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Chemical Analysis of Selected Pothole Water Sources in Southwestern National Parks, Monuments, and Recreation Areas

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CHEMICAL ANALYSIS OF SELECTED POTHOLE WATER SOURCES IN SOUTHWESTERN NATIONAL PARKS, MONUMENTS, AND RECREATION AREAS

by

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ABSTRACT

Environmental data related to the evaluation of inorganic air pollution input to pothole ecosystems in the desert Southwest have been collected over the past several years. Chemical composition of pothole waters and associated sediments are reported. The enrichment factor approach has been applied to the sediments in an effort to identify elemental levels that diverge from mean crustal abundances. These data provide a baseline for determining changes in elemental concentration and enrichment status in the future.

INTRODUCTION

Acid deposition in the arid Southwest has only recently been recognized as a problem. Because precipitation events are scarce and infrequent in deserts, pollutants were thought to be adequately diluted and dispersed before they were carried to the Earth's surface in rain or snow. Alkaline soils have high buffering capacity, and most surface and ground waters are also alkaline[1], which should also reduce risk from acidic deposition. Sources of acidic pollutants are not as concentrated as in the eastern United States.

These broad generalizations do not hold for all ecosystems in arid and semi-arid parts of the Southwest. Acidic pollutants may actually accumulate over time by dry deposition. During a small precipitation event, the resultant solution could be much more acidic than the rainfall itself. Specific systems (e.g., pothole communities, cryptobiotic soils, desert mountain aquatic systems) may not have the buffering capacity of surrounding rock and soil, and thus may be at greater risk to damage from acid deposition.

Power plants and industrial facilities that add acidic pollutants to the atmosphere are abundant in the Southwest. The Colorado Plateau region, of particular interest for this study, is surrounded by coal- and oil-fired power plants (Fig. 1). A number of new sources are proposed on or near the Colorado Plateau in the next 20-50 years. Air masses from other industrialized areas (e.g. smelters in southern Arizona and northern Mexico, the Los Angeles Basin, etc.) are carried across the Colorado Plateau[2]. These polluted air masses can deposit both wet and dry acidic components on the Colorado Plateau. National Atmospheric Deposition Program (NADP) stations on or near the Colorado Plateau (Fig. 1) have recorded pH values of less than 5.0 for many weekly precipitation averages (the lowest was 3.84 at Mesa Verde National Park for the week of 30 Aug. 1983) in the past eight years[3]. A pH of 5.6 is generally considered to be "clean" precipitation[4], although local conditions may affect what is accepted as "normal" pH in rainfall[5]. For example, natural mean annual pH in the Great Basin region has been estimated at about 6.0[1].

Potholes are depressions in bedrock that are not in active drainages. Precipitation collected in these basins creates small, ephemeral aquatic environments. These pools contain fauna unique to temporary aquatic systems. Because aquatic organisms are particularly susceptible to decreased pH levels[6-10], aquatic systems should be studied to determine the sensitivity of indigenous species. Although many surface waters in the Southwest are buffered, potholes generally have very low alkalinities[1], and thus may be more susceptible to acid deposition. Biomonitoring of these sensitive species can then provide early indications that the system is being disturbed. Ephemeral pool ecosystems may show impacts to increased acid deposition before other systems in arid parks, and thus should be monitored. There is some evidence that despite low alkalinities in pothole water, there is a large reservoir of acid neutralizing capacity available in the sediment and/or the rock[11].

Few studies have been made of pothole ecology or associated water chemistry on the Colorado Plateau[12-14]. Environmental tolerance ranges and hatching and mating stimulants are unknown for most species inhabiting Colorado Plateau potholes. Little is known about what determines patterns in community structure, what roles potholes play in surrounding terrestrial ecosystems, or what the impacts of various anthropogenic activities are on these relatively discrete ecosystems. The impacts of decreased pH or of increasing trace metal concentrations on pothole community and ecosystem processes are unknown, and should be investigated to determine the suitability of pothole systems for biomonitoring of acid deposition in the arid Southwest.

Pothole organisms are well adapted to living in the constantly changing, often harsh environment of ephemeral rock pools. Much of the year, potholes are dry; organisms have desiccation resistant (e.g. snails) or desiccation tolerant (e.g. crustacean eggs) stages, or they migrate to permanent water (e.g. backswimmers[15]). Even during the wet phase, conditions can be severe. Temperatures can reach 35 deg. C, and then drop to 15 deg. C overnight. Photosynthesis can remove enough carbon dioxide to drive the pH from 6.5 to 9.4 in 6.5 hours[11]. Through a single wet phase, conductivity, average pH, and alkalinity will

