	85	10.4	63	2	2.5	32	0.54	0.03	0.01		0.07	0.07	0.01	0.01	0.16	5.1			1	1	0.01	9.2	2	3.9	1	0.3	20.7	23	4	
Carson R Woodfords	4/1/92	6.6	8	55	8.8	52	8	1.4	24	2.5	0.04	0.01		0.15	0.02	0.01	0.05	0.23	4.5			1	1	0.02	6.6	1.5	2.5	0.91	0.22	18.6	40	30	
Carson R Woodfords	5/5/92	8.6	7.6	116	9.4	33	6	0.6	24	1.5	0.03	0.01		0.13	0.02	0.01	0.01	0.17	3.6	20	5	1	1	0.01	5.9	1.5	2.5	0.7	0.23	19.9	30	30	230
Carson R Woodsford	6/2/92	14.3	7.2	59	8.2	47	3	0.7	28	1	0.03	0.01		0.18	0.02	0.01	0.01	0.22	3.4			1	1	0.01	6.8	1.7	2.5	0.93	0.22	17.7	150	30	
Carson R Woodfords	7/7/92	16.4	7.9	68	9.4	67	1	1.2	36	0.49	0.02	0.01		0.05	0.02	0.01	0.01	0.09	4			2	1	0.02	8.3	2.2	3.1	1.4	0.24	17.6	430	30	
Carson R Woodfords	8/4/92	14.8	7.8	84	7.6	64	1	0.8	39	0.68	0.02	0.01		0.11	0.02	0.01	0.02	0.16	4.2			1	1	0.02	8.7	2.3	3.8	1.5	0.29	20	430	40	
Carson R Woodfords	9/1/92	11.6	7.7	78	7.7	61	1	1.1	38	0.74	0.02	0.01		0.32	0.02	0.01	0.01	0.36	5			1	1	0.03	8.5	2.1	3.5	1.5	0.27	19.3	430	30	
Carson R Woodfords	10/13/92	10.8	7.6	96	8.7	70	1	0.9	40	0.81	0.01	0.01		0.11	0.02	0.01	0.01	0.15	3.2			1	1	0.02	7.5	2	3.6	1.5	0.3	21.3	150	30	
Carson R Woodfords	11/4/92	4.3	8.4	88	10.8	64	1	1.4	36	1.2	0.02	0.01		0.02	0.07	0.01	0.01	0.11	4.9	31	10	2	2	0.01	8.6	2.2	4.1	1.4	0.32	21.6	150	30	30
Carson R Woodfords	12/8/92	1.7	9.2	67	15	63	1	1	39	0.4	0.02	0.01		0.02	0.02	0.01	0.04	0.09	3.4			1	1	0.02	9.7	2.3	4.6	1.6	0.34	21.9	90	30	
Carson R Woodfords	1/19/93	2.8	8.9	82	11.2	70	1	1.5	37	0.49	0.02	0.01		0.1	0.03	0.01	0.05	0.19	4			2	1	0.03	8.8	2.2	4.8	1.4	0.37	24.1	30	30	
Carson R Woodfords	2/2/93	1.4	8.5	92	10.8	61	1	3	38	1.2	0.03	0.01		0.1	0.02	0.01	0.06	0.19	4.4			1	1	0.02	9.2	2.9	4.2	1.4	0.3	19.9	70	30	
Carson R Woodfords	3/2/93	3.9	7.8	77	10.1	58	1	3.2	37	0.73	0.02	0.01		0.1	0.02	0.01	0.03	0.16	4			1	1	0.01	8.8	2	4.4	1.4	0.34	23	70	30	
Carson R Woodfords	4/6/93	3.6	7.8	71	11.6	69	4	2.2	27	1.4	0.02	0.01		0.08	0.02	0.01	0.03	0.14	4.8			1	1	0.05	7.4	1.8	3.4	1.1	0.29	21.3	30	30	
Carson R Woodfords	5/4/93	4.6	8.1	50	11.8	39	20	1	20	3.4	0.06	0.01		0.14	0.03	0.01	0.03	0.21	2.9	17	16	1	1	0.02	5.6	1.6	1.7	0.77	0.16	14.6	90	30	40
Carson R Woodfords	6/1/93	5.3	7.3	42	10.4	36	20	0.7	21	5.1	0.07	0.02		0.22	0.02	0.01	0.01	0.26	3.3			1	1	0.01	4.6	1.2	1.9	0.61	0.2	19.3	430	30	
Carson R Woodfords	7/7/93	12.5	7.5	48	8.55	37	6	0.4	21	1.5	0.03	0.01		1.95	0.02	0.01	0.01	1.99	2.6			1	1	0.01	5	1.3	1.8	0.75	0.18	17.2	70	30	
Carson R Woodfords	8/3/93	14.8	7.1	60	7.3	37	4	0.6	27	1.4	0.03	0.01		0.17	0.02	0.01	0.01	0.21	2.7			1	1	0.02	6.1	1.5	2.2	1	0.2	17.4	40	30	
Carson R Woodfords	9/1/93	12	8.5	79	8.55	48	6	1	31	2	0.04	0.01		0.35	0.02	0.01	0.01	0.39	3.8			1	1	0.01	7.9	1.9	3.2	1.3	0.26	19.2	930	150	
Carson R Woodfords	10/5/93	10.4	7.4	65	8.95	57	5	0.8	32	2.1	0.03	0.02		0.15	0.03	0.01	0.04	0.23	5.2			4	1	0.01	7.4	2	3.7	1.8	0.31	21.7	230	40	
Carson R Woodfords	11/2/93	2.2	8.6	74	10.8	62	1	0.8	35	0.25	0.02	0.01		0.15	0.03	0.01	0.01	0.2	4.1	26	5	1	1	0.03	7.4	2	3.8	1.3	0.31	22.5	30	30	40
Carson R Woodfords	12/1/93	1	8	76	10.2	60	1	1	36	0.5	0.01	0.01		0.07	0.04	0.01	0.01	0.13	4.3			2	1	0.02	8.4	2.2	4.8	1.6	0.38	24.5	90	30	
Carson R Woodfords	1/4/94	2	7.7	84	10.8	64	1	1	35	0.36	0.02	0.02		0.16	0.02	0.01	0.01	0.2	4.6			1	1	0.04	8.3	2.1	4.5	1.4	0.36	23.9	40	30	
Carson R Woodfords	2/1/94	0.9	6.9	86	10.6	61	1	1	38	0.4	0.02	0.01		0.16	0.02	0.01	0.02	0.21	7.4			1	1	0.01	8.4	2.1	4.3	1.6	0.34	22.8	90	30	
Carson R Woodfords	3/1/94	2.7	7.8	84	10.8	56	1	2.2	35	0.64	0.01	0.01		0.12	0.02	0.01	0.01	0.16	4.8			1	1	0.02	7.8	2	4.3	1.5	0.35	24	40	30	
Carson R Woodfords	4/5/94	3.7	7.4	68	10.6	50	3	1.4	27	1.4	0.01	0.01		0.12	0.02	0.01	0.01	0.16	4.1			1	1	0.04	7	1.8	3.1	1.2	0.27	20.3	30	30	
Carson R Woodfords	5/3/94	7.3	7.5	54	10.9	34	5	0.7	24	1.5	0.02	0.01		0.21	0.03	0.01	0.01	0.26	2.8	21	5	1	1	0.01	5.3	1.3	2.1	0.06	0.21	19.6	150	30	43
Carson R Woodfords	6/1/94	10.2	7.2	47	9.45	38	5	0.5	22	1.4	0.02	0.01		0.34	0.03	0.01	0.01	0.39	4.3			1	1	0.01	5.6	1.5	2.3	0.9	0.22	19	150	40	
Carson R Woodfords	7/6/94	12.5	7.7	67	9.8	44	3	0.7	30	0.8	0.02	0.01		0.13	0.03	0.01	0.01	0.18	4.4			1	1	0.01	6.2	1.6	2.9	1.2	0.26	21.1	90	30	
Carson R Woodfords	8/2/94	12.6	7.7	85	7.5	59	1	0.8	39	0.24	0.02	0.01		0.24	0.02	0.01	0.01	0.28	4			1	1	0.01	8.4	2.3	4.1	1.5	0.32	21.6	90	40	
Carson R Woodfords	9/1/94	9.8	7.9	86	8.7	65	2	1.1	40	0.51	0.01	0.01		0.02	0.08	0.01	0.01	0.12	4.8			1	4	0.01	9	2.2	4.5	1.7	0.34	22.5	430	30	
Carson R Woodfords	10/4/94	6.4	8	105	9.4	69	1	0.8	40	0.51	0.01	0.02		0.16	0.02	0.01	0.01	0.2	4.8			1	1	0.01	8.3	2.2	4.9	1.8	0.39	24.9	230	30	
Carson R Woodfords	11/1/94	7.6	7.8	83	9.95	66	1	0.8	37	0.36	0.03	0.01		0.13	0.02	0.01	0.01	0.17	4.9	29	5	1	1	0.01	8.4	2.2	4.5	1.8	0.35	23.2	40	30	30
Carson R Woodfords	12/7/94	0.8	7.8	81	10.8	65	1	1.6	35	0.36	0.01	0.01		0.14	0.03	0.01	0.01	0.19	5.6			1	1	0.03	8.3	2.1	4.3	1.5	0.34	23	30	30	
Carson R Woodfords	1/4/95	0.6	7.7	78	11.1	58	1	1.4	35	0.5	0.02	0.01		0.17	0.06	0.01	0.01	0.25	5.5			2	1	0.02	9.6	3	5.3	2.4	0.38	22.6	30	30	
Carson R Woodfords	1/31/95	4	8.5	91		65	2	3.1	34	1.1	0.03	0.01		0.12	0.05	0.01	0.02	0.2	5.7			1	1	0.01	8	2	4.1	1.3	0.33	23	40	30	

Carson River @ Woodfords (SW 01)

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total P	PO4-P	TKN	Org-N	NH3-	NO2-N	NO3-N	Total	SO4	Har	COD	BOD	O&	Boron	Ca	Mg	Na	K	SAR	%Na	Total Col	Fecal Col	Fecal Strep
Carson R Woodfords	3/1/95	3.8	7.8	83	12.1	59	2	2.4	28	1	0.02	0.01		0.18	0.02	0.01	0.01	0.22	5.6			1	2	0.01	7	1.8	5	1.2	0.43	29.1	30	30	
Carson R Woodfords	4/4/95	2.3	7.6	63	11.9	52	6	1.8	25	1.1	0.01	0.01		0.18	0.02	0.01	0.02	0.23	4.8			2	1	0.01	7.2	1.9	3.4	1.2	0.29	21.3	150	30	
Carson R Woodfords	5/2/95	2.5	7.5	40	11.1	41	54	0.7	18	4.1	0.14	0.01		0.32	0.02	0.01	0.05	0.4	5.3	16	10	2	1	0.01	5.4	1.7	2.2	0.93	0.21	18.1	40	40	30
Carson R Woodfords	6/5/95	5.2	7.3	38	10.2	36	31	0.5	18	4.85	0.06	0.01		0.22	0.02	0.01	0.02	0.27	4.6			1	1	0.01	4.1	1.2	1.8	0.68	0.2	19.6	30	30	
Carson R Woodfords	7/5/95	7	7.2	50	9.8	32	12	0.3	18	3.6	0.03	0.01		0.18	0.03	0.01	0.01	0.23	4.2			1	1	0.02	4.6	1.3	1.7	0.9	0.18	17	90	30	
Carson R Woodfords	8/1/95	10.3	7.5	44	8.9	41	6	0.4	22	1	0.02	0.01		0.12	0.08	0.01	0.02	0.23	4.1			1	1	0.01	5.1	1.4	1.8	0.73	0.18	16.8	70	30	
Carson R Woodfords	9/6/95	9	7.1	63	8.9	52	1	0.5	30	0.51	0.01	0.02		0.22	0.08	0.01	0.04	0.35	4			1	1		6.1	1.5	3.3	1.1	0.3	23.9	90	30	
Carson R Woodfords	10/3/95	10.2	7.2	67	9	60	13	0.7	32	1.6	0.01	0.01		0.02	0.02	0.01	0.04	0.09	2.3			1	1	0.12	6.7	1.8	3.3	1.3	0.29	21.7	230	30	
Carson R Woodfords	11/1/95	6.4	7.6	75	9.6	38		0.7	35	0.35	0.01	0.01		0.02	0.05	0.01	0.01	0.09	2.6	26	5	1	1	0.02	7.5	2.1	3.7	1.5	0.3	21.5	30	30	40
Carson R Woodfords	12/19/95	2.5	7.1	76	10	56	1	1.3	33	0.44	0.03	0.01		0.14	0.06	0.01	0.04	0.25	3.2			2	1	0.01	7.6	2	3.7	1.5	0.3	21.6	40	30	
Carson R Woodfords	1/2/96	2.9	7.4	67	12.2	52	2	1.6	28	0.68	0.01	0.01		0.16	0.05	0.01	0.03	0.25	2.7			1	1	0.01	7.2	1.8	3.9	1.4	0.33	23.8	30	30	
Carson R Woodfords	2/6/96	1.9	7.5	46	11.1	46	12	1.6	20	2.3	0.04	0.01		0.29	0.04	0.01	0.06	0.4	3			2	1	0.01	5.3	1.4	2.2	1.2	0.21	18.9	930	30	
Carson R Woodfords	3/6/96	2.2	7.6	67	10.8	57	2	1.8	30	0.67	0.02	0.01		0.21	0.02	0.01	0.03	0.27	2.3			1	2	0.01	6.6	1.9	3.4	1.2	0.29	22.2	90	30	
Carson R Woodfords	4/2/96	3.2	7.6	57	10.8	43	3	1.6	27	1.1	0.01	0.01		0.1	0.02	0.01	0.01	0.14	2.3			1	1	0.02	6.7	1.6	3	0.9	0.27	21	30	30	
Carson R Woodfords	5/1/96	5.1	7.4	41	10.4	31	18	0.5	21	3.9	0.03	0.01		0.2	0.02	0.01	0.01	0.24	2.7	17	10	1	1	0.01	5.5	1.4	2.3	0.82	0.22	19.6	40	30	30
Carson R Woodfords	6/4/96	7.7	7.6	40	10.8	32	13	0.5	20	1.9	0.04	0.01		0.36	0.02	0.01	0.01	0.4	2.3			1	1	0.01	4.7	1.3	1.9	0.73	0.19	18.6	150	40	
Carson R Woodfords	7/9/96	17.5	7.6	50	9.4	84	3	0.5	23	0.67	0.01	0.01		0.12	0.02	0.01	0.01	0.16	2.1			1	1	0.01	5.2	1.3	2	0.82	0.2	18.3	90	40	
Carson R Woodfords	8/6/96	11.3	6.9	65	8.55	56	1	0.5	31	0.42	0.04	0.01		0.23	0.02	0.01	0.1	0.36	1.9			1	1	0.01	7.4	1.8	3.5	1.4	0.29	21.6	90	30	
Carson R Woodfords	9/11/96	10.6	7.5	72	8.75	57	1	0.6	34	0.36	0.02	0.01		0.16	0.02	0.01	0.03	0.22	2			1	1	0.02	6.4	1.8	3.8	1.5	0.34	24.6	90	30	
Carson R Woodfords	10/1/96	9.3	7.8	77	9.1	62	1	1.1	35	0.32	0.02	0.01		0.17	0.02	0.01	0.02	0.22	1.9			1	1	0.02	7.4	2	4	1.6	0.33	23.2	40	30	
Carson R Woodfords	11/12/96	4.7	7.4	73	12.2	46	1	0.7	34	0.53	0.01	0.01		0.09	0.02	0.01	0.06	0.18	2.3	27	2	1	1	0.02	7.2	1.9	3.9	1.5	0.33	23.4	90	40	40
Carson R Woodfords	12/3/96	1.3	7.3	73	12.6	68	1	1	34	0.49	0.02	0.01		0.2	0.02	0.01	0.1	0.33	2.7			1	1	0.02	7	2	3.4	1.3	0.29	21.2	30	30	
Carson R Woodfords	1/7/97	0.6	6.6	51	13	50	2	1.2	22	1.9	0.02	0.01		0.19	0.02	0.01	0.13	0.35	2.6			1	1	0.02	5.8	1.5	2.5	0.99	0.23	19.9	430	30	
Carson R Woodfords	2/4/97	2.8	7.2	63	14.6	48	1	1.6	28	0.62	0.02	0.01		0.08	0.04	0.01	0.08	0.21	3			1	1	0.01	6.5	1.6	2.9	0.91	0.26	20.8	30	30	
Carson R Woodfords	3/4/97	0.4	7.1	74	15	55	1	2.1	32	0.53	0.61	0.03		0.18	0.22	0.01	0.03	0.44	2.6			1	1	0.02	7.8	1.9	4.6	1.2	0.38	25.7	40	30	
Carson R Woodfords	4/8/97	4.6	7.6	53	17.2	51	2	0.8	25	0.77	0.01	0.01		0.12	0.02	0.01	0.1	0.25	3			1	1	0.01	5.7	1.5	2.5	0.88	0.24	20.1	30	30	
Carson R Woodfords	5/6/97	6	6.8	45	10.7	36	7	0.5	23	2.3	0.05	0.01		0.36	0.02	0.01	0.02	0.41	3.7	20	5	1	1	0.01	5	1.4	2	0.71	0.2	18.5	30	30	
Carson R Woodfords	6/3/97	9.3	7.3	43	9.2	38	5	0.5	21	1.8	0.02	0.01		0.23	0.02	0.01	0.01	0.27	3.5			1	1	0.02	4.9	1.4	2.7	1.3	0.27	23	30	30	230
Carson R Woodfords	7/1/97	7.8	7	56	8.2	43	2	0.5	26	0.6	0.02	0.01		0.06	0.05	0.01	0.05	0.17	3.3			1	1	0.02	6.1	1.8	2.7	0.99	0.24	19.7	90	30	
Carson R Woodfords	8/5/97	13.7	7.4	66	9.2	53	1	1	31	0.34	0.02	0.01		0.04	0.07	0.02	0.12	0.25	3.4			1	1	0.01	6.8	2.1	3.8	1.4	0.32	23.1	90	30	
Carson R Woodfords	9/2/97	13.1	7.8	70	7.3	46	1	1.1	35	0.38	0.03	0.01		0.05	0.05	0.01	0.02	0.13	1.9			1	1	0.01	7.5	2.1	4.4	1.7	0.36	24.4	40	30	
Carson R Woodfords	10/7/97	7.1	7.6	74	7.5	62	1	0.7	36	0.26	0.02	0.01		0.11	0.02	0.01	0.28	0.42	2.1			1	1	0.01	7.9	2.2	3.7	1.6	0.29	20.7	30	30	
Carson R Woodfords	11/5/97	5.4	7	76	7.3	52	1	0.6	34	0.2	0.02	0.01		0.1	0.02	0.01	0.24	0.37	2.2	29	5	1	40	0.01	7.5	2.2	3.9	1.4	0.32	22.3	30	30	30
Carson R Woodfords	12/2/97	1.1	7.4	75	9.8	57	0.94	1.01	34.1	0.24	0.01	0.01	0.1	0.1	0.05	0.01	0.03		2.4			1	1	0.01	8	2.2	3.9	1.4			30	30	
Carson R Woodfords	1/6/98	1	7.4	73.4	7.6	68	0.24	1.14	35.4	0.38	0.02	0.01	0.2		0.02	0.01	0.13		2.3			1.44	1	0.01	7	1.9	4.1	1.5			40	30	
Carson R Woodfords	2/9/98	2.6	7.2	74.6	9	55	0.89	2.12	33	0.51	0.02	0.01	0.1		0.02	0.01	0.02		2.3			0.79	1	0.01	7.6	2	3.8	1.33			90	30	
Carson R Woodfords	3/3/98	2.7	7.1	79	7.5	58	1.13	3.26	33.6	0.56	0.03	0.01	0.1		0.02	0.01	0.03		2.1			1.74	1	0.04	8.1	2.1	4.4	1.35			30	30	
Carson R Woodfords	4/1/98	1.1	6.8	64.3	10.1	51	2.56	2.05	27.8	1.4	0.04	0.01	0.3		0.02	0.01	0.05		2.4			1.31	1	0.03	6.3	1.8	3	1.17			30	30	
Carson R Woodfords	5/5/98	3	7.2	43.5	10.5	42	7.78	0.88	27.6	2.85	0.03	0.01	0.3		0.02	0.01	0.02		2.5	11	5	1.05		0.01	4.5	1.2	2.1	0.8			70	30	90
Carson R Woodfords	6/2/98	4.5	6.7	41.1	10	43	27.9	0.57	19.9	4.7	0.05	0.01	0.2		0.02	0.01	0.01		2.5			0.98	1	0.01	4.4	1.3	1.9	0.74			230	40	
Carson R Woodfords	7/14/98	8.9	6.7	41.2	10.6	34	5.07	0.5	20.8	1.6	0.02	0.01	0.1		0.02	0.01	0.01		2.3			0.96	1	0.01	4.3	1.3	1.8	0.82			30	30	

Data collected by South
Tahoe Public Utility District
and made available to
Regional Board Staff in
electronic format.

