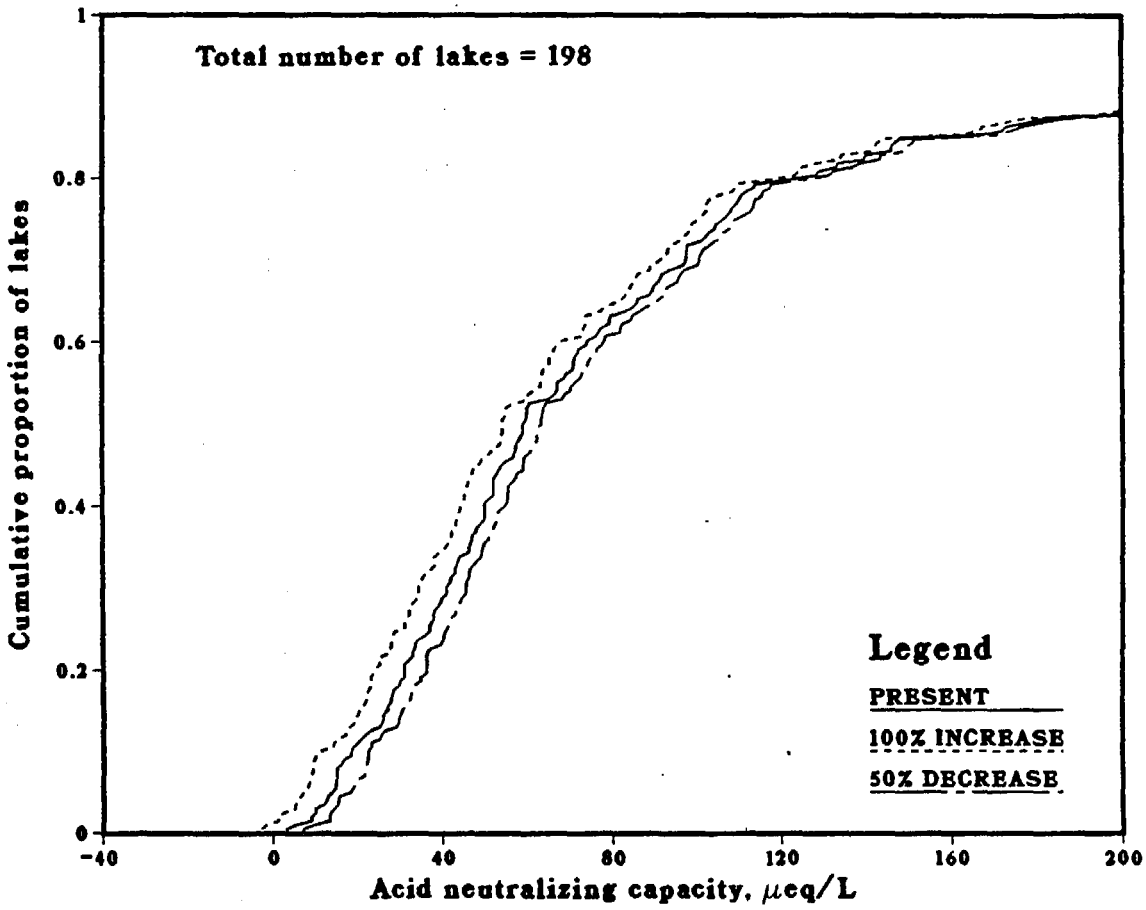

Figure 41. Predicted chemical condition of UI database lakes due to changes in ammonium nitrate and sulfuric acid loadings in a wet year using the steady state charge balance model (NH_4^+/NO_3^- = 1:1).

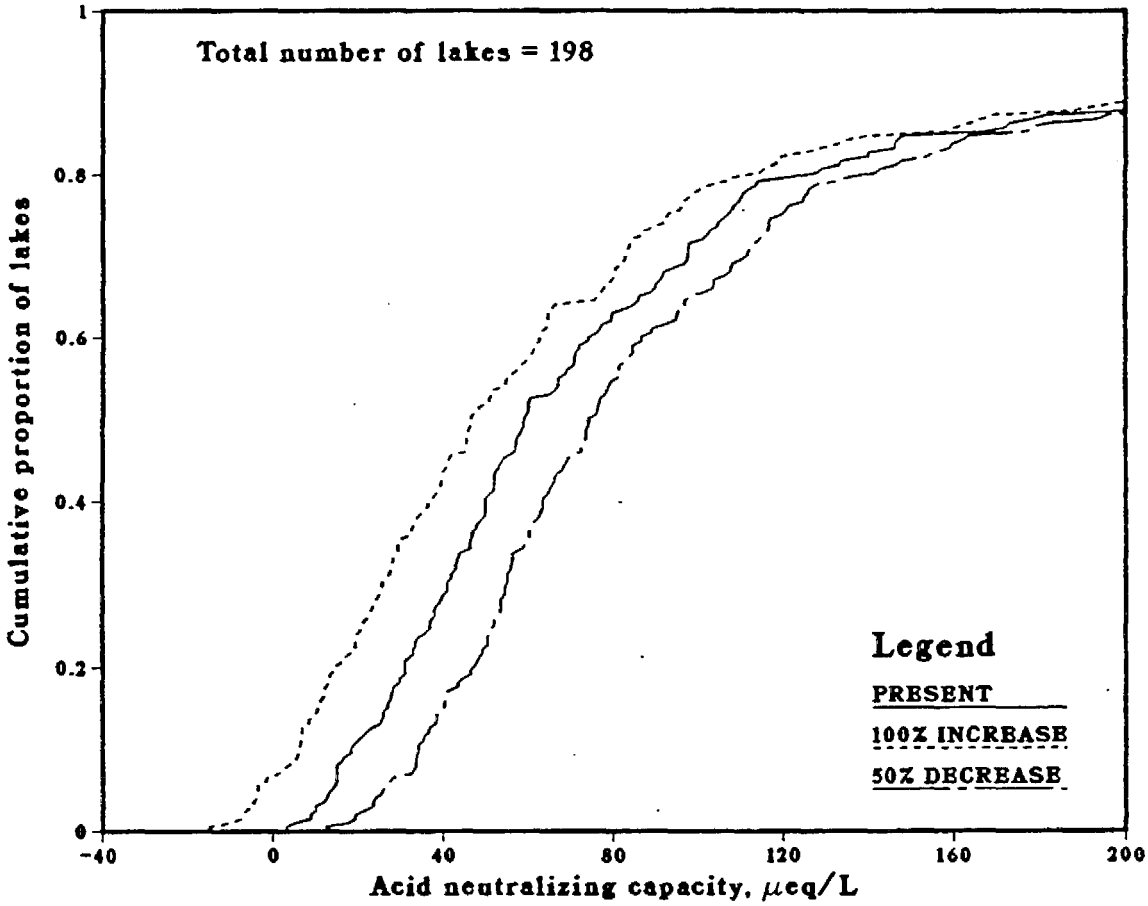

Figure 42. Steady state charge balance model predicted chemical condition of UI database lakes due to changes in sulfuric acid and ammonium nitrate loadings for NH_4^+/NO_3^- = 1.5:1.

assumption as sulfate also undergoes slight chemical and biological reduction in the watershed. Assuming that the lake sulfate concentration is the steady state concentration which leaves the watershed, the ratio of the lake sulfate concentration to that in the precipitation would be a measure of the evapoconcentration factor according to Equation 7. Calculated values less than 1.0 and greater than 3.5 were considered unreasonable. An average evapoconcentration factor of 2.0 was determined with a standard deviation of 0.6. The lake ANC values were calculated for values of E = 1.5 and 2.5 to check the sensitivity of this parameter.

The sulfuric acid scenario showed that this range produced a sensitivity in predicted ANC values of ±5% for double loadings and ±2% for half loadings. These results are shown in Appendix F, Figures 43 and 44, respectively. The ammonium nitrate scenario, as shown in Figures 45 and 46, resulted in a sensitivity of ±4% for double loadings and ±1% for half loadings. Lastly, the combined sulfuric acid and ammonium nitrate scenario showed a sensitivity of ±5% for double loadings and ±3% for half loadings. The plots for this analysis are shown in Figures 47 and 48.

A ±50% change in the Henriksen F-factor was also used in determining the sensitivity of the predicted ANC. Both scenarios which included sulfuric acid loadings showed little change in predicted ANC in response to this change. The sulfuric acid only scenario produced alkalinities which differed ±7% for double loadings (Figure 49) and ±2% for half loadings (Figure 50) from those calculated using an F-factor of 0.4. However, the sulfuric acid plus ammonium nitrate scenario showed only a ±3% change for double loadings (Figure 51) and ±2% for half loadings (Figure 52). Thus, it would seem that the evapoconcentration factor has a greater effect on the predicted ANC in the combined scenario while the Henriksen F-factor has the greater effect in the sulfuric acid only scenario.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

It has been reported that many parts of the world currently receive acid deposition. Many of those regions have shown the effects of such exposure by an increase in the number of acidic lakes and the loss of biota in such lakes. The Sierra Nevada in California is one of those regions that have been reported as sensitive and receiving low levels of acid deposition. The characteristics of watersheds and lake waters in the alpine zone are similar to those in other regions in the world that contain acidified lakes. This would indicate that the watersheds and lakes in this region might also be at risk to further inputs of acid deposition. There is evidence of episodic acidification in lakes and streams in the southern Sierra (Melack et al. 1987; Dozier et al. 1987).

The University of Iowa (UI) database was formed in order to provide a population of lakes in the Sierra Nevada that could be used to determine their present chemical condition and to determine what percentage of lakes that would be at risk should acid loadings increase. Results obtained from the manipulation of data in the UI database and the Environmental Protection Agency's Western Lake Survey can be used to scale-up and determine the population of lakes at risk to acidic deposition. Conclusions based on the analysis of this database are as follows:

1. There is a large percentage of sensitive lakes (ANC < 50 μeq/L) in the Sierra Nevada in California. There are currently no acid lakes. Relative to the eastern United

States, the amount of acid deposition is not great. Wet acid deposition is greater than dry deposition.

2. Henriksen's nomograph was not accurate in determining the present number of sensitive (ANC < 40 μeq/L) lakes. This indicates that the data used to empirically develop this model may not accurately describe lakes in the Sierra. It may also indicate that the amount of nitrogen sources of acid in deposition are substantial. The Henriksen nomograph only considers deposition of sulfate sources of acid. Regions which receive significant amounts of nitrogen deposition will not be accurately described by this model. Therefore, the use of Henriksen's nomograph as a predictive model in the Sierra Nevada is not advised.

3. The steady state charge balance model was developed as a means of predicting the percentage of sensitive and acid lakes that will result for changes in deposition loadings of sulfuric acid, ammonium nitrate, and a combination of both. These species were chosen by CARB after performing factor analysis on precipitation data collected at Emerald Lake and Giant Forest in Sequoia National Park. The results of steady state charge balance model are summarized in Table 8.

Sulfuric acid loadings at twice the current levels resulted in an increase in sensitive lakes (ANC < 40 μeq/L) of approximately seven percent. More importantly, 1% of the lakes showed ANC values less than zero. Loadings at half the current levels had a less dramatic result. The percentage of lakes in the sensitive category under this loading decreased only 3%.

The effect of increased ammonium nitrate deposition is smaller relative to increases in sulfuric acid deposition. Ammonium nitrate deposition results in an acidifying influence

Table 8. Percentage of sensitive lakes based on annual average deposition and fall lake chemistries in the Sierra Nevada for changes in loadings for different loading scenarios

Scenario	Percentage of Sensitive Lakes* 100% Increase	50% Decrease
Current	29 (0)	
H_2SO_4	35 (1)	26 (0)
NH_4NO_3 (NH_4^+/NO_3^- = 1:1)	31 (0)	27 (0)
NH_4NO_3 (NH_4^+/NO_3^- = 1.5:1)	39 (4)	18 (0)
H_2SO_4 plus NH_4NO_3 (NH_4^+/NO_3^- = 1:1)	37 (3)	23 (0)
H_2SO_4 plus NH_4NO_3 (NH_4^+/NO_3^- = 1.5:1)	43 (7)	15 (0)

*Percentage of acid lakes in parentheses.

because most all of the ammonium is taken up or nitrified in the watershed (an acidifying influence), while, on the average, 93 percent of nitrate is taken up or reduced (an alkalizing effect). The net result is slightly acidifying. The percentage of sensitive lakes increased only five percent with no lakes becoming acidic. A 50% decrease in loadings resulted in a decrease of 2% in the number of sensitive lakes for a 1:1 ratio of NH_4^+/NO_3^- in deposition. The model is sensitive to this ratio in deposition. It also does not take into account the effect of reductions in NH_3 emissions in the Central Valley that might allow nitric acid to be transported.

Combined changes in sulfuric acid and ammonium nitrate loadings have the greatest overall effect on lake chemistry. The number of sensitive lakes for a 100% increase in loadings rose nine percent with 3% of the lakes becoming acidic. Half the current loading levels resulted in a decrease of 6% of the number of sensitive lakes. Again, the ratio of NH_4^+/NO_3^- can become very important for values greater than 1.0.

The cases for wet and dry precipitation years were also studied. In the case for each of the three scenarios discussed, a greater number of lakes become sensitive for the case of a dry year as opposed to a wet year. This is due to the greater extent of concentration of acid-associated ions in the dry year.

Recommendations

1. Better quality data are required for a detailed uncertainty analysis to be performed. This includes improvements in wet and dry deposition chemistry, improved methods of extrapolating wet deposition chemistry and snow pack chemistry to lakes in the database, better prediction of future trends in NH_4^+/NO_3^- deposition, and improved values of the evapoconcentration factors at each lake.

2. Future episodic scenarios, as well as current events, must be considered with better event models. This could be possible with data from the four lake watersheds under intensive study in the southern Sierra. The 102 lakes from the EPA's Western Lake Survey may be an adequate source of data if inclusion probabilities are provided.

3. Snowmelt events are potentially more important in terms of acidification than summer deposition events. Many lakes experience low pH and low ANC, but current levels of acidic deposition are not sufficient to chronically acidify the systems. It would therefore be useful to include UCSB's snowmelt formulations in the event model as well.

4. The Air Resources Board should use this regional assessment to (1) estimate the resources at risk to chronic acidification, (2) devise a field program to provide better data for both episodic and chronic acidification models, (3) to use this kind of analysis as a basis for considering deposition standards, and (4) to establish source-receptor relationships in order to relate proposed emission standards to aquatic effects at sensitive receptors for future modeling efforts.

APPENDIX A

UI DATABASE LAKES AND THEIR LOCATIONS

Table 9. UI database lakes including thier location and elevation.

Lake name	WLS ID No.	Latitude	Longitude	Elev. (m)
From the Western Lake Survey (Landers et al. 1987)				
Noble Lake	4A1-001	38-31'40"N	119-46'35"W	2702
Lost Lake	4A1-003	38-13'49"N	119-38'51"W	2964
Leopold Lake	4A1-004	38-10'39"N	119-48'16"W	2696
(no name)	4A1-005	38-07'53"N	119-43'58"W	2550
(no name)	4A1-006	38-05'12"N	119-42'19"W	2720
Mary Lake	4A1-007	38-08'39"N	119-33'40"W	2940
(no name)	4A1-008	38-04'15"N	119-46'53"W	2232
Lake Vernon	4A1-009	38-00'50"N	119-43'22"W	1988
Hoover Lakes (NE)	4A1-012	38-03'27"N	119-17'50"W	2964
Roosevelt Lake	4A1-013	37-58'15"N	119-20'00"W	3106
Kidney Lake	4A1-014	37-53'50"N	119-11'45"W	3184
Bingaman Lake	4A1-015	37-50'45"N	119-14'45"W	3403
(no name)	4A1-016	37-42'15"N	119-17'15"W	3111
Nydiver Lakes (middle)	4A1-017	37-41'40"N	119-10'15"W	3086
Iceberg Lake	4A1-018	37-44'15"N	119-10'10"W	2989
Walton Lake	4A1-019	37-37'22"N	119-21'52"W	3159
Lake Wit-So-Nah-Pah	4A1-020	37-31'35"N	118-52'30"W	3233
Chief Lake	4A1-021	37-28'10"N	118-55'35"W	3202
Neil Lake	4A1-023	37-17'53"N	118-54'22"W	3240
Vee Lake	4A1-024	37-19'20"N	118-48'30"W	3404

Table 9 -- continued.

Lake name	WLS ID No.	Latitude	Longitude	Elev. (m)
(no name)	4A1-025	37-16'47"N	119-01'25"W	2816
Merriam Lake	4A1-026	37-17'45"N	118-45'30"W	3334
Wahoo Lakes (NW)	4A1-027	37-13'50"N	118-42'50"W	3446
Heather Lake	4A1-028	37-11'20"N	118-51'07"W	3063
(no name)	4A1-029	37-10'20"N	118-44'40"W	3263
Upper Lamarck Lake	4A1-030	37-12'35"N	118-39'00"W	3330
Big Pines Lakes (6th L.)	4A1-031	37-08'10"N	118-30'40"W	3382
(no name)	4A1-033	37-01'45"N	118-41'45"W	3251
(no name)	4A1-034	37-04'00"N	118-38'20"W	3715
(no name)	4A1-035	37-01'37"N	118-29'30"W	3521
Horseshoe Lakes (middle)	4A1-036	36-56'37"N	118-34'15"W	3208
Swamp Lakes (Western)	4A1-037	36-53'20"N	118-43'25"W	2916
(no name)	4A1-038	36-54'10"N	118-33'30"W	3257
(no name)	4A1-040	36-48'15"N	118-25'10"W	3355
(no name)	4A1-041	36-43'05"N	118-31'50"W	3184
(no name)	4A1-042	36-40'55"N	118-24'25"W	3574
(no name)	4A1-043	36-36'25"N	118-38'45"W	3281
(no name)	4A1-044	36-39'40"N	118-20'00"W	3330
(no name)	4A1-045	36-37'20"N	118-20'45"W	3525
(no name)	4A1-046	36-34'37"N	118-32'04"W	3379
(no name)	4A1-047	36-31'37"N	118-18'20"W	3550
Big Five Lakes (Sm. N.)	4A1-048	36-29'04"N	118-31'10"W	3111

Table 9 -- continued.