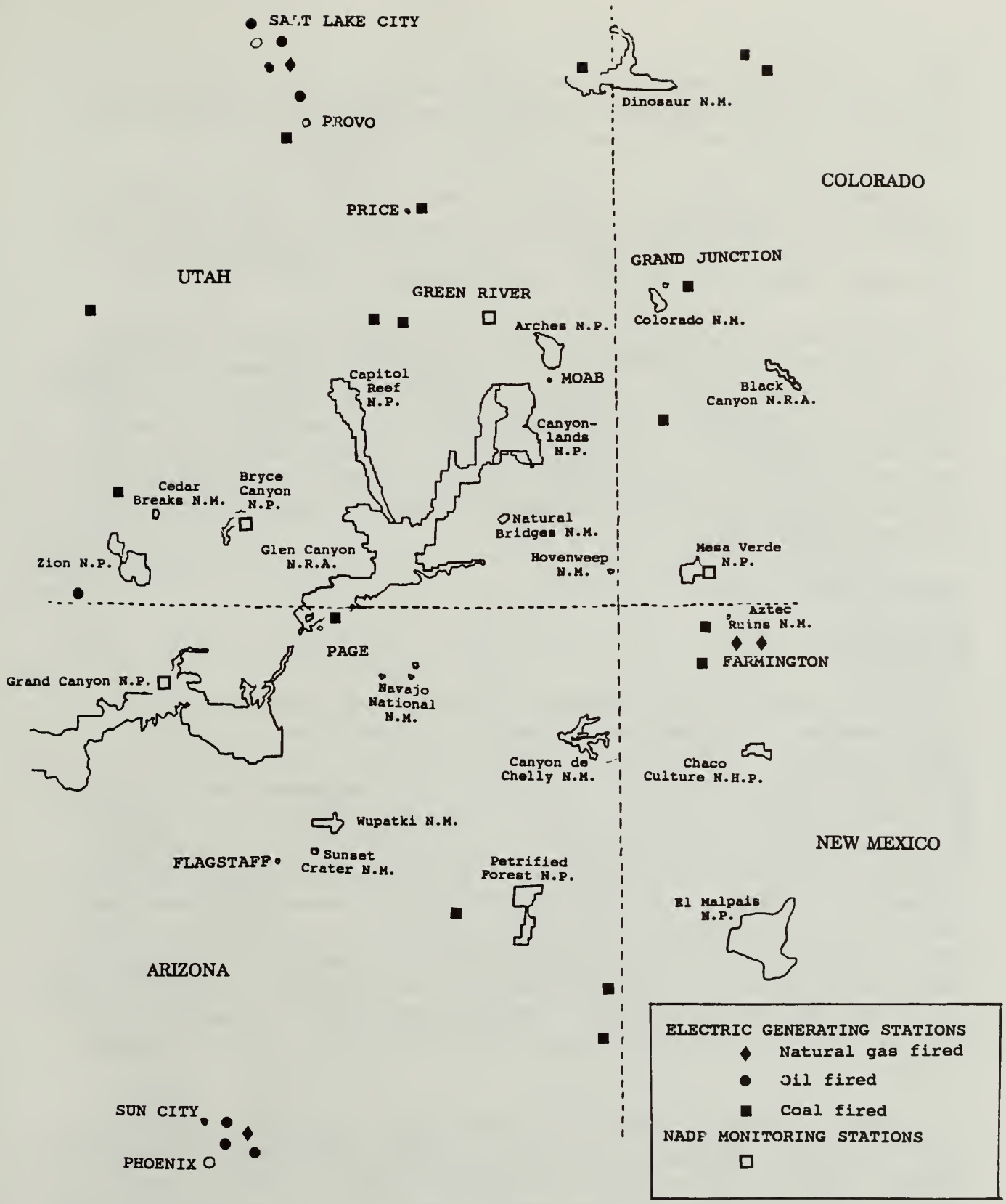

Figure 1. NPS units, electric generating stations, and NADP monitoring stations on or near the Colorado Plateau.

increase while dissolved oxygen can decrease dramatically. Pothole inhabitants are adapted to a wide range of these environmental parameters, but conditions of their aquatic habitats still affect growth, reproductive efforts, and even survival[16-21].

A pothole is a very dynamic environment, but changes in pothole water as a result of acid deposition may lie outside the natural range of conditions. Thus, lowered pH, with or without an increase in heavy metal contamination, can upset the balance needed for pothole organisms to survive and reproduce successfully before the pool dries up.

In 1988 a study was initiated to address some of the questions concerning susceptibility of pothole ecosystems to acid deposition. Basic ecological questions of community structure and ecosystem functioning, as well as impacts of lowered pH on pothole systems were considered. As part of this study, water and sediment samples from selected potholes were analyzed for water quality parameters and trace element composition. The chemical composition of the water collected in these potholes is assumed to reflect an integration of the composition of precipitation and dry deposition falling directly into the pothole catchment basins and the composition of the sediments.

EXPERIMENTAL METHODS

Water Chemistry:

Water samples were collected from potholes in Grand County, Utah, during 1988 and 1989. Eleven potholes in Arches National Park and 15 in Grand Resource Area, BLM (hereafter referred to as BLM potholes or pools) were selected for each sample period, but logistics and/or field conditions (e.g. dry pools) limited the actual number sampled on any one date to between 3 and 20. Approximate locations of the sampling sites are shown in Fig. 2, and physical measurements presented in Table A-I in Appendix A. If a pothole scheduled to be sampled was dry, a nearby pool was selected as a substitute whenever possible. We did not correlate water chemistry of substitute potholes with originally selected potholes when both were wet due to funding constraints. Our primary objective was to investigate the general chemical composition of water in potholes shortly after rain occurred, rather than how the water chemistry of the same pothole behaved over a series of precipitation events. Sediment samples were collected from 10 of the 11 Arches pools that had previously had water samples taken, and from eight of the BLM pools (two pools still had water in them at sampling time) on 3 Nov. 1988.

In 1990 the study was extended in scope with water samples taken from selected potholes in the Lake Mead (LAME) National Recreation Area and Joshua Tree (JOTR) National Monument. This expansion was undertaken to determine whether any impact on water chemistry had occurred at sites that were nearer potential pollution sources (Navajo Generating Station, Mojave Generating Station, and Los Angeles Basin, respectively).