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total(	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Upper	7/8/80	15.5	7.9	95		93	19	1.8	56	3.5	0.03			0.27	0.07		0.09	0.43			13	1	1	0.06				1.4			1400	230	
Indian Cr Mid	7/8/80	17	7.6	250		187	9	40	69	5.5	0.11			0.45	0.03		0.13	0.61			14		1	0.12				2.4			2800	330	
Indian Cr Lower	7/14/80	19.5	7.9	160		88	18	15	64	6.1	0.19			0.87	0.07		0.04	0.98			35	1	1	0.16				0.46			24000	24000	
Indian Cr Upper	3/24/81	10.5	7.6			90	1	1.8	46	5.4	0.02			0.26	0.16		0.09	0.51			7	1									30	30	
Indian Cr Mid	3/24/81	5	7.4			61	4	3.6	34	2.6	0.04			0.16	0.08		0.07	0.31			6										40	30	
Indian Cr Lower	3/24/81	7	7.7			96	13	5.2	45	4.4	0.09			0.31	0.08		0.07	0.46			7										30	30	
Indian Cr Upper	6/16/81	9.5	7.2	138		109	6		58	8.8	0.05			0.25	0.13		0.12	0.5			9	1	1	0.02				1.35			430	70	30
Indian Cr Mid	6/16/81	11	7.4	305		205	7		84	9.2	0.2			0.43	0.14		0.12	0.69			10		1	0.07				1.86			2400	930	430
Indian Cr Lower	6/16/81	12	7.9	195		161	4		66	2.6	0.12			0.68	0.16		0.07	0.91			25	1	1	0.07				2.63			11000	4600	4600
Indian Cr Upper	7/14/81	21.5	7.2	187		129	3		60	5.3	0.1			0.44	0.03		0.32	0.79			11		1	0.01				2.53			11000	750	4600
Indian Cr Mid	7/14/81	17	7.5	600		364	3		87	4	0.08			0.42	0.07		1.79	2.28			8		1	0.09				5.18			230	90	90
Indian Cr Lower	7/14/81	25	8.8	435		282	4		89	2.8	0.13			0.56	0.03		0.18	0.77			16		1	0.03				5.18			4600	4600	430
Indian Cr Upper	8/11/81																																
Indian Cr Mid	8/11/81	18	7.6	620		386	3		92	4.2	0.04			0.49	0.01		1.42	1.92			11	1	1	0.2				6.95			750	750	430
Indian Cr Lower	8/11/81	20.5	8.4	450		354	4		112	2.3	0.13			0.76	0.01		0.09	0.86			26	1	4	0.15				8.9			4600	430	200
Indian Cr Mid	9/10/81	12	7.2	500		334	3		86	3.2	0.04			0.33	0.01		1.2	1.54			5	1	1	0.11				2.68			24000	24000	230
Indian Cr Lower	9/10/81	16.5	8.2	270		188	7		88	2.5	0.09			0.29	0.01		0.09	0.39			9	1	1	0.06				2.49			230	40	90
Indian Cr Mid	10/13/81	10.5	7.3	510		327	1		86	2.3	0.04			0.23	0.01		1.12	1.36			5	1	1	0.09				2.46			2400	90	30
Indian Cr Mid	11/10/81	4	7.5	93		87	2		37	1.7	0.02			0.15	0.03		0.05	0.23			4	1	1	0.01				1.53			430	30	40
Indian Cr Lower	11/10/81	4.5	7.6	108		74	3		42	2.2	0.03			0.19	0.03		0.05	0.27			4	1	1	0.01				1.61			150	70	30
Indian Cr Mid	12/1/81	0.5	7.6	102		72	1		35	2.4	0.03			0.2	0.01		0.09	0.3			9	1	3	0.03				1.38			40	30	30
Indian Cr Lower	12/1/81	1.5	7.6	104		66	3		39	2	0.03			0.17	0.01		0.09	0.27			8	2	2	0.02				1.36			230	90	40
Indian Cr Mid	3/17/82	2	7.2	130		136	6		42	6.4	0.03			0.28	0.04		0.28	0.6			10	1	2	0.05				1.4			70	30	30
Indian Cr Lower	3/17/82	2.5	7.3	150		113	4		47	5	0.02			0.25	0.04		0.29	0.58			8	1	1	0.04				1.54			430	30	30
Indian Cr Mid	4/7/82	4.5	7.2	122		77	8		40	7	0.09			0.26	0.01		0.13	0.4			9	1	1	0.05				1.2			30	30	30
Indian Cr Lower	4/7/82	6	7.3	157		104	10		49	5.9	0.06			0.3	0.01		0.17	0.48			9	1	1	0.06				1.47			90	90	30
Indian Cr Mid	5/24/82	16.5	7.5	132		87	10		55	5.1	0.11			0.49	0.04		0.17	0.7			19	1	1	0.04				1.59			150	70	230
Indian Cr Lower	5/24/82	15.5	7.6	115		99	7		49	2.9	0.07			0.43	0.03		0.14	0.6			17	1	1	0.04				1.11			150	70	70
Indian Cr Mid	6/23/82	16.2	7.5	176		129	4		62	3.6	0.09			0.32	0.02		0.19	0.53			15	1	1	0.04				2.12			930	90	90
Indian Cr Lower	6/23/82	15.1	7.6	160		120	8		59	3.6	0.08			0.34	0.03		0.1	0.47			14	1	1	0.04				1.75			2100	430	230
Indian Cr Mid	7/15/82		7.7	395		261	6		83	3.5	0.17			0.56	0.02		0.11	0.69			15	1	1	0.15				5.21			750	430	230
Indian Cr Lower	7/15/82		7.6	272		192	6		70	3.3	0.13			0.53	0.02		0.28	0.83			17	2	1	0.12				3.84			4600	930	430
Indian Cr Mid	8/9/82		7.6	495		304	7		96	5.7	0.25			0.88	0.02		0.12	1.02			23	1	1	0.19				6.25			930	230	90
Indian Cr Lower	8/9/82		7.5	365		208	19		84	5.8	0.13			0.53	0.01		0.27	0.81			18	1	1	0.13				4.46			4600	750	150
Indian Cr Mid	9/13/82	11.6	7.2	295		187	10		74	4.1	0.13			0.53	0.01		0.2	0.74			21	3	1	0.08				4.64			11000	4600	24000
Indian Cr Lower	9/13/82	11.6	7.6	207		140	20		63	3.1	0.06			0.29	0.01		0.17	0.47			12	1	1	0.05				2.46			2100	230	2400
Indian Cr Mid	12/20/82		7.5	120		83	2		50	5.8	0.06			0.15	0.04		0.07	0.26			12	1	1								1500	40	30
Indian Cr Lower	12/20/82		7.6	133		93	20		53	6.1	0.2			0.35	0.05		0.07	0.47			12	1	1								1500	40	30
Indian Cr Mid	3/9/83	7.6	9.2	290				41			0.22				0.06			0.06			18												
Indian Cr Mid	3/14/83	6.8	8.7	170				17			0.15				0.07			0.07			15												
Indian Cr Lower	3/14/83	6.3	8.3	165				21			0.14				0.06			0.06			15												
Indian Cr Mid	3/23/83	3.7	9.4	312		180	12	41	66	5.8	0.19			0.87	0.09		1.47	2.43			22	3	1	0.12				4.2			30	30	30
Indian Cr Lower	3/23/83	4.1	9.1	280		172	14	37	62	5.9	0.16			0.74	0.11		1.39	2.24			18	3	1	0.11				3.7			40	30	30
Indian Cr Mid	3/28/83	6.4		270				33			0.14				0.01			0.01			19												
Indian Cr Lower	3/28/83	6.8		230				29			0.12				0.01			0.01			17												
Indian Cr Upper	4/4/83	6.3	7.55	57				1.1	30		0.03				0.11			0.11			6												
Indian Cr Mid	4/4/83	5.4	9.33	250				31	58		0.12				0.2			0.2			13												
Indian Cr Upper	4/11/83	9.1	7.59	50				0.8			0.02				0.07			0.07			6												
Indian Cr Mid	4/11/83	6.9	8.03	108				6			0.05				0.06			0.06			8												
Indian Cr Upper	6/8/83	11.6	7.6	49		41	5	0.1	27	2.2	0.02			0.22	0.01		0.01	0.24		19	8	1	1	0.02				1.12			430	30	30
Indian Cr Mid	6/8/83	12.4	7.62	90		79	4	3.8	42	3.2	0.05			0.25	0.08		0.02	0.35		36	11	1	1	0.03				1.24			230	230	90

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Lower	6/8/83	13.3	7.66	96		81	9	1.4	43	4	0.06			0.39	0.03		0.02	0.44		38	12	1	1	0.04				1.25			2400	430	
Indian Cr Lower	6/13/83																														90	30	40
Indian Cr Upper	9/12/83	15.5	7.63	121	7	99	1	0.5	64	1.2	0.03			0.24	0.02	0.01	0.02	0.29	10	51	11	1	1	0.02				2.02			150	40	40
Indian Cr Mid	9/12/83	15.3	7.51	400	6.6	239	10	52	99	7.7	0.15			0.28	0.04	0.01	0.3	0.63	14.7	128	14	2	1	0.11				4.5			430	150	40
Indian Cr Lower	9/12/83	13.9	7.57	157	7.6	115	8	11	50	3.4	0.08			0.38	0.04	0.01	0.04	0.47	10	81	5	1	1	0.06				2.46			4600	930	390
Indian Cr Upper	12/12/83	0.8	7.44	71	10.7	76	3	1.1	37	12	0.02			0.14	0.06	0.01	0.01	0.22	10	28	9	1	1	0.09				1.08			430	150	30
Indian Cr Mid	12/12/83	0.7	7.56	100	10.7	83	3	3.4	45	12	0.02			0.16	0.05	0.01	0.02	0.24	10	37	8	1	1	0.07				1.29			430	230	40
Indian Cr Lower	12/12/83	1.6	7.58	112	10.4	79	7	5.6	49	9.1	0.04			0.14	0.06	0.01	0.04	0.25	10	42	8	1	1	0.05				1.41			230	90	40
Indian Cr Upper	3/7/84	3.8	7.59	76	9.8	67	6	0.8	40	3.9	0.04			0.14	0.04	0.01	0.01	0.2	10	30	6	2	1	0.01	8.15	2.04	4.6	1.45	0.37	24.6	30	30	40
Indian Cr Lower	3/7/84	5.9	7.85	150	11.8	57	4	9.2	58	4.6	0.07			0.16	0.03	0.01	0.09	0.29	10	58	6	2	1	0.01	14.4	3.88	9.6	1.97	0.57	27.7	30	30	40
Indian Cr Upper	4/11/84	11.5	7.9	79	7.4	77	13	0.5	43	2.5	0.03			0.29	0.05	0.01	0.01	0.36	10	30	9	1	1	0.03	8.2	2.07	4.6	1.61	0.37	24.3	40	30	390
Indian Cr Lower	4/11/84	11.5	7.82	85	8.4	56	42	2.8	42	5.4	0.09			0.31	0.05	0.01	0.02	0.39	10	34	11	1	1	0.01	8.6	2.44	4.8	1.5	0.37	23.8	30	30	230
Indian Cr Upper	5/7/84	7.3	7.85	80	8.6	54	6	0.5	42	1.7	0.03			1.33	0.01	0.01	0.01	1.36	10	30	10	1	1	0.01	7.8	1.91	4.5	1.35	0.37	25.2	30	30	150
Indian Cr Mid	5/7/84	10.1	7.56	163	8	111	6	11	62	4.7	0.13			0.32	0.1	0.01	0.16	0.59	10	56	14	1	1	0.02	13.5	3.96	11	1.98	0.68	31.7	930	110	230
Indian Cr Lower	5/7/84	9	7.66	140	8.55	94	3	7.8	58	2.3	0.08			0.2	0.05	0.01	0.04	0.3	10	53	10	1	1	0.02	12.5	4.03	8.5	1.8	0.53	26.9	30	30	230
Indian Cr Upper	6/5/84	16.4	7.34	65	7.25	59	5	1.8	30	2.1	0.04			0.26	0.1	0.01	0.01	0.38	10	24	12	1	1	0.03	6	1.65	3.4	1.17	0.31	24.1	11000	90	90
Indian Cr Lower	6/5/84	15.6	7.27	115	6.7	71	37	2.5	46	5.6	0.09			0.46	0.1	0.01	0.01	0.58	10	42	19	1	1	0.05	10.3	2.88	5.3	1.73	0.37	22.4	4600	430	430
Indian Cr Lower	7/10/84	15	7.4	210	7.5	142	3	15	77	4.1	0.11			0.34	0.12	0.01	0.09	0.56	10	76	9	1	1	0.07	19.9	4.88	12	2.26	0.61	26.1	930	230	210
Indian Cr Lower	8/6/84	18.9	7.83	293		193	9	36	78	5.4	0.12			0.31	0.16	0.01	0.23	0.71	10.8	89	9	1	1	0.09	24.3	6.1	22	3.15	1.03	34.7	930	430	930
Indian Cr Lower	9/4/84	14.2	7.57	300	7.7	170	28	36	77	3.1	0.1			0.28	0.08	0.01	0.21	0.58	10.2	92	8	1	1	0.06	25	6.45	21	3.17	0.96	32.9	11000	930	1500
Indian Cr Lower	10/3/84	9	7.29	275	8	181	2	30	81	2.1	0.06			0.34	0.13	0.01	0.08	0.56	10	89	11	1	1	0.07	22.4	6.6	20	3.72	0.92	32.5	930	110	230
Indian Cr Upper	11/5/84	3	7.89	78	10	62	2	0.5	44	1.6	0.02			0.18	0.07	0.01	0.01	0.27	10	32	9	2	1	0.03	8.7	2.09	5.3	1.83	0.41	26.1	4600	430	230
Indian Cr Mid	11/5/84	4.8	7.37	145	9.3	107	2	13	57	3.7	0.08			0.26	0.13	0.01	0.01	0.41	10	50	11	2	1	0.01	13.5	3.64	12	2.63	0.71	32.4	930	230	150
Indian Cr Lower	11/5/84	4.9	7.57	155	10	95	1	9.4	60	2.5	0.05			0.24	0.09	0.01	0.01	0.35	10	53	4	1	1	0.05	13.6	4.1	9.5	2.2	0.57	27.8	930	930	90
Indian Cr Lower	12/4/84	3.2	7.58	150	10.4	101	1	8.7	61	3.5	0.05			0.12	0.07	0.01	0.08	0.28	10	51	5	1	1	0.05	13.9	4.04	9.7	1.83	0.58	28.2	90	90	30
Indian Cr Lower	1/14/85		7.75	147	10.7	93	17	5.7	62	2.4	0.08			0.26	0.03	0.01	0.1	0.4	10	55	13	3	1	0.02	13.9	4.14	8.3	1.55	0.5	25.1	30	30	40
Indian Cr Lower	2/4/85		7.7	140	10.8	98	21	5.8	61	4.4	0.05			0.2	0.06	0.01	0.11	0.38	10	53	4	2	1	0.26	13.7	4	8.4	1.74	0.51	25.6	430	30	30
Indian Cr Lower	3/12/85	4.6	7.32	103	11.2	66	5	5.6	46	3.2	0.03			0.18	0.02	0.01	0.05	0.26	10	24	5	1	1	0.28	10.7	2.95	5.4	1.66	0.37	22.3		30	30
Indian Cr Lower	4/2/85	4.8	7.51	90	11.6	62	25	4.1	38	15	0.09			0.33	0.05	0.01	0.08	0.47	10	31	9	1	1	0.4	8.7	2.23	3.2	1.71	0.25	17.4	230	30	30
Indian Cr Mid	5/7/85	13.5	7.46	110	7.6	100	9	7	42	6.9	0.22			0.72	0.09	0.01	0.03	0.85	10	35	28	3	1	0.06	9.65	2.42	6.9	4.26	0.51	27.5	24000	24000	230
Indian Cr Lower	5/7/85	11.1	7.55	98	7.6	91	16	6.1	43	5.3	0.13			0.47	0.07	0.01	0.01	0.56	10	36	18	1	1	0.01	9.25	2.69	5.6	1.97	0.41	24.7	11000	430	90
Indian Cr Lower	6/4/85	12.1	7.18	155	5.7	106	2	6.8	58	2	0.05			0.27	0.06	0.01	1.6	1.94	10	56	12	1	1	0.1	15.2	4.25	8.1	1.7	0.47	23.4	4600	430	30
Indian Cr Lower	6/17/85	23.5	7.65	145				5.2	67	3	0.12					0.01	0.01	0.02															
Indian Cr Lower	6/24/85	18.8	7.82	195	7.55			13	82	3	0.08					0.01	0.04	0.05															
Indian Cr Lower	7/1/85	13	7.48	225	3.8	141	5	18	77	3.5	0.1			0.46	0.06	0.01	0.01	0.54	10	63	14	2	1	0.01	18.8	5.4	12	3.04	0.64	26.9	3817	2700	430
Indian Cr Lower	7/22/85	20.4	7.51	370	6.6			48	87		0.15																						
Indian Cr Lower	8/5/85	15.8	7.59	482	6.18	280	7	49	91	5.6	0.14			0.45	0.02	0.01	0.34	0.82	28.1	109	14	1	1	2.4	31.2	7.8	47	6.15	1.94	46.4	4600	930	430
Indian Cr Lower	8/19/85	18.6	7.64	400	7.7			51	89		0.08																						
Indian Cr Lower	9/3/85	12	7.86	450	7.85	265	2	61	91	2.5	0.06			0.32	0.04	0.01	0.08	0.45	24.2	105	10	1	1	0.23	32.5	6.7	45	5	1.87	45.9	2400	930	90
Indian Cr Lower	10/1/85	7.8	7.54	250	8.45	159	1	24	75	2	0.05			0.16	0.03	0.01	0.12	0.32	10	76	6	1	1	0.22	21.7	6.3	18	2.57	0.88	32.3	230	40	30
Indian Cr Mid	11/4/85	7.3	7.39	140	7.9	120	1	9.7	49	1.9	0.05			0.07	0.02	0.01	0.01	0.11	10	45	3	1	1	0.01	12.2	3.4	9.3	1.8	0.6	30.1	430	430	40
Indian Cr Lower	11/4/85	7.6	7.55	130	8.45	101	1	9.1	54	1.6	0.04			0.09	0.03	0.01	0.02	0.15	10	45	4	1	1	0.01	12	3.62	7.6	1.62	0.48	25.9	930	150	40
Indian Cr Lower	12/3/85	3.3	7.55	117	9	60	7	6.6	44	8.6	0.08			0.29	0.09	0.01	0.2	0.59	10	38	15	1	1	0.01	9.3	3.1	7.2	2.47	0.52	28.6	430	150	90
Indian Cr Lower	1/7/86	1.8	8.01	91	12.4	54	2	3.3	40	2.9	0.04			0.15	0.02	0.01	0.03	0.21	10	33	6	1	1	0.01	9.2	2.56	5.1	1.39	0.38	23.9	30	30	30
Indian Cr Lower	2/3/86	2.4	7.56	84	10	90	4	2.8	38	2.3	0.04			0.12	0.06	0.01	0.01	0.2	10	31	1	1	1	0.01	8.1	2.31	4.6	1.37	0.36	24.1	40	30	30
Indian Cr Lower	3/3/86	8.2	7.77	175	12.4	131	17	17	40	12	0.11			0.66	0.22	0.02	0.55	1.45	12.3	38	19	3	1	0.04	11	2.6	19	3	1.33	49.6	70	30	40
Indian Cr Lower	3/12/86	5.8	7.91	185	9.1	150	25	20	39		0.12			0.74	0.23	0.02	1.22	2.21			20	3											
Indian Cr Lower	3/18/86	6.5	7.95	190	10	118		20	39	14	0.1			0.79	0.3	0.03	0.91	2.03			19												
Indian Cr Lower	3/25/86	10.5	8.31	210	8.75	137	13	24	39	11	0.1			0.93	0.25	0.04	1.12	2.34			20	3											
Indian Cr Lower	4/8/86	10.7	8.52	125	7.65	80	3	19	46	4.3	0.06			0.17	0.02	0.01	0.09	0.29	10	41	11	2	1	0.01	10.5	10	3.2	1.92	0.16	9.1	40	30	30
Indian Cr Mid	5/6/86	9.8	8.08	270	8.4	169	1	27	74	8.2	0.12			0.13	0.02	0.01	0.22	0.38	13.2	81	8		1	0.06	22	6.39	23	2.43	1.1	37.1	150	40	70