Lake name	WLS ID No.	Latitude	Longitude	Elev. (m)
Long Lake	4A1-049	36-29'15"N	118-31'32"W	3396
Lake Dorothy	4A1-051	37-32'20"N	118-52'55"W	3135
Big Pine Lakes (2nd L.)	4A1-052	37-07'25"N	118-29'13"W	3062
(no name)	4A1-053	36-48'40"N	118-25'49"W	3306
Horton Lake	4A1-054	37-19'00"N	118-40'00"W	3031
(no name)	4A1-055	38-05'10"N	119-40'34"W	2745
(no name)	4A1-056	37-08'40"N	118-39'50"W	3666
Cow Meadow Lake	4A1-058	38-08'35"N	119-44'10"W	2379
Vogelsang Lake	4A1-059	37-47'12"N	119-20'35"W	3154
Wright Lakes (NW)	4A1-060	36-38'11"N	118-22'00"W	3525
Smith Lake	4A2-007	39-43'56"N	120-40'20"W	1854
Goose Lake	4A2-008	39-40'22"N	120-38'07"W	2019
Upper Sardine Lake	4A2-009	39-36'30"N	120-38'00"W	1828
Blue Lake	4A2-015	39-21'28"N	120-37'52"W	1812
S.P. Lakes (SE)	4A2-016	39-18'10"N	120-33'35"W	1921
Forni Lake	4A2-022	38-57'17"N	120-15'42"W	2421
Lake Lois	4A2-023	38-55'00"N	120-12'00"W	2531
Dicks Lake	4A2-024	38-54'45"N	120-08'30"W	2568
Grouse Lake	4A2-025	38-51'28"N	120-11'54"W	2482
Lake Aloha	4A2-026	38-51'45"N	120-08'15"W	2475
Angora Lakes (SW)	4A2-027	38-51'45"N	120-04'00"W	2275
Ropi Lake	4A2-028	38-50'22"N	120-07'49"W	2324

Table 9 -- continued.

Lake name	WLS ID No.	Latitude	Longitude	Elev. (m)
Round Lake	4A2-029	38-45'00"N	120-00'17"W	2451
Frog Lake	4A2-030	38-41'16"N	119-59'05"W	2702
Lost Lakes (East)	4A2-031	38-38'45"N	119-56'42"W	2641
Summit Lake	4A2-033	38-36'15"N	119-52'15"W	2446
Summit Lake	4A2-034	38-26'00"N	119-58'20"W	2156
Star Lakes (North)	4A2-037	37-31'00"N	119-32'44"W	2428
Bare Island Lake	4A2-038	37-29'44"N	119-29'25"W	2550
Mirror Lake	4A2-040	37-12'52"N	119-07'25"W	2629
Little Lake	4A2-042	37-09'30"N	119-02'37"W	2810
Mud Lakes (Eastern)	4A2-043	37-06'37"N	119-04'18"W	2641
Little Spanish Lake	4A2-044	36-55'43"N	118-54'26"W	2598
Hockett Lakes (Center)	4A2-045	36-21'29"N	118-39'58"W	2598
Union Reservoir	4A2-052	38-25'55"N	119-59'30"W	2089
Duck Lake	4A2-053	36-59'32"N	118-53'30"W	2794
Chiquito Lake	4A2-054	37-32'08"N	119-26'10"W	2428
Emigrant Lake	4A2-056	38-39'38"N	120-02'15"W	2617
Long Lake	4A2-057	39-17'33"N	120-25'50"W	2019
Fontanillis Lake	4A2-058	38-55'12"N	120-09'05"W	2531
Long Lake	4A2-061	39-42'00"N	120-40'48"W	1999
Strawberry Lake	4A2-063	37-12'15"N	119-06'42"W	2739
Waca Lake	4A2-064	38-51'18"N	120-08'25"W	2495
Deerheart Lake	4A3-018	40-14'15"N	120-59'10"W	1927

Table 9. -- continued.

Lake name	WLS ID No.	Latitude	Longitude	Elev. (m)
Saucer Lake	4A3-020	40-03'02"N	121-20'52"W	1915
Saddle Lake	4A3-021	39-59'13"N	121-20'57"W	1842
Gold Lake	4A3-022	39-56'27"N	121-08'05"W	1818
Thompson Lake	4A3-023	39-52'39"N	121-11'58"W	1647
McKinstry Lake	4A3-031	39-02'30"N	120-19'50"W	2104
Azure Lake	4A3-032	38-55'16"N	120-07'25"W	2348
Grass Lake	4A3-034	38-52'22"N	120-06'40"W	2202
Shriner Lake	4A3-036	38-32'11"N	120-09'32"W	2092
Silver Lake	4A3-043	37-46'37"N	119-07'30"W	2203
Twin Lakes (North)	4A3-044	37-37'18"N	119-00'22"W	2623
Crystal Lake	4A3-045	37-35'35"N	119-01'02"W	2940
Nellie Lake	4A3-047	37-16'52"N	119-14'45"W	2714
Three Lakes (NW)	4A3-056	39-58'10"N	121-13'15"W	1866
Twin Lakes (South)	4A3-065	37-36'50"N	119-00'30"W	2623
Twin Lakes (NE)	4A3-066	38-10'00"N	119-20'00"W	2159
Independence Lake	4A3-069	39-26'30"N	120-16'30"W	2118
From Melack et al. (1985):				
Upper Treasure		37-23'13"N	118-46'00"W	3389
Dade		37-22'47"N	118-45'42"W	3511
Duck		37-33'00"N	118-57'38"W	3178

Table 9 -- continued.

Lake name	Latitude	Longitude	Elev. (m)
Barney	37-33'47"N	118-58'02"W	3097
Parker Pass	37-50'08"N	119-12'35"W	3316
Kuna	37-49'50"N	119-14'15"W	3536
Helen	37-49'55"N	119-13"37"W	3316
Dana	37-54'35"N	119-13'07"W	3365
Upper Granite	37-55'32"N	119-16'42"W	3170
Upper Gaylor	37-55'20"N	119-16'01"W	3121
Convict	37-55'30"N	118-51'25"W	2310
Dusy (South)	37-05'10"N	118-33'19"W	3292
Dusy	37-05'56"N	118-32'15"W	3473
Isosceles	37-05'47"N	118-32'49"W	3389
Dusy (North)	37-06'11"N	118-32'59"W	3438
Bishop Pass	37-06'48"N	118-32'28"W	3609
Upper Bishop	37-07'03"N	118-33'00"W	3333
Fifth	37-05'54"N	118-32'39"W	3424
Above Sam Mack	37-06'34"N	118-31'12"W	3731
Summit	37-26'00"N	118-46'11"W	3609
Needle	37-26'12"N	118-46'30"W	3438
Trail	37-26'30"N	118-46'22"W	3402
Fairy Shrimp	37-26'40"N	118-45'40"W	3517
Ruby	37-24'50"N	118-46'15"W	3365
Heather	36-36'02"N	118-41'15"W	2804

Table 9 -- continued.

Lake name	Latitude	Longitude	Elev. (m)
Pear	36-36'01"N	118-40'00"W	2899
Tableland	36-37'30"N	118-38'11"W	3261
Tablemeadow	36-36'33"N	118-39'05"W	3139
Mosquito 5	36-24'53"N	118-37'35"W	3048
Mosquito 3	36-25'09"N	118-37'16"W	2999
Mosquito 1	36-25'28"N	118-37'08"W	2926
Upper Columbine	36-27'49"N	118-33'41"W	3365
Columbine	36-27'41"N	118-33'35"W	3255
Upper Monarch	36-27'04"N	118-34'11"W	3292
Lower Monarch	36-27'10"N	118-34'24"W	3146
Granite	36-51'47"N	118-37'12"W	3097
Volcanic	36-52'26"N	118-37'50"W	3170
Dragon	36-48'04"N	118-23'06"W	3389
Gardiner (South)	36-48'24"N	118-26'38"W	3475
Gardiner	36-48'49"N	118-26'47"W	3473
Sixty (South)	36-48'04"N	118-25'55"W	3438
Findome	36-48'30"N	118-24'40"W	3414
Upper Rae	36-48'04"N	118-23'57"W	3524
Kearsarge	36-46'10"N	118-23'04"W	3365
Twin West	38-08'51"N	119-21'40"W	2162
Lundy	38-01'44"N	119-16'13"W	2390
Moat	38-03'24"N	119-16'42"W	3194

Table 9 -- continued.

Lake name	Latitude	Longitude	Elev. (m)
Upper Frog	38-02'38"N	119-17'20"W	3231
Ten	37-54'18"N	119-31'28"W	2634
Lower Cathedral	37-50'21"N	119-24'50"W	2902
Z	37-59'17"N	119-17'32"W	3146
Above Spuller	37-56'42"N	119-17'06"W	3146
Cecile	37-39'47"N	119-09'55"W	3152
Ediza	37-41'04"N	119-09'55"W	2853
Garnet	37-43'19"N	119-09'36"W	2975
Thousand Island	37-42'31"N	119-10'53"W	2997
Bright Dot	37-32'40"N	118-51'40"W	3194
Constance	37-30'55"N	118-52'02"W	3292
Upper Benchmark	36-34'06"N	118-18'29"W	3629
Arctic 6	36-35'14"N	118-17'44"W	3804
Arctic 4	36-35'10"N	118-18'00"W	3792
Arctic 2	36-34'58"N	118-18'29"W	3731
Fallen Leaf	38-54'00"N	120-03'55"W	1932
Cascade	38-56'25"N	120-05'30"W	1970
Crystal	36-26'30"N	118-34'11"W	3267
Gem	37-23'05"N	118-45'20"W	3438
Emerald	36-35'49"N	118-40'30"W	2800
Eastern Brook	37-25'51"N	118-44'28"W	3146

Table 9 -- continued.

Lake name	Latitude		Longitude		Elev. (m)
From California Department of Fish and Game (McCleneghan et al. 1987):					
Taylor	40-09'	N	120-43'	W	2060
Crystal	40-03'	N	120-53'	W	2036
Eureka	39-46"	N	120-44'	W	1884
Haven	39-39'	N	120-38'	W	2048
Secret	39-27'	N	120-32'	W	1951
Warren	39-21'	N	120-24'	W	2195
High Loch Leven	39-17'	N	120-30'	W	2073
Five (Lower)	39-10'	N	120-15'	W	2585
Lost	39-01'	N	120-11'	W	2341
Smith	38-51'	N	120-11'	W	2658
Ralston	38-50'	N	120-05'	W	2384
Winnemucca	38-40'	N	120-00'	W	2755
Granite	38-39'	N	120-05'	W	2341
Twin	38-36'	N	119-57'	W	2487
Highland (Lower)	38-29'	N	119-47'	W	2664
Gaylor (Lower)	37-55'	N	119-16'	W	3170
McCloud	37-37'	N	119-02'	W	2780
Serene	37-27'	N	118-45'	W	3146
Devil's Bathtub	37-26'	N	119-00'	W	2794
Long	37-18'	N	119-04'	W	2451
Crater	37-51'	N	119-00'	W	2877

Table 9 -- continued.

Lake name	Latitude		Longitude		Elev. (m)
Piute	37-14'	N	118-40'	W	3342
Summit	37-14'	N	118-41'	W	3414
Chocolate (Upper)	37-06'	N	118-33'	W	3200
Golden Trout	36-47'	N	118-22'	W	3462
Cottonwood No. 5	36-28'	N	118-14'	W	3354
Franklin (Lower)	36-25'	N	118-31'	W	3146
Bullfrog (Lower)	36-24'	N	118-31'	W	3365

APPENDIX B

UI DATABASE LAKE CHEMISTRIES

Table 10. Chemistry data for lakes in the UI database.
All concentrations in ueq/L.

Lake name	pH	[Ca]	[Mg]	[Na]
Noble Lake	7.51	118.40	116.00	68.90
Lost Lake	7.35	128.30	17.70	20.40
Leopold Lake	6.42	9.00	3.90	9.40
(no name)	6.23	12.70	5.60	10.20
(no name)	6.31	9.40	2.80	6.10
Mary Lake	6.87	43.60	7.40	30.40
(no name)	6.52	14.30	3.90	15.90
Lake Vernon	6.90	43.20	8.20	26.80
Hoover Lakes (NE)	7.61	493.30	29.60	60.00
Roosevelt Lake	6.79	25.50	2.50	18.60
Kidney Lake	6.86	85.90	19.50	19.40
Bingaman Lake	6.93	38.00	8.10	22.70
(no name)	6.60	36.10	4.40	11.20
Nydiver Lakes (Middle)	6.61	18.30	3.50	9.40
Iceberg Lake	6.62	22.60	2.10	7.10
Walton Lake	6.79	38.40	4.40	13.40
Lake Wit-So-Nah-Pah	7.62	387.30	14.50	13.00
Chief Lake	6.83	34.10	3.30	19.70
Neil Lake	6.80	29.60	5.40	18.30
Vee Lake	6.65	42.90	1.80	21.40
(no name)	7.01	37.90	10.00	23.80

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Merriam Lake	6.90	32.80	2.20	13.80
Wahoo Lakes (NW)	6.85	35.90	5.10	9.10
Heather Lake	7.39	25.90	4.90	11.60
(no name)	6.85	19.60	4.30	26.10
Upper Lamarck Lake	6.99	91.40	6.90	9.20
Big Pine Lakes(6th L.)	7.56	202.20	26.00	59.40
(no name)	6.73	29.10	3.10	7.30
(no name)	6.94	32.70	3.00	10.40
(no name)	6.81	62.90	5.30	10.30
Horseshoe Lakes (Middle)	7.10	48.70	7.90	22.00
Swamp Lakes (Western)	6.78	21.30	3.40	9.00
(no name)	7.26	67.40	10.40	25.10
(no name)	7.03	64.30	4.00	9.90
(no name)	7.02	45.60	4.40	13.40
(no name)	7.50	178.20	9.00	37.70
(no name)	6.46	15.40	2.00	5.10
(no name)	7.07	81.60	3.40	23.10
(no name)	7.27	70.30	7.90	26.70
(no name)	6.92	63.60	3.00	18.60
(no name)	7.11	33.50	3.50	22.00
Big Five Lakes (Small N)	7.34	84.50	13.10	49.10
Long Lake	7.36	43.00	10.30	45.50

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Lake Dorothy	7.35	191.90	10.70	18.70
Big Pine Lakes(2nd L.)	7.41	109.50	14.00	33.60
(no name)	7.23	78.10	3.80	10.80
Horton Lake	7.42	115.60	9.50	30.90
(no name)	6.67	20.60	5.70	16.00
(no name)	6.49	19.90	3.50	7.40
Cow Meadow Lake	7.03	33.20	9.70	18.10
Vogelsang Lake	6.94	31.80	4.40	18.30
Wright Lakes(NW)	7.23	72.40	9.00	29.50
Smith Lake	8.14	743.50	289.60	53.20
Goose Lake	6.99	19.70	19.50	23.60
Upper Sardine Lake	7.33	90.50	12.90	14.60
Blue Lake	7.16	39.60	14.10	22.30
S.P. Lakes (SE)	7.15	39.50	18.20	36.20
Forni Lake	6.52	21.00	5.60	30.00
Lake Lois	6.77	19.00	4.90	10.70
Dicks Lake	6.95	38.20	6.90	13.20
Grouse Lake	6.73	13.80	4.10	20.70
Lake Aloha	6.24	15.10	3.30	5.00
Angora Lakes (SW)	6.92	46.10	11.30	40.00
Ropi Lake	6.10	20.50	3.90	9.60
Round Lake	7.72	162.20	111.50	55.20

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Frog Lake	7.06	35.00	11.60	19.20
Lost Lakes (East)	7.34	126.90	26.90	15.60
Summit Lake	7.49	133.00	95.70	97.40
Summit Lake	7.24	36.00	13.80	54.60
Star Lakes (North)	7.06	37.40	8.00	39.50
Bare Island Lake	7.11	47.70	6.00	25.90
Mirror Lake	7.19	63.40	11.20	36.50
Little Lake	6.51	6.80	3.00	19.40
Mud Lakes (Eastern)	7.30	88.20	14.10	28.80
Little Spanish Lake	7.03	48.70	11.40	15.70
Hockett Lakes (Center)	7.03	45.30	12.90	34.80
Union Reservoir	7.17	49.60	17.40	33.60
Duck Lake	6.72	29.10	5.50	28.80
Chiquito Lake	7.06	51.90	12.20	55.00
Emigrant Lake	7.07	32.80	19.20	13.20
Long Lake	6.95	29.10	6.90	16.50
Fontanillis Lake	6.77	33.90	6.00	8.70
Long Lake	7.12	60.20	12.40	16.30
Strawberry Lake	7.27	48.20	19.70	36.10
Waca Lake	6.27	10.10	2.50	6.00
Deerheart Lake	7.35	106.00	56.80	43.50
Saucer Lake	7.56	104.40	67.90	42.90

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Saddle Lake	7.05	79.50	25.60	46.40
Gold Lake	7.28	56.60	26.00	27.90
Thompson Lake	7.02	27.00	9.90	35.70
McKinstry Lake	7.66	42.10	16.80	39.20
Azure Lake	6.93	25.20	6.20	11.90
Grass Lake	7.64	275.10	36.40	42.40
Shriner Lake	7.23	48.00	21.70	37.40
Silver Lake	7.92	199.00	31.90	54.40
Twin Lakes (North)	9.05	575.20	421.80	266.30
Crystal Lake	7.27	37.10	13.70	21.00
Nellie Lake	6.90	29.20	10.70	31.10
Three Lakes (NW)	7.23	80.00	40.60	72.70
Twin Lakes (South)	8.20	601.80	260.80	204.30
Twin Lakes (NE)	7.87	377.70	64.70	81.30
Independence Lake	7.65	213.70	93.90	70.30
Upper Treasure	6.40	24.80	2.50	6.70
Dade	6.20	30.00	2.50	8.00
Duck	7.10	89.50	10.10	31.90
Barney	9.40	549.00	9.60	97.30
Parker Pass	6.10	118.00	18.80	23.20
Kuna	6.30	14.70	3.60	6.80
Helen	7.20	53.00	12.90	34.40