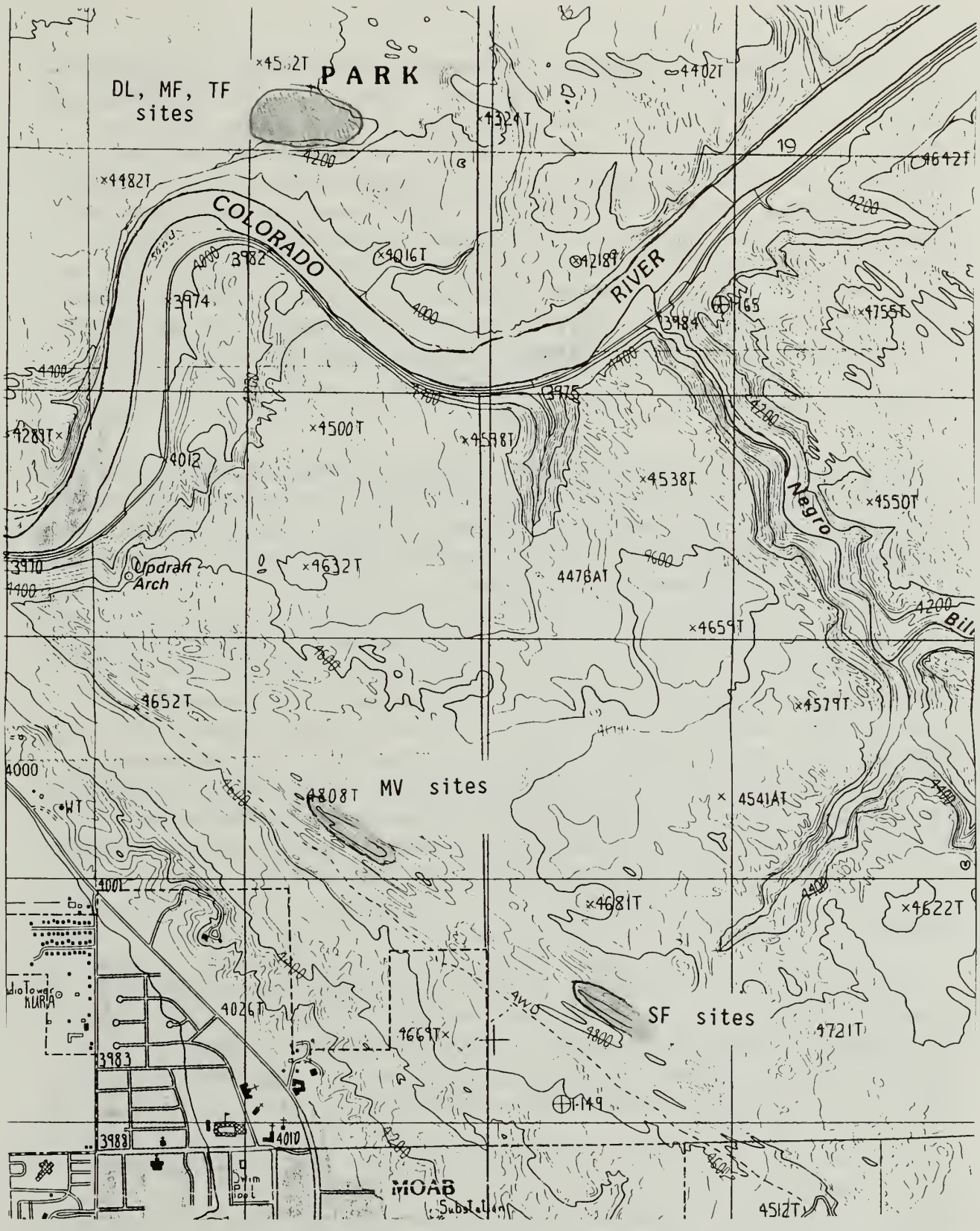

Figure 2. Sampling sites in Arches National Park and adjoining BLM land.

The temperature and pH of each pool were measured *in situ* at every sampling period in 1989, using an Orion Model SA 230 pH meter, with a Fisher combination pH electrode with Calomel reference. A Beckman Series 10 pH meter with temperature compensation and combination pH probes was used in 1990. Alkalinity in each pool was measured using a Hach alkalinity titration kit except for those taken on 28 July and 15 Sept. 1988 which did not have alkalinity measured. Due to the low alkalinities, 32 mL of sample was used for each titration instead of the 8 mL recommended by Hach. Bromocresol green/methyl red indicator was added to the sample and titrated to the color endpoint with 0.030 N sulfuric acid. The number of drops needed to reach the endpoint was multiplied by 4.275 to obtain alkalinity in mg/L $CaCO_3$. Some of these data were remeasured by acid titration to the methyl purple endpoint for total alkalinity (Method WI500)[22] after the samples had been received at Los Alamos.

Trace Element Content:

Water at all sites was collected in precleaned polyethylene bottles by pipetting two 100 mL samples in 5 mL increments from just below the surface of the pool using disposable pipettes. Great care was taken not to disturb the fine sediment. One sample was acidified with 5 mL of concentrated nitric acid (preservative for cation and trace metal analyses) and one sample remained untreated (alkalinity and anion analyses).

Anions (F^-, Cl^-, NO_3^-, $SO_4^=$, and $PO_4^=$) were determined by ion chromatography and major cations (Na^+, K^+, Ca^{2+}, and Mg^{2+}) by flame atomic absorption or inductively coupled plasma atomic emission spectrometry. Other analyses included: conductivity by wheatstone bridge, alkalinity by titration, and up to 60 trace metals by inductively coupled plasma mass spectrometry (ICPMS). Details of the chemical and instrumental methods employed may be found in Ref. 22. Quality assurance was maintained by concurrent analysis of a variety of National Institute of Standards and Technology (NIST, formerly the National Bureau of Standards) and Environmental Protection Agency (EPA) reference materials. Our quality assurance/control policies and techniques are detailed in Ref. 23.

Sediments:

Approximately 25 g of wet sediment at two different depths (surface and 1-2 cm below the surface) were collected. A polyethylene spoon was used to take the surface sample from the top centimeter of sediment over an area of approximately 25 cm^2. Sediments from 1-2 cm depth were taken from the center of the area exposed by sampling surface material. All samples were packaged in polyethylene bags and shipped to Los Alamos.

In the laboratory, the samples were first air dried and then sieved through a 20 mesh brass screen to remove large debris. Instrumental neutron activation determination of up to 44 elements in each sample was performed at the Los Alamos National Laboratory's Omega West Reactor using the automated methods described in Refs. 24-25. Aliquots of approximately 4 g of soil were encapsulated in screw-capped polyethylene rabbits and irradiated in a thermal

neutron flux of 6 x 10^{12} neutrons/cm^2/sec. The following is the irradiation and counting sequence currently employed:

1. First irradiation: 20 sec.
2. Transfer to delayed neutron counter, decay for 10 sec.
3. Count delayed neutrons for 30 sec.
4. Transfer to Ge(Li) detector, decay for 20 min.
5. Count short-lived gamma-emitting activities for 475 sec.
6. Transfer back to reactor for a second irradiation of 500 sec.
7. Transfer to storage, decay for 4-7 days.
8. Transfer back to Ge(Li) detector, count for 1 hour.
9. Transfer back to storage, decay 2-3 weeks.
10. Transfer back to Ge(Li) detector for final count of 2 hours.