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Lower	5/6/86	9.3	8.18	145	9.5	102	3	9.1	51	2.6	0.05			0.17	0.02	0.01	0.08	0.28	10	48	7		1	0.01	2.4	3.94	9.7	1.32	0.89	46.9	70	40	40
Indian Cr Lower	6/3/86	21.2	7.47	108	7.9	191	9	3.9	51	4.8	0.1			0.38	0.09	0.01	0.03	0.51	10	45	19	1	1	0.03	12	3.2	6	1.76	0.39	22.3	430	230	430
Indian Cr Lower	7/8/86	16.4	7.54	125	6.3	99	2	4.4	60	2.9	0.08			0.29	0.09	0.01	0.01	0.4	10	51	14	1	1	0.01	12	3.4	8.8	1.54	0.57	29.4	930	230	4600
Indian Cr Lower	8/4/86	18.3	7.61	160	6.55	115	2	8.1	70	3.8	0.07			0.23	0.08	0.01	0.01	0.33	10	61	10		1	0.01	16	4.5	8.8	1.6	0.5	24	390	90	750
Indian Cr Lower	9/10/86	13.9	7.74	205	6.7	154	2	17	67	3	0.06			0.18	0.05	0.01	0.11	0.35	10	61	7	1	1	0.04	15	0.44	15	2	1.04	43.8	430	230	430
Indian Cr Lower	10/7/86	8.4	7.69	118	9	81	2	6.4	44	1.4	0.04			0.12	0.03	0.01	0.03	0.19	7.72	38	7	1	1	0.03	10	2.7	7.4	1.7	0.53	29.6	430	90	230
Indian Cr Mid	11/11/86	1.2	7.45	81	10	60	2	1.7	39	1.2	0.01			0.02	0.02	0.01	0.01	0.06	7.69	28	4	1	1	0.02	7.6	2.2	4.7	1.5	0.38	25.4	40	40	40
Indian Cr Lower	11/11/86	1.8	7.44	85	9.5	73	3	1.6	42	1.6	0.02			0.02	0.02	0.01	0.01	0.06	7.54	32	4	1	1	0.01	8.1	2.5	5	1.5	0.39	25.1	150	90	90
Indian Cr Lower	12/9/86	0.6	7.32	95	6.6	60	2	2	45	1.4	0.02			0.11	0.02	0.01	0.01	0.15	3.95	34	2	1	1	0.01	9	2.6	4.7	1.7	0.35	22.4	750	230	90
Indian Cr Lower	1/6/87	0.5	7.26	108	11.6	77	2	2.8	52	1.3	0.04			0.08	0.06	0.01	0.02	0.17	8	39	6	1	1	0.04	10	3.2	5.4	2	0.38	22.4	90	30	150
Indian Cr Lower	2/10/87	3.7	6.34	96	10.2	74	4	2.1	48	1.7	0.04			0.12	0.04	0.01	0.01	0.18	7	34	5	1	1	0.03	8.7	2.9	5.2	1.6	0.38	24	40	40	30
Indian Cr Lower	3/10/87	6.3	7.1	97	10	82	2	2.6	46	1.7	0.04			0.14	0.04	0.01	0.01	0.2	7	37	7	1	1	0.01	10	2.8	5.2	1.7	0.37	22.6	90	30	30
Indian Cr Lower	4/7/87	7.6	6.71	103	8.55	80	6	3.7	47	2.2	0.07			0.39	0.09	0.01	0.01	0.5	8.02	50	16	1	1	0.01	11	3.1	5.7	3.3	0.39	21.8	750	430	280
Indian Cr Mid	5/5/87	12.3	6.94	196	7.6	134	3	11	83	2.6	0.08			0.2	0.03	0.01	0.06	0.3	8.99	67	4	1	1	0.04	18	5.2	16	2	0.85	33.5	90	40	110
Indian Cr Lower	5/5/87	11	7.41	114	7.8	80	4	2.4	56	1.4	0.06			0.34	0.02	0.01	0.01	0.38	6.02	45	11	1	1	0.01	12	3.4	6	1.8	0.39	22	930	90	30
Indian Cr Lower	6/2/87	12.4	6.7	157	7.2	116	2	12	67	1.4	0.05			0.26	0.03	0.01	0.02	0.32	13.4	55	7	1	1	0.03	16	4.4	12	1.9	0.68	30.1	230	230	230
Indian Cr Lower	7/8/87	13.4	7.18	320	6.9	187	14	38	79	5.7	0.08			0.31	0.04	0.01	0.12	0.48	24.5	83	6		1	0.04	10.4	6.6	26	2.6	1.55	50	430	430	110
Indian Cr Lower	8/4/87	15.6	7.29	425	5.75	249	2	55	82	2.8	0.06			0.26	0.03	0.01	0.22	0.52	36	97	12	1	1	0.05	27	8.3	39	3.5	1.68	44.4	430	30	430
Indian Cr Lower	9/1/87	16.8	7.49	420	6.8	257	2	57	79	2.6	0.05			0.26	0.04	0.01	0.18	0.49	37.4	102	5	1	1	0.06	26	7.8	43	3.7	1.89	47.9	11000	430	90
Indian Cr Mid	9/30/87			680			2			2.4																							
Indian Cr Mid	10/5/87			210			2			2.1																							
Indian Cr Lower	10/6/87	9.2	6.79	230	10.8	145	4	19	72	5.2	0.07			0.35	0.02	0.01	0.11	0.49	11.4		9	1	1	0.01	18	5.4	17	3.3	0.9	34.1	24000	930	430
Indian Cr Mid	10/21/87			105			2			1.7																							
Indian Cr Lower	10/21/87			115			3			2.3																							
Indian Cr Mid	10/26/87	8.6	8.04	100			2			1.5																							
Indian Cr Lower	10/26/87	9.9	7.63	111			3			2.1																							
Indian Cr Mid	11/4/87	5.4	7.3	94	10.4	76	7	3.2	40	4.3	0.05			0.12	0.02	0.01	0.01	0.16	4.95		5	1	1	0.07	9.2	2.3	5.9	1.8	0.45	26.9	90	90	70
Indian Cr Lower	11/4/87	6.2	7.49	108	7.25	88	6	4.4	45	3.6	0.05			0.19	0.02	0.01	0.02	0.24	5.25		5	1	1	0.06	10	2.8	6.5	2.1	0.46	26.5	70	70	90
Indian Cr Mid	11/10/87	5.2	6.54	90			11			10																							
Indian Cr Lower	11/10/87	6.2	6.78	98			12			13																							
Indian Cr Mid	11/18/87		7.01	88			20			18																							
Indian Cr Lower	11/18/87		7.15	90			20			18																							
Indian Cr Mid	11/24/87	8.2	7.66	352			2			3.5																							
Indian Cr Lower	11/24/87	6.1	8.02	98			6			2.7																			0.46	1			
Indian Cr Upper	12/2/87	5.9	7.33	102			1			1.1																							
Indian Cr Mid	12/2/87	8.2	6.51	407			1			2.5																							
Indian Cr Lower	12/2/87	5.2	6.94	100			4			2																							
Indian Cr Upper	12/10/87	5.2	7.55	80	9.1	70	1	1.1	48	2.2	0.02			0.17	0.02	0.01	0.02	0.22	3.4		6	1	1	0.01	9.8	2.5	7.1	1.5	0.52	29.6	40	30	30
Indian Cr Mid	12/10/87	8.8	7.29	400	8.15	237	1	48	91	2.2	0.04			0.19	0.02	0.01	0.31	0.53	27.5		5	1	1	0.07	33	11	33	2.2	1.26	35.5	200	30	40
Indian Cr Lower	12/10/87	5.2	7.3	160	9.5	88	2	6.1	56	2.1	0.04			0.2	0.02	0.01	0.04	0.27	5.39		5	1	1	0.02	13	4.3	8.8	2	0.54	26.6	930	30	30
Indian Cr Upper	12/14/87	0.4	7.2	99			1			1.5																							
Indian Cr Mid	12/14/87	5.4	7.13	415			1			1.8																							
Indian Cr Lower	12/14/87	1.1	7.66	125			2			1.6																							
Indian Cr Upper	12/23/87	2.3	7.15	96			1			2.6																							
Indian Cr Mid	12/23/87	5.6	7.25	432			2			3																							
Indian Cr Lower	12/23/87	2.5	7.31	182			2			2.4																							
Indian Cr Upper	12/30/87	1.4	7.02	82			1			2.7																							
Indian Cr Mid	12/30/87	4.2	7.14	404			6			3.6																							
Indian Cr Lower	12/30/87	1.1	7.03	145			1			2																							
Indian Cr Upper	1/5/88	1.9	6.62	82	9	50	1	1.4	38	2.9	0.02			0.17	0.02	0.01	0.01	0.21	4		5	1	1	0.01	8	2	5.8	1.2	0.47	29.8	90	30	30
Indian Cr Mid	1/5/88	6.8	6.97	390	10.3	234	1	47	93	2	0.05			0.12	0.02	0.01	0.01	0.16	27.6		5	1	1	0.57	33	11	29	1.8	1.11	32.6	30	30	40

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Lower	1/5/88	2.4	7.56	164	6.6	88	2	6.5	17	3.8	0.06			0.29	0.04	0.01	0.02	0.36	6.69		5	1	1	0.02	17	5.7	7.8	2.4	0.41	19.7	430	430	90
Indian Cr Upper	1/19/88	1.1	7.22	82			1			2.9																							
Indian Cr Mid	1/19/88	2.8	7.57	284			10			41																							
Indain Cr Lower	1/19/88	0.8	7.52	140			6			7.7																							
Indian Cr Upper	1/27/88	1.8	6.98	80			1			3																							
Indian Cr Mid	1/27/88	2.8	6.78	232			10			29																							
Indian Cr Lower	1/27/88	2.3	6.93	134			3			6.9																							
Indian Cr Upper	2/5/88	1.5	7.14	86			1			2.7																							
Indian Cr Mid	2/5/88	3.5	6.86	281			8			27																							
Indian Cr Lower	2/5/88	0.4	6.96	142			3			5.1																							
Indian Cr Upper	2/9/88	9.5	7.45	83	12.6	71	1	1.1	41	2.4	0.02			0.11	0.02	0.01	0.01	0.15	3.87		21	1	1		7.5	2	6.3	1.1	0.52	32.5	30	30	30
Indian Cr Mid	2/9/88	4	6.81	230	12.2	206	32	21	66	115	0.21			0.44	0.02	0.01	0.12	0.59	33.6		19	1	1		18	5.9	20	5.8	1.04	36.2	40	30	40
Indian Cr Lower	2/9/88	1.7	7.27	106	12.7	83	35	4.5	45	16	0.16			0.4	0.02	0.01	0.03	0.46	6.29		18	2	1		9.2	3.3	6.2	2.4	0.44	25.4	11000	30	70
Indian Cr Upper	2/17/88	1.7	6.74	85			1			2.1																							
Indian Cr Mid	2/17/88	3.7	6.5	222			15			75																							
Indian Cr Lower	2/17/88	2.2	6.51	112			5			8.5																							
Indian Cr Upper	2/24/88	2.3	7.49	75			1			2.2																							
Indian Cr Mid	2/24/88	4.6	7.46	161			72			72																							
Indian Cr Lower	2/24/88	4	7.62	94			14			16																							
Indian Cr Upper	3/2/88	4.8	6.98	81			1			2.5																							
Indian Cr Mid	3/2/88	5.8	6.91	132			72			95																							
Indian Cr Lower	3/2/88	6.8	6.99	110			19			25																							
Indian Cr Upper	3/9/88	5.4	6.8	85	10.6	71	1	1.2	44	1.9	0.02			0.19	0.04	0.01	0.01	0.25	3.3		5	1	1	0.01	8.8	2.3	6.3	1.2	0.48	29.3	230	30	30
Indian Cr Mid	3/9/88	5.8	6.88	106	11	81	61	5	42	37	0.23			0.4	0.03	0.01	0.02	0.46	9.14		6	2	1	0.02	10	3	7.4	1.7	0.52	28.9	70	40	30
Indian Cr Lower	3/9/88	7.3	6.17	85	12.2	61	7	3	38	3.4	0.04			0.2	0.02	0.01	0.02	0.25	5.74		5	2	1	0.02	8.9	2.8	5.1	1.4	0.38	23.8	150	30	30
Indian Cr Upper	3/15/88	5.2	7.37	75	11.7		1			0.19																							
Indian Cr Mid	3/15/88	5.3	7.63	86	11.9		40			13																							
Indian Cr Lower	3/15/88	7.3	7.76	85	12.6		6			5.9																							
Indian Cr Upper	3/23/88	9.2	7.23	90			1			2.2																							
Indian Cr Mid	3/23/88	11.8	7.25	307			3			5.4																							
Indian Cr Lower	3/23/88	14	7.47	87			11			4.1																							
Indian Cr Upper	3/30/88	8	6.88	91			2			1.9																							
Indian Cr Mid	3/30/88	9.6	7.29	222			4			14																							
Indian Cr Lower	3/30/88	11.8	7.58	80			13			5.4																							
Indian Cr Upper	4/5/88	8	6.6	95	9.3	80	1	0.9	48	1.9	0.01			0.17	0.03	0.01	0.02	0.23	3.19		5	1	1	0.01	9.6	2.6	6.9	1.6	0.5	29	30	30	30
Indian Cr Mid	4/5/88	12.1	7.04	208	9.6	149	6	17	63	5.1	0.07			0.15	0.1	0.01	0.08	0.34	13.9		5	1	1	0.03	18	6.2	16	1.6	0.82	32.4	30	30	40
Indian Cr Lower	4/5/88	12.2	7.75	108	10.8	92	5	3.8	46	3.1	0.05			0.35	0.08	0.01	0.01	0.45	6.5		10	1	1	0.01	11	3.5	6.3	2	0.42	23.5	70	70	40
Indian Cr Upper	4/12/88	10.4	6.64	101			2			1.3																							
Indian Cr Mid	4/12/88	11.7	7.13	310			2			3.2																							
Indian Cr Lower	4/12/88	9.5	7.11	121			47			4.8																							
Indian Cr Upper	4/18/88	8.8	7.27	101			1			1.4																							
Indian Cr Mid	4/18/88	9.7	7.8	315			2			2.2																							
Indian Cr Lower	4/18/88	7.7	7.66	103			19			6.7																							
Indian Cr Upper	4/26/88	6.2	6.78	103			1			1.4																							
Indian Cr Mid	4/26/88	7.2	6.46	320			2			2.1																							
Indian Cr Lower	4/26/88	6	6.99	130			2			1.6																							
Indian Cr Upper	5/4/88	8.4	6.69	101	6	81	1	0.9	54	1.2	0.02			0.11	0.02	0.01	0.01	0.15	2.83		5	1		0.01	11	2.9	7.1	1.4	0.49	27.2	30	30	30
Indian Cr Mid	5/4/88	12	6.86	179	10	136	1	11	52	2.4	0.1			0.47	0.07	0.01	0.01	0.56	18.7		14	1	1	0.03	14	4.8	13	3.6	0.76	32.3	150	30	90
Indian Cr Lower	5/4/88	12	7.21	118	5.5	86	5	2.8	50	2.8	0.06			0.36	0.09	0.01	0.01	0.47	5.06		6	1	1	0.02	12	3.8	6.1	1.7	0.39	21.7	230	90	90
Indian Cr Mid	6/8/88	10.6	7.41	263	9.65	184	2	24	89	1.5	0.07			0.25	0.02	0.01	0.04	0.32	14.9		5	1	1	0.01	24	8.2	24	1.8	1.07	35.2	430	230	230
Indian Cr Lower	6/8/88	8.7	8.14	126	11.6	94	1	3.8	56	0.65	0.04			0.17	0.02	0.01	0.01	0.21	5.63		5	1	1	0.01	14	4.4	7.6	1.1	0.45	23.3	90	90	40