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Dana	6.60	58.00	7.70	13.90
Upper Granite	7.20	56.00	7.30	25.60
Upper Gaylor	7.10	107.00	6.00	14.90
Convict	8.50	1240.00	34.30	63.20
Dusy (South)	7.60	116.00	4.10	64.00
Dusy	7.00	32.00	5.40	26.10
Isosceles	7.20	27.00	4.80	10.00
Dusy (North)	6.80	23.00	5.10	13.60
Bishop Pass	6.90	21.00	7.10	9.60
Upper Bishop	8.10	155.00	14.10	39.80
Fifth	7.50	60.00	9.70	20.80
Above Sam Mack	6.30	15.30	4.30	4.60
Summit	6.20	15.00	3.10	10.10
Needle	7.10	43.00	6.20	22.10
Trail	7.40	86.00	6.90	37.50
Fairy Shrimp	5.70	16.00	3.50	7.20
Ruby	5.90	46.00	5.30	17.50
Heather	6.40	23.00	5.30	17.50
Pear	6.40	15.00	2.60	5.30
Tableland	6.30	8.50	2.10	20.80
Tablemeadow	6.40	11.70	2.50	4.90
Mosquito 5	6.80	52.00	5.70	20.70

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Mosquito 3	6.60	44.00	5.90	9.90
Mosquito 1	6.80	60.00	9.20	25.70
Upper Columbine	7.10	38.00	2.40	15.00
Columbine	7.00	32.00	3.00	14.10
Upper Monarch	6.90	32.20	3.80	19.70
Lower Monarch	6.90	51.00	5.40	24.60
Granite	6.90	22.00	4.40	12.50
Volcanic	7.10	26.00	3.80	9.50
Dragon	7.70	100.00	10.00	14.00
Gardiner (South)	7.50	36.00	2.40	7.20
Gardiner	6.80	37.00	3.00	8.00
Sixty (South)	7.00	55.00	3.00	8.40
Findome	7.20	93.00	6.00	17.00
Upper Rae	7.80	159.00	10.00	40.00
Kearsarge	7.50	83.00	10.40	49.90
Twin West	8.30	308.00	45.00	80.00
Lundy	7.80	423.00	30.00	75.00
Moat	7.50	32.00	5.30	17.60
Upper Frog	8.20	675.00	30.00	70.00
Ten	6.30	22.00	5.00	16.00
Lower Cathedral	6.10	13.50	3.00	11.00
Z	7.20	33.50	4.50	11.00

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Above Spuller	6.50	33.00	9.90	10.00
Cecile	7.10	30.00	3.20	22.50
Ediza	7.00	42.00	4.00	22.30
Garnet	7.20	59.00	10.00	36.00
Thousand Island	7.00	33.00	5.10	11.10
Bright Dot	8.70	788.00	25.00	46.00
Constance	8.10	336.00	14.00	19.00
Upper Benchmark	6.90	7.00	87.00	39.00
Arctic 6	8.70	51.00	10.90	26.10
Arctic 4	7.20	42.00	5.70	20.70
Arctic 2	6.60	42.00	5.10	19.70
Fallen Leaf	6.80	137.00	24.50	47.60
Cascade	7.80	70.00	17.20	28.30
Crystal	7.00	43.00	3.90	13.00
Gem	6.50	38.00	3.90	15.40
Emerald	6.30	17.00	6.00	20.00
Eastern Brook	6.90	77.00	11.80	32.00
Taylor	7.20	97.30	25.70	52.70
Crystal	6.40	43.10	25.90	32.40
Eureka	6.40	28.40	17.50	31.40
Haven	6.40	28.60	27.90	26.70
Secret	6.60	60.20	20.30	29.20

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Warren	6.20	45.10	13.70	20.80
High Loch Leven	5.40	23.60	6.70	18.80
Five (Lower)	6.20	47.20	14.30	17.60
Lost	6.00	25.50	6.80	26.50
Smith	5.60	8.00	2.00	9.00
Ralston	5.60	15.00	2.30	7.80
Winnemucca	6.70	79.80	25.50	11.00
Granite	6.00	16.40	5.80	13.50
Twin	6.50	50.60	17.80	24.80
Highland (Lower)	7.80	196.00	29.90	33.80
Gaylor (Lower)	6.40	67.60	6.30	15.40
McCloud	6.20	19.00	8.20	18.70
Serene	6.50	39.50	11.60	31.00
Devil's Bathtub	6.20	21.70	5.50	28.10
Long	6.00	17.90	4.00	18.30
Crater	6.30	46.50	9.50	26.90
Piute	6.20	35.70	4.00	11.40
Summit	6.40	47.10	5.90	22.60
Chocolate (Upper)	6.80	127.00	16.90	32.10
Golden Trout	7.00	432.00	19.50	23.30
Cottonwood No. 5	6.40	72.80	8.70	35.40
Franklin (Lower)	6.80	146.00	6.70	22.00

Table 10 -- continued.

Lake name	pH	[Ca]	[Mg]	[Na]
Bullfrog (Lower)	6.60	98.30	6.60	20.30

Table 11. Chemistry data for lakes in the UI database (continued).
All concentrations in ueq/L.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Noble Lake	318.10	1.00	0.80	4.00
Lost Lake	167.70	7.50	0.00	1.40
Leopold Lake	16.20	7.20	1.50	3.50
(no name)	14.75	9.30	1.20	7.20
(no name)	15.10	4.70	0.80	2.00
Mary Lake	71.10	17.50	0.10	1.80
(no name)	28.60	3.10	0.00	3.00
Lake Vernon	57.25	14.00	0.40	13.00
Hoover Lakes (NE)	241.50	385.90	2.60	2.70
Roosevelt Lake	38.10	4.20	0.10	1.70
Kidney Lake	38.00	92.90	6.30	2.00
Bingaman Lake	67.20	3.90	0.00	1.30
(no name)	27.10	12.10	8.10	2.70
Nydiver Lakes (Middle)	26.00	5.20	1.20	2.30
Iceberg Lake	25.70	6.50	2.20	1.20
Walton Lake	34.40	8.50	9.50	5.60
Lake Wit-So-Nah-Pah	294.10	165.60	0.70	1.70
Chief Lake	58.45	5.10	0.00	1.10
Neil Lake	46.40	7.30	8.20	2.00
Vee Lake	67.10	4.00	0.00	1.40
(no name)	72.10	4.40	0.10	1.40

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Merriam Lake	49.90	5.00	0.40	1.50
Wahoo Lakes (NW)	53.40	5.20	3.50	1.10
Heather Lake	37.30	8.90	0.40	1.90
(no name)	46.95	3.40	0.20	1.40
Upper Lamarck Lake	110.10	6.70	3.30	1.50
Big Pine Lakes (6th L.)	237.80	68.60	0.50	2.60
(no name)	27.80	13.60	2.80	1.20
(no name)	35.90	9.70	4.30	1.50
(no name)	43.80	37.10	1.60	1.70
Horseshoe Lakes (Middle)	83.05	7.30	0.30	1.70
Swamp Lakes (Western)	33.60	4.10	0.50	1.60
(no name)	104.40	10.90	0.30	1.40
(no name)	79.50	9.20	0.50	0.90
(no name)	60.10	6.40	0.40	3.80
(no name)	178.20	45.70	0.00	1.10
(no name)	16.80	4.90	2.50	2.30
(no name)	101.30	11.20	0.00	1.00
(no name)	97.45	9.30	0.70	2.20
(no name)	52.10	31.10	4.10	2.30
(no name)	57.30	8.30	0.20	1.80
Big FiveLakes (Small N)	139.80	4.90	0.20	2.60
Long Lake	97.80	5.90	0.00	1.50

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Lake Dorothy	145.95	89.80	0.50	2.30
Big Pine Lakes(2nd L.)	133.50	32.30	5.10	3.10
(no name)	97.70	5.10	0.80	1.50
Horton Lake	139.50	23.80	2.20	2.80
(no name)	33.60	2.70	0.10	1.80
(no name)	14.90	7.20	10.30	1.60
Cow Meadow Lake	55.10	4.40	5.30	3.20
Vogelsang Lake	46.35	2.60	0.10	1.20
Wright Lakes(NW)	106.00	7.30	0.00	1.40
Smith Lake	1104.80	9.50	0.10	5.10
Goose Lake	60.55	3.50	0.30	6.90
Upper Sardine Lake	111.70	10.60	0.10	3.80
Blue Lake	66.40	12.40	0.10	7.90
S.P. Lakes (SE)	77.60	7.30	1.70	8.00
Forni Lake	46.50	4.10	0.10	5.60
Lake Lois	29.80	8.20	0.70	3.30
Dicks Lake	56.85	7.90	0.30	2.50
Grouse Lake	28.25	4.90	1.20	6.80
Lake Aloha	18.40	7.30	3.20	2.70
Angora Lakes (SW)	102.20	1.70	0.00	4.60
Ropi Lake	18.50	8.10	4.70	6.80
Round Lake	354.85	3.50	0.10	4.60

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Frog Lake	67.15	4.80	2.40	5.20
Lost Lakes (East)	172.00	1.60	0.00	0.80
Summit Lake	304.90	1.90	0.00	1.30
Summit Lake	109.50	2.20	1.60	7.70
Star Lakes (North)	79.90	4.50	0.20	2.00
Bare IslandLake	79.60	10.70	0.00	2.60
Mirror Lake	108.40	1.30	0.50	2.60
Little Lake	25.15	4.50	0.10	2.50
Mud Lakes (Eastern)	110.60	1.60	0.00	2.90
Little Spanish Lake	69.30	2.10	0.10	1.10
Hockett Lakes (Center)	68.80	3.70	0.00	2.60
Union Reservoir	96.70	3.90	3.30	6.20
Duck Lake	59.70	2.20	0.20	2.20
Chiquito Lake	91.60	1.00	0.10	3.10
Emigrant Lake	70.70	5.70	0.40	1.40
Long Lake	47.90	4.60	2.10	5.40
Fontanillis Lake	43.40	10.50	0.10	2.60
Long Lake	86.20	7.30	0.10	4.30
Strawberry Lake	104.70	1.80	0.00	2.30
Waca Lake	12.75	4.50	1.50	3.50
Deerheart Lake	204.20	0.20	0.10	3.50
Saucer Lake	210.15	0.80	0.30	4.30

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Saddle Lake	146.85	4.80	1.00	4.80
Gold Lake	113.60	3.10	0.10	5.40
Thompson Lake	77.00	0.80	1.70	5.90
McKinstry Lake	89.70	2.40	0.30	6.70
Azure Lake	39.70	5.20	0.80	4.00
Grass Lake	282.70	0.50	1.20	6.90
Shriner Lake	97.60	4.10	0.20	6.90
Silver Lake	233.70	41.30	0.10	19.90
Twin Lakes (North)	1242.05	55.20	0.10	8.40
Crystal Lake	76.20	7.00	0.10	2.00
Nellie Lake	74.30	2.20	0.00	3.50
Three Lakes (NW)	181.70	1.70	1.40	11.00
Twin Lakes (South)	1056.80	55.60	0.10	8.50
Twin Lakes (NE)	441.90	97.50	0.20	5.40
Independence Lake	393.90	3.00	0.20	4.50
Upper Treasure	19.00	10.00	3.80	6.00
Dade	22.00	13.00	7.50	11.00
Duck	103.00	20.00	0.80	6.00
Barney	403.00	155.00	1.20	14.00
Parker Pass	5.00	138.00	6.30	66.00
Kuna	15.00	14.00	3.30	7.00
Helen	52.00	40.00	0.70	20.00

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Dana	9.00	61.00	8.60	9.00
Upper Granite	74.00	12.00	0.40	18.00
Upper Gaylor	91.00	31.00	0.10	14.00
Convict	1137.00	242.00	0.10	34.00
Dusy (South)	146.00	32.00	2.50	23.00
Dusy	30.00	13.00	0.20	23.00
Isosceles	20.00	11.00	0.20	17.00
Dusy (North)	27.00	12.00	0.10	10.00
Bishop Pass	12.00	17.00	0.40	34.00
Upper Bishop	200.00	33.00	1.10	14.00
Fifth	60.00	20.00	2.10	3.00
Above Sam Mack	10.00	8.00	5.80	5.00
Summit	10.00	12.00	6.10	9.00
Needle	71.00	20.00	0.70	20.00
Trail	122.00	12.00	0.10	11.00
Fairy Shrimp	15.00	14.00	0.90	8.00
Ruby	52.00	10.00	0.90	3.00
Heather	52.00	9.00	0.00	7.00
Pear	31.00	8.00	0.10	13.00
Tableland	9.00	13.00	0.00	13.00
Tablemeadow	14.00	8.00	0.00	4.00
Mosquito 5	57.00	18.00	0.10	9.00

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Mosquito 3	44.00	22.00	0.10	2.00
Mosquito 1	71.00	14.00	0.10	8.00
Upper Columbine	50.00	7.00	0.00	5.00
Columbine	42.00	7.00	0.30	5.00
Upper Monarch	39.00	17.00	0.90	2.00
Lower Monarch	54.00	22.00	0.60	6.00
Granite	28.00	38.00	0.00	40.00
Volcanic	31.00	7.00	0.00	8.00
Dragon	65.00	56.00	0.00	17.00
Gardiner (South)	37.00	7.00	2.20	7.00
Gardiner	43.00	10.00	1.60	18.00
Sixty (South)	50.00	7.00	2.00	7.00
Findome	114.00	9.00	0.00	10.00
Upper Rae	133.00	96.00	0.10	38.00
Kearsarge	98.00	39.00	0.10	56.00
Twin West	372.00	68.00	0.20	14.00
Lundy	301.00	207.00	0.20	7.00
Moat	41.00	25.00	0.20	4.00
Upper Frog	393.00	386.00	0.90	12.00
Ten	42.00	1.00	0.00	5.00
Lower Cathedral	21.00	0.00	0.10	4.00
Z	26.00	18.00	0.00	9.00

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Above Spuller	48.00	16.00	2.70	7.00
Cecile	33.00	21.00	0.20	74.00
Ediza	43.00	13.00	1.30	8.00
Garnet	50.00	21.00	0.00	44.00
Thousand Island	37.00	3.00	0.00	6.00
Bright Dot	756.00	72.00	0.20	12.00
Constance	258.00	110.00	0.50	21.00
Upper Benchmark	129.00	19.00	3.10	6.00
Arctic 6	40.00	34.00	34.20	5.00
Arctic 4	59.00	27.00	18.70	6.00
Arctic 2	60.00	15.00	3.10	6.00
Fallen Leaf	173.00	37.00	0.00	14.00
Cascade	107.00	15.00	0.00	5.00
Crystal	50.00	32.00	0.00	5.00
Gem	38.00	19.00	7.00	2.00
Emerald	31.00	11.00	0.70	2.00
Eastern Brook	90.00	8.00	0.00	5.00
Taylor	148.00	37.00	3.80	4.00
Crystal	85.00	15.00	7.50	3.00
Eureka	49.00	20.00	0.80	2.00
Haven	58.00	19.00	1.20	4.00
Secret	52.00	89.00	6.30	7.00

Table 11. -- continued.

Lake name	[ANC]	[SO_4^{2-}]	[NO_3^-]	[Cl^-]
Warren	41.00	14.00	3.30	2.00
High Loch Leven	13.00	27.00	0.70	14.00
Five (Lower)	47.00	40.00	8.60	4.00
Lost	53.00	17.00	0.40	4.00
Smith	3.00	6.00	0.10	2.00
Ralston	15.00	6.00	0.10	1.00
Winnemucca	92.00	16.00	2.50	2.00
Granite	31.00	4.50	0.20	3.00
Twin	89.00	31.00	0.20	4.00
Highland (Lower)	213.00	64.00	0.10	1.00
Gaylor (Lower)	41.00	42.00	0.40	0.50
McCloud	23.00	10.00	1.10	3.00
Serene	59.00	25.50	2.10	5.00
Devil's Bathtub	51.00	10.00	5.80	2.00
Long	32.00	5.00	6.10	2.00
Crater	72.00	15.00	0.70	2.00
Piute	33.00	17.00	0.10	1.00
Summit	59.00	27.00	0.90	0.50
Chocolate (Upper)	128.00	50.00	0.90	0.50
Golden Trout	330.00	150.00	0.00	3.00
Cottonwood No. 5	94.00	14.00	0.10	4.00
Franklin (Lower)	108.00	46.00	0.00	2.00

Table 11. -- continued.