Every Ge(Li) detector is calibrated using NIST traceable materials. Initially, each detector is calibrated with a certified Eu-152 radiation source to establish relative efficiency and characteristic peak shape. Absolute calibration is achieved by running a large set of NIST Coal, Fly Ash, and Silicate Standard Reference Materials (SRMs). Quality assurance for the automated neutron activation data reported in this work was provided by the concurrent analysis of geological SRMs produced by NIST that were submitted to the Reactor group as unknowns.

RESULTS AND DISCUSSION

Mean elemental and other constituent concentrations from unfiltered samples in groups of potholes are presented in Tables 1 and 2, with complete results of all chemical and physical measurements in pothole waters shown in Tables B-I through B-IV in Appendix B. The enrichment factor approach has again been employed to highlight elements that depart significantly from average crustal abundance in the pothole sediments from Grand County. This approach has been described in detail in Ref. 26. Mean enrichment factors are listed in Table 3 and the elemental concentration data and individual enrichment factors are given in Tables C-I through C-IV in Appendix C.

Temperature, pH, and alkalinity increase from sunrise to sunset each day in potholes[27]. Increases in pH may be due to photosynthetic consumption of CO_2. Therefore, some of the differences observed in these parameters are due to sampling at different times of day. The detailed compilations of these field data are presented in Tables D-I through D-III in Appendix D.

Among the "mineral" analyses (F^-, Cl^-, NO_3^-, $SO_4^=$, Na^+, K^+, Ca^{2+}, and Mg^{2+}) in the water samples, there seems to be a definite gradient with significant increases in many of the potholes nearest southern California for most of this group of analytes. Among the trace

Table 1: Summary of Mean Elemental Concentrations in Southwestern Pothole Waters

Site	Ag (ug/L)	Al (ug/L)	As (ug/L)	Au (ug/L)	B (ug/L)	Ba (ug/L)	Be (ug/L)	Bi (ug/L)	Br (ug/L)	Ca (mg/L)	Cd (ug/L)
MV	< 1	< 10	< 10	< 1	< 100	80	< 10	< 1	< 100	8.8	< 1
SF	< 1	< 10	< 10	< 1	30	100	< 10	< 1	110	18.0	< 1
DL	< 1	< 10	< 10	< 1	< 100	77	< 10	< 1	100	11.4	< 1
MF	< 1	< 10	< 10	< 1	< 100	80	< 10	< 1	< 100	9.0	< 1
TF	< 1	< 10	< 10	< 1	< 100	90	< 10	< 1	110	13.7	< 1
LAME	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	13.0	< 0.1
JOTR	< 1	---	< 10	< 1	1600	< 100	< 10	< 1	< 100	26.0	< 0.1

Site	Ce (ug/L)	Cl (mg/L)	Co (ug/L)	Cr (ug/L)	Cs (ug/L)	Cu (ug/L)	Dy (ug/L)	Er (ug/L)	Eu (ug/L)	F (mg/L)	Fe (mg/L)
MV	< 1	1.0	< 1	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
SF	< 1	1.7	< 1	< 10	< 1	< 50	< 1	< 1	< 1	0.3	1.0
DL	< 1	1.8	< 1	< 10	< 1	< 30	< 1	< 1	< 1	< 0.2	3.2
MF	< 1	1.7	< 1	< 10	< 1	70	< 1	< 1	< 1	< 0.2	3.0
TF	< 1	2.1	< 1	< 10	< 1	< 20	< 1	< 1	< 1	< 0.3	2.0
LAME	< 1	4.2	< 1	2.3	< 1	6.8	< 1	< 1	< 1	< 0.2	< 0.5
JOTR	< 1	14.8	< 1	4.1	< 1	13	< 1	< 1	< 1	< 0.2	0.6

Site	Ga (ug/L)	Gd (ug/L)	Ge (ug/L)	Hf (ug/L)	Hg (ug/L)	Ho (ug/L)	I (ug/L)	In (ug/L)	Ir (ug/L)	K (mg/L)	La (ug/L)
MV	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2	< 1
SF	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0	< 1
DL	< 1	< 1	< 1	< 1	< 1	< 1	< 2	< 1	< 1	1.4	< 1
MF	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1	< 1	1.9	< 1
TF	< 1	< 1	< 1	< 1	< 1	< 1	< 3	< 1	< 1	1.4	< 1
LAME	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.5	< 1
JOTR	< 1	< 1	< 1	< 1	< 1	< 1	< 4	< 1	< 1	1.9	< 1

Site	Li (ug/L)	Lu (ug/L)	Mg (mg/L)	Mn (ug/L)	Mo (ug/L)	Na (mg/L)	Nb (ug/L)	Nd (ug/L)	Ni (ug/L)	Os (ug/L)
MV	< 10	< 1	1.1	59	< 1	0.8	< 1	< 1	< 50	< 1
SF	< 10	< 1	1.3	150	< 1	0.6	< 1	< 1	< 50	< 1
DL	< 10	< 1	1.1	220	< 1	1.2	< 1	< 1	< 50	< 1
MF	< 10	< 1	1.1	80	< 1	1.2	< 1	< 1	70	< 1
TF	< 10	< 1	1.2	180	< 1	1.3	< 1	< 1	110	< 1
LAME	< 100	< 1	2.0	17	< 1	1.3	< 1	< 1	< 1	< 1
JOTR	250	< 1	2.3	8	< 2	11.9	< 1	< 1	< 3	< 1

Table 1: Summary of Mean Elemental Concentrations in Southwestern Pothole Waters (cont.)