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Mid	7/6/88	18.4	7.31	303		206	3	23	114	7.3	0.15			0.45	0.23	0.01	0.04	0.73	9.88		5	1	1	0.05	24	7.8	24	2.2	1.08	35.5	11000	11000	24000
Indian Cr Lower	7/6/88	16.7	7.82	124		100	2	3.2	62	3.1	0.07			0.22	0.02	0.01	0.01	0.26	4.36		20	2	1	0.02	13	3.8	6.6	0.9	0.41	22.5	90	30	40
Indian Cr Mid	8/3/88	16	7.1	276	8.2	193	2	21	103	7.1	0.12			0.23	0.07	0.01	0.04	0.35	13.9		5	1	1	0.06	23	7.8	20	2.1	0.91	32	430	40	930
Indian Cr Lower	8/10/88	16	7.21	130	8.77	93	8	3.2	66	4.1	0.08			0.21	0.03	0.01	0.01	0.26	4.11		5	1	1	0.04	14	4.1	6.9	1.4	0.41	21.8	11000	30	930
Indian Cr Mid	9/14/88	11.7	7.15	385	5.18	214	4	25	129	7.8	0.11			0.26	0.11	0.01	0.01	0.39	11.9	110	9	2	1	0.05	28	9	27	2.8	1.13	34.7	2400	2400	93
Indian Cr Lower	9/14/88	11	7.48	145	6.3	101	9	4.1	68	7.4	0.09			0.28	0.06	0.01	0.01	0.36	4.85	54	7	2	1	0.03	14	4.3	7.6	2.1	0.45	23	1100	150	240
Indian Cr Mid	10/4/88	12.5	7.09	366	5.3	224	12	27	137	12.5	0.17			0.33	0.05	0.01	0.01	0.4	9.22		10	2	1	0.08	30	9.4	29	2.8	1.18	35	2100	1500	930
Indian Cr Lower	10/4/88	11.3	7.43	160	5.65	116	19	6.4	72	5	0.07			0.24	0.05	0.01	0.01	0.31	6.23		5	1	1	0.02	16	5.1	9.4	2.1	0.52	24.3	1500	930	40
Indian Cr Mid	11/2/88	7.6	7.49	98	9.4	75	1	1.8	42	1.1	0.04			0.14	0.05	0.01	0.01	0.21	6.61		5	1	1	0.01	9.5	2.6	5.9	1.7	0.43	25.9	930	430	40
Indian Cr Lower	11/2/88	7.9	7.9	103	9.36	76	3	2.2	45	1.8	0.04			0.17	0.05	0.01	0.01	0.24	6.2		5	1	1	0.01	10	2.9	6.3	1.8	0.45	25.9	2400	210	390
Indian Cr Upper	12/8/88	4.5	7.21	105	9.07	134	1	1.4	50	1.5	0.02			0.19	0.02	0.01	0.01	0.23	4.3		11		1	0.02	10	2.5	8.2	1	0.6	32.8	230	40	390
Indian Cr Mid	12/8/88	1.5	7.46	92	10.9	118	2	1.1	39	1.7	0.02			0.06	0.02	0.01	0.01	0.1	3.11		5		1	0.01	9.1	2.4	4.9	1.2	0.37	23.8	271	40	30
Indian Cr Lower	12/8/88	2.2	7.16	99	11.1	129	18	1.8	43	3.2	0.03			0.11	0.02	0.01	0.01	0.15	4.95		5		1	0.02	9.8	2.7	5.5	1.3	0.4	24.3	230	30	40
Indian Cr Upper	1/11/89	0.4	7.28	102	14.6	72	2	1.1	39	3.9	0.02			0.19	0.02	0.01	0.01	0.23	4.27		10	1	1	0.02	7.3	1.7	6.5	1.1	0.56	34.6	40	30	30
Indian Cr Mid	1/11/89	1	7.11	163	12.7	98	2	3.7	51	6.3	0.07			0.15	0.02	0.01	0.03	0.21	9.36		5	1	1	0.03	12	3.4	9.7	1.4	0.63	31.5	430	40	230
Indian Cr Lower	1/11/89	0.9	7.4	185	11.4	110	5	4.2	66	3.7	0.07			0.33	0.05	0.01	0.09	0.48	6.8		17	1	1	0.01	14	4.5	8.3	2.3	0.49	24.2	1500	40	90
Indian Cr Upper	2/15/89	0.6	7.58	85	13.9	68	1	1	39	2.8	0.02			0.14	0.02	0.01	0.01	0.18	3.65		5	2	1	0.01	7.3	1.8	6.9	0.99	0.59	35.8	30	30	30
Indian Cr Mid	2/15/89	1	7.33	137	11.9	91	13	3.5	52	8.1	0.07			0.13	0.02	0.01	0.02	0.18	7.46		5	2	1	0.01	11	3	9.7	1.2	0.66	33.8	30	30	30
Indian Cr Lower	2/15/89	2.1	7.57	166	11.6	100	1	4	65	4.1	0.09			0.17	0.02	0.01	0.07	0.27	5.44		5	2	1	0.01	15	4.5	8.3	1.6	0.48	23.7	30	30	30
Indian Cr Upper	3/1/89	3.5	7.45	86	10.1	72	1	2.4	38	3.1	0.02			0.21	0.02	0.01	0.09	0.33	4.22		16	1	1	0.02	7.8	2	7	1.4	0.57	34	150	30	40
Indian Cr Mid	3/1/89	2.8	7.05	94	11.9	58	7	4.1	30	5.9	0.04			0.19	0.02	0.01	0.15	0.37	5.93		10	1	1	0.04	8.1	2.2	4.9	1.4	0.39	25.5	430	30	90
Indian Cr Lower	3/1/89	3.5	7.06	93	7.53	63	12	4.1	35	5.1	0.09			0.28	0.02	0.01	0.1	0.41	5.82		12	1	1	0.03	8.8	2.4	4.7	1.5	0.36	23.2	430	30	930
Indian Cr Upper	4/11/89	10.7	7.09	103	8.5	57	1	1.1	44	2	0.02			0.2	0.02	0.01	0.01	0.24	3.79		5	1	1	0.02	8.2	2	6.3	1.4	0.51	31	30	30	30
Indian Cr Mid	4/11/89	13.9	7.28	109	9.35	58	2	4.4	42	4	0.07			0.2	0.04	0.01	0.01	0.26	6.15		5	1	1	0.02	9.4	2.7	6.9	1	0.5	29.5	30	30	30
Indian Cr Lower	4/11/89	17.9	7.25	102	7.7	100	228	3.4	46	112	0.43			0.94	0.18	0.01	0.07	1.2	3.38		20	2	1	0.01	11	3.4	5.9	2.4	0.39	22.4	430	40	150
Indian Cr Upper	5/10/89	11.3	7.6	91	7.65	87	1	1	50	2.1	0.01			0.23	0.02	0.01	0.01	0.27	3.84		16	1	1	0.01	9	2.3	7.2	1.4	0.55	31.7	90	40	210
Indian Cr Mid	5/10/89	13.9	7.52	178	6.3	151	3	8.4	92	6.4	0.12			0.25	0.02	0.01	0.01	0.29	8.33		8	1	1	0.01	19	5.8	17	1.6	0.87	33.5	430	430	150
Indian Cr Lower	5/10/89	13.2	7.54	107	7.2	103	19	2.2	59	6.7	0.13			0.73	0.1	0.01	0.02	0.86	5.77		30	1	1	0.01	13	4	6.2	1.4	0.38	21	4600	430	4600
Indian Cr Upper	6/7/89	11.9	6.89	110	3.75	93	1	0.9	57	1.3	0.01			0.17	0.02	0.01	0.01	0.21	2.83		5	1	1	0.03	11	2.7	7.4	1.6	0.51	28.4	30	30	40
Indian Cr Mid	6/7/89	15	7.52	175	6.4	153	4	7.2	84	13	0.14			0.38	0.02	0.01	0.01	0.42	12.1		6	1	1	0.06	19	5.1	16	2	0.84	32.9	4600	2400	430
Indian Cr Lower	6/7/89	14.7	7.67	144	7.25	121	2	2.5	71	3.5	0.08			0.43	0.02	0.01	0.01	0.47	4.95		10	1	1	0.03	16	4.6	6.7	1.1	0.37	19.4	11000	930	90
Indian Cr Mid	7/12/89	16.9	7.35	292	5.8	198	3	18	122	7.2	0.09			0.21	0.02	0.01	0.01	0.25	9.09		5	1	1	0.06	23	7.4	25	2	1.15	37.5	4600	1500	326
Indian Cr Lower	7/12/89	18.4	6.4	120	4.1	97	3	2.6	61	3.1	0.11			0.37	0.02	0.01	0.01	0.41	4.55		7	1	1	0.03	13	3.8	5.2	1.6	0.32	18.4	2400	930	2400
Indian Cr Mid	8/1/89	16.3	7.26	290				17			0.12				0.02	0.01	0.01	0.04															
Indian Cr Lower	8/1/89	17.2	7.16	200				15			0.26				0.36	0.04	0.25	0.65															
Indian Cr Mid	8/2/89	17.2	7.59	295	5.8	187	12	18	122	7.6	0.1			0.25	0.02	0.01	0.01	0.29	7.24		7	1	1	0.05	23	7.4	26	2	1.2	38.4	150	40	230
Indian Cr Lower	8/2/89	19.8	7.51	140	4.1	92	3	3.8	68	3.7	0.11			0.25	0.02	0.01	0.01	0.29	4.55		10	1	1	0.01	14	4.1	7.2	1.6	0.43	22.5	750	750	90
Indian Cr Mid	9/19/89	12.3	7.38	300	6.6	205	4	18	131	6.9	0.11			0.22	0.06	0.01	0.01	0.3	6.64		5	2	1	0.03	23.9	8.1	27	1.2	1.21	38.3	2400	2400	430
Indian Cr Lower	9/19/89	10.4	7.48	205	6.2	172	2	15	87	3.9	0.16			0.94	0.19	0.01	0.01	1.15	7.48		38	2	1	0.02	18.3	6.4	13	6.4	0.67	26.3	24000	11000	930
Indian Cr Mid	10/3/89	10.3	7.66	305	8.3	198	4	18	134	9.2	0.1			0.18	0.06	0.01	0.01	0.26	6.5		5	1	1	0.05	25	7.6	26	3.1	1.16	36.6	930	230	150
Indian Cr Lower	10/3/89	9.2	7.67	178	5.2	125	248	7.7	85	40	0.34			0.64	0.09	0.01	0.01	0.75	5.28		22	2	1	0.01	19	5.6	10	3.2	0.51	22.6	930	430	430
Indian Cr Upper	11/1/89	6	7.69	100	6.8	91	6	1.9	48	5	0.01			0.15	0.05	0.01	0.01	0.22	3.98		8	1	1	0.01	10	2.2	6.9	1.4	0.51	29.5	90	30	40
Indian Cr Mid	11/1/89	3.5	7.31	76	9.6	46	1	1.6	34	1.6	0.01			0.1	0.07	0.01	0.01	0.19	4.11		5	1	1	0.01	8.2	1.8	3.3	1.2	0.27	19.6	430	40	30
Indian Cr Lower	11/1/89	5.3	7.87	85	9.5	66	12	1.6	39	2.6	0.02			0.11	0.06	0.01	0.02	0.2	4.19		5	1	1	0.01	9.1	2.2	4.1	1.4	0.31	21	230	90	30
Indian Cr Upper	12/5/89	2.8	8.21	73	9	89	1	1	38	2.7	0.01			0.15	0.02	0.01	0.01	0.19	3.59		5	1	1	0.01	7.4	1.8	6.6	1.1	0.56	34.4	230	30	40
Indian Cr Mid	12/5/89	2.2	8.02	77	10.1	68	1	1.3	37	1.6	0.02			0.09	0.02	0.01	0.01	0.13	4.38		5	1	1	0.01	8.1	2.3	4.5	1.4	0.35	23.7	930	430	90
Indian Cr Lower	12/5/89	4.3	7.61	88	9.7	87	3	1.6	42	1.3	0.05			0.13	0.02	0.01	0.01	0.17	4.44		5	1	1	0.01	9.6	2.8	5	1.5	0.36	22.5	930	230	430
Indian Cr Upper	1/3/90	0.6	8.04	172	9.3	64	1	0.9	39	2.5	0.01			0.09	0.02	0.01	0.01	0.13	3.8		5	1	1	0.01	7.3	1.8	6.3	1.1	0.54	33.6	40	30	30
Indian Cr Mid	1/3/90	2.3	7.63	185	8.45	125	2	5.9	71	6.4	0.1			0.08	0.02	0.01	0.03	0.14	9.1		5	1	1	0.02	16	4.5	15	1.6	0.85	35	930	90	90
Indian Cr Lower	1/3/90	0.6	7.68	159	9.4	109	1	3.8	68	2.1	0.05			0.12	0.02	0.01	0.01	0.16	5.12		5	1	1	0.01	15	4.6	8.2	1.6	0.47	23.4	40	30	30
Indian Cr Upper	2/7/90	0.5	7.15	83	8.7	79	1	0.9	41	2.1	0.02			0.07	0.04	0.01	0.01	0.13	3.92		5	1	1	0.01	7.2	1.8	5.9	1	0.5	32.5	70	30	30