Lake name	[ANC]	$[SO_4^{2-}]$	$[NO_3^-]$	$[Cl^-]$
Bullfrog (Lower)	86.00	24.00	0.00	2.00

Table 12. Chemistry data for lakes in the UI database (continued) and the precipitation station assigned to each lake. All concentrations in ueq/L except for silica, mg/L.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Noble Lake	33.60	0.60	9.22	S. Lake Tahoe
Lost Lake	1.70	0.00	0.31	Yosemite
Leopold Lake	3.20	2.20	1.10	Yosemite
(no name)	3.70	0.80	1.30	Yosemite
(no name)	2.20	0.00	0.74	Yosemite
Mary Lake	5.60	0.00	2.27	Yosemite
(no name)	2.70	0.60	1.42	Yosemite
Lake Vernon	5.00	0.00	2.92	Yosemite
Hoover Lakes (NE)	10.50	0.00	4.81	Yosemite
Roosevelt Lake	2.30	0.00	2.51	Yosemite
Kidney Lake	9.90	0.00	3.69	Yosemite
Bingaman Lake	8.40	0.00	4.08	Yosemite
(no name)	3.20	0.00	1.96	Mammoth
Nydiver Lakes (Middle)	3.00	0.10	1.84	Mammoth
Iceberg Lake	2.30	0.10	0.51	Mammoth
Walton Lake	4.00	0.00	1.85	Mammoth
Lake Wit-So-Nah-Pah	8.00	0.00	5.18	Mammoth
Chief Lake	2.90	0.00	2.91	Mammoth
Neil Lake	6.30	0.00	3.16	Mammoth
Vee Lake	2.00	0.00	2.49	Mammoth
(no name)	5.00	0.70	0.97	Yosemite

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Merriam Lake	2.70	0.50	2.03	Mammoth
Wahoo Lakes (NW)	6.20	0.00	1.87	Mammoth
Heather Lake	4.20	0.00	1.70	Yosemite
(no name)	3.00	0.00	3.28	Mammoth
Upper Lamarck Lake	8.60	0.00	1.21	Mammoth
Big Pine Lakes(6th L.)	22.20	0.10	4.30	Mammoth
(no name)	2.70	0.90	1.63	Mammoth
(no name)	2.30	0.00	1.71	Mammoth
(no name)	3.50	0.40	1.59	Mammoth
Horseshoe Lakes (Middle)	5.80	0.40	3.30	Emerald
Swamp Lakes (Western)	2.70	0.60	1.52	Emerald
(no name)	5.70	0.40	2.52	Emerald
(no name)	2.90	0.40	1.77	Emerald
(no name)	3.20	0.40	1.36	Emerald
(no name)	2.70	0.40	3.90	Emerald
(no name)	2.50	0.40	1.03	Emerald
(no name)	3.40	0.40	1.41	Emerald
(no name)	3.80	0.10	3.96	Emerald
(no name)	1.60	0.00	1.60	Emerald
(no name)	3.40	0.20	3.24	Mammoth
Big Five Lakes (Small N)	6.00	0.80	5.65	Emerald
Long Lake	3.70	0.00	3.76	Mammoth

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Lake Dorothy	7.40	0.60	3.86	Mammoth
Big Pine Lakes(Second L.)	11.80	0.10	1.93	Mammoth
(no name)	3.60	0.30	1.33	Mammoth
Horton Lake	6.90	1.00	2.44	Mammoth
(no name)	3.90	0.00	8.34	Yosemite
(no name)	2.00	0.00	1.08	Mammoth
Cow Meadow Lake	2.70	1.10	0.43	Yosemite
Vogelsang Lake	2.90	0.00	2.87	Yosemite
Wright Lakes(NW)	3.20	0.00	6.06	Mammoth
Smith Lake	3.20	0.70	10.38	Soda Springs
Goose Lake	2.50	0.30	0.84	Soda Springs
Upper Sardine Lake	1.10	0.00	1.82	Soda Springs
Blue Lake	3.30	0.00	1.68	Soda Springs
S.P. Lakes (SE)	11.00	2.20	1.20	Soda Springs
Forni Lake	3.40	0.00	1.67	S. Lake Tahoe
Lake Lois	2.50	0.00	1.40	S. Lake Tahoe
Dicks Lake	4.50	0.10	1.67	S. Lake Tahoe
Grouse Lake	2.60	0.00	1.73	S. Lake Tahoe
Lake Aloha	2.60	1.10	0.65	S. Lake Tahoe
Angora Lakes (SW)	8.40	0.00	2.02	S. Lake Tahoe
Ropi Lake	4.00	0.00	1.00	S. Lake Tahoe
Round Lake	31.10	0.00	15.25	S. Lake Tahoe

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Frog Lake	10.10	0.00	0.42	S. Lake Tahoe
Lost Lakes (East)	2.40	0.60	0.21	S. Lake Tahoe
Summit Lake	6.00	0.70	0.22	S. Lake Tahoe
Summit Lake	25.00	0.50	8.02	Yosemite
Star Lakes (North)	2.70	0.60	3.01	Yosemite
Bare IslandLake	5.10	0.20	2.36	Yosemite
Mirror Lake	5.20	0.60	2.49	Yosemite
Little Lake	2.90	0.00	2.63	Yosemite
Mud Lakes (Eastern)	5.90	0.70	1.01	Yosemite
Little Spanish Lake	1.30	0.00	1.91	Giant Forest
Hockett Lakes (Center)	2.40	0.80	0.99	Giant Forest
Union Reservoir	6.30	0.00	2.35	Yosemite
Duck Lake	3.80	0.30	2.66	Yosemite
Chiquito Lake	4.30	0.00	0.22	Yosemite
Emigrant Lake	7.50	0.00	1.27	S. Lake Tahoe
Long Lake	4.60	0.00	0.93	Soda Springs
Fontanillis Lake	3.50	0.00	1.24	S. Lake Tahoe
Long Lake	1.50	0.00	1.32	Quincy
Strawberry Lake	4.30	0.40	2.64	Yosemite
Waca Lake	2.40	0.00	0.63	S. Lake Tahoe
Deerheary Lake	5.20	0.00	2.04	Quincy
Saucer Lake	4.40	0.70	0.64	Quincy

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Saddle Lake	5.80	0.90	2.56	Quincy
Gold Lake	6.20	0.00	3.90	Quincy
Thompson Lake	8.10	0.00	3.67	Quincy
McKinstry Lake	5.20	0.90	0.75	S. Lake Tahoe
Azure Lake	3.60	0.00	1.35	S. Lake Tahoe
Grass Lake	10.70	0.00	3.55	S. Lake Tahoe
Shriner Lake	7.60	0.80	2.09	S. Lake Tahoe
Silver Lake	10.70	0.00	5.50	Mammoth
Twin Lakes (North)	64.70	0.00	9.30	Mammoth
Crystal Lake	6.80	0.00	3.39	Mammoth
Nellie Lake	8.30	0.00	1.99	Yosemite
Three Lakes (NW)	22.40	7.10	8.67	Quincy
Twin Lakes (South)	64.10	0.00	30.00	Mammoth
Twin Lakes (NE)	15.60	0.00	5.08	Yosemite
Independence Lake	22.00	0.80	11.72	Soda Springs
Upper Treasure	4.00	0.60	1.70	Mammoth
Dade	8.90	0.00	1.25	Mammoth
Duck	8.40	2.20	0.93	Mammoth
Barney	13.00	0.80	5.97	Mammoth
Parker Pass	47.90	0.00	2.43	Yosemite
Kuna	4.80	0.00	1.31	Yosemite
Helen	9.30	0.60	4.15	Yosemite

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Dana	7.30	0.00	1.60	Yosemite
Upper Granite	16.50	0.00	2.30	Yosemite
Upper Gaylor	12.60	0.00	0.87	Yosemite
Convict	45.10	0.00	6.87	Mammoth
Dusy (South)	26.50	0.00	N/A	Mammoth
Dusy	12.10	0.00	N/A	Mammoth
Isosceles	8.60	0.10	N/A	Mammoth
Dusy (North)	9.90	0.10	N/A	Mammoth
Bishop Pass	27.20	0.00	N/A	Mammoth
Upper Bishop	20.30	0.00	4.46	Mammoth
Fifth	6.80	0.00	1.24	Mammoth
Above Sam Mack	3.30	0.00	0.65	Mammoth
Summit	5.40	0.00	1.24	Mammoth
Needle	33.10	0.70	N/A	Mammoth
Trail	14.20	0.50	2.82	Mammoth
Fairy Shrimp	4.00	0.00	N/A	Mammoth
Ruby	5.40	0.00	2.25	Mammoth
Heather	5.40	0.00	1.23	Emerald
Pear	8.30	0.00	0.48	Emerald
Tableland	3.60	0.10	1.27	Emerald
Tablemeadow	3.40	0.90	0.72	Emerald
Mosquito 5	6.20	0.00	2.49	Emerald

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Mosquito 3	1.80	0.40	1.11	Emerald
Mosquito 1	3.90	0.40	0.45	Emerald
Upper Columbine	2.30	0.60	1.27	Emerald
Columbine	3.00	0.40	1.00	Emerald
Upper Monarch	6.70	0.40	1.51	Emerald
Lower Monarch	6.70	0.40	2.04	Emerald
Granite	65.90	0.40	N/A	Emerald
Volcanic	5.20	0.40	1.30	Emerald
Dragon	19.00	0.40	N/A	Mammoth
Gardiner (South)	4.50	0.10	N/A	Mammoth
Gardiner	15.00	0.00	0.58	Mammoth
Sixty (South)	4.00	0.20	0.79	Mammoth
Findome	9.00	0.80	1.40	Mammoth
Upper Rae	43.00	0.00	1.78	Mammoth
Kearsarge	51.20	0.60	3.43	Mammoth
Twin West	19.00	0.10	4.19	Yosemite
Lundy	20.00	0.30	5.94	Yosemite
Moat	3.80	1.00	2.66	Yosemite
Upper Frog	16.00	0.00	4.36	Yosemite
Ten	2.00	0.00	1.43	Yosemite
Lower Cathedral	1.00	1.10	0.92	Yosemite
Z	8.00	0.00	2.41	Yosemite

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Above Spuller	10.00	0.00	N/A	Yosemite
Cecile	62.40	0.70	1.01	Mammoth
Ediza	5.80	0.30	6.00	Mammoth
Garnet	12.00	0.00	2.30	Mammoth
Thousand Island	3.20	0.00	N/A	Mammoth
Bright Dot	15.50	2.20	5.08	Mammoth
Constance	29.00	0.00	3.86	Mammoth
Upper Benchmark	5.00	0.00	4.79	Mammoth
Arctic 6	18.70	0.10	2.64	Mammoth
Arctic 4	19.20	0.00	N/A	Mammoth
Arctic 2	4.80	1.10	N/A	Mammoth
Fallen Leaf	12.30	0.00	3.04	S. Lake Tahoe
Cascade	8.70	0.00	N/A	S. Lake Tahoe
Crystal	2.20	0.00	N/A	Emerald
Gem	3.40	0.00	N/A	Mammoth
Emerald	6.70	0.60	1.20	Emerald
Eastern Brook	9.00	0.70	N/A	Mammoth
Taylor	6.10	0.60	3.06	Quincy
Crystal	5.30	0.00	1.14	Quincy
Eureka	2.30	2.20	2.82	Quincy
Haven	1.70	0.80	2.58	Quincy
Secret	1.40	0.00	3.18	Soda Springs

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Warren	6.10	0.00	4.08	Soda Springs
High Loch Leven	3.10	0.60	2.04	Soda Springs
Five (Lower)	3.40	0.00	3.84	Soda Springs
Lost	4.20	0.00	2.04	Soda Springs
Smith	1.50	0.00	1.26	S. Lake Tahoe
Ralston	2.30	0.00	1.08	S. Lake Tahoe
Winnemucca	4.60	0.00	1.44	S. Lake Tahoe
Granite	3.90	0.00	1.92	S. Lake Tahoe
Twin	9.80	0.10	3.36	S. Lake Tahoe
Highland (Lower)	0.90	0.10	3.42	Yosemite
Gaylor (Lower)	3.20	0.00	2.46	Yosemite
McCloud	5.40	0.00	3.72	Mammoth
Serene	12.30	0.00	2.04	Mammoth
Devil's Bathtub	5.30	0.00	4.50	Yosemite
Long	4.90	0.00	3.18	Yosemite
Crater	9.40	0.70	3.84	Yosemite
Piute	4.20	0.50	1.86	Mammoth
Summit	3.20	0.00	2.76	Mammoth
Chocolate (Upper)	12.10	0.00	3.96	Mammoth
Golden Trout	9.20	0.00	3.00	Mammoth
Cottonwood No. 5	7.10	0.00	5.22	Mammoth
Franklin (Lower)	5.40	0.10	3.30	Emerald

Table 12. -- continued.

Lake name	$[K^+]$	$[NH_4^+]$	$[SiO_2]$	Precip Station
Bullfrog (Lower)	4.60	0.90	3.24	Emerald

APPENDIX C

TOTAL DEPOSITION CHEMISTRY

Table 13. Total deposition chemistry (volume-weighted wet plus dry concentrations for the period 1984-1987) at the CARB precipitation stations. All concentrations in μeq/L.

Station	pH	$[Ca^{2+}]$	$[Mg^{2+}]$	$[Na^{+}]$	$[K^{+}]$
Emerald Lake	4.97	10.47	1.94	4.82	1.53
Giant Forest	5.23	4.02	1.45	4.12	0.54
Mammoth Mountain	5.20	7.82	1.82	3.57	0.72
Quincy	5.25	3.64	1.61	5.22	1.00
Soda Springs	5.31	2.98	1.22	4.12	0.59
South Lake Tahoe	5.25	5.51	1.71	4.13	1.06
Yosemite	5.31	4.97	2.18	5.63	1.07

Table 14. Total deposition chemistry at the CARB precipitation stations (continued). All concentrations in μeq/L.

Station	$[NH_4^{+}]$	$[SO_4^{2+}]$	$[NO_3^{-}]$	$[Cl^{-}]$
Emerald Lake	25.56	6.19	19.62	6.58
Giant Forest	13.86	6.17	10.88	5.15
Mammoth Mountain	13.65	4.07	11.24	3.77
Quincy	4.91	4.40	6.61	6.75
Soda Springs	4.66	3.71	5.98	5.01
South Lake Tahoe	6.14	5.84	8.32	4.75
Yosemite	9.76	6.54	10.44	6.48

APPENDIX D

UI DATABASE LAKES AND THEIR CALCULATED EVAPOCONCENTRATION FACTORS

Table 15. Calculation of the evapoconcentration factor using input and lake sulfate concentrations. Values not in the range 1.0 - 3.5 are assigned an average value of 2.0. All concentrations in ueq/L.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Noble Lake	1.0000	5.8400	2.0000
Lost Lake	7.5000	6.5400	1.1468
Leopold Lake	7.2000	6.5400	1.1009
(no name)	9.3000	6.5400	1.4220
(no name)	4.7000	6.5400	2.0000
Mary Lake	17.5000	6.5400	2.6758
(no name)	3.1000	6.5400	2.0000
Lake Vernon	14.0000	6.5400	2.1407
Hoover Lakes (NE)	385.9000	6.5400	2.0000
Roosevelt Lake	4.2000	6.5400	2.0000
Kidney Lake	92.9000	6.5400	2.0000
Bingaman Lake	3.9000	6.5400	2.0000
(no name)	12.1000	4.0700	2.9730
Nydiver Lakes (Middle)	5.2000	4.0700	1.2776
Iceberg Lake	6.5000	4.0700	1.5971
Walton Lake	8.5000	4.0700	2.0885
Lake Wit-So-Nah-Pah	165.6000	4.0700	2.0000
Chief Lake	5.1000	4.0700	1.2531
Neil Lake	7.3000	4.0700	1.7936
Vee Lake	4.0000	4.0700	2.0000

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
(no name)	4.4000	6.5400	2.0000
Merriam Lake	5.0000	4.0700	1.2285
Wahoo Lakes (NW)	5.2000	4.0700	1.2776
Heather Lake	8.9000	6.5400	1.3609
(no name)	3.4000	4.0700	2.0000
Upper Lamarck Lake	6.7000	4.0700	1.6462
Big Pine Lakes (6th L.)	68.6000	4.0700	2.0000
(no name)	13.6000	4.0700	3.3415
(no name)	9.7000	4.0700	2.3833
(no name)	37.1000	4.0700	2.0000
Horseshoe Lakes (Middle)	7.3000	6.1900	1.1793
Swamp Lakes (Western)	4.1000	6.1900	2.0000
(no name)	10.9000	6.1900	1.7609
(no name)	9.2000	6.1900	1.4863
(no name)	6.4000	6.1900	1.0339
(no name)	45.7000	6.1900	2.0000
(no name)	4.9000	6.1900	2.0000
(no name)	11.2000	6.1900	1.8094
(no name)	9.3000	6.1900	1.5024
(no name)	31.1000	6.1900	2.0000
(no name)	8.3000	4.0700	2.0393

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Big Five Lakes (Small N)	4.9000	6.1900	2.0000
Long Lake	5.9000	4.0700	1.4496
Lake Dorothy	89.8000	4.0700	2.0000
Big Pine Lakes (2nd L.)	32.3000	4.0700	2.0000
(no name)	5.1000	4.0700	1.2531
Horton Lake	23.8000	4.0700	2.0000
(no name)	2.7000	6.5400	2.0000
(no name)	7.2000	4.0700	1.7690
Cow Meadow Lake	4.4000	6.5400	2.0000
Vogelsang Lake	2.6000	6.5400	2.0000
Wright Lakes(NW)	7.3000	4.0700	1.7936
Smith Lake	9.5000	3.7100	2.5606
Goose Lake	3.5000	3.7100	2.0000
Upper Sardine Lake	10.6000	3.7100	2.8571
Blue Lake	12.4000	3.7100	3.3423
S.P. Lakes (SE)	7.3000	3.7100	1.9677
Forni Lake	4.1000	5.8400	2.0000
Lake Lois	8.2000	5.8400	1.4041
Dicks Lake	7.9000	5.8400	1.3527
Grouse Lake	4.9000	5.8400	2.0000
Lake Aloha	7.3000	5.8400	1.2500

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Angora Lakes (SW)	1.7000	5.8400	2.0000
Ropi Lake	8.1000	5.8400	1.3870
Round Lake	3.5000	5.8400	2.0000
Frog Lake	4.8000	5.8400	2.0000
Lost Lakes (East)	1.6000	5.8400	2.0000
Summit Lake	1.9000	5.8400	2.0000
Summit Lake	2.2000	6.5400	2.0000
Star Lakes (North)	4.5000	6.5400	2.0000
Bare Island Lake	10.7000	6.5400	1.6361
Mirror Lake	1.3000	6.5400	2.0000
Little Lake	4.5000	6.5400	2.0000
Mud Lakes (Eastern)	1.6000	6.5400	2.0000
Little Spanish Lake	2.1000	6.1700	2.0000
Hockett Lakes (Center)	3.7000	6.1700	2.0000
Union Reservoir	3.9000	6.5400	2.0000
Duck Lake	2.2000	6.5400	2.0000
Chiquito Lake	1.0000	6.5400	2.0000
Emigrant Lake	5.7000	5.8400	2.0000
Long Lake	4.6000	3.7100	1.2399
Fontanillis Lake	10.5000	5.8400	1.7979
Long Lake	7.3000	4.4000	1.6591