Site	Pb (ug/L)	Pd (ug/L)	Pr (ug/L)	Pt (ug/L)	Rb (ug/L)	Re (ug/L)	Rh (ug/L)	Ru (ug/L)	Sb (ug/L)	Sc (ug/L)
MV	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DL	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
LAME	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
JOTR	12	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Site	Se (ug/L)	Sm (ug/L)	Sn (ug/L)	Sr (ug/L)	Ta (ug/L)	Tb (ug/L)	Te (ug/L)	Th (ug/L)	Ti (ug/L)
MV	< 10	< 1	< 1	110	< 1	< 1	< 1	< 1	< 10
SF	< 20	< 1	< 1	220	< 1	< 1	< 1	< 1	< 10
DL	30	< 1	< 1	340	< 1	< 1	< 1	< 1	< 10
MF	24	< 1	< 1	350	< 1	< 1	< 1	< 1	< 10
TF	35	< 1	< 1	270	< 1	< 1	< 1	< 1	< 10
LAME	< 10	< 1	< 1	72	< 1	< 1	< 1	< 1	< 10
JOTR	< 10	< 1	3	130	< 1	< 1	< 1	< 1	< 10

Site	Tl (ug/L)	Tm (ug/L)	U (ug/L)	V (ug/L)	W (ug/L)	Y (ug/L)	Yb (ug/L)	Zn (ug/L)	Zr (ug/L)
MV	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF	< 1	< 1	< 2	< 2	< 1	< 1	< 1	< 10	< 1
DL	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 10	< 1
MF	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 10	< 1
TF	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 10	< 1
LAME	< 1	< 1	< 1	< 1	< 1	< 1	< 1	22	< 1
JOTR	< 1	< 1	< 1	2	< 1	< 1	< 1	14	< 1

Table 2: Summary of Mean Concentrations of Other Constituents in Southwestern Pothole Waters

Site	Conductivity (microhos)	NO_3-N (mg/L)	Field pH (units)	PO_4-P (mg/L)	SO_4 (mg/L)	Total Alkalinity (mg/L) (field)	(laboratory)	Temperature (deg. C)
MV	61	< 0.2	8.0	< 0.2	7.6	26	10	25.4
SF	108	< 0.2	7.9	< 0.2	10.9	36	24	21.7
DL	87	< 0.4	7.5	< 0.2	14.2	28	16	27.0
MF	84	0.4	8.2	< 0.2	12.4	26	19	25.4
TF	91	0.6	8.3	< 0.2	17.2	28	21	29.0
LAME	---	---	9.1	---	25	25	25	24.4
JOTR	---	15.4	9.4	0.4	32	26	---	27.0

Notes: field = measurements made *in situ*
laboratory = measurements made in Los Alamos

Table 3: Summary of Enrichment Factors for Grand County, Utah, Pothole Sediments

Group	Depth (cm)	Samp (no.)	As	Ba	Br	Ca	Co
MV	0	3	13 ± 4	2.1 ± 0.6	3.5 ± 1.9	0.3 ± 0.2	0.8 ± 0.1
	1-2	3	10 ± 4	2.2 ± 0.2	0.8 ± 0.2	0.1	0.5 ± 0.1
SF	0	5	12 ± 3	1.6 ± 0.4	3.6 ± 2.2	0.2 ± 0.1	0.9 ± 0.2
	1-2	6	8 ± 1	2.3 ± 0.3	1.5 ± 0.6	0.1	0.7 ± 0.2
DL	0	2	8.2	1.4	4.0	0.3	1.0
	1-2	2	6.3	2.3	2.2	0.1	0.6
MF	0	3	6 ± 1	1.9 ± 0.4	1.9 ± 0.7	0.2	0.5 ± 0.1
	1-2	3	6 ± 1	2.6 ± 0.4	1.4 ± 0.2	0.1	0.5 ± 0.1
TF	0	5	5 ± 3	1.7 ± 0.3	3.4 ± 1.0	0.2 ± 0.1	0.7 ± 0.1
	1-2	5	6 ± 2	2.4 ± 0.5	1.4 ± 0.5	0.1	0.6 ± 0.1

Group	Depth (cm)	Samp (no.)	Cs	Eu	Fe	Mg	Mn
MV	0	3	1.8 ± 0.1	1.7 ± 0.1	0.6 ± 0.1	0.5 ± 0.1	1.5 ± 0.6
	1-2	3	1.4 ± 0.1	1.3 ± 0.2	0.5 ± 0.1	0.3 ± 0.1	0.3 ± 0.1
SF	0	5	1.6 ± 0.1	1.6 ± 0.3	0.7 ± 0.1	0.6 ± 0.1	2.3 ± 1.4
	1-2	6	1.6 ± 0.2	1.4 ± 0.1	0.5 ± 0.2	0.4 ± 0.1	0.3 ± 0.1
DL	0	2	1.6	1.9	0.7	0.5	1.4
	1-2	2	1.6	1.4	0.5	0.3	0.2
MF	0	3	1.4 ± 0.1	1.4 ± 0.1	0.5 ± 0.1	0.4 ± 0.1	0.6 ± 0.1
	1-2	3	1.6 ± 0.2	1.4 ± 0.2	0.5 ± 0.1	0.3 ± 0.1	0.2 ± 0.1
TF	0	5	1.5 ± 0.2	1.5 ± 0.2	0.6 ± 0.1	0.4 ± 0.1	1.1 ± 0.3
	1-2	5	1.5 ± 0.2	1.3 ± 0.2	0.5 ± 0.1	0.3 ± 0.1	0.3 ± 0.2

Table 3: Summary of Enrichment Factors for Grand County, Utah, Pothole Sediments (cont.)