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N
Indian Cr Mid	2/7/90	2.3	7.17	167	9.2	91	3	4	65	6.7	0.1			0.07	0.03	0.01
Indian Cr Lower	2/7/90	1.2	7.33	152	9.1	83	11	3.4	69	3.3	0.08			0.21	0.05	0.01
Indian Cr Upper	3/6/90	2.3	8.47	82	8.75	75	1	1.4	39	5.2	0.03			0.18	0.02	0.01
Indian Cr Mid	3/6/90	3	7.76	235	9	87	2	2.4	45	8.6	0.07			0.16	0.02	0.01
Indian Cr Lower	3/6/90	3.7	7.6	55	9.15	73	11	2.8	40	3.1	0.04			0.15	0.02	0.01
Indian Cr Upper	4/3/90	6.3	6.83	99	11.3	73	1	0.9	41	2.5	0.02			0.08	0.02	0.01
Indian Cr Mid	4/3/90	9	7.12	128	8.45	68	2	2.8	42	3.4	0.07			0.17	0.02	0.01
Indian Cr Lower	4/3/90	8.4	7.34	108	9.8	82	3	2.4	55	2.2	0.07			0.21	0.02	0.01
Indian Cr Upper	5/1/90	7.3	6.95	99	4.4	83	1	0.8	49	1.8	0.02			0.14	0.02	0.01
Indian Cr Mid	5/1/90	5.9	7.62	60	9.8	51	3	0.9	27	2.2	0.03			0.17	0.02	0.01
Indian Cr Lower	5/1/90	8	7.16	75	9.1	62	4	1	34	1.8	0.04			0.2	0.02	0.01
Indian Cr Upper	6/5/90	9.7	7.1	110	2.75	90	7	1.6	55		0.03			0.16	0.02	0.01
Indian Cr Mid	6/5/90	15	7.4	313	6.5	121	3	7.3	101		0.1			0.21	0.05	0.01
Indian Cr Lower	6/5/90	13.3	7.8	123	7.6	93	3	1.8	62		0.08			0.17	0.02	0.01
Indian Cr Mid	7/10/90	17.5	7.42	264	5.9	181	4	11	117	6.7	0.11	0.04		0.04	0.03	0.01
Indian Cr Lower	7/10/90	16.7	7.37	135	5.6	99	42	3.2	64	9.3	0.11	0.11		0.04	0.02	0.01
Indian Cr Mid	8/7/90	17.9	7.41	241	6.1	163	10	11	106	9.5	0.11	0.02		0.25	0.02	0.01
Indian Cr Lower	8/7/90	17.2	7.61	139	5.55	97	8	2.6	67	4.7	0.12	0.06		0.25	0.02	0.01
Indian Cr Mid	9/5/90	15.4	7.89	295	6	172	4	10	116	6.2	0.11	0.03		0.23	0.02	0.01
Indian Cr Lower	9/5/90	14	7.97	148	5.1	98	11	3.2	69	5.5	0.1	0.03		0.21	0.03	0.01
Indian Cr Mid	10/2/90	12.1	7.34	278	6.1	180	4	11	116	6.6	0.11	0.03		0.18	0.02	0.01
Indian Cr Lower	10/2/90	12.6	7.32	173	5.2	128	13	4.9	78	6.2	0.13	0.02		0.31	0.02	0.01
Indian Cr Mid	11/1/90	4.5	7.85	88	8.3	66	1	1.2	41	1.4	0.04	0.02		0.14	0.02	0.01
Indian Cr Lower	11/1/90	5.1	8.19	99	8.75	70	22	1.4	47	3.3	0.05	0.02		0.15	0.02	0.01
Indian Cr Mid	12/4/90	1.7	7.29	85	9.1	67	1	0.9	38	1.9	0.03	0.02		0.08	0.02	0.01
Indian Cr Lower	12/4/90	2.9	7.42	103	8.7	75	7	1.2	45	3.6	0.19	0.02		0.27	0.02	0.01
Indian Cr Mid	1/8/91	3.6	6.65	237	7.6	151	5	7.4	104	1.5	0.12	0.01		0.12	0.03	0.01
Indian Cr Lower	1/8/91	1.3	6.53	153	11	110	1	3.4	71	2.3	0.08	0.03		0.29	0.04	0.01
Indian Cr Upper	2/6/91	3.2	8.32	82	5.6	67	1	1.4	41	4.9	0.04	0.01		0.12	0.02	0.01
Indian Cr Mid	2/6/91	7.3	7.85	233	5.9	149	4	8.7	106	13	0.11	0.01		0.16	0.02	0.01
Indian Cr Lower	2/6/91	4.9	8.27	97	8.2	68	4	2.9	48	2.7	0.06	0.02		0.23	0.02	0.01
Indian Cr Upper	3/14/91	3.1	8.17	82	8.4	87	3	1.5	38	5.3	0.03	0.01		0.25	0.02	0.01
Indian Cr Mid	3/14/91	5.8	7.95	186	7.9	132	2	6	81	6.1	0.1	0.03		0.18	0.02	0.01
Indian Cr Lower	3/14/91	3.9	8.02	146	8.3	113	2	3.9	69	2.52	0.05	0.02		0.22	0.02	0.01
Indian Cr Upper	4/3/91	7.6	8.12	82	8	65	2	2.1	33	9	0.05	0.02		0.28	0.02	0.01
Indian Cr Mid	4/3/91	9.5	7.85	266	7.6	193	8	22	74	18	0.13	0.05		0.46	0.05	0.01
Indian Cr Lower	4/3/91	9.3	7.94	177	8	123	5	7.5	71	5.2	0.08	0.02		0.27	0.03	0.01
Indian Cr Upper	5/9/91	8	9.73	92	6.4	73	1	1.7	44	3.4	0.03	0.01		0.16	0.02	0.03
Indian Cr Mid	5/9/91	8.4	7.97	183	6.25	147	4	7.3	97	8.9	0.12	0.02		0.18	0.02	0.03
Indian Cr Lower	5/9/91	5.7	7.91	122	7.75	108	30	4.1	54	7.9	0.23	0.06		1	0.07	0.04
Indian Cr Upper	6/4/91	10.8	8.05	97	6.6	83	4	0.7	48	3	0.03	0.01		0.21	0.05	0.01
Indian Cr Mid	6/4/91	15	7.86	206	6.2	152	5	5.8	99	5.5	0.1	0.02		0.23	0.06	0.01
Indian Cr Lower	6/4/91	13.9	7.74	131	6.5	109	17	2	66	3.6	0.11	0.02		0.5	0.1	0.01
Indian Cr Mid	7/9/91	17.6	7.41	253	5.75	168	16	7.3	119	15	0.16	0.05		0.86	0.28	0.01
Indian Cr Lower	7/9/91	14.3	7.36	143	6.8	98	38	2.5	65	6.4	0.11	0.05		0.3	0.05	0.01
Indian Cr Upper	8/6/91	20.3	7.44	200	6	101	4	2.5	73	1.8	0.04	0.01		0.33	0.07	0.01
Indian Cr Mid	8/6/91	16.7	7.44	163	6.15	177	4	8.3	127	9.7	0.11	0.03		0.28	0.08	0.01
Indian Cr Lower	8/6/91	16	6.88	146	6.9	108	2	3.2	72	4.4	0.12	0.05		0.27	0.06	0.01
Indian Cr Mid	9/3/91	18.8	7.19	200	5.7	180	3	8.6	126	6.9	0.11	0.03		0.24	0.05	0.01
Indian Cr Lower	9/3/91	17.3	7.33	115	6.5	100	28	2.8	66	7.3	0.24	0.04		0.47	0.06	0.01
Indian Cr Mid	10/1/91	13.8	7.21	271	5.45	170	7	8.4	126	15	0.16	0.02		0.3	0.03	0.01

Location	Date	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Mid	2/7/90	0.1	0.21	7.13		5	1	1	0.04	12	3.6	10	1.3	0.64	31.9	40	30	30
Indian Cr Lower	2/7/90	0.07	0.34	5.39		5	1	1	0.07	15	4.5	7.3	1.7	0.42	21.4	40	30	30
Indian Cr Upper	3/6/90	0.02	0.23	4.91		21	1	1	0.01	7.6	1.9	6.4	1.4	0.53	32.7	430	30	90
Indian Cr Mid	3/6/90	0.03	0.22	6.44		19	1	1	0.01	8.9	2.6	7.8	1.5	0.59	32.7	150	30	40
Indian Cr Lower	3/6/90	0.01	0.19	5.78		6	1	1	0.02	9	2.6	4.8	1.4	0.36	23	90	30	230
Indian Cr Upper	4/3/90	0.01	0.12	3.66		5	1	1	0.01	8.7	2.2	6.9	1.3	0.54	31.6	70	30	150
Indian Cr Mid	4/3/90	0.01	0.21	5.72		8	1	1	0.02	10	2.8	6.9	1.2	0.49	28.3	30	30	30
Indian Cr Lower	4/3/90	0.01	0.25	4.04		5	1	1	0.02	14	3.9	6.4	1.5	0.38	20.8	30	30	70
Indian Cr Upper	5/1/90	0.02	0.19	3.32	33	5	1	1	0.01	9.8	2.3	7.2	1.5	0.53	30.4	30	30	90
Indian Cr Mid	5/1/90	0.01	0.21	4.28	24	5	1	1	0.01	6.8	1.8	2.8	0.89	0.24	19.2	4600	70	430
Indian Cr Lower	5/1/90	0.02	0.25	4.28	29	5	1	1	0.02	7.5	2.3	3.5	0.9	0.28	20.6	90	90	90
Indian Cr Upper	6/5/90	0.01	0.2	2.87		9	2	1	0.02	12	2.9	8.9	1.6	0.59	30.6	30	30	40
Indian Cr Mid	6/5/90	0.02	0.29	8.04		5	1	1	0.06	21	6.7	19	1.7	0.92	33.4	430	230	930
Indian Cr Lower	6/5/90	0.01	0.21	3.83		10	1	1	0.02	14	4.4	6.7	1	0.39	21.1	230	30	430
Indian Cr Mid	7/10/90	0.04	0.12			5	1	1	0.07							4600	2400	24000
Indian Cr Lower	7/10/90	0.03	0.1			8	1	1	0.05							930	70	430
Indian Cr Mid	8/7/90	0.01	0.29	7.34		8	1	1	0.11	20	5.8	23	2.2	1.16	39.5	1500	230	
Indian Cr Lower	8/7/90	0.01	0.29	5.57		7	1	1	0.04	14	4.2	6.6	2.1	0.39	20.7	1200	430	
Indian Cr Mid	9/5/90	0.02	0.28	5.96		5	2	1	0.04	22	7.1	21	1.9	0.99	34.5	2400	40	
Indian Cr Lower	9/5/90	0.01	0.26	4.88		5	2	1	0.01	15	4.5	8.2	2	0.47	23.3	430	90	
Indian Cr Mid	10/2/90	0.02	0.23	6.89			1	1	0.07	24	7	22	2.1	1.01	34.3	430	150	
Indian Cr Lower	10/2/90	0.01	0.35	5.36			1	1	0.04	16	5.3	9.4	2.9	0.51	23.8	2400	230	
Indian Cr Mid	11/1/90	0.02	0.19	4.43	29	6	1	1	0.02	7.8	2.3	4.7	1.7	0.37	24.7	230	230	230
Indian Cr Lower	11/1/90	0.02	0.2	4.55	34	9	1	1	0.04	9	2.6	5	1.9	0.37	23.4	930	230	90
Indian Cr Mid	12/4/90	0.01	0.12	4.16			1	1	0.02	8.1	2.2	4.6	1.6	0.36	24.2	230	90	
Indian Cr Lower	12/4/90	0.01	0.31	4.34			1	1	0.02	9.6	2.7	5.5	2	0.4	24.1	430	30	
Indian Cr Mid	1/8/91	0.12	0.28	7.16			1	1	0.05	20	6.2	18	2.2	0.9	33.3	40	30	
Indian Cr Lower	1/8/91	0.15	0.49	5.27			2	1	0.01	14	4.7	7.2	3.4	0.42	21.1	430	70	
Indian Cr Upper	2/6/91	0.01	0.16	4.4			1	1	0.02	7.3	1.9	6.7	1.3	0.57	34.4	90	30	
Indian Cr Mid	2/6/91	0.03	0.22	6.89			1	1	0.06	19	6.3	19	2.3	0.96	35.1	90	30	
Indian Cr Lower	2/6/91	0.03	0.29	5.36			1	1	0.01	9.4	2.8	5.3	2.3	0.38	23.3	430	30	
Indian Cr Upper	3/14/91	0.01	0.29	4.91			1	1	0.01	7.6	1.9	6.5	1.5	0.54	33	90	30	
Indian Cr Mid	3/14/91	0.01	0.22	6.23			1	1	0.04	16	5.2	14	2	0.77	32.2	40	30	
Indian Cr Lower	3/14/91	0.03	0.28	4.82			1	1	0.03	15	4.9	8.2	2.2	0.46	22.8	90	30	
Indian Cr Upper	4/3/91	0.01	0.32	6.05			1	1	0.02	6.5	1.8	5.1	1.6	0.45	30.1	30	30	
Indian Cr Mid	4/3/91	0.46	0.98	29.1			1	1	0.03	16	4.7	11	4.4	0.62	26.9	30	30	
Indian Cr Lower	4/3/91	0.14	0.45	8.44			1	1	0.03	20	4.2	28	2.7	1.48	46.3	30	30	
Indian Cr Upper	5/9/91	0.01	0.22	3.71	30	9	1	1	0.01	8.8	2.2	6.1	1.4	0.47	28.8	40	30	40
Indian Cr Mid	5/9/91	0.01	0.24	6.95	71	12	1	1	0.01	18	5.9	15	2.7	0.78	31	430	150	230
Indian Cr Lower	5/9/91	0.11	1.22	7.97	46	42	3	1	0.01	12	4	5.8	4.1	0.36	19.6	11000	4600	2400
Indian Cr Upper	6/4/91	0.01	0.28	3.89			1	1	0.01	9.5	2.3	7.7	1.6	0.58	32.2	430	90	
Indian Cr Mid	6/4/91	0.01	0.31	5.39			1	1	0.05	19	6.1	17	2.1	0.86	32.9	930	430	
Indian Cr Lower	6/4/91	0.01	0.62	4.82			1	1	0.01	16	4.5	5.2	1.7	0.29	15.7	11000	11000	
Indian Cr Mid	7/9/91	0.03	1.18	6.11			2	1	0.01	24	7.2	20	1.7	0.91	32.1	11000	11000	
Indian Cr Lower	7/9/91	0.03	0.39	5.09			1	1	0.01	15	4.2	6.3	1.7	0.37	19.4	430	430	
Indian Cr Upper	8/6/91	0.01	0.42	3.2			2	1	0.02	15	3.3	11	2.2	0.66	30.7	90	40	
Indian Cr Mid	8/6/91	0.02	0.39	5.48			2	1	0.04	26	7.8	22	2.6	0.97	32.3	2400	2400	
Indian Cr Lower	8/6/91	0.01	0.35	4.64			1	1	0.02	16	4.8	8.1	1.6	0.45	22.2	750	430	
Indian Cr Mid	9/3/91	0.02	0.32	5.48			1	1	0.07	24	7.1	19	2.4	0.87	30.9	4600	150	
Indian Cr Lower	9/3/91	0.01	0.55	4.46			1	1	0.03	14	4	6.2	1.4	0.37	20.2	230	230	
Indian Cr Mid	10/1/91	0.01	0.35	4.92			2	1	0.05	23	7.1	21	2.6	0.98	33.6	1500	150	