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Strawberry Lake	1.8000	6.5400	2.0000
Waca Lake	4.5000	5.8400	2.0000
Deerheart Lake	0.2000	4.4000	2.0000
Saucer Lake	0.8000	4.4000	2.0000
Saddle Lake	4.8000	4.4000	1.0909
Gold Lake	3.1000	4.4000	2.0000
Thompson Lake	0.8000	4.4000	2.0000
McKinstry Lake	2.4000	5.8400	2.0000
Azure Lake	5.2000	5.8400	2.0000
Grass Lake	80.5000	5.8400	2.0000
Shriner Lake	4.1000	5.8400	2.0000
Silver Lake	41.3000	4.0700	2.0000
Twin Lakes (North)	55.2000	4.0700	2.0000
Crystal Lake	7.0000	4.0700	1.7199
Nellie Lake	2.2000	6.5400	2.0000
Three Lakes (NW)	1.7000	4.4000	2.0000
Twin Lakes (South)	55.6000	4.0700	2.0000
Twin Lakes (NE)	97.5000	6.5400	2.0000
Independence Lake	3.0000	3.7100	2.0000
Upper Treasure	10.0000	4.0700	2.4570
Dade	13.0000	4.0700	3.1941

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Duck	20.0000	4.0700	2.0000
Barney	155.0000	4.0700	2.0000
Parker Pass	138.0000	6.5400	2.0000
Kuna	14.0000	6.5400	2.1407
Helen	40.0000	6.5400	2.0000
Dana	61.0000	6.5400	2.0000
Upper Granite	12.0000	6.5400	1.8349
Upper Gaylor	31.0000	6.5400	2.0000
Convict	242.0000	4.0700	2.0000
Dusy (South)	32.0000	4.0700	2.0000
Dusy	13.0000	4.0700	3.1941
Isosceles	11.0000	4.0700	2.7027
Dusy (North)	12.0000	4.0700	2.9484
Bishops Pass	17.0000	4.0700	2.0000
Upper Bishop	33.0000	4.0700	2.0000
Fifth	20.0000	4.0700	2.0000
Above Sam Mack	8.0000	4.0700	1.9656
Summit	12.0000	4.0700	2.9484
Needle	20.0000	4.0700	2.0000
Trail	12.0000	4.0700	2.9484
Fairy Shrimp	14.0000	4.0700	3.4398

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Ruby	10.0000	4.0700	2.4570
Heather	9.0000	6.1900	1.4540
Pear	8.0000	6.1900	1.2924
Tableland	13.0000	6.1900	2.1002
Tablemeadow	8.0000	6.1900	1.2924
Mosquito 5	18.0000	6.1900	2.9079
Mosquito 3	22.0000	6.1900	2.0000
Mosquito 1	14.0000	6.1900	2.2617
Upper Columbine	7.0000	6.1900	1.1309
Columbine	7.0000	6.1900	1.1309
Upper Monarch	17.0000	6.1900	2.7464
Lower Monarch	22.0000	6.1900	2.0000
Granite	38.0000	6.1900	2.0000
Volcanic	7.0000	6.1900	1.1309
Dragon	56.0000	4.0700	2.0000
Gradiner (South)	7.0000	4.0700	1.7199
Gardiner	10.0000	4.0700	2.4570
Sixty (South)	7.0000	4.0700	1.7199
Findome	9.0000	4.0700	2.2113
Upper Rae	96.0000	4.0700	2.0000
Kearsarge	39.0000	4.0700	2.0000

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Twin West	68.0000	6.5400	2.0000
Lundy	207.0000	6.5400	2.0000
Moat	25.0000	6.5400	2.0000
Upper Frog	386.0000	6.5400	2.0000
Ten	1.0000	6.5400	2.0000
Lower Cathedral	0.0000	6.5400	2.0000
Z	18.0000	6.5400	2.7523
Above Spuller	16.0000	6.5400	2.4465
Cecile	21.0000	4.0700	2.0000
Ediza	13.0000	4.0700	3.1941
Garnet	21.0000	4.0700	2.0000
Thousand Island	3.0000	4.0700	2.0000
Bright Dot	72.0000	4.0700	2.0000
Constance	110.0000	4.0700	2.0000
Upper Benchmark	19.0000	4.0700	2.0000
Arctic 6	34.0000	4.0700	2.0000
Arctic 4	27.0000	4.0700	2.0000
Arctic 2	15.0000	4.0700	2.0000
Fallen Leaf	37.0000	5.8400	2.0000
Cascade	15.0000	5.8400	2.5685
Crystal	32.0000	6.1900	2.0000

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Gem	19.0000	4.0700	2.0000
Emerald	11.0000	6.1900	1.7771
Eastern Brook	8.0000	4.0700	1.9656
Taylor	37.0000	4.4000	2.0000
Crystal	15.0000	4.4000	3.4091
Eureka	20.0000	4.4000	2.0000
Haven	19.0000	4.4000	2.0000
Secret	89.0000	3.7100	2.0000
Warren	14.0000	3.7100	2.0000
High Loch Leven	27.0000	3.7100	2.0000
Five (Lower)	40.0000	3.7100	2.0000
Lost	17.0000	3.7100	2.0000
Smith	6.0000	5.8400	1.0274
Ralston	6.0000	5.8400	1.0274
Winnemucca	16.0000	5.8400	2.7397
Granite	4.5000	5.8400	2.0000
Twin	31.0000	5.8400	2.0000
Highland (Lower)	64.0000	6.5400	2.0000
Gaylor (Lower)	42.0000	6.5400	2.0000
McCloud	10.0000	4.0700	2.4570
Serent	25.5000	4.0700	2.0000

Table 15. -- continued.

Lake name	Lake $[SO_4^{2-}]$	Deposition $[SO_4^{2-}]$	E
Devil's Bathtub	10.0000	6.5400	1.5291
Long	5.0000	6.5400	2.0000
Crater	15.0000	6.5400	2.2936
Piute	17.0000	4.0700	2.0000
Summit	27.0000	4.0700	2.0000
Chocolate (Upper)	50.0000	4.0700	2.0000
Golden Trout	150.0000	4.0700	2.0000
Cottonwood No. 5	14.0000	4.0700	3.4398
Franklin (Lower)	46.0000	6.1900	2.0000
Bullfrog (Lower)	24.0000	6.1900	2.0000

Table 16. Evapoconcentration factors for Western Lake Survey Lakes using hydologic data. Values not in the range 1.0 - 3.5 are assigned an average value of 2.0.

Lake Name	Precip (m/yr)	Surface Water Runoff (m/yr)	E
Noble Lake	1.0948	0.5080	2.1551
Lost Lake	1.6164	1.0160	1.5909
Leopold Lake	1.4386	0.5080	2.8319
(no name)	1.6018	0.5080	3.1531
(no name)	1.6018	0.5080	3.1531
Mary Lake	1.7431	1.0160	1.7156
(no name)	1.3834	0.2540	2.0000
Lake Vernon	1.3154	0.2540	2.0000
Hoover Lakes (NE)	0.6985	0.2540	2.7500
Roosevelt Lake	0.9013	0.5080	1.7742
Kidney Lake	0.6057	0.2540	2.3846
Bingaman Lake	1.0695	0.5080	2.1053
(no name)	1.1793	0.5080	2.3215
Nydiver Lakes (Middle)	0.9525	0.5080	1.8750
Iceberg Lake	1.1043	0.5080	2.1738
Walton Lake	1.1899	0.5080	2.3423
Lake Wit-So-Nah-Pah	0.7389	0.2540	2.9091
Chief Lake	0.8393	0.5080	1.6522
Neil Lake	0.6350	0.5080	1.2500
Vee Lake	0.7193	0.5080	1.4159
(no name)	0.8120	0.5080	1.5984
Merriam Lake	0.8250	0.5080	1.6240

Table 16. -- continued.

Lake Name	Precip (m/yr)	Surface Water Runoff (m/yr)	E
Wahoo Lakes (NW)	0.8835	0.5080	1.7392
Heather Lake	1.0325	0.5080	2.0325
(no name)	1.0826	0.5080	2.1311
Upper Lamarck Lake	0.6927	0.5080	1.3636
Big Pine Lakes(6th L.)	0.4119	0.2540	1.6217
(no name)	1.0978	0.5080	2.1610
(no name)	0.9118	0.5080	1.7949
(no name)	0.7030	0.2540	2.7677
Horseshoe Lakes (Middle)	0.9277	0.5080	1.8262
Swamp Lakes (Western)	0.9525	0.5080	1.8750
(no name)	0.9277	0.5080	1.8262
(no name)	0.7484	0.5080	1.4732
(no name)	0.8614	0.5080	1.6957
(no name)	0.8164	0.5080	1.6071
(no name)	1.1441	0.2540	2.0000
(no name)	0.8467	0.5080	1.6667
(no name)	0.7551	0.5080	1.4864
(no name)	1.1899	0.5080	2.3423
(no name)	0.7103	0.5080	1.3982
Big Five Lakes (Small N)	1.2579	0.2540	2.0000
Long Lake	0.6003	0.2540	2.3634
Lake Dorothy	0.7030	0.2540	2.7677
Big Pine Lakes(2nd L.)	0.4119	0.2540	1.6217

Table 16. -- continued.

Lake Name	Precip (m/yr)	Surface Water Runoff (m/yr)	E
(no name)	0.7711	0.5080	1.5179
Horton Lake	0.5131	0.2540	2.0201
(no name)	1.6018	0.5080	3.1531
(no name)	0.9118	0.5080	1.7949
Cow Meadow Lake	1.6018	0.5080	3.1531
Vogelsang Lake	1.2007	0.5080	2.3636
Wright Lakes(NW)	0.7938	0.5080	1.5626
Smith Lake	1.6119	0.2540	2.0000
Goose Lake	1.5240	0.5080	3.0000
Upper Sardine Lake	1.5933	1.0160	1.5682
Blue Lake	1.6675	0.5080	3.2825
S.P. Lakes (SE)	1.7450	0.5080	3.4350
Forni Lake	1.5240	1.0160	1.5000
Lake Lois	1.5283	1.0160	1.5042
Dicks Lake	1.3368	1.0160	1.3157
Grouse Lake	1.5283	1.0160	1.5042
Lake Aloha	1.4014	1.0160	1.3793
Angora Lakes (SW)	1.1140	0.5080	2.1929
Ropi Lake	1.3138	1.0160	1.2931
Round Lake	1.0948	1.0160	1.0776
Frog Lake	1.3026	1.0160	1.2821
Lost Lakes (East)	1.2915	1.0160	1.2712
Summit Lake	1.2157	0.5080	2.3931

Table 16. -- continued.

Lake Name	Precip (m/yr)	Surface Water Runoff (m/yr)	E
Summit Lake	1.3435	0.5080	2.6447
Star Lakes (North)	1.2954	0.5080	2.5500
Bare Island Lake	1.3077	0.5080	2.5742
Mirror Lake	1.0286	0.5080	2.0248
Little Lake	1.1689	0.5080	2.3010
Mud Lakes (Eastern)	1.2954	0.5080	2.5500
Little Spanish Lake	1.0160	0.5080	2.0000
Hockett Lakes (Center)	0.9429	0.1270	2.0000
Union Reservoir	1.2595	0.5080	2.4793
Duck Lake	1.1759	0.5080	2.3148
Chiquito Lake	1.2344	0.5080	2.4299
Emigrant Lake	1.3561	1.0160	1.3347
Long Lake	1.8379	1.0160	1.8090
Fontanillis Lake	1.3252	1.0160	1.3043
Long Lake	1.5846	0.5080	3.1193
Strawberry Lake	1.0583	0.5080	2.0833
Waca Lake	1.3576	1.0160	1.3362
Deerheart Lake	0.8766	0.2540	3.4512
Saucer Lake	1.6374	0.5080	3.2232
Saddle Lake	1.7145	0.5080	3.3750
Gold Lake	1.6314	0.5080	3.2114
Thompson Lake	1.7072	0.5080	3.3606
McKinstry Lake	1.6374	1.0160	1.6116

Table 16. -- continued.

Lake Name	Precip (m/yr)	Surface Water Runoff (m/yr)	E
Azure Lake	1.3368	0.5080	2.6315
Grass Lake	1.3031	1.0160	1.2826
Shriner Lake	1.2075	0.5080	2.3770
Silver Lake	0.6301	0.5080	1.2404
Twin Lakes (North)	0.7703	0.5080	1.5163
Crystal Lake	0.8536	0.5080	1.6803
Nellie Lake	0.8759	0.5080	1.7242
Three Lakes (NW)	1.6864	0.5080	3.3197
Twin Lakes (South)	0.8120	0.5080	1.5984
Twin Lakes (NE)	0.5409	0.2540	2.1295
Independence Lake	0.9293	0.2540	2.0000

APPENDIX E

CALCULATED REACTION RATES FOR AMMONIUM, SULFATE, AND NITRATE IN LAKES FROM THE WESTERN LAKE SURVEY

Table 17. Reaction rates for ammonium for the lakes in the Western Lake Survey and their residence times (see Equation 14).

WLS Lake ID	$NH_4^+_{lake}$ (μeq/L)	$NH_4^+_{precip}$ (μeq/L)	E	K_{NH4} (day^{-1})	Residence Time (yr)
4A1-001	0.61	6.14	2.16	-0.1421	0.3476
4A1-003	0.00	9.76	1.59	0.0000	0.3052
4A1-004	2.16	9.76	2.83	-0.0888	0.3121
4A1-005	0.83	9.76	3.15	-1.1120	0.0393
4A1-006	0.00	9.76	3.15	0.0000	1.5800
4A1-007	0.00	9.76	1.72	0.0000	0.4266
4A1-008	0.61	9.76	2.00	-0.1223	0.5873
4A1-009	0.00	9.76	2.00	0.0000	0.0374
4A1-012	0.00	9.76	2.75	0.0000	0.0469
4A1-013	0.00	9.76	1.77	0.0000	0.7322
4A1-014	0.00	9.76	2.38	0.0000	0.6443
4A1-015	0.00	9.76	2.11	0.0000	0.2573
4A1-016	0.00	13.65	2.32	0.0000	0.0493
4A1-017	0.05	13.65	1.87	-4.4555	0.2754
4A1-018	0.05	13.65	2.17	-0.5084	2.6754
4A1-019	0.00	13.65	2.34	0.0000	0.0940
4A1-020	0.00	13.65	2.91	0.0000	0.1037
4A1-021	0.00	13.65	1.65	0.0000	1.8280
4A1-023	0.00	13.65	1.25	0.0000	0.0409
4A1-024	0.00	13.65	1.42	0.0000	0.6960
4A1-025	0.72	9.76	1.60	-0.2741	0.1959

Table 17.-- continued.

WLS Lake ID	NH_4^+lake (μeq/L)	NH_4^+precip (μeq/L)	E	K_{NH4} (day^{-1})	Residence Time (yr)
4A1-026	0.50	13.65	1.62	-0.2611	0.4499
4A1-027	0.00	13.65	1.74	0.0000	0.1346
4A1-028	0.00	9.76	2.03	0.0000	0.2622
4A1-029	0.00	13.65	2.13	0.0000	0.4828
4A1-030	0.00	13.65	1.36	0.0000	1.7250
4A1-031	0.11	13.65	1.62	-1.1800	0.4485
4A1-033	0.89	13.65	2.16	-0.2867	0.2939
4A1-034	0.00	13.65	1.79	0.0000	0.3126
4A1-035	0.39	13.65	2.77	-0.0751	1.7793
4A1-036	0.44	25.56	1.83	-2.8373	0.0996
4A1-037	0.55	25.56	1.87	-0.1881	1.1767
4A1-038	0.39	25.56	1.83	-6.2934	0.0509
4A1-040	0.44	25.56	1.47	-0.1569	1.3865
4A1-041	0.39	25.56	1.70	-1.4867	0.1976
4A1-042	0.39	25.56	1.61	-1.9801	0.1444
4A1-043	0.39	25.56	2.00	-0.3066	0.9839
4A1-044	0.39	25.56	1.67	-1.6724	0.1776
4A1-045	0.14	25.56	1.49	-16.6884	0.0447
4A1-046	0.00	25.56	2.34	0.0000	1.3255
4A1-047	0.22	13.65	1.40	-2.1271	0.1077
4A1-048	0.83	25.56	2.00	-0.0662	1.8461

Table 17.-- continued.

WLS Lake ID	NH_4^+lake (µeq/L)	NH_4^+precip (µeq/L)	E	K_{NH4} (day^{-1})	Residence Time (yr)
4A1-049	0.00	13.65	2.36	0.0000	0.0860
4A1-051	0.58	13.65	2.77	-0.0070	18.6885
4A1-052	0.05	13.65	1.62	-4.2156	0.2586
4A1-053	0.28	13.65	1.52	-0.4756	0.4227
4A1-054	1.00	13.65	2.02	-0.6471	0.1116
4A1-055	0.00	9.76	3.15	0.0000	0.1228
4A1-056	0.00	13.65	1.79	0.0000	0.2865
4A1-058	1.05	9.76	3.15	-7.0432	0.0109
4A1-059	0.00	9.76	2.36	0.0000	0.4246
4A1-060	0.00	13.65	1.56	0.0000	0.2570
4A2-007	0.72	4.66	2.00	-0.0183	1.5264
4A2-008	0.31	4.66	3.00	0.1062	0.5396
4A2-009	0.00	4.66	1.57	0.0000	1.1178
4A2-015	0.00	4.66	3.28	0.0000	7.7250
4A2-016	2.22	4.66	3.44	-0.1681	0.0413
4A2-022	0.00	6.14	1.50	0.0000	0.1080
4A2-023	0.00	6.14	1.50	0.0000	0.8494
4A2-024	0.08	6.14	1.32	-0.2269	1.1344
4A2-025	0.00	6.14	1.50	0.0000	0.0368
4A2-026	1.05	6.14	1.38	-0.0072	2.5172
4A2-027	0.00	6.14	2.19	0.0000	0.5717

Table 17.-- continued.