Group	Depth (cm)	Samp (No.)	Sb	Sc	Se	U	V	Zn
MV	0	3	25 ± 5	0.7 ± 0.1	57 ± 11	1.9 ± 0.8	0.8 ± 0.1	1.5 ± 0.3
	1-2	3	25 ± 3	0.5 ± 0.1	60 ± 30	2.0 ± 0.8	0.6 ± 0.2	0.7
SF	0	5	21 ± 2	0.8 ± 0.2	68 ± 9	2.1 ± 0.3	1.0 ± 0.2	1.5 ± 0.2
	1-2	6	22 ± 4	0.6 ± 0.2	77 ± 22	2.2 ± 0.4	0.7 ± 0.1	1.6 ± 0.4
DL	0	2	16	0.8	50	3.8	1.2	1.7
	1-2	2	17	0.6	102	2.9	0.8	1.4
MF	0	3	17 ± 1	0.6 ± 0.2	46 ± 6	1.9 ± 0.6	1.0 ± 0.4	0.9 ± 0.2
	1-2	3	21 ± 1	0.5 ± 0.1	86 ± 38	2.1 ± 0.2	0.6 ± 0.1	1.4 ± 0.3
TF	0	5	18 ± 1	0.7 ± 0.1	42 ± 8	3.1 ± 1.3	1.0 ± 0.3	1.2 ± 0.3
	1-2	5	18 ± 3	0.5 ± 0.1	79 ± 30	2.7 ± 0.9	0.7 ± 0.1	1.2 ± 0.4

metals in waters, Cu, Pb, V, and Zn are definitely enriched in JOTR relative to LAME and Grand County, Utah. These are common industrial and energy production/consumption related trace elements. Boron is also strongly enriched in all the JOTR water samples relative to all the other sites. This element is commonly emitted from both coal-fired power plants and automobiles using certain types of unleaded gasoline. We consider these enrichments to be evidence of wet and dry deposition from long-range transport of atmospheric aerosols generated in southern California. Of the entire suite of elements/anions determined in the water samples, only iron and manganese were elevated in the Grand County samples relative to those closer to urban areas, and may represent the enrichment and mobilization of Fe and Mn in the desert Southwest ecosystem due to cryptobiotic soil activity. The zinc data from 21 Aug. 1988 in Grand County are uniformly high, and probably represent contaminated samples due to inexperience with the sampling equipment and the concentrated nitric acid preservative.

The enrichment factors in the Grand County sediments presented in Table 3 reflect the common features of unpolluted soils in the desert Southwest. Arsenic, bromine, antimony, selenium, and uranium are significantly enriched relative to average crustal materials. Calcium and magnesium are definitely depleted, while the remaining elements have enrichment factors near 1.0 indicating little difference from mean crustal abundance. It is noteworthy that although Mn was measured at elevated concentrations in the pothole waters, this was not reflected in the sediments. Unfortunately, no sediment samples were collected from LAME or JOTR for comparison.

SUMMARY AND MANAGEMENT IMPLICATIONS

The vast majority of trace elemental concentrations in pothole waters in all areas are below the detection limits of our most sensitive instrumentation. Most of these will be present in the waters at the sub-parts-per-billion range (microgram/L). This represents very clean waters

showing little impact from metal-rich airborne particulate matter from anthropogenic sources. At the present time, the Grand County potholes provide excellent background data against which more urbanized catchment basins can be evaluated. Many of the mineral analytes (Ca, Cl, Na, NO_3-N, and SO_4) and several trace metals (B, Cu, Pb, V, and Zn) suggest input from some external source at JOTR.

The limited pothole data presented in this study suggest that these widespread desert features may indeed be used to assess long-term trends in atmospheric deposition in remote ecosystems. At present, no impact on the biological resource in these rock pools has been observed.

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Appendix A: Physical Characteristics of Potholes

Table A-I: Physical Characteristics of Potholes Sampled

Site No.	Maximum Area (m^2)	Maximum Depth (cm)	Maximum Volume (L)	Site No.	Maximum Area (m^2)	Maximum Depth (cm)	Maximum Volume (L)
DL-5	8.9	32	3900	TF-2	13.5	33	5300
DL-11	14.7	39	6000	TF-4	9.8	43	6400
DL-14A	8.7	26	3800	TF-7	9.3	18	1700
				TF-11	6.3	28	2500
MF-5	9.1	45	2600	TF-14	9.7	29	2700
MF-6	14.9	44	4900				
MF-8	8.6	22	2400	CAT-1	---	--	8900
MF-9	15.6	53	8200	CAT-2	---	--	61
				CAT-3	---	--	38
MV-5	2.7	24	640	CAT-4	---	--	35
MV-11	12.3	35	5300	CAT-5	---	--	120
MV-13	7.4	32	2200	LAKE-1	---	--	230
MV-14A	2.5	28	690	GRAPE-1	---	--	110
MV-14B	14.5	28	3800	GRAPE-2	---	--	91
MV-25	11.4	32	3300				
MV-35	5.3	0	2400	HO-1	---	--	3000
				HO-2	---	--	440
SF-2	5.1	25	1300	HO-3	---	--	620
SF-8	6.4	0	2100	BO-1	---	--	0
SF-9A	6.7	30	2300	BO-2	---	--	300
SF-10B	14.6	44	5100	BO-3	---	--	98
SF-12B	5.6	16	890	BO-4	---	--	310
SF-13	8.4	39	2700	BO-5	---	--	660
SF-18	10.7	34	2400				
SF-19	12.0	29	3500				