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Lower	10/1/91	12.2	7.3	158	7.65	100	46	3.6	71	18	0.16	0.02		0.29	0.06	0.01	0.01	0.37	4.52			1	1	0.01	16	4.9	8.7	1.8	0.48	23.2	430	430	
Indian Cr Mid	11/5/91	6.1	6.46	86	9.2	68	2	1.5	39	2.2	0.03	0.01		0.01	0.02	0.01	0.01	0.05	4.97	32	5	1	1	0.02	8	2	4.3	1.7	0.35	23.5	430	40	90
Indian Cr Lower	11/5/91	7	6.85	95	9.2	78	7	1.8	44	3.4	0.04	0.02		0.17	0.05	0.01	0.01	0.24	5.09	35	5	1	1	0.02	8.8	2.4	4.7	1.8	0.36	23	90	30	90
Indian Cr Upper	12/10/91	2.5	6.9	109	10.9	90	1	2	49	6.9	0.02	0.01		0.19	0.03	0.01	0.01	0.24	4.3			1	1	0.01	10	2.6	6.6	1.4	0.48	27.7	140	30	
Indian Cr Mid	12/10/91	0.7	7.16	143	13	66	1	1.4	37	1.9	0.04	0.01		0.1	0.02	0.01	0.01	0.14	4.86			1	1	0.01	8.3	2.2	3.5	1.5	0.27	19.3	230	40	
Indian Cr Lower	12/10/91	0.5	7.13	107	12.2	77	4	1.9	44	2	0.04	0.02		0.16	0.02	0.01	0.01	0.2	5.09			1	1	0.01	9.5	2.8	4.2	1.7	0.3	19.6	230	230	
Indian Cr Upper	1/8/92	1.7	8.16	96	10.2	89	1	1.3	44	4	0.03	0.02		0.11	0.02	0.01	0.02	0.16	4.52			1	1	0.01	8.8	2.1	7.6	1.1	0.59	34	40	30	
Indian Cr Mid	1/8/92	2.2	8.03	180	8.4	116	2	4.1	78	9.2	0.11	0.03		0.11	0.08	0.01	0.03	0.23	6.15			1	1	0.04	16	4.6	12	1.6	0.67	30	150	30	
Indian Cr Lower	1/8/92	1.3	8.68	116	11	84	2	1.8	54	1.7	0.05	0.03		0.16	0.06	0.01	0.02	0.25	5.28			1	1	0.02	12	3.3	5.5	1.6	0.36	20.8	430	40	
Indian Cr Upper	2/4/92	1.3	7.74	87	9.1	76	26	1.2	42	9.6	0.1	0.02		0.36	0.06	0.01	0.02	0.45	4.69			2	1	0.01	8.6	1.9	7	1.2	0.56	33	15	3	
Indian Cr Mid	2/4/92	3.7	7.62	188	7.9	124	3	5.3	80	14	0.12	0.01		0.08	0.06	0.01	0.02	0.17	6.52			1	1	0.04	17	4.9	12	1.6	0.65	28.7	240	3	
Indian Cr Lower	2/4/92	1	7.9	102	9.8	76	1	2	50	1.3	0.03	0.02		0.09	0.05	0.01	0.01	0.16	4.9			1	1	0.02	11	3.1	5.1	1.4	0.34	20.9	93	15	
Indian Cr Upper	3/3/92	5	7.18	95	10.2	79	1	1.5	42	2.8	0.02	0.01		0.09	0.02	0.01	0.01	0.13	4.42			1	1	0.01	8.5	2	6.7	1.1	0.53	32	4	3	
Indian Cr Mid	3/3/92	8	7.33	242	7.4	155	5	7.8	104	14	0.1	0.02		0.21	0.02	0.02	0.02	0.27	6.99			1	1	0.04	20	6.3	17	1.7	0.84	32.1	3	3	
Indian Cr Lower	3/3/92	5.8	7.47	118	9.7	88	1	2.8	54	0.76	0.03	0.02		0.11	0.02	0.01	0.01	0.15	4.64			1	1	0.04	13	3.6	6	1.3	0.37	21	4	3	
Indian Cr Upper	4/1/92	9.4	7.73	94	8.6	78	1	1.1	45	2.6	0.02	0.01		0.08	0.02	0.01	0.01	0.12	4.41			1	1	0.01	9	2	6.9	1.3	0.54	31.7	30	30	
Indian Cr Mid	4/1/92	11.3	7.6	226	7.2	162	7	7.7	106	14	0.12	0.01		0.2	0.02	0.01	0.02	0.25	6.24			2	1	0.04	21	6.4	16	1.8	0.78	30	30	30	
Indian Cr Lower	4/1/92	8.6	7.89	144	8.5	105	2	2.9	72	0.9	0.05	0.02		0.16	0.02	0.01	0.01	0.2	4.3			1	1	0.05	15	4.4	8.6	1.4	0.5	24.6	30	30	
Indian Cr Upper	5/5/92	14.6	7.33	110	7.4	87	1	1.3	57	3.4	0.1	0.01		0.74	0.02	0.01	0.02	0.79	3.65	38	9	1	1	0.01	12	2.6	9.8	1.5	0.66	33.3	30	30	150
Indian Cr Mid	5/5/92	15.2	7.54	178	6.7	129	4	4.2	94	5.5	0.11	0.05		0.42	0.05	0.01	0.02	0.5	6.01	69	9	1	1	0.02	19	5.5	17	1.6	0.88	33.9	430	90	430
Indian Cr Lower	5/5/92	12.7	7.69	106	8.4	88	5	2.2	55	2	0.08	0.03		0.77	0.02	0.01	0.01	0.81	6.38	45	29	2	1	0.01	13	3.5	7.6	1.4	0.48	25.3	1400	230	930
Indian Cr Upper	6/2/92	18.5	6.95	120	6.35	97	1	1.3	69	1.9	0.03	0.01		0.26	0.02	0.01	0.01	0.3	4.75			2	1	0.01	14	3.3	8.5	2	0.53	26.5	30	30	
Indian Cr Mid	6/2/92	16.9	7.39	204	6.75	154	4	5	106	6.05	0.15	0.05		0.56	0.1	0.01	0.02	0.69	5.65			1	1	0.05	20	6.3	15	1.7	0.74	29.5	24000	24000	
Indian Cr Lower	6/2/92	16.7	7.57	112	9	104	9	1.7	68	1.9	0.07	0.03		0.5	0.02	0.01	0.01	0.54	4.97			1	1	0.02	15	4.4	5.5	0.99	0.32	17.4	40	40	
Indian Cr Upper	7/7/92	19.7	7.32	146	6.1	121	2	2.1	80	3.5	0.04	0.01		0.23	0.02	0.01	0.02	0.28	4.16			2	1	0.05	17	3.7	9.1	2.5	0.52	24.5	2400	430	
Indian Cr Mid	7/7/92	15.3	7.38	242	5.4	168	4	7.5	121	7	0.1	0.02		0.18	0.02	0.02	0.01	0.23	5.23			2	1	0.08	24	7	19	2	0.87	31.1	230	230	
Indian Cr Lower	7/7/92	14.3	7.97	115	7	84	1	1.8	58	2.2	0.06	0.04		0.1	0.02	0.01	0.01	0.14	3.86			1	1	0.02	13	3.6	6.1	0.82	0.38	21.5	230	40	
Indian Cr Mid	8/4/92	17.3	7.62	266	4.55	178	5	7.6	132	4.9	0.1	0.01		0.13	0.06	0.01	0.04	0.24	4.67			1	1	0.08	25	7.7	22	2.6	0.98	32.9	150	90	
Indian Cr Lower	8/4/92	19.5	8	126	5.65	96	4	2.4	67	3	0.14	0.03		0.17	0.03	0.01	0.01	0.22	4.08			1	1	0.04	14	4.2	7.5	1.7	0.45	23	2400	90	
Indian Cr Mid	9/1/92	14.6	7.54	266	5.45	189	5	8.3	134	6.6	0.1	0.02		0.47	0.03	0.01	0.02	0.53	4.95			1	1	0.05	24	7.5	22	2.7	1	33.6	2100	30	
Indian Cr Lower	9/1/92	14	7.94	166	6.4	103	3	3.8	65	3	0.07	0.03		0.32	0.02	0.01	0.01	0.36	4.24			1	1	0.03	13	4	7	2	0.43	22.8	430	40	
Indian Cr Mid	10/13/92	11.7	7.44	258	6.7	186	4	7.8	126	6.6	0.09	0.02		0.24	0.04	0.01	0.02	0.31	7.72			2	1	0.06	23	7.3	22	2.8	1.02	34.4	230	40	
Indian Cr Lower	10/13/92	9.9	7.74	200	8.7	123	2	4	73	2.9	0.06	0.03		0.16	0.02	0.01	0.01	0.2	3.18			1	1	0.04	15	4.8	8.9	2.4	0.51	24.3	1500	70	
Indian Cr Mid	11/4/92	7.2	7.01	164	8	128	2	3.9	68	4.1	0.11	0.05		0.09	0.05	0.01	0.01	0.16	13.9	57	14	2	1	0.02	13	3.7	11	2.4	0.69	32	390	30	30
Indian Cr Lower	11/4/92	5	7.65	171	10.5	123	2	4.9	78	2.5	0.09	0.03		0.16	0.06	0.01	0.01	0.24	4.84	64	22	1	1	0.01	16	5.2	11	3.4	0.61	26.7	90	30	40
Indian Cr Upper	12/8/92	1.5	7.72	90	12.6	92	1	1.4	49	4.3	0.04	0.02		0.13	0.02	0.01	0.05	0.21	5.78			1	1	0.01	10	2.3	9	1.4	0.66	35.1	430	30	
Indian Cr Mid	12/8/92	3.5	7.18	181	10.2	125	3	4.5	82	6.4	0.17	0.01		0.14	0.02	0.01	0.05	0.22	5.48			1	1	0.03	17	4.6	13	2.1	0.72	30.6	430	40	
Indian Cr Lower	12/8/92	1.5	7.36	141	13.7	108	14	4	62	3	0.12	0.04		0.47	0.02	0.01	0.06	0.56	5.72			2	1	0.02	14	4.3	8	3.9	0.47	23.2	4600	30	
Indian Cr Upper	1/26/93	2.4	7.81	88	10.2	75	1	3.3	36	6.7	0.04	0.02		0.41	0.03	0.02	0.06	0.52	5.38			1	1	0.02	7.8	2.1	9.7	1.5	0.79	41.2	90	30	
Indian Cr Mid	1/26/93	2.4	7.57	203	8.8	135	3	5.4	86	13	0.13	0.03		0.34	0.09	0.02	0.03	0.48	8.6			1	1	0.04	18	5.3	18	2.8	0.95	35.7	90	30	
Indian Cr Lower	1/26/93	2.1	7.56	203	9.55	141	5	6	90	4.2	0.14	0.06		0.53	0.09	0.02	0.19	0.83	5.69			1	1	0.01	19	6.3	14	4.1	0.71	27.9	1500	40	
Indian Cr Upper	2/2/93	2.6	8.61	87	10.4	75	1	3.4	38	3.6	0.03	0.01		0.18	0.02	0.01	0.02	0.23	4.15			1	1	0.03	8.3	2.1	9.9	1.4	0.79	40.8	30	30	
Indian Cr Mid	2/2/93	2.9	7.64	203	7.9	141	6	6.4	94	12.5	0.16	0.02		0.24	0.02	0.01	0.05	0.32	8.1			2	1	0.05	20	5.7	16	2.3	0.81	31.3	280	70	
Indian Cr Lower	2/2/93	2.1	7.69	180	10	117	2	4.8	85	3.2	0.08	0.04		0.27	0.02	0.01	0.14	0.44	5.44			2	1	0.02	19	5.7	8.6	2.6	0.44	20.1	70	30	
Indian Cr Upper	3/2/93	2.5	7.25	84	9.45	68	1	3.1	38	2.7	0.03	0.01		0.24	0.02	0.01	0.01	0.28	3.7			1	1	0.01	7.5	1.8	6.1	1.4	0.51	32.2	30	30	
Indian Cr Mid	3/2/93	3.6	7.53	238	6.4	146	4	14	83	4.9	0.15	0.07		0.65	0.12	0.01	0.06	0.84	10.8			2	1	0.04	19	3.7	18	3.4	0.98	36.8	90	30	
Indian Cr Lower	3/2/93	3.4	7.48	225	8.5	138	26	6	88	5	0.13	0.13		0.65	0.03	0.01	0.11	0.8	5.82			2	1	0.02	19	5.2	9.2	2.6	0.48	21.7	90	30	
Indian Cr Upper	4/6/93	6.2	7.45	70	10.4	76	1	1	29	2.8	0.02	0.02		0.11	0.02	0.01	0.02	0.16	4.07			1	1	0.01	6	1.5	4.7	1.1	0.44	31.2	30	30	
Indian Cr Mid	4/6/93	5	7.4	95	10.9	74	1	1.6	36	3.8	0.04	0.02		0.16	0.02	0.01	0.02	0.21	4.47			1	1	0.01	7.4	2	5.7	1.3	0.47	30.4	30	30	
Indian Cr Lower	4/6/93	4.2	7.88	107	9.1	44	4	2.2	43	3.6	0.04	0.02		0.1	0.02	0.01	0.03	0.16	4.35			1	1	0.01	9.4	2.6	6.1	1.4	0.45	26.9	90	90	
Indian Cr Upper	5/4/93	7.5	8.09	84	8.5	76	1	0.9	40	2.4	0.03	0.01		0.26	0.02	0.01	0.01	0.3	4.04	28	24	1	1	0.01	8.6	2.3	5.7	1.6	0.44	27.3	230	30	150

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Mid	5/4/93	9.9	7.46	144	7.8	112	2	4.4	66	5.4	0.11	0.06		0.28	0.02	0.01	0.01	0.32	5.14	50	18	2	1	0.05	15	4.2	8.6	1.9	0.5	24.6	430	230	30
Indian Cr Lower	5/4/93	7	7.63	119	9.8	87	4	2.7	55	1.7	0.06	0.05		0.25	0.02	0.01	0.06	0.34	4.01	44	21	1	1	0.02	13	3.9	5.8	1.4	0.36	20	2400	40	40
Indian Cr Upper	6/1/93	11.3	7.11	75	8.4	66	1	0.7	38	2.8	0.03	0.01		0.23	0.02	0.01	0.01	0.27	4.21			1	1	0.01	6.7	1.7	5	1.2	0.44	30.1	430	430	
Indian Cr Mid	6/1/93	16.7	7.1	179	7.5	137	2	7.7	88	5.6	0.12	0.06		0.51	0.08	0.01	0.01	0.61	6.12			1	1	0.04	19	5.1	13	1.8	0.68	28.5	2400	2400	
Indian Cr Lower	6/1/93	15.1	7.39	102	8.3	82	5	1.9	51	2	0.06	0.02		0.47	0.02	0.01	0.01	0.51	4.44			1	1	0.02	11	3	5	1.3	0.34	20.8	2400	230	
Indian Cr Upper	7/7/93	16.8	7.28	82	7.65	70	1	0.7	43	1.6	0.03	0.01		0.71	0.02	0.01	0.01	0.75	3.61			1	1	0.01	9.3	2.2	5.2	1.7	0.39	24.7	930	930	
Indian Cr Mid	7/7/93	19.3	7.21	221	6.5	152	3	7	104	5.5	0.1	0.05		0.51	0.05	0.01	0.02	0.59	5.26			2	1	0.02	24	6.8	15	2	0.69	26.5	4600	4600	
Indian Cr Lower	7/7/93	15.2	7.37	130	6.95	111	11	1.7	66	3.5	0.13	0.06		0.77	0.02	0.01	0.01	0.81	5.78			2	1	0.02	17	4.4	5.8	2.3	0.32	16.6	2400	2400	
Indian Cr Upper	8/3/93	17.2	6.73	123	5.95	105	1	1	65	2.4	0.04	0.02		0.55	0.02	0.02	0.01	0.6	4.04			1	1	0.02	13	3	7.5	2.4	0.48	25.4	4600	930	
Indian Cr Mid	8/3/93	18.4	6.77	233	5.85	159	2	8	107	6.5	0.1	0.04		0.42	0.02	0.02	0.01	0.47	4.58			2	1	0.05	21	6	16	2.8	0.79	30.1	4600	930	
Indian Cr Lower	8/3/93	17.7	6.98	138	6.15	120	2	4.2	67	2.8	0.12	0.06		0.63	0.02	0.02	0.01	0.68	4.78			1	1	0.04	15	3.9	6.8	3	0.4	20.5	4600	1505	
Indian Cr Upper	9/1/93	17.5	7.27	148	3.8	106	2	0.9	73	2.6	0.06	0.02		0.31	0.02	0.01	0.01	0.35	3.41			2	1	0.01	16	3.7	9.5	2.4	0.55	26.2	230	30	
Indian Cr Mid	9/1/93	15.6	6.99	252	6.5	169	2	9.9	116	9.5	0.11	0.04		0.29	0.03	0.01	0.01	0.34	7.09			2	1	0.04	25	1.9	22	2.4	1.14	39.5	90	40	
Indian Cr Lower	9/1/93	14.6	7.33	129	10.6	90	2	1.9	64	3.2	0.09	0.05		0.3	0.02	0.01	0.01	0.34	4.04			1	1	0.02	15	4.2	8.2	1.3	0.48	24	2100	61	
Indian Cr Mid	10/5/93	13.4	7.16	262	6.4	173	14	12	12	8.5	0.12	0.03		0.12	0.02	0.01	0.02	0.17	9.51			3	1	0.05	26	7.7	23	2.3	1.01	33.4	30	30	
Indian Cr Lower	10/5/93	9.2	7.26	132	6.65	97	6	3.3	61	3	0.07	0.04		0.2	0.02	0.01	0.01	0.24	5.44			2	1	0.02	13	4	7.9	2.2	0.49	24.9	430	90	
Indian Cr Mid	11/2/93	6.8	7.5	271	7.2	180	4	11	119	9	0.11	0.01		0.37	0.02	0.01	0.02	0.42	5.68	87	10	2	1	0.01	23	7.4	20	1.8	0.92	32.5	30	30	40
Indian Cr Lower	11/2/93	3.3	7.55	97	8.3	83	4	1.4	46	1.7	0.04	0.01		0.22	0.1	0.01	0.02	0.35	4.55	35	6	1	1	0.03	9.3	2.8	5.1	1.4	0.37	23.3	430	90	150
Indian Cr Upper	12/1/93	3	7.45	93	6.8	79	1	2.7	44	3	0.05	0.02		0.36	0.04	0.01	0.01	0.42	4.33			2	1	0.07	9.3	2.5	7.2	1.7	0.54	30.5	1500	140	
Indian Cr Mid	12/1/93	4	7.62	256	8.4	174	3	11	114	9	0.07	0.02		0.23	0.04	0.01	0.01	0.29	5.74			2	1	0.05	24	7.2	20	2.1	0.91	32	40	30	
Indian Cr Lower	12/1/93	2	7.25	101	8.8	83	2	2.6	46	1.7	0.04	0.02		0.27	0.04	0.01	0.09	0.41	5.24			2	1	0.04	11	3.2	6	2.2	0.4	23.1	930	40	
Indian Cr Upper	1/4/94	2	6.72	79	9.6	78	1	1.5	40	3.3	0.02	0.03		0.25	0.02	0.01	0.01	0.29	4.8			1	1	0.01	7.9	2	6.9	1.2	0.56	33.7	4600	30	
Indian Cr Mid	1/4/94	5.5	7.14	253	9	169	5	9.9	113	13	0.15	0.03		0.34	0.02	0.01	0.02	0.39	6			2	1	0.02	24	7.2	20	1.8	0.91	32.1	150	30	
Indian Cr Lower	1/4/94	4	7.32	136	7.9	103	5	2.6	66	2.4	0.12	0.03		0.29	0.02	0.01	0.15	0.47	4.5			1	1	0.01	15	4.6	7.8	1.6	0.45	22.5	1500	90	
Indian Cr Upper	2/1/94	1.2	7.2	82	8.6	72	1	1.3	42	3.5	0.03	0.01		0.2	0.02	0.01	0.01	0.24	7.94			1	1	0.01	7.9	1.9	7	1	0.57	34.5	230	40	
Indian Cr Mid	2/1/94	3.4	7.24	263	9.6	166	4	11	113	13	0.16	0.02		0.28	0.02	0.01	0.01	0.32	9.1			2	1	0.02	23	6.8	20	1.7	0.94	33.2	30	30	
Indian Cr Lower	2/1/94	0.9	7.17	152	8.5	105	2	3.3	73	2.4	0.05	0.02		0.22	0.02	0.01	0.12	0.37	7.38			1	1	0.01	16	4.8	8.2	1.6	0.46	22.4	40	30	
Indian Cr Upper	3/1/94	3.1	7.7	81	9.8	67	1	1	40	3.7	0.04	0.02		0.3	0.02	0.01	0.01	0.34	5.02			1	1	0.01	7.2	1.8	7.2	1.4	0.62	36.5	40	30	
Indian Cr Mid	3/1/94	6.4	7.94	131	8.7	91	3	4.5	52	9.7	0.12	0.04		0.3	0.02	0.01	0.02	0.35	8.29			1	1	0.02	10	2.9	9.6	1.6	0.68	34.9	40	30	
Indian Cr Lower	3/1/94	4.5	7.9	135	8.7	98	5	3.3	64	4.4	0.11	0.04		0.34	0.03	0.01	0.08	0.46	5.47			1	1	0.01	13	4.2	8.1	2	0.49	25.2	30	30	
Indian Cr Upper	4/5/94	6.7	6.98	99	8.9	76	1	0.9	45	2.9	0.02	0.01		0.19	0.02	0.01	0.01	0.23	3.25			1	1	0.05	8.5	2	7.9	1.4	0.63	35.5	30	30	
Indian Cr Mid	4/5/94	8	7.4	243	11.4	161	11	9.5	106	20	0.13	0.03		0.37	0.02	0.01	0.01	0.41	5.74			3	1	0.02	22	6.4	20	1.7	0.96	34.2	30	30	
Indian Cr Lower	4/5/94	5.2	7.67	132	9.1	97	9	2.9	62	3	0.03	0.02		0.16	0.02	0.01	0.03	0.22	3.56			1	1	0.04	14	4.4	7.6	2.1	0.45	22.8	40	30	
Indian Cr Upper	5/3/94	9.6	7.34	108	6.7	76	1	0.8	54	2.6	0.03	0.01		0.18	0.02	0.01	0.02	0.23	2.99	58	5	1	1	0.01	11	2.4	7.5	1.4	0.53	29.4	90	30	90
Indian Cr Mid	5/3/94	11.2	7.3	240	7.8	153	4	10	105	7.8	0.11	0.02		0.26	0.03	0.01	0.01	0.31	5.64	101	5	2	1	0.03	22	6.1	18	1.6	0.87	32.3	70	30	40
Indian Cr Lower	5/3/94	9.1	7.38	90	10.8	69	5	1.1	40	1.8	0.05	0.02		0.45	0.02	0.01	0.01	0.49	3.51	33	10	1	1	0.01	9	2.5	4.3	0.6	0.32	21.8	150	40	430
Indian Cr Upper	6/1/94	13.4	6.72	125	5.7	93	1	0.9	63	2.5	0.03	0.01		0.29	0.03	0.01	0.04	0.37	4.45			1	1	0.01	13	3.1	9.3	1.8	0.6	29.8	189	30	
Indian Cr Mid	6/1/94	14.9	7.03	149	7.8	108	2	3.6	75	3.6	0.08	0.02		0.42	0.03	0.01	0.01	0.47	5.21			1	1	0.03	16	4.2	10	1.8	0.57	26.7	2400	930	
Indian Cr Lower	6/1/94	13.2	7.29	118	8.15	81	1	1.6	56	1.6	0.05	0.01		0.34	0.04	0.01	0.01	0.4	4.78			1	1	0.02	13	3.6	6	1	0.37	21.2	230	230	
Indian Cr Mid	7/6/94	17.4	7.28	257	9.1	155	4	9.9	115	11	0.14	0.04		0.62	0.09	0.01	0.05	0.77	6.44			3	1	0.01	21	6.5	19	1.7	0.92	33.7	24000	24000	
Indian Cr Lower	7/6/94	11.8	7.57	130	9	84	1	2.2	61	1.5	0.06	0.02		0.25	0.01	0.01	0.01	0.28	4.39			1	1	0.01	12	3.7	6.4	1.2	0.41	22.9	150	70	
Indian Cr Mid	8/2/94	16.1	7.47	268	5.4	174	4	10	121	13	0.15	0.02		0.32	0.02	0.01	0.01	0.36	6.02			2	1	0.05	24	7.3	20	2	0.91	32	230	90	
Indian Cr Lower	8/2/94	15.2	7.54	160	5	98	1	2.8	68	3.1	0.09	0.04		0.38	0.02	0.01	0.01	0.42	4.47			1	1	0.01	15	4.4	7.2	1.5	0.41	21.4	430	90	
Indian Cr Mid	9/1/94	12.8	7.53	255	5.9	174	2	9.1	116	9	0.11	0.03		0.23	0.03	0.01	0.01	0.28	6.66			2	1	0.04	24	7.1	19	2.1	0.87	31	230	40	
Indian Cr Lower	9/1/94	13.3	7.6	143	5.55	101	2	2.8	68	3.2	0.05	0.03		0.08	0.02	0.01	0.01	0.12	5.19			1	1	0.01	15	4.4	7.5	1.7	0.43	22	150	150	
Indian Cr Mid	10/4/94	9.4	7.49	252	6.6	172	4	8.8	112	9.1	0.11	0.03		0.37	0.02	0.01	0.02	0.42	6.7			2	1	0.04	21	6.5	19	2	0.92	33.6	230	40	
Indian Cr Lower	10/4/94	8.6	7.27	169	6	121	14	3.8	77	4.5	0.08	0.04		0.36	0.02	0.01	0.01	0.4	5.5			1	1	0.01	16	4.8	8.3	2.7	0.46	22.2	150	90	
Indian Cr Mid	11/1/94	9.4	7.41	245	8.5	166	4	8.1	111	9.7	0.15	0.02		0.2	0.02	0.01	0.01	0.24	6.03	85	5	1	1	0.06	22	7	19	1.9	0.9	32.4	90	30	230
Indian Cr Lower	11/1/94	7.6	7.7	105	9.7	80	2	1.8	48	1.9	0.06	0.02		0.26	0.02	0.01	0.01	0.3	4.82	39	7	1	1	0.01	11	3	6.1	2.1	0.42	23.8	210	30	90
Indian Cr Upper	12/7/94	2.2	7.29	102	7.6	89	1	3.2	44	3.1	0.02	0.01		0.26	0.02	0.01	0.01	0.3	6.82			1	1	0.01	9.2	2.9	10	1.4	0.73	37.2	90	30	
Indian Cr Mid	12/7/94	4.3	7.55	247	7.9	160	4	8.4	106	12	0.12	0.02		0.17	0.03	0.01	0.03	0.24	6.91			1	1	0.04	21	6.6	18	1.8	0.87	32.3	90	30	