WLS Lake ID	$NH_4^+_{lake}$ (μeq/L)	$NH_4^+_{precip}$ (μeq/L)	E	K_{NH4} (day^{-1})	Residence Time (yr)
4A2-028	0.00	6.14	1.29	0.0000	0.0879
4A2-029	0.00	6.14	1.08	0.0000	0.2351
4A2-030	0.00	6.14	1.28	0.0000	0.9129
4A2-031	0.61	6.14	1.27	-0.0351	0.8748
4A2-033	0.72	6.14	2.39	-0.0482	0.8304
4A2-034	0.47	9.76	2.64	-0.1343	0.8047
4A2-037	0.61	9.76	2.55	-0.5081	0.2041
4A2-038	0.25	9.76	2.57	-0.1452	1.5562
4A2-040	0.55	9.76	2.02	-0.2143	0.4288
4A2-042	0.00	9.76	2.30	0.0000	0.1469
4A2-043	0.72	9.76	2.55	-2.3748	0.0386
4A2-044	0.00	13.86	2.00	0.0000	0.0798
4A2-045	0.78	13.86	2.00	-0.5163	0.0347
4A2-052	0.00	9.76	2.48	0.0000	0.0661
4A2-053	0.28	9.76	2.31	-1.1320	0.1179
4A2-054	0.00	9.76	2.43	0.0000	0.0210
4A2-056	0.00	6.14	1.33	0.0000	0.2941
4A2-057	0.00	4.66	1.81	0.0000	0.8045
4A2-058	0.00	6.14	1.30	0.0000	0.5824
4A2-061	0.00	4.91	3.12	0.0000	7.6441
4A2-063	0.44	9.76	2.08	-0.3407	0.3515

Table 17.-- continued.

WLS Lake ID	$NH_4^+_{lake}$ (μeq/L)	$NH_4^+_{precip}$ (μeq/L)	E	K_{NH4} (day^{-1})	Residence Time (yr)
4A2-064	0.00	6.14	1.34	0.0000	0.9847
4A3-018	0.00	4.91	3.45	0.0000	0.6105
4A3-020	0.72	4.91	3.22	-0.2888	0.1866
4A3-021	0.94	4.91	3.37	-0.0903	0.4431
4A3-022	0.00	4.91	3.21	0.0000	0.8989
4A3-023	0.00	4.91	3.36	0.0000	0.1544
4A3-031	0.89	6.14	1.61	-0.1627	0.1654
4A3-032	0.00	6.14	2.63	0.0000	1.1737
4A3-034	0.00	6.14	1.28	0.0000	0.0486
4A3-036	0.78	6.14	2.38	-0.0979	0.2935
4A3-043	0.00	13.65	1.24	0.0000	0.0538
4A3-044	0.00	13.65	1.52	0.0000	0.1585
4A3-045	0.00	13.65	1.68	0.0000	0.3476
4A3-047	0.00	9.76	1.72	0.0000	0.6438
4A3-056	7.10	4.91	3.32	-0.0064	0.5115
4A3-065	0.00	13.65	1.60	0.0000	0.0082
4A3-066	0.00	9.76	2.13	0.0000	1.1055
4A3-069	0.78	4.66	2.00	-0.0029	8.0602

Table 18. Reaction rates for sulfate for the lakes in the Western Lake Survey and their residence times (see Equation 14).

WLS Lake ID	$SO_4^{2-}_{lake}$ (μeq/L)	$SO_4^{2-}_{precip}$ (μeq/L)	E	K_{SO4} (day^{-1})	Residence Time (yr)
4A1-001	0.96	5.84	2.16	-0.0833	0.3476
4A1-003	7.49	6.54	1.59	-0.0035	0.3052
4A1-004	7.18	6.54	2.83	-0.0119	0.3121
4A1-005	9.31	6.54	3.15	-0.0376	0.0393
4A1-006	4.67	6.54	3.15	-0.0051	1.5800
4A1-007	17.53	6.54	1.72	0.0023	0.4266
4A1-008	3.08	6.54	2.00	-0.0128	0.5873
4A1-009	13.98	6.54	2.00	0.0046	0.0374
4A1-012	385.90	6.54	2.75	0.0557	0.0469
4A1-013	4.23	6.54	1.77	-0.0063	0.7322
4A1-014	92.94	6.54	2.38	0.0034	0.6443
4A1-015	3.93	6.54	2.11	-0.0257	0.2573
4A1-016	12.08	4.07	2.32	0.0120	0.0493
4A1-017	5.20	4.07	1.87	-0.0045	0.2754
4A1-018	6.45	4.07	2.17	-0.0004	2.6754
4A1-019	8.52	4.07	2.34	-0.0033	0.0940
4A1-020	165.57	4.07	2.91	0.0243	0.1037
4A1-021	5.10	4.07	1.65	-0.0004	1.8280
4A1-023	7.28	4.07	1.25	0.0200	0.0409
4A1-024	4.04	4.07	1.42	-0.0016	0.6960
4A1-025	4.39	6.54	1.60	-0.0183	0.1959

Table 18.-- continued.

WLS Lake ID	$SO_4^{2-}_{lake}$ (μeq/L)	$SO_4^{2-}_{precip}$ (μeq/L)	E	K_{SO4} (day^{-1})	Residence Time (yr)
4A1-026	4.95	4.07	1.62	-0.0020	0.4499
4A1-027	5.20	4.07	1.74	-0.0073	0.1346
4A1-028	8.89	6.54	2.03	-0.0048	0.2622
4A1-029	3.37	4.07	2.13	-0.0085	0.4828
4A1-030	6.74	4.07	1.36	0.0003	1.7250
4A1-031	68.56	4.07	1.62	0.0054	0.4485
4A1-033	13.62	4.07	2.16	0.0031	0.2939
4A1-034	9.74	4.07	1.79	0.0017	0.3126
4A1-035	37.12	4.07	2.77	0.0005	1.7793
4A1-036	7.30	6.19	1.83	-0.0150	0.0996
4A1-037	4.08	6.19	1.87	-0.0041	1.1767
4A1-038	10.87	6.19	1.83	-0.0021	0.0509
4A1-040	9.16	6.19	1.47	$8.5x10^{-6}$	1.3865
4A1-041	6.43	6.19	1.70	-0.0085	0.1976
4A1-042	45.68	6.19	1.61	0.0148	0.1444
4A1-043	4.85	6.19	2.00	-0.0036	0.9839
4A1-044	11.16	6.19	1.67	0.0012	0.1776
4A1-045	9.32	6.19	1.49	0.0008	0.0447
4A1-046	31.13	6.19	2.34	0.0011	1.3255
4A1-047	8.27	4.07	1.40	0.0078	0.1077
4A1-048	4.87	6.19	2.00	-0.0017	1.8461

Table 18.-- continued.

WLS Lake ID	$SO_4^{2-}_{lake}$ (μeq/L)	$SO_4^{2-}_{precip}$ (μeq/L)	E	K_{SO4} (day^{-1})	Residence Time (yr)
4A1-049	5.89	4.07	2.36	-0.0119	0.0860
4A1-051	89.85	4.07	2.77	$9.6x10^{-5}$	18.6885
4A1-052	32.29	4.07	1.62	0.0084	0.2586
4A1-053	5.14	4.07	1.52	-0.0013	0.4227
4A1-054	23.78	4.07	2.02	0.0159	0.1116
4A1-055	2.73	6.54	3.15	-0.1395	0.1228
4A1-056	7.18	4.07	1.79	-0.0002	0.2865
4A1-058	4.39	6.54	3.15	-0.9218	0.0109
4A1-059	2.59	6.54	2.36	-0.0303	0.4246
4A1-060	7.27	4.07	1.56	0.0013	0.2570
4A2-007	9.49	3.71	2.00	0.0003	1.5264
4A2-008	3.53	3.71	3.00	-0.0051	0.5396
4A2-009	10.57	3.71	1.57	0.0011	1.1178
4A2-015	12.43	3.71	3.28	$4.1x10^{-6}$	7.7250
4A2-016	7.33	3.71	3.44	-0.0200	0.0413
4A2-022	4.14	5.84	1.50	-0.0280	0.1080
4A2-023	8.18	5.84	1.50	-0.0002	0.8494
4A2-024	7.91	5.84	1.32	$6.8x10^{-5}$	1.1344
4A2-025	4.93	5.84	1.50	-0.0574	0.0368
4A2-026	7.33	5.84	1.38	-0.0001	2.5172
4A2-027	1.71	5.84	2.19	-0.0284	0.5717

Table 18.-- continued.

WLS Lake ID	$SO_4^{2-}_{lake}$ (μeq/L)	$SO_4^{2-}_{precip}$ (μeq/L)	E	K_{SO4} (day^{-1})	Residence Time (yr)
4A2-028	8.12	5.84	1.29	0.0022	0.0879
4A2-029	3.55	5.84	1.08	-0.0089	0.2351
4A2-030	4.83	5.84	1.28	-0.0018	0.9129
4A2-031	1.56	5.84	1.27	-0.0112	0.8748
4A2-033	1.91	5.84	2.39	-0.0157	0.8304
4A2-034	2.24	6.54	2.64	-0.0168	0.8047
4A2-037	4.54	6.54	2.55	-0.0341	0.2041
4A2-038	10.71	6.54	2.57	-0.0008	1.5562
4A2-040	1.27	6.54	2.02	-0.0583	0.4288
4A2-042	4.54	6.54	2.30	-0.0424	0.1469
4A2-043	1.56	6.54	2.55	-0.6856	0.0386
4A2-044	2.12	6.17	2.00	-0.1156	0.0798
4A2-045	3.68	6.17	2.00	-0.0349	0.0347
4A2-052	3.89	6.54	2.48	-0.1275	0.0661
4A2-053	2.25	6.54	2.31	-0.0805	0.1179
4A2-054	1.01	6.54	2.43	-1.8952	0.0210
4A2-056	5.70	5.84	1.33	-0.0034	0.2941
4A2-057	4.56	3.71	1.81	-0.0015	0.8045
4A2-058	10.49	5.84	1.30	0.0013	0.5824
4A2-061	7.29	4.40	3.12	-0.0002	7.6441
4A2-063	1.79	6.54	2.08	-0.0503	0.3515

Table 18.-- continued.

WLS Lake ID	$SO_4^{2-}_{lake}$ (μeq/L)	$SO_4^{2-}_{precip}$ (μeq/L)	E	K_{SO4} (day^{-1})	Residence Time (yr)
4A2-064	4.53	5.84	1.34	-0.0019	0.9847
4A3-018	0.23	4.40	3.45	-0.1189	0.6105
4A3-020	0.79	4.40	3.22	-0.2333	0.1866
4A3-021	4.79	4.40	3.37	-0.0114	0.4431
4A3-022	3.14	4.40	3.21	-0.0101	0.8989
4A3-023	0.83	4.40	3.36	-0.1239	0.1544
4A3-031	2.39	5.84	1.61	-0.0470	0.1654
4A3-032	5.16	5.84	2.63	-0.0043	1.1737
4A3-034	80.53	5.84	1.28	0.0510	0.0486
4A3-036	4.10	5.84	2.38	-0.0131	0.2935
4A3-043	41.29	4.07	1.24	0.0446	0.0538
4A3-044	55.22	4.07	1.52	0.0150	0.1585
4A3-045	7.00	4.07	1.68	0.0002	0.3476
4A3-047	2.16	6.54	1.72	-0.0172	0.6438
4A3-056	1.69	4.40	3.32	-0.0381	0.5115
4A3-065	55.57	4.07	1.60	0.2949	0.0082
4A3-066	97.52	6.54	2.13	0.0021	1.1055
4A3-069	3.04	3.71	2.00	-0.0004	8.0602

Table 19. Reaction rates for nitrate for the lakes in the Western Lake Survey and their residence times (see Equation 14).

WLS Lake ID	NO_3^-lake (μeq/L)	NO_3^-precip (μeq/L)	E	K_{NO3} (day^{-1})	Residence Time (yr)
4A1-001	0.82	8.32	2.16	-0.1427	0.3476
4A1-003	0.04	10.44	1.59	-3.7201	0.3052
4A1-004	1.53	10.44	2.83	-0.1378	0.3121
4A1-005	1.23	10.44	3.15	-0.7933	0.0393
4A1-006	0.84	10.44	3.15	-0.0576	1.5800
4A1-007	0.11	10.44	1.72	-1.0115	0.4266
4A1-008	0.02	10.44	2.00	-5.1439	0.5873
4A1-009	0.35	10.44	2.00	-4.0931	0.0374
4A1-012	2.60	10.44	2.75	-0.5872	0.0469
4A1-013	0.12	10.44	1.77	-0.5595	0.7322
4A1-014	6.31	10.44	2.38	-0.0121	0.6443
4A1-015	0.00	10.44	2.11	0.0000	0.2573
4A1-016	8.14	11.24	2.32	-0.1286	0.0493
4A1-017	1.24	11.24	1.87	-0.1532	0.2754
4A1-018	2.16	11.24	2.17	-0.0097	2.6754
4A1-019	9.45	11.24	2.34	-0.0495	0.0940
4A1-020	0.69	11.24	2.91	-1.2234	0.1037
4A1-021	0.02	11.24	1.65	-1.5644	1.8280
4A1-023	8.21	11.24	1.25	-0.0472	0.0409
4A1-024	0.03	11.24	1.42	-1.8928	0.6960
4A1-025	0.08	10.44	1.60	-2.7228	0.1959

Table 19.-- continued.

WLS Lake ID	NO_3^-lake (μeq/L)	NO_3^-precip (μeq/L)	E	K_{NO3} (day^{-1})	Residence Time (yr)
4A1-026	0.44	11.24	1.62	-0.2457	0.4499
4A1-027	3.50	11.24	1.74	-0.0924	0.1346
4A1-028	0.39	10.44	2.03	-0.5236	0.2622
4A1-029	0.19	11.24	2.13	-0.6649	0.4828
4A1-030	3.32	11.24	1.36	-0.0057	1.7250
4A1-031	0.48	11.24	1.62	-0.2180	0.4485
4A1-033	2.82	11.24	2.16	-0.0676	0.2939
4A1-034	4.32	11.24	1.79	-0.0251	0.3126
4A1-035	1.57	11.24	2.77	-0.0147	1.7793
4A1-036	0.31	19.62	1.83	-3.1633	0.0996
4A1-037	0.53	19.62	1.87	-0.1499	1.1767
4A1-038	0.26	19.62	1.83	-7.2732	0.0509
4A1-040	0.47	19.62	1.47	-0.1137	1.3865
4A1-041	0.42	19.62	1.70	-1.0529	0.1976
4A1-042	0.05	19.62	1.61	-12.3845	0.1444
4A1-043	2.55	19.62	2.00	-0.0337	0.9839
4A1-044	0.00	19.62	1.67	0.0000	0.1776
4A1-045	0.67	19.62	1.49	-2.6101	0.0447
4A1-046	4.13	19.62	2.34	-0.0200	1.3255
4A1-047	0.21	11.24	1.40	-1.8438	0.1077
4A1-048	0.20	19.62	2.00	-0.1765	1.8461

Table 19.-- continued.

WLS Lake ID	NO_3^-lake (μeq/L)	NO_3^-precip (μeq/L)	E	K_{NO3} (day^{-1})	Residence Time (yr)
4A1-049	0.05	11.24	2.36	-10.4263	0.0860
4A1-051	0.51	11.24	2.77	-0.0066	18.6885
4A1-052	5.07	11.24	1.62	-0.0273	0.2586
4A1-053	0.79	11.24	1.52	-0.1327	0.4227
4A1-054	2.23	11.24	2.02	-0.2236	0.1116
4A1-055	0.12	10.44	3.15	-5.8595	0.1228
4A1-056	10.32	11.24	1.79	-0.0088	0.2865
4A1-058	5.32	10.44	3.15	-1.2936	0.0109
4A1-059	0.07	10.44	2.36	-2.0296	0.4246
4A1-060	0.00	11.24	1.56	0.0000	0.2570
4A2-007	0.06	5.98	2.00	-0.2811	1.5264
4A2-008	0.25	5.98	3.00	-0.1677	0.5396
4A2-009	0.09	5.98	1.57	-0.2524	1.1178
4A2-015	0.11	5.98	3.28	-0.0340	7.7250
4A2-016	1.73	5.98	3.44	-0.2947	0.0413
4A2-022	0.14	8.32	1.50	-2.1362	0.1080
4A2-023	0.68	8.32	1.50	-0.0556	0.8494
4A2-024	0.31	8.32	1.32	-0.0819	1.1344
4A2-025	1.18	8.32	1.50	-0.7090	0.0368
4A2-026	3.16	8.32	1.38	-0.0027	2.5172
4A2-027	0.03	8.32	2.19	-2.4891	0.5717

Table 19.-- continued.

WLS Lake ID	NO_3^-lake (μeq/L)	NO_3^-precip (μeq/L)	E	K_{NO3} (day^{-1})	Residence Time (yr)
4A2-028	4.71	8.32	1.29	-0.0399	0.0879
4A2-029	0.14	8.32	1.08	-0.7459	0.2351
4A2-030	2.42	8.32	1.28	-0.0112	0.9129
4A2-031	0.02	8.32	1.27	-1.9662	0.8748
4A2-033	0.02	8.32	2.39	-3.0911	0.8304
4A2-034	1.64	10.44	2.64	-0.0396	0.8047
4A2-037	0.21	10.44	2.55	-1.6057	0.2041
4A2-038	0.02	10.44	2.57	-2.4400	1.5562
4A2-040	0.47	10.44	2.02	-0.2729	0.4288
4A2-042	0.06	10.44	2.30	-7.8397	0.1469
4A2-043	0.02	10.44	2.55	-117.8167	0.0386
4A2-044	0.06	10.88	2.00	-8.0209	0.0798
4A2-045	0.00	10.88	2.00	0.0000	0.0347
4A2-052	3.31	10.44	2.48	-0.2750	0.0661
4A2-053	0.24	10.44	2.31	-1.3892	0.1179
4A2-054	0.12	10.44	2.43	-27.2911	0.0210
4A2-056	0.44	8.32	1.33	-0.2243	0.2941
4A2-057	2.07	5.98	1.81	-0.0133	0.8045
4A2-058	0.13	8.32	1.30	-0.3872	0.5824
4A2-061	0.10	6.61	3.12	-0.0595	7.6441
4A2-063	0.02	10.44	2.08	-10.3318	0.3515

Table 19.-- continued.