Appendix B: Individual Constituent Concentrations in Pothole Water Samples

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters

Site No.	Collection Date	Ag (ug/L)	Al (ug/L)	As (ug/L)	Au (ug/L)	B (ug/L)	Ba (ug/L)	Be (ug/L)	Bi (ug/L)	Br (ug/L)	Ca (mg/L)	Cd (ug/L)
MV-5	8/15/89	< 1	---	< 10	< 1	< 50	75 ± 15	< 10	< 1	< 100	9.0 ± 0.8	< 1
	10/16/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	6.5 ± 0.7	< 1
MV-11	9/15/88	< 1	---	< 10	< 1	56 ± 11	65 ± 13	< 10	< 1	93 ± 18	10.2 ± 1.0	< 1
	8/15/89	< 1	---	< 10	< 1	< 50	69 ± 15	< 10	< 1	< 100	9.5 ± 0.8	< 1
	10/16/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	9.0 ± 0.8	< 1
MV-13	9/15/88	< 1	---	< 10	< 1	< 100	110 ± 22	< 10	< 1	< 100	9.3 ± 0.9	< 1
	9/13/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	10.1 ± 1.0	< 1
	10/16/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	10.0 ± 1.0	< 1
MV-14A	8/15/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	13.2 ± 1.2	< 1
	10/16/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	10.4 ± 1.0	< 1
MV-14B	9/13/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	8.4 ± 0.8	< 1
	10/5/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	9.3 ± 1.0	< 1
	10/16/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	10.0 ± 1.0	< 1
MV-20	8/15/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	7.1 ± 0.7	< 1
MV-25	9/15/88	< 1	---	< 10	< 1	< 100	60 ± 12	< 10	< 1	< 100	11.8 ± 1.2	< 1
	8/15/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	10.1 ± 1.0	< 1
	9/13/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	9.4 ± 0.9	< 1
	10/16/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	7.6 ± 0.8	< 1
MV-35	9/15/88	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	60 ± 12	5.8 ± 0.6	< 1
	8/15/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	5.3 ± 0.5	< 1
	10/16/89	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	4.1 ± 0.4	< 1
SF-2	10/5/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	70 ± 15	8.5 ± 0.8	< 1
	10/16/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	60 ± 10	7.5 ± 0.8	< 1
SF-8	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	13.0 ± 1.3	< 1
	9/15/88	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	< 100	3.7 ± 0.4	< 1
	9/25/88	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	67 ± 13	7.5 ± 0.8	< 1
	1/12/89	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	< 100	0.20 ± 0.03	< 1
	8/15/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	17.5 ± 1.8	< 1
	10/05/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	15.5 ± 1.4	< 1
	10/16/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	10.5 ± 1.1	< 1

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Ag (ug/L)	Al (ug/L)	As (ug/L)	Au (ug/L)	B (ug/L)	Ba (ug/L)	Be (ug/L)	Bi (ug/L)	Br (ug/L)	Ca (mg/L)	Cd (ug/L)
SF-9A	10/05/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	14.5 ± 1.4	< 1
	10/16/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	17.5 ± 1.8	< 1
SF-9B	7/28/88	< 1	< 10	< 10	< 1	8 ± 1	100 ± 10	< 10	< 1	< 100	---	< 1
SF-10B	7/28/88	< 1	< 10	< 10	< 1	10 ± 1	100 ± 10	< 10	< 1	< 100	---	< 1
	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	30 ± 3	< 1
	9/15/88	< 1	---	< 10	< 1	57 ± 12	47 ± 9	< 10	< 1	89 ± 18	8.4 ± 0.8	< 1
	9/25/88	< 1	---	< 10	< 1	45 ± 9	73 ± 14	< 10	< 1	151 ± 31	21 ± 2	< 1
	1/12/89	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	< 100	0.37 ± 0.04	< 1
	8/15/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	32 ± 3	< 1
	10/05/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	20 ± 3	< 1
	10/16/89	< 1	< 10	< 10	< 1	< 100	120 ± 10	< 10	< 1	< 100	19 ± 2	< 1
SF-12A	7/28/88	< 1	< 10	10 ± 1	< 1	10 ± 1	200 ± 20	< 10	< 1	< 100	---	< 1
	9/25/88	< 1	---	< 10	< 1	48 ± 10	< 50	< 10	< 1	154 ± 30	20.8 ± 2.1	< 1
SF-12B	7/28/88	< 1	< 10	< 10	< 1	10 ± 1	500 ± 50	< 10	< 1	< 100	---	< 1
	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	33 ± 3	< 1
	9/15/88	< 1	---	< 10	< 1	54 ± 10	47 ± 9	< 10	< 1	90 ± 18	9.5 ± 1.0	< 1
	9/25/88	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	260 ± 52	22 ± 2	< 1
	1/12/89	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	< 100	< 0.03	< 1
	8/15/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	31 ± 3	< 1
	10/05/89	< 1	< 10	< 10	< 1	< 100	< 100	< 10	< 1	< 100	27 ± 3	< 1
	10/16/89	< 1	< 10	< 10	< 1	< 100	< 100	< 10	< 1	< 100	24 ± 2	< 1
SF-13	7/28/88	< 1	< 10	< 10	< 1	10 ± 1	100 ± 10	< 10	< 1	< 100	---	< 1
	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	29 ± 3	< 1
	9/15/88	< 1	---	< 10	< 1	55 ± 11	59 ± 12	< 10	< 1	77 ± 15	9.6 ± 1.0	< 1
	1/12/89	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	< 100	0.27 ± 0.03	< 1
	8/15/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	34 ± 3	< 1
	10/05/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	19 ± 2	< 1
	10/16/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	14 ± 2	< 1
SF-18	10/05/89	< 1	< 10	< 10	< 1	< 100	< 100	< 10	< 1	< 100	19 ± 3	< 1
	10/16/89	< 1	< 10	< 10	< 1	< 100	< 100	< 10	< 1	< 100	16 ± 2	< 1
SF-19	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	27 ± 3	< 1
	9/15/88	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	61 ± 12	6.7 ± 0.7	< 1
	9/25/88	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	80 ± 16	13.8 ± 1.4	< 1
	1/12/89	< 1	---	< 10	< 1	< 100	< 1	< 10	< 1	< 100	0.34 ± 0.03	< 1
	8/15/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	25 ± 3	< 1
	0/16/89	< 1	< 10	< 10	< 1	< 100	< 100	< 10	< 1	< 100	11 ± 2	< 1