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total P	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Lower	12/7/94	3.5	8.1	98	9.6	77	7	2.1	44	1.5	0.06	0.02		0.23	0.02	0.01	0.01	0.27	6.1			1	1	0.02	9.1	2.7	5.3	1.6	0.39	24.3	430	30	
Indian Cr Upper	1/4/95	1.1	7.2	95	8.6	87	1	2.9	41	3.7	0.02	0.02		0.27	0.02	0.01	0.01	0.31	6.14			2	1	0.01	8.1	2	7.5	1.2	0.61	35.2	30	30	
Indian Cr Mid	1/4/95	3.5	7.33	243	8.4	160	6	8.4	111	18	0.14	0.01		0.39	0.02	0.01	0.03	0.45	6.36			3	1	0.03	24	7.2	19	1.7	0.87	31	30	30	
Indian Cr Lower	1/4/95	1.1	7.71	142	10.4	103	6	3.1	65	3	0.04	0.02		0.22	0.02	0.01	0.07	0.32	5.16			2	1	0.01	15	4.4	8	1.7	0.46	23.1	40	40	
Indian Cr Upper	1/31/95	4.1	8.56	101		74	1	2.5	28	6.6	0.05	0.02		0.36	0.02	0.01	0.05	0.44	6.38			1	2	0.01	5.4	1.5	5	1.5	0.49	33.5	90	30	
Indian Cr Mid	1/31/95	6.9	7.83	179		128	4	7.6	61	6.8	0.13	0.04		0.91	0.02	0.01	0.11	1.05	10			2	1	0.03	15	3.4	14	2.9	0.84	35.5	30	30	
Indian Cr Lower	1/31/95	7.8	7.98	157		119	5	5	64	5	0.09	0.03		0.54	0.02	0.01	0.1	0.67	8.19			1	1	0.02	14	4	8.8	2.4	0.53	26	140	40	
Indian Cr Upper	3/1/95	6	7.94	72	10.2	71	1	1.3	34	2.2	0.03	0.01		0.22	0.02	0.01	0.01	0.26	5.08			1	5	0.01	6.5	1.7	6.2	1.3	0.55	35.1	30	30	
Indian Cr Mid	3/1/95	7.6	7.94	160	11.2	114	2	6.6	62	3.5	0.12	0.04		0.82	0.02	0.01	0.1	0.95	7.93			2	1	0.02	15	2.8	12	3	0.74	33	30	30	
Indian Cr Lower	3/1/95	8	8.15	149	12.4	110	14	5.1	64	4.4	0.12	0.03		0.68	0.02	0.01	0.03	0.74	7.03			1	1	0.02	14	3.5	10	2.5	0.61	29.2	30	30	
Indian Cr Upper	4/4/95	4.2	7.21	63	10.9	65	1	0.8	30	2.4	0.02	0.01		0.2	0.02	0.01	0.01	0.24	4.83			1	1	0.01	6.6	1.7	4.9	1.1	0.43	30	90	30	
Indian Cr Mid	4/4/95	8.3	7.59	106	9	90	3	3.5	44	8.6	0.12	0.96		0.6	0.06	0.01	0.22	0.89	7.17			2	1	0.02	11	2.1	7.4	2.3	0.53	29.2	230	40	
Indian Cr Lower	4/4/95	8.6	7.67	114	9	92	10	3.6	48	7.2	0.13	0.05		0.55	0.04	0.01	0.15	0.75	6.83			2	1	0.02	12	2.8	7.4	2.3	0.49	26.6	430	40	
Indian Cr Upper	5/2/95	5.8	7.56	61	9.6	63	3	0.5	31	3.1	0.02	0.01		0.19	0.02	0.01	0.01	0.23	5.2	22	10	2	1	0.01	6.4	1.6	4.6	1	0.42	29.5	430	40	230
Indian Cr Mid	5/2/95	10.7	7.5	99	8.95	89	4	2.6	43	7.6	0.12	0.04		0.56	0.02	0.01	0.02	0.61	6.64	33	19	1	1	0.04	11	2.1	6.7	2.1	0.48	27.3	40	40	30
Indian Cr Lower	5/2/95	14.6	7.91	107	8.55	96	11	2.4	49	6.4	0.12	0.04		0.62	0.02	0.01	0.03	0.68	5.96	39	16	1	1	0.01	12	2.8	6.9	1.8	0.46	25.5	140	30	70
Indian Cr Upper	6/5/95	12.2	7.64	91	7.8	77	2	0.6	46	1.5	0.03	0.01		0.39	0.02	0.01	0.01	0.43	4.98			1	1	0.01	9.6	2.1	5.8	1.4	0.44	26.8	4600	1500	
Indian Cr Mid	6/5/95	15.2	6.88	250	8.1	168	3	11	104	7.6	0.11	0.04		0.26	0.02	0.01	0.04	0.33	8.09			1	1	0.03	22	6.4	18	1.8	0.86	31.9	430	230	
Indian Cr Lower	6/5/95	15.8	6.54	113	8.2	93	6	2	55	2.3	0.08	0.04		0.59	0.02	0.01	0.01	0.63	5.8			1	2	0.04	13	3.7	5.6	1	0.35	19.9	4600	930	
Indian Cr Upper	7/5/95	14.4	7.84	78	8.6	65	2	0.6	41	2.1	0.03	0.01		0.24	0.05	0.01	0.01	0.31	4.72			1	1	0.02	9.6	2.2	4.3	1.5	0.32	21.1	2100	430	
Indian Cr Mid	7/5/95	17.8	7.29	254	7.2	167	3	10	109	7.7	0.1	0.03		0.18	0.12	0.01	0.05	0.36	7.09			1	1	0.05	28	7.9	20	2.2	0.85	29.2	2100	2100	
Indian Cr Lower	7/5/95	15.8	7.3	104	7.65	85	5	1.2	50	1.8	0.06	0.02		0.51	0.02	0.01	0.02	0.56	5.74			1	1	0.02	7.5	2	2.2	1	0.18	14.5	4600	4600	
Indian Cr Upper	8/1/95	16.9	7.94	98	8.15	86	1	0.4	52	1.3	0.02	0.08		0.02	0.32	0.01	0.01	0.36	4.76			1	1	0.01	12	2.7	5.7	1.8	0.38	22.2	430	230	
Indian Cr Mid	8/1/95	15.2	7.4	251	7.45	172	2	9.7	112	6	0.08	0.03		0.2	0.03	0.01	0.03	0.27	6.5			1	3	0.04	26	7.6	19	1.9	0.84	29.5	930	230	
Indian Cr Lower	8/1/95	19.3	7.45	153	6.5	126	7	1.9	77	2.5	0.13	0.08		0.78	0.02	0.01	0.01	0.82	6.1			2	2	0.01	20	5.1	5.2	3.1	0.26	13.1	4600	4600	
Indian Cr Upper	9/6/95	14.7	7	120	7.8	98		1.9	61	1.4	0.04	0.03		0.36	0.04	0.01	0.03	0.44	4.43			1	1		12	2.4	7	1.7	0.48	26.6	150	90	
Indian Cr Mid	9/6/95	13	7.19	253	6.8	171	1	10	112	4.3	0.1	0.04		0.17	0.03	0.01	0.02	0.23	6.18			1	1		23	5.7	18	1.8	0.86	32	930	30	
Indian Cr Lower	9/6/95	12.5	7.09	138	7.5	115	4	1.7	70	2.9	0.15	0.06		0.95	0.03	0.01	0.01	1	5.12			1	1		15	3.5	6.3	2	0.38	20.1	11000	4600	
Indian Cr Upper	10/3/95	9.2	7.55	119	8	97	2	1.6	58	2.1	0.04	0.02		0.19	0.02	0.01	0.01	0.23	0.64			1	1	0.01	12	2.7	7.6	2.2	0.51	27.3	1500	430	
Indian Cr Mid	10/3/95	12.2	8.22	248	7.65	172	4	9.1	108	5.1	0.07	0.02		0.07	0.02	0.01	0.03	0.13	4.91			1	1	0.05	23	6.8	17	1.9	0.79	29.6	4600	4600	
Indian Cr Lower	10/3/95	9	6.78	141	8	104	10	2.4	69	3.6	0.07	0.03		0.31	0.03	0.01	0.04	0.39	2.74			1	2	0.01	15	4.3	6.9	1.3	0.4	20.9	430	90	
Indian Cr Upper	11/1/95	8	7.26	105	6.7	84		1.2	54	1.8	0.02	0.01		0.08	0.02	0.01	0.01	0.12	2.53	37	6	1	1	0.01	11	2.7	7.4	1.6	0.51	28.4	30	30	230
Indian Cr Mid	11/1/95	10.3	7.16	165	8.2	109	2	4.5	78	6	0.1	0.04		0.25	0.02	0.01	0.01	0.29	4.3	57	7	1	1	0.02	18	4.6	11	2.3	0.59	26.3	430	230	150
Indian Cr Lower	11/1/95	10.1	8.14	100	8.65	75	5	1.3	49	1.6	0.04	0.18		0.59	0.02	0.01	0.01	0.63	2.9	37	7	1	1	0.01	11	3.2	5.5	1.6	0.37	21.9	90	90	150
Indian Cr Upper	12/19/95	3.9	7.89	80	10.6	76	1	1.9	50	1.9	0.04	0.01		0.27	0.02	0.01	0.01	0.31	2.45			1	1	0.01	9.8	2.5	7.8	1.5	0.57	31.6	40	40	
Indian Cr Mid	12/19/95	4.4	7.26	237	8.4	157	2	9.3	104	6.4	0.08	0.02		0.19	0.04	0.01	0.11	0.35	7.22			1	1	0.03	11	6.5	17	2.1	1	39.4	150	150	
Indian Cr Lower	12/19/95	2.5	7.42	144	10.7	104	1	3.4	68	1.6	0.06	0.02		0.25	0.02	0.01	0.12	0.4	2.64			1	1	0.01	14	4.4	7.7	2.6	0.45	22.9	90	30	
Indian Cr Upper	1/2/96	4.3	7.38	100	10.6	71	3	9.1	48	1.9	0.03	0.01		0.16	0.05	0.01	0.01	0.23	2.45			1	1	0.01	10	3.8	8.7	2.8	0.59	30	230	30	
Indian Cr Mid	1/2/96	7.7	7.02	238	9.2	95	11	9.1	103	7.5	0.15	0.01		0.19	0.06	0.01	0.13	0.39	5.81			1	1	0.05	21	6.8	18	3.2	0.87	31.6	40	40	
Indian Cr Lower	1/2/96	4.7	7.54	140	10.8	91	1	2.7	68	1.9	0.03	0.01		0.12	0.04	0.01	0.1	0.27	2.27			1	1	0.01	14	4.4	7.5	1.9	0.44	22.7	4600	30	
Indian Cr Upper	2/6/96	2.4	7.11	59	9.9	64	7	1.2	28	8.6	0.07	0.04		0.31	0.02	0.01	0.04	0.38	4.71			2	1	0.01	5.7	1.7	3.8	1.6	0.35	26.2	2400	40	
Indian Cr Mid	2/6/96	4.5	7.36	94	11.4	77	20	1.6	43	6.1	0.09	0.01		0.65	0.02	0.01	0.06	0.74	3.37			2	1	0.02	11	2.2	6.2	2.4	0.44	25.4	230	40	
Indian Cr Lower	2/6/96	5.6	7.43	98	8.4	78	31	2	45	7.4	0.1	0.02		0.62	0.02	0.01	0.09	0.74	3.44			2	1	0.04	11	2.5	6.1	2.3	0.43	24.6	430	30	
Indian Cr Upper	3/6/96	2.4	7.17	66	8.8	66	3	1.3	33	3.1	0.03	0.01		0.27	0.02	0.01	0.01	0.31	2.76			2	1	0.01	6.1	1.8	4.7	1.2	0.42	29.7	30	30	
Indian Cr Mid	3/6/96	2.8	6.62	119	9.4	90	2	2.6	53	4.6	0.06	0.02		0.5	0.02	0.01	0.06	0.59	3.52			2	3	0.02	11	2.9	7.5	1.9	0.51	28	230	30	
Indian Cr Lower	3/6/96	3.7	7.07	127	9.6	100	3	2.7	62	3.5	0.06	0.02		0.44	0.02	0.01	0.12	0.59	2.8			1	1	0.01	13	4	7.2	1.8	0.44	23.4	430	30	
Indian Cr Upper	4/2/96	9.4	7.61	69	8.4	67	4	1	36	2.6	0.03	0.01		0.5	0.02	0.01	0.01	0.54	2.76			1	1	0.01	6.9	1.7	5.2	1	0.45	30.7	230	30	
Indian Cr Mid	4/2/96	5.5	7.3	84	9.65	71	3	1.5	41	3.4	0.04	0.03		0.2	0.02	0.01	0.02	0.25	2.84			1	1	0.01	8.5	2.2	5.8	1.1	0.45	28.4	70	30	
Indian Cr Lower	4/2/96	7.7	7.75	102	10	67	3	1.8	50	2.7	0.05	0.01		0.1	0.02	0.01	0.03	0.16	2.64			1	1	0.01	11	3	6.5	1.2	0.44	25.5	30	30	
Indian Cr Mid	5/1/96	16.4	7.65	139	8.3	92	10	3.8	65	5.5	0.07	0.05		0.28	0.02	0.01	0.05	0.36	3.52	51	7	2	1	0.03	17	4	9.8	1.8	0.55	25.8	430	230	90
Indian Cr Upper	5/7/96	15.2	7.72	89	6.6	67	3	1.2	45	2.3	0.03	0.01		0.35	0.02	0.01	0.01	0.39	2.99	31	8	1	1	0.01	11	2.4	7.2	1.4	0.51	28.6	930	40	1500