WLS Lake ID	NO_3^-lake (μeq/L)	NO_3^-precip (μeq/L)	E	K_{NO3} (day^{-1})	Residence Time (yr)
4A2-064	1.45	8.32	1.34	-0.0178	0.9847
4A3-018	0.08	6.61	3.45	-0.5109	0.6105
4A3-020	0.28	6.61	3.22	-1.0275	0.1866
4A3-021	1.03	6.61	3.37	-0.1122	0.4431
4A3-022	0.10	6.61	3.21	-0.6309	0.8989
4A3-023	1.68	6.61	3.36	-0.0905	0.1544
4A3-031	0.31	8.32	1.61	-0.6860	0.1654
4A3-032	0.77	8.32	2.63	-0.0599	1.1737
4A3-034	1.24	8.32	1.28	-0.4272	0.0486
4A3-036	0.21	8.32	2.38	-0.5123	0.2935
4A3-043	0.08	11.24	1.24	-8.6966	0.0538
4A3-044	0.09	11.24	1.52	-3.2216	0.1585
4A3-045	0.08	11.24	1.68	-1.7499	0.3476
4A3-047	0.02	10.44	1.72	-4.5816	0.6438
4A3-056	1.42	6.61	3.32	-0.0719	0.5115
4A3-065	0.06	11.24	1.60	-91.9835	0.0082
4A3-066	0.16	10.44	2.13	-0.3322	1.1055
4A3-069	0.21	5.98	2.00	-0.0147	8.0602

APPENDIX F

SENSITIVITY ANALYSIS PLOTS FOR STEADY STATE CHARGE BALANCE MODEL RESULTS

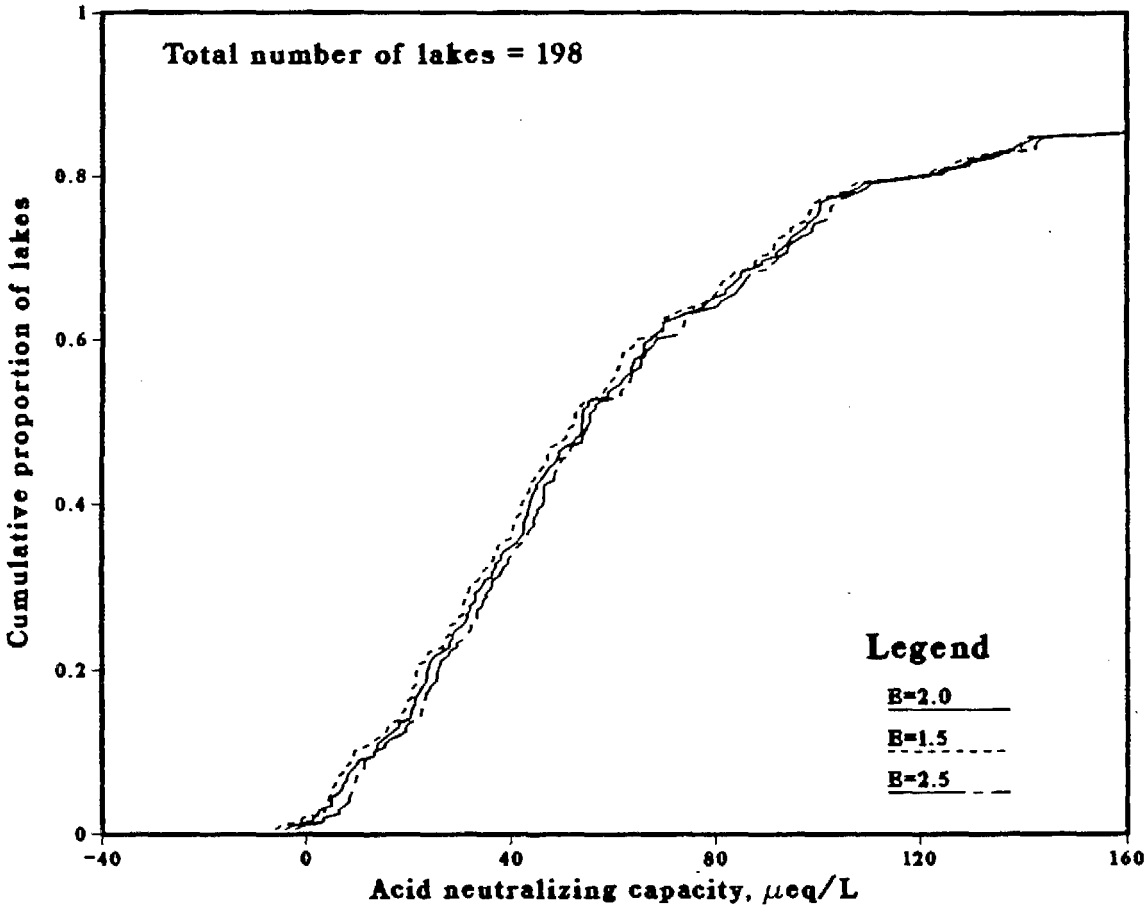

Figure 43. Sensitivity analysis for changes in evapoconcentration factor for double loading of sulfuric acid.

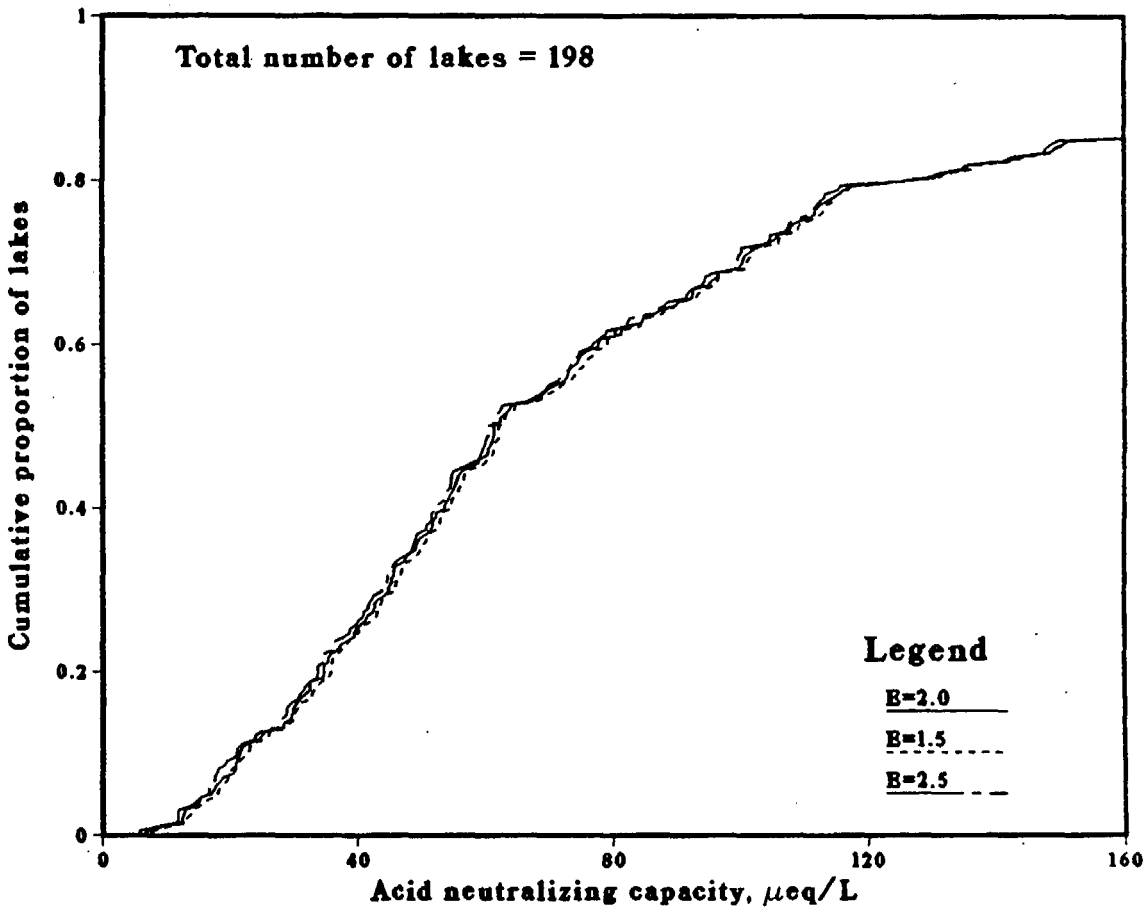

Figure 44. Sensitivity analysis for changes in evapoconcentration factor for half loading of sulfuric acid.

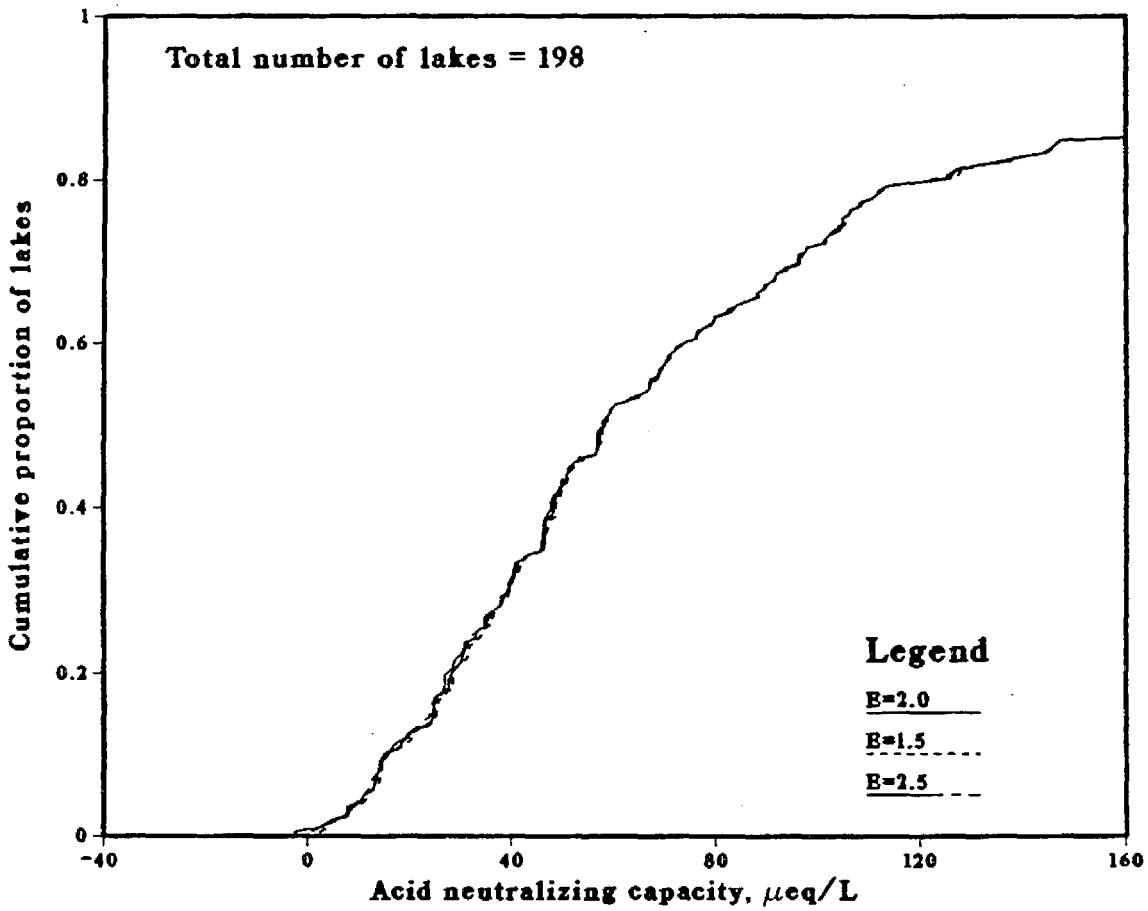

Figure 45. Sensitivity analysis for changes in evapoconcentration factor for double loading of ammonium nitrate.

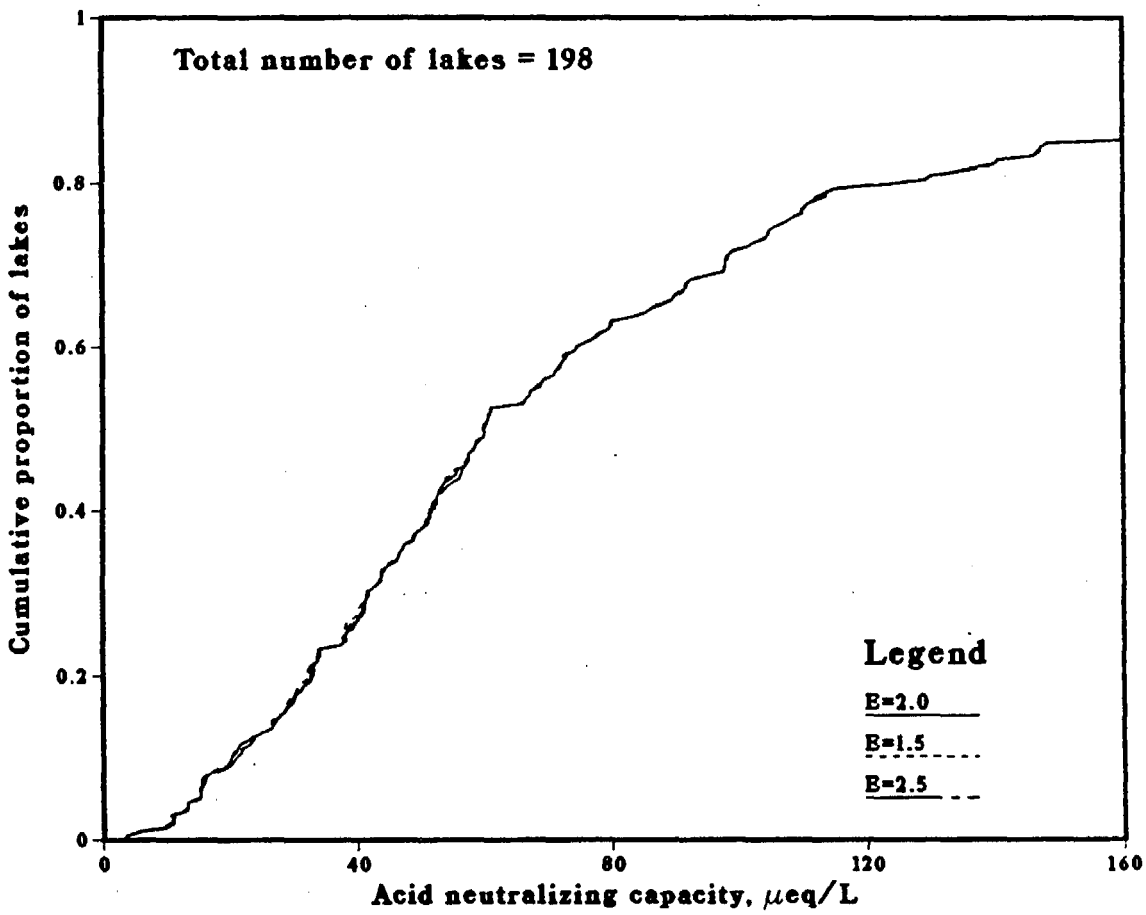

Figure 46. Sensitivity analysis for changes in evapoconcentration factor for half loading of ammonium nitrate.

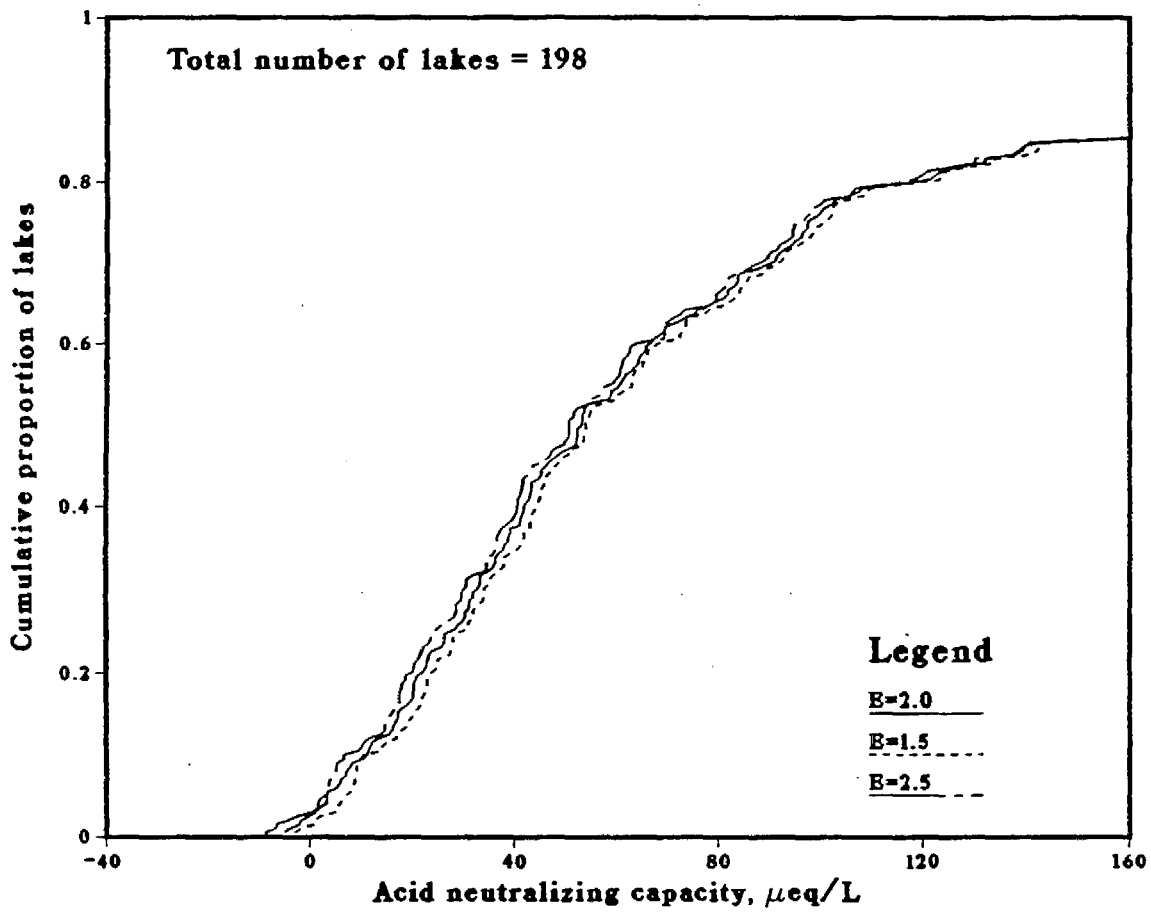

Figure 47. Sensitivity analysis for changes in evapoconcentration factor for double loading of sulfuric acid and ammonium nitrate.