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total ?	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Lower	5/7/96	11.1	7.34	88	7.7	73	10	1	43	2.4	0.07	0.02		0.38	0.02	0.01	0.02	0.43	3.37	36	10	1	1	0.02	12	3.1	4.8	1.2	0.31	19.1	210	40	430
Indian Cr Upper	6/4/96	17.4	8.28	77	8.3	67	3	0.7	39	1.6	0.02	0.01		0.36	0.02	0.01	0.01	0.4	2.74			1	1	0.01	8.5	2	5	1.2	0.4	26	2400	430	
Indian Cr Mid	6/4/96	21.8	7.9	95	10.8	82	3	1.4	45	3.1	0.11	0.04		0.49	0.02	0.01	0.01	0.53	4.01			1	1	0.02	11	2.8	6	2.1	0.41	23.8	4600	430	
Indian Cr Lower	6/4/96	24.2	7.86	112	8.9	71	19	1.2	53	1.6	0.11	0.03		0.66	0.02	0.01	0.01	0.7	3.8			2	1	0.02	13	3.7	5.4	1.8	0.33	19	2400	2400	
Indian Cr Upper	7/9/96	17.5	7.36	106	8.4	92	1	0.7	54	1.9	0.02	0.01		0.24	0.02	0.01	0.01	0.28	2.58			1	1	0.01	12	2.6	5.9	1.7	0.4	23	390	230	
Indian Cr Mid	7/9/96	20.7	7.42	136	8.8	112	2	2.9	63	5	0.11	0.08		0.26	0.02	0.01	0.02	0.31	3.48			1	1	0.02	14	3.3	8.1	1.6	0.5	25.8	230	230	
Indian Cr Lower	7/9/96	18.4	6.99	144	7.7	130	14	1.9	70	3.3	0.11	0.05		0.54	0.02	0.01	0.01	0.58	3.48			1	1	0.02	16	4.2	6	2.1	0.34	17.9	930	230	
Indian Cr Upper	8/6/96	12.7	7.19	122	8.6	97	4	0.8	62	5.4	0.07	0.01		0.32	0.02	0.01	0.02	0.37	2.74			1	1	0.01	14	2.7	6.8	2.4	0.43	23.1	2100	230	
Indian Cr Mid	8/6/96	16.6	7.09	142	8.9	112	3	2.8	66	6.1	0.15	0.04		0.4	0.02	0.01	0.07	0.5	3.31			1	1	0.01	14	3.2	8.2	2.1	0.51	26	11000	930	
Indian Cr Lower	8/6/96	18.8	7.49	168	7.5	119	8	3.3	79	5.8	0.16	0.1		0.52	0.02	0.01	0.06	0.61	2.99			1	1	0.01	18	4.4	8.4	2.8	0.45	21.5	24000	4600	
Indian Cr Upper	9/11/96	13.8	7.36	159	5.2	112	2	1.3	80	3.4	0.04	0.01		0.22	0.02	0.01	0.02	0.27	2.56			1	1	0.02	16	3.8	9.9	2.3	0.57	26.9	11000	4600	
Indian Cr Mid	9/11/96	15.9	7.23	205	7.3	140	1	6.1	94	6.6	0.11	0.03		0.2	0.02	0.01	0.05	0.28	4.07			1	1	0.04	18	5.3	14	2.2	0.74	30.4	2400	150	
Indian Cr Lower	9/11/96	16.5	7.53	155	8	111	2	2.4	76	3.6	0.12	0.04		0.36	0.02	0.01	0.04	0.43	2.88			1	1	0.03	15	4.6	8.8	2.4	0.5	24.3	4600	90	
Indian Cr Upper	10/1/96	10.7	7.62	185	6.2	126	1	3.8	84	4.8	0.03	0.01		0.38	0.02	0.01	0.01	0.42	3.7			1	1	0.03	17	4.2	11	2.7	0.61	27.4	2400	230	
Indian Cr Mid	10/1/96	17.4	7.43	224	9.2	159	2	7.9	102	7.6	0.08	0.04		0.26	0.02	0.01	0.03	0.32	5.03			1	1	0.05	21	5.8	16	2.1	0.79	30.6	430	230	
Indian Cr Lower	10/1/96	12.4	7.59	166	8.3	128	2	2.9	83	3.5	0.07	0.02		0.46	0.02	0.01	0.01	0.5	3.01			1	1	0.03	17	5.1	8.7	2.4	0.47	22.1	930	90	
Indian Cr Upper	11/12/96	4.8	7.33	107	10.8	78	1	0.9	54	2.5	0.02	0.01		0.25	0.02	0.01	0.02	0.3	2.82	38	6	1	1	0.02	10	2.5	8.7	1.7	0.63	33.5	430	230	40
Indian Cr Mid	11/12/96	5.3	7.05	85	10.7	61	2	1.1	41	2.4	0.03	0.02		0.09	0.04	0.01	0.2	0.34	2.62	32	2	1	1	0.01	8.4	2.2	5.2	1.5	0.41	26.1	930	150	90
Indian Cr Lower	11/12/96	5.9	7.39	99	10.9	51	3	1.4	48	2.4	0.04	0.01		0.12	0.02	0.01	0.03	0.18	2.29	39	2	1	1	0.03	9.6	2.7	5.7	1.6	0.41	25	230	40	40
Indian Cr Upper	12/3/96	3.1	7.3	113	10.6	82	3	1.3	58	2.35	0.04	0.01		0.25	0.02	0.01	0.14	0.42	2.33			1	1	0.01	12	2.8	7.9	1.5	0.53	28.3	930	230	
Indian Cr Mid	12/3/96	1.4	6.37	83	11.1	68	5	1.3	39	2.9	0.04	0.02		0.2	0.02	0.01	0.03	0.26	2.97			1	1	0.01	8.5	2.2	4.6	1.4	0.36	23.8	930	40	
Indian Cr Lower	12/3/96	2	7.21	99		81	25	1.6	46	5	0.09	0.02		0.2	0.02	0.01	0.04	0.27	2.8			2	1	0.02	9.5	2.7	5.1	1.6	0.37	23.1	430	30	
Indian Cr Upper	1/7/97	2.1	6.74	58	12.8	65	3	0.8	29	6.1	0.04	0.01		0.24	0.02	0.01	0.05	0.32	3.74			1	1	0.02	6.2	1.5	4	1.2	0.37	27.3	230	30	
Indian Cr Mid	1/7/97	2.6	7.92	86	11.7	76	9	1.4	39	8.2	0.08	0.04		0.58	0.29	0.01	0.18	1.06	3.58			1	1	0.03	9.9	2	5.4	1.8	0.4	25	430	30	
Indian Cr Lower	1/7/97	2.4	7.36	91	10.8	74	11	1.6	42	8.6	0.09	0.03		0.51	0.26	0.01	0.2	0.98	3.39			3	1	0.03	10	2.3	5.7	1.9	0.42	25.1	230	30	
Indian Cr Upper	2/4/97	2.8	7.32	61	11.6	61	2	0.8	30	4	0.02	0.01		0.11	0.02	0.01	0.02	0.16	3.01			1	1	0.02	5.9	1.5	3.9	0.94	0.37	27.7	70	30	
Indian Cr Mid	2/4/97	2.8	7.23	83	12.2	64	2	1.7	38	5.9	0.05	0.04		0.24	0.09	0.01	0.15	0.49	3.25			1	1	0.02	8.2	1.9	5	1.2	0.4	26.7	200	40	
Indian Cr Lower	2/4/97	4.1	7.23	100	11	75	3	1.9	46	4.9	0.07	0.03		0.22	0.07	0.01	0.18	0.48	2.89			1	1	0.02	10	2.7	5.6	1.3	0.4	24.4	30	30	
Indian Cr Upper	3/4/97	0.6	7.08	73	13.8	60	1	1.1	37	2.7	0.02	0.01		0.05	0.02	0.01	0.02	0.1	2.55			1	1	0.01	8.2	1.9	5.5	1.2	0.44	28.6	40	30	
Indian Cr Mid	3/4/97	2.5	6.99	115	13	72	3	2.9	50	7	0.11	0.01		0.32	0.06	0.01	0.17	0.56	2.55			1	1	0.07	12	2.9	7.2	1.6	0.48	26.2	40	30	
Indian Cr Lower	3/4/97	3.5	7.32	125	14	88	2	2.9	58	4	0.06	0.02		0.16	0.02	0.01	0.09	0.28	2.56			1	1	0.02	13	3.7	6.7	1.6	0.42	22.6	140	30	
Indian Cr Upper	4/8/97	4.9	7.67	77	11	67	1	0.5	39	2.4	0.01	0.01		0.08	0.02	0.01	0.28	0.39	3.34			1	1	0.01	8	2	5.4	1.3	0.44	28.2	40	30	
Indian Cr Mid	4/8/97	9.1	7.38	164	13.9	119	2	5.7	70	7.4	0.12	0.04		0.15	0.02	0.01	0.17	0.35	6.2			1	1	0.02	15	4.1	11	1.6	0.64	29.8	40	30	
Indian Cr Lower	4/8/97	7.4	7.15	96	12.1	78	26	1.6	44	4.5	0.08	0.01		0.43	0.02	0.01	0.23	0.69	4.15			2	1	0.01	9.8	3	5	1.6	0.35	21.8	430	40	
Indian Cr Upper	5/6/97	9.6	7.42	86	9.2	78	3	0.7	45	3	0.05	0.01		0.2	0.02	0.01	0.03	0.26	4.4	34	12	1	1	0.01	8.9	2	4.8	1.2	0.37	24.6	4600	750	
Indian Cr Mid	5/6/97	13.4	7.29	199	6.4	142	16	7	85	14	0.19	0.03		0.55	0.02	0.01	0.04	0.62	9.58	68	23	4	1	0.05	18	5.3	14	2.2	0.74	30.4	2400	230	
Indian Cr Lower	5/6/97	14.3	7.01	99	8.6	81	7	1.6	48	2.7	0.09	0.02		0.81	0.02	0.01	0.05	0.89	5.13	42	14	2	1	0.04	10	3.1	4.8	1.2	0.33	21	4600	70	
Indian Cr Upper	6/3/97	13	6.99	88	7.9	74	9	0.5	46	4.3	0.04	0.01		0.45	0.02	0.01	0.01	0.49	4.25			1	1	0.01	10	2.6	6.2	1.9	0.45	26.1	1500	230	270
Indian Cr Mid	6/3/97	13.9	7.21	260	8.5	171	6	12	109	8.1	0.11	0.03		0.34	0.02	0.01	0.03	0.4	6.5			1	1	0.06	2.5	7.4	22	2.5	1.57	54.5	430	430	150
Indian Cr Lower	6/3/97	13.8	7.4	112	8.1	88	7	1	56	2.2	0.08	0.02		0.46	0.02	0.01	0.01	0.5	4.44			1	1	0.01	14	3.9	5.7	1.2	0.34	19.1	1500	1500	210
Indian Cr Upper	7/1/97	12.8	7.6	117	8.1	87	2	1	58	2.5	0.07	0.01		0.29	0.02	0.01	0.04	0.36	4.27			1	1	0.03	13	3.4	7.5	1.7	0.47	25.1	11000	4600	
Indian Cr Mid	7/1/97	14.2	7.36	268	7.65	174	4	11	108	7	0.21	0.02		0.26	0.03	0.01	0.05	0.35	4.15			1	1	0.06	25	7.6	22	2.3	0.98	33.1	11000	4600	
Indian Cr Lower	7/1/97	13.9	7.39	105	7	76	10	1.2	47	3.6	0.16	0.02		0.52	0.02	0.01	0.18	0.73	4.86			1	1	0.03	12	3.5	5.3	1.5	0.34	19.9	2400	430	
Indian Cr Upper	8/5/97	15.6	7.87	167	4.9	113	6	1	86	3.9	0.07	0.02		0.4	0.03	0.02	0.12	0.57	4.39			1	1	0.01	19	4.8	10	2.9	0.53	23.5	390	40	
Indian Cr Mid	8/5/97	17.6	7.54	256	5.9	172	8	11	111	5.9	0.08	0.02		0.17	0.02	0.02	0.06	0.27	6.23			1	1	0.03	23	7.4	21	2	0.97	33.5	930	30	
Indian Cr Lower	8/5/97	17.5	7.6	155	7.4	110	3	2.6	77	3.1	0.08	0.05		0.29	0.02	0.02	0.07	0.4	4.33			1	1	0.01	17	5.1	8.2	1.3	0.44	21.5	4600	30	
Indian Cr Upper	9/2/97	16.7	7.59	176	6.2	119	1	1.5	93	2.4	0.05	0.01		0.37	0.02	0.01	0.03	0.43	2.38			1	1	0.02	20	5.1	12	2.6	0.61	26	430	70	
Indian Cr Mid	9/2/97	15.7	7.43	254	6	170	43	11	110	9.1	0.12	0.03		0.39	0.02	0.01	0.04	0.46	5.32			1	1	0.06	24	7.4	21	2.3	0.96	32.8	750	750	
Indian Cr Lower	9/2/97	14.5	7.86	133	6.8	105	10	3.8	70	5.4	0.1	0.05		0.2	0.02	0.01	0.03	0.26	2.5			2	1	0.03	16	4.7	8.9	2.4	0.5	23.7	11000	430	
Indian Cr Upper	10/7/97	6.9	7.78	174	3.1	129	1	1.1	91	1.9	0.04	0.02		0.24	0.02	0.01	0.29	0.56	2.46			1	1	0.01	20	5.2	11	2	0.56	24.4	40	30	
Indian Cr Mid	10/7/97	9.8	7.52	251	7.1	169	5	10	110	3.9	0.07	0.03		0.13	0.02	0.01	0.39	0.55	5.11			1	1	0.03	25	7.5	19	2.2	0.85	30	30	30	

Location	Date	Temp	pH	EC	DO	TDS	SS	Cl	Alk	Turb	Total	PO4-P	TKN	Org-N	NH3-N	NO2-N	NO3-N	Total N	SO4	Hard	COD	BOD	O&G	Boron	Ca	Mg	Na	K	SAR	%Na	Total Coli	Fecal Coli	Fecal Strep
Indian Cr Lower	10/7/97	7.3	7.6	134	8.5	101	1	2.7	63	2	0.04	0.02		0.16	0.02	0.01	0.32	0.51	2.37			1	1	0.01	14	4.4	7.5	1.7	0.44	22.8	40	40	
Indian Cr Upper	11/5/97	9.6	7.77	139	6.6	104	1	0.6	73	1.4	0.03	0.01		0.2	0.02	0.01	0.34	0.57	2.75	56	6	1	19	0.01	16	4.1	9	1.9	0.51	24.8	230	90	40
Indian Cr Mid	11/5/97	12.6	7.5	219	9.1	145	2	9.3	91	3.4	0.09	0.04		0.16	0.02	0.01	0.29	0.48	7.98	75	5	1	1	0.04	20	6.2	16	2.4	0.8	30.7	150	30	30
Indian Cr Lower	11/5/97	8.1	7.44	74	8.5	76	2	1.4	45	1.5	0.05	0.02		0.2	0.02	0.01	0.17	0.4	2.69	39	5	1	1	0.02	9.6	3	5.3	1.6	0.38	23.1	210	40	30
Indian Cr Upper	12/2/97	3.5	7.35	110	9.65	79	128	1.1	56.1	18	0.27	0.01	0.95	0.92	0.03	0.01	0.02		2.79			2.02	1	0.02	14	3.1	7.2	1.5			230	30	
Indian Cr Mid	12/2/97	4.7	7.17	154	9.75	111	0.8	4.4	69.2	0.24	0.08	0.03	0.23	0.21	0.02	0.01	0.06		4.1			0.86	1	0.03	15	4.3	11	1.6			90	40	
Indian Cr Lower	12/2/97	1.7	7.29	92.7	10	69	1.8	1.4	43.9	0.79	0.03	0.01	0.17	0.17	0.02	0.01	0.01		2.66			1.14	1	0.01	9.7	2.9	4.8	1.4			2400	40	
Indian Cr Upper	1/6/98	0.8	7.51	100	10.5	83	3	0.9	54.2	2.1	0.03	0.01	0.2		0.02	0.01	0.1		2.59			1.28	1	0.01	9.91	2.55	6.9	1.34			230	30	
Indian Cr Mid	1/6/98	1.6	7.1	130	9.9	94	2.2	3.7	66.3	3.9	0.08	0.03	0.28		0.02	0.01	0.13		4.44			1.22	1	0.02	11.2	3.34	8.3	1.79			430	30	
Indian Cr Lower	1/6/98	0.1	6.85	99.8	10.4	82	3.6	1.8	47.6	2.4	0.05	0.01	0.31		0.02	0.01	0.1		2.64			1.47	1	0.05	9.4	2.81	5.6	1.61			30	30	
Indian Cr Upper	2/9/98	1.4	7.33	84.7	10.6	67	0.6	1.4	41.9	2.2	0.02	0.01	0.18		0.02	0.01	0.01		2.75			0.8	1	0.01	7.94	2.05	5.7	1.17			230	30	
Indian Cr Mid	2/9/98	1.4	7.39	83.8	11.6	64	3.4	2.6	36	3.3	0.03	0.02	0.13		0.02	0.01	0.02		2.8			0.88	1	0.01	7.74	2.14	4.6	1.37			90	30	
Indian Cr Lower	2/9/98	2.9	7.17	84.2	11	64	4.4	2.8	37.9	2.4	0.04	0.01	0.17		0.02	0.01	0.02		2.72			0.87	1	0.01	7.76	2.32	4.7	1.42			230	30	
Indian Cr Upper	3/3/98	1.6	7.18	81.9	10.7	67	4.2	2.5	39.3	2.1	0.02	0.01	0.2		0.02	0.01	0.01		2.49			1.29	1	0.02	7.85	2.1	6.1	1.16			150	30	
Indian Cr Mid	3/3/98	5.2	6.82	156	10	106	3.2	4.7	66.3	4.7	0.03	0.03	0.37		0.02	0.01	0.08		6.38			2.1	1	0.03	15.1	3.69	10	1.96			90	30	
Indian Cr Lower	3/3/98	4.3	7.21	117	10.8	95	19	3	57.2	3.5	0.12	0.02	0.44		0.02	0.01	0.06		2.9			1.46	1	0.02	11.9	3.61	7.6	1.78			40	40	
Indian Cr Upper	4/1/98	2.9	7.13	66.4	11.5	63	1.4	1	33.7	3.3	0.02	0.01	0.17		0.02	0.01	0.01		2.8			1.35	1	0.01	5.97	1.81	4.3	1.05			40	30	
Indian Cr Mid	4/1/98	2.5	7.01	80.7	11	70	3.4	1.7	37.9	4.5	0.04	0.02	0.22		0.02	0.01	0.04		2.77			1.27	1		7.23	2.11	5.2	1.23			230	230	
Indian Cr Lower	4/1/98	3	7.17	93.8	10.2	76	12	1.9	45.2	5.1	0.05	0.02	0.23		0.02	0.01	0.05		3.16			1.54	1	0.04	8.59	2.62	5.8	1.4			90	30	
Indian Cr Upper	5/5/98	8.3	7.48	90.6	6.8	80	1.2	0.6	34.1	1.7	0.02	0.01	0.29		0.02	0.01	0.01		2.54	32	5	0.86		0.01	9.31	2.24	5.7	1.09			390	30	230
Indian Cr Mid	5/5/98	9	7.16	115	8.9	98	2	2	38	2.7	0.06	0.03	0.34		0.02	0.01	0.01		2.9	41	5	1.05		0.02	11	2.79	7.8	1.57			930	90	90
Indian Cr Lower	5/5/98	8.7	7.07	114	8.1	95	10	2	45.6	2.3	0.08	0.03	0.72		0.02	0.01	0.01		3.25	43	5	1.38		0.02	11.5	3.27	6.4	1.63			1500	90	210
Indian Cr Upper	6/2/98	10.6	7.45	98.6	8	79	3.7	0.5	48.9	1.8	0.03	0.01	0.26		0.02	0.01	0.01		2.4			0.87	1	0.01	10	2.28	5.8	1.28			4600	2400	
Indian Cr Mid	6/2/98	12.4	6.9	118	8.3	97	4	1.7	56.5	2.9	0.08	0.04	0.38		0.02	0.01	0.02		2.84			1.1	1	0.01	11.6	2.43	7.4	1.69			750	430	
Indian Cr Lower	6/2/98	11	6.99	102	8.3	84	6.2	1.4	48	2.3	0.09	0.02	0.51		0.02	0.01	0.01		3.02			1.24	1	0.01	10.2	2.48	5.1	1.65			2400	2400	
Indian Cr Upper	7/14/98	13.5	7.76	107	9.1	86	2.4	0.7	54.4	1.95	0.04	0.02	0.3		0.02	0.01	0.01		3.01			0.96	1	0.01	11.9	3.1	5.2	1.96			230	230	
Indian Cr Mid	7/14/98	15.2	7.24	114	9.85	95	4	1.7	55.6	3	0.08	0.05	0.3		0.02	0.01	0.01		3.31			1.05	1	0.01	12.3	3.21	5.9	1.95			430	230	
Indian Cr Lower	7/14/98	15.2	7.1	110	7.35	99	15	1.3	55	4.2	0.13	0.05	0.66		0.02	0.01	0.01		4.37			1.68	1	0.01	13.1	3.62	4.5	2.11			2400	930	