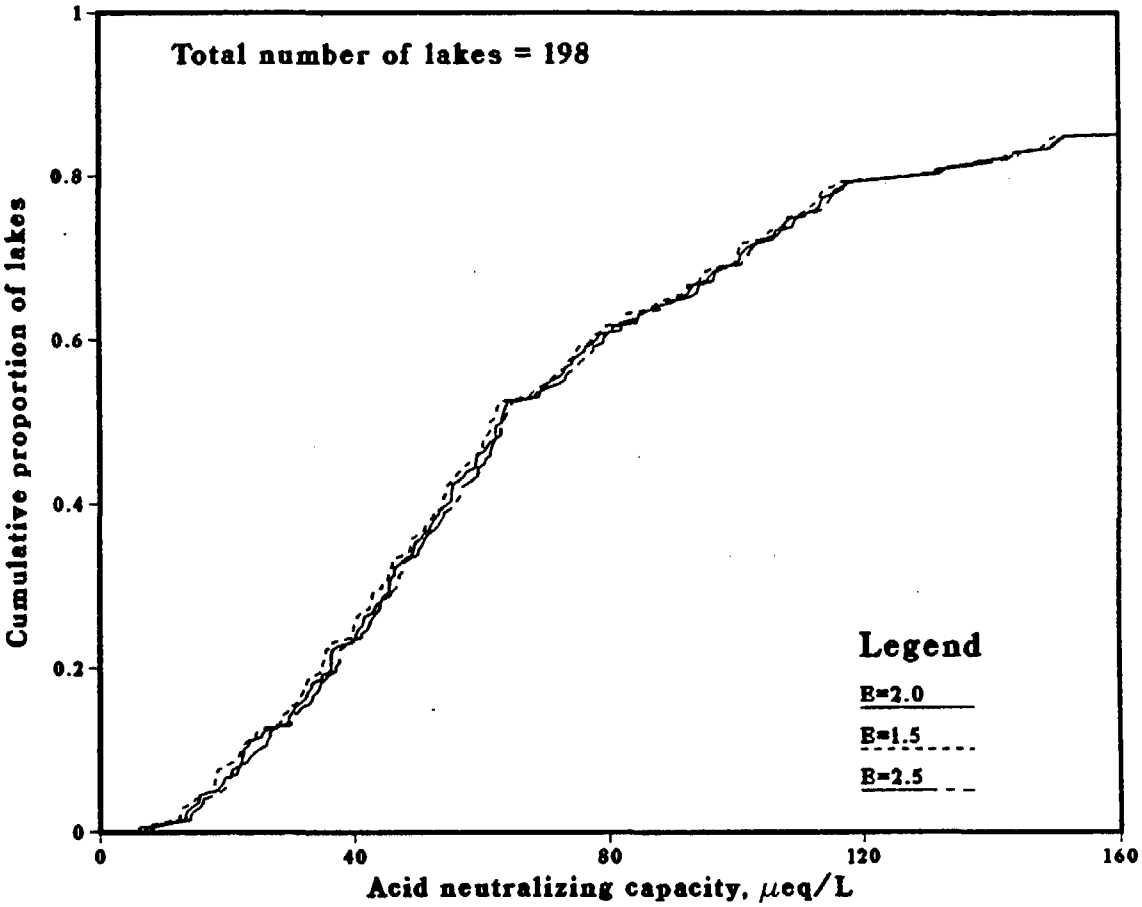

Figure 48. Sensitivity analysis for changes in evapoconcentration factor for half loading of sulfuric acid and ammonium nitrate.

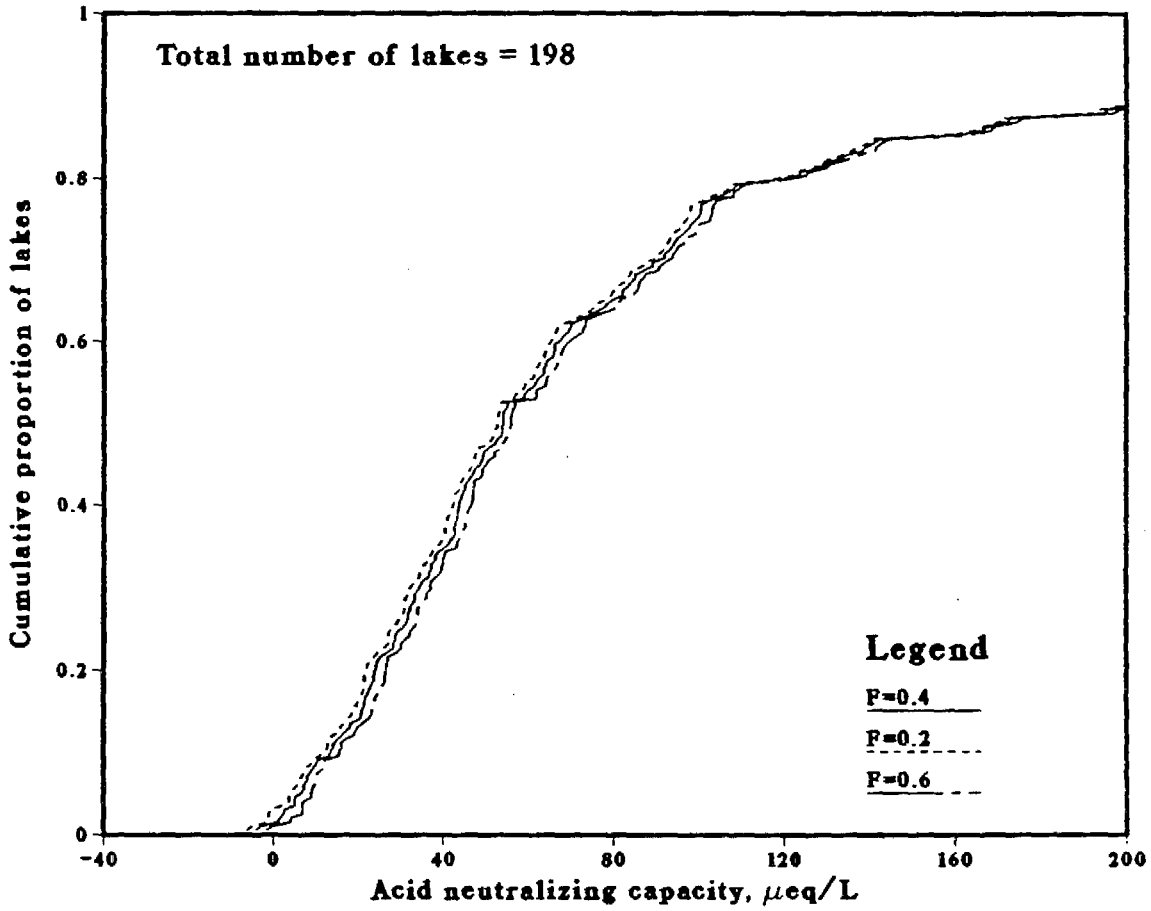

Figure 49. Sensitivity analysis for changes in Henriksen F-factor for double loading of sulfuric acid.

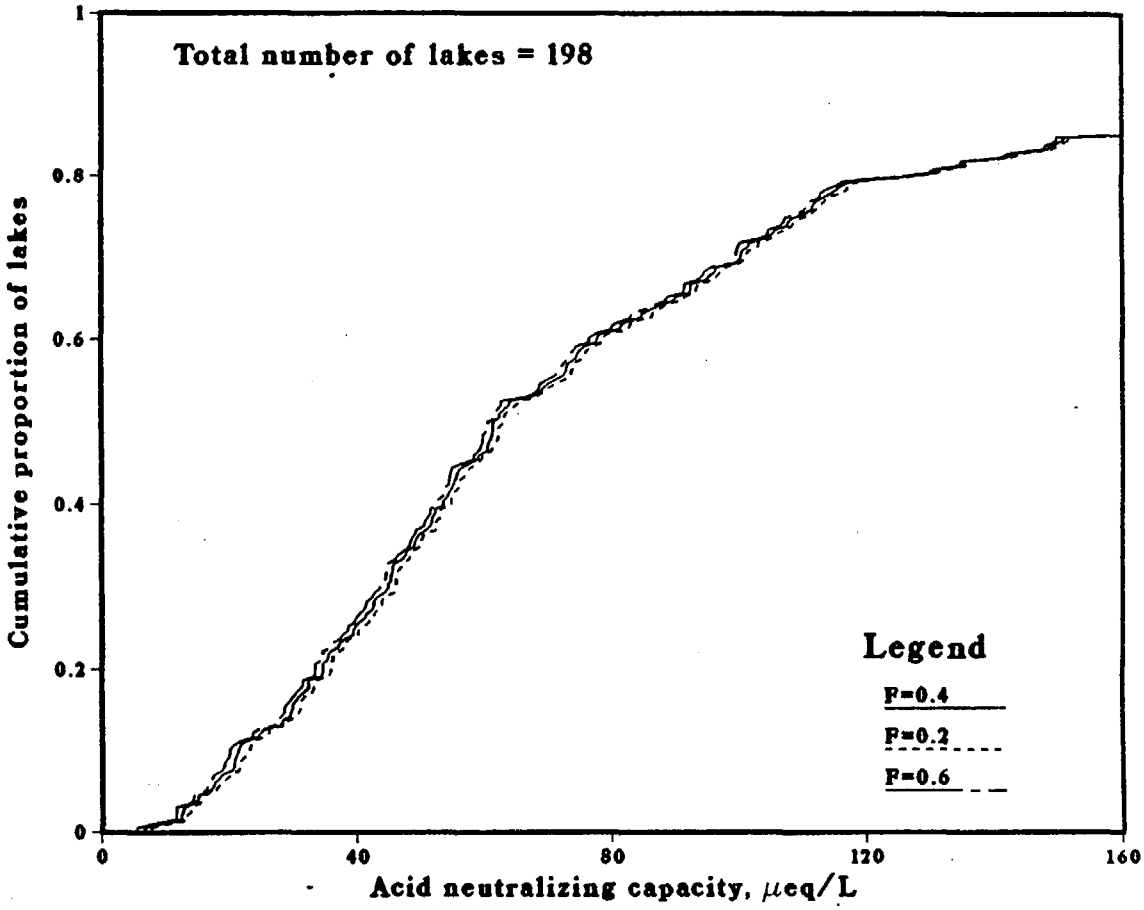

Figure 50. Sensitivity analysis for changes in Henriksen F-factor for half loading of sulfuric acid.

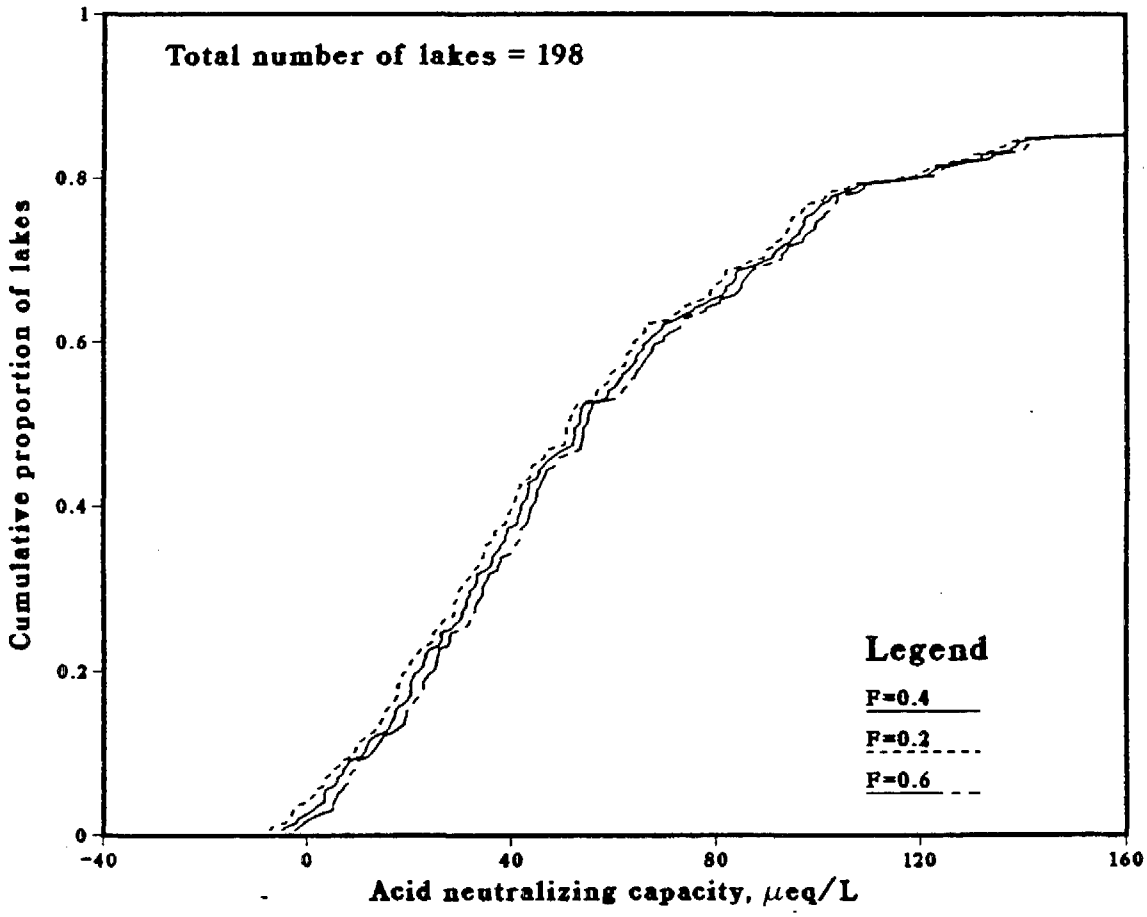

Figure 51. Sensitivity analysis for changes in Henriksen F-factor for double loading of sulfuric acid and ammonium nitrate.

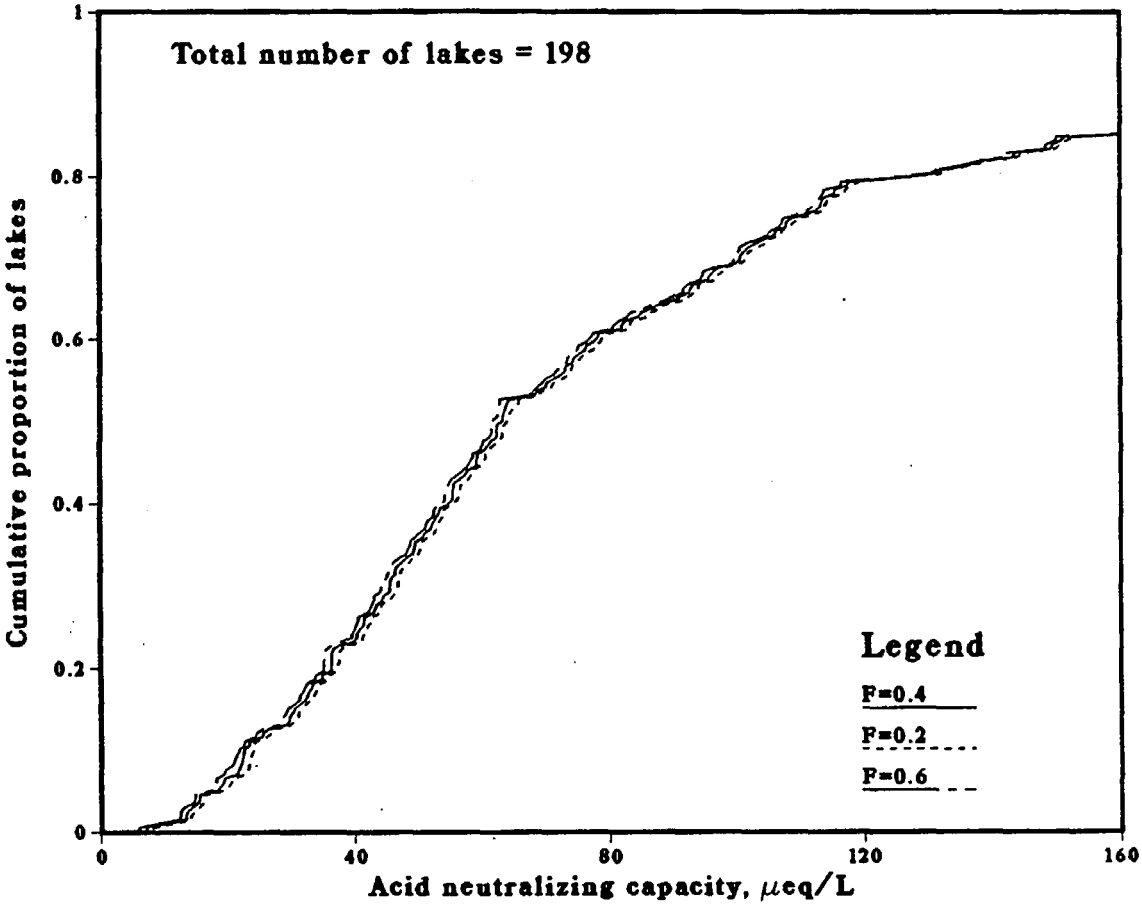

Figure 52. Sensitivity analysis for changes in Henriksen F-factor for half loading of sulfuric acid and ammonium nitrate.

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