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Ce (ug/L)	Cl (mg/L)	Co (ug/L)	Cond.* (uhos)	Cr (ug/L)	Cs (ug/L)	Cu (ug/L)	Dy (ug/L)	Er (ug/L)	Eu (ug/L)	F (mg/L)	Fe (mg/L)
MV-5	8/15/89	< 1	1.1 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	10/16/89	< 1	1.1 ± 0.2	< 1	---	< 10	< 1	100 ± 10	< 1	< 1	< 1	< 0.2	2.0 ± 1.0
MV-11	9/15/88	< 1	1.0 ± 0.2	< 1	64 ± 6	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	8/15/89	< 1	1.5 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	10/16/89	< 1	1.1 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
MV-13	9/15/88	< 1	0.8 ± 0.2	< 1	61 ± 6	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	0.43 ± 0.09
	9/13/89	< 1	0.9 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.6 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
MV-14A	8/15/89	< 1	0.8 ± 0.3	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.6 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
MV-14B	9/13/89	< 1	1.9 ± 0.3	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/5/89	< 1	1.1 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.9 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
MV-20	8/15/89	< 1	1.3 ± 0.3	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
MV-25	9/15/88	< 1	1.0 ± 0.2	< 1	76 ± 8	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	8/15/89	< 1	1.3 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	9/13/89	< 1	1.1 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	10/16/89	< 1	0.9 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
MV-35	9/15/88	< 1	0.6 ± 0.1	< 1	43 ± 4	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	0.73 ± 0.15
	8/15/89	< 1	0.8 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.8 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
SF-2	10/5/89	< 1	1.1 ± 0.1	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	1.4 ± 0.2	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	< 0.2	< 0.5
SF-8	8/21/88	< 1	1.0 ± 0.1	< 1	78 ± 8	< 10	< 1	100 ± 10	< 1	< 1	< 1	< 0.2	1.0 ± 0.1
	9/15/88	< 1	0.3 ± 0.1	< 1	28 ± 3	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	9/25/88	< 1	0.9 ± 0.2	< 1	52 ± 5	< 10	< 1	< 50	< 1	< 1	< 1	< 0.2	0.34 ± 0.07
	1/12/89	< 1	0.4 ± 0.1	< 1	12 ± 1	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	8/15/89	< 1	0.8 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/05/89	< 1	0.7 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.5 ± 0.1	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5

* Cond. = Conductivity

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Ce (ug/L)	Cl (mg/L)	Co (ug/L)	Cond.* (uhos)	Cr (ug/L)	Cs (ug/L)	Cu (ug/L)	Dy (ug/L)	Er (ug/L)	Eu (ug/L)	F (mg/L)	Fe (mg/L)
SF-9A	10/05/89	< 1	1.2 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.8 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
SF-9B	7/28/88	10 ± 1	2.4 ± 0.2	< 1	168 ± 17	10 ± 1	< 1	10 ± 1	< 1	< 1	< 1	0.4 ± 0.1	1.0 ± 0.1
SF-10B	7/28/88	< 1	4.2 ± 0.4	< 1	245 ± 24	10 ± 1	< 1	10 ± 1	< 1	< 1	< 1	0.5 ± 0.1	1.0 ± 0.1
	8/21/88	< 1	2.8 ± 0.3	< 1	171 ± 17	< 10	< 1	100 ± 10	< 1	< 1	< 1	0.3 ± 0.1	1.0 ± 0.1
	9/15/88	< 1	1.1 ± 0.1	< 1	51 ± 5	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	9/25/88	< 1	2.2 ± 0.2	< 1	129 ± 13	< 10	< 1	< 50	< 1	< 1	< 1	< 0.2	0.48 ± 0.10
	1/12/89	< 1	0.4 ± 0.1	< 1	3.5 ± 0.4	< 10	< 1	< 1	< 1	< 1	< 1	0.3 ± 0.2	< 0.1
	8/15/89	< 1	3.2 ± 0.4	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	0.5 ± 0.1	0.7 ± 0.2
	10/05/89	< 1	2.2 ± 0.3	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	0.4 ± 0.1	0.6 ± 0.3
	10/16/89	< 1	1.9 ± 0.2	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	0.5 ± 0.1	< 0.5
SF-12A	7/28/88	< 1	6.7 ± 0.7	< 1	310 ± 31	10 ± 1	< 1	< 1	< 1	< 1	< 1	0.7 ± 0.1	1.0 ± 0.1
	9/25/88	< 1	2.0 ± 0.2	< 1	125 ± 13	< 10	< 1	< 50	< 1	< 1	< 1	0.2 ± 0.1	< 0.1
SF-12B	7/28/88	< 1	2.8 ± 0.3	< 1	210 ± 21	10 ± 1	< 1	10 ± 1	< 1	< 1	< 1	0.6 ± 0.1	1.0 ± 0.1
	8/21/88	< 1	2.9 ± 0.3	< 1	194 ± 19	< 10	< 1	100 ± 10	< 1	< 1	< 1	0.3 ± 0.1	5.0 ± 0.5
	9/15/88	< 1	1.0 ± 0.1	< 1	64 ± 6	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	9/25/88	< 1	3.1 ± 0.3	< 1	134 ± 13	< 10	< 1	< 50	< 1	< 1	< 1	0.3 ± 0.1	< 0.1
	1/12/89	< 1	0.4 ± 0.1	< 1	15 ± 2	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	8/15/89	< 1	2.5 ± 0.3	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	0.3 ± 0.1	3.9 ± 0.4
	10/05/89	< 1	2.2 ± 0.3	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	0.3 ± 0.1	3.4 ± 0.4
	10/16/89	< 1	2.0 ± 0.3	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	0.3 ± 0.1	2.9 ± 0.3
SF-13	7/28/88	< 1	2.7 ± 0.3	< 1	192 ± 19	10 ± 1	< 1	< 1	< 1	< 1	< 1	0.5 ± 0.1	1.0 ± 0.1
	8/21/88	< 1	2.4 ± 0.2	< 1	167 ± 17	< 10	< 1	100 ± 10	< 1	< 1	< 1	0.3 ± 0.1	5.0 ± 0.5
	9/15/88	< 1	0.5 ± 0.1	< 1	60 ± 6	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	0.36 ± 0.07
	1/12/89	< 1	2.9 ± 0.3	< 1	20 ± 2	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	8/15/89	< 1	2.5 ± 0.3	< 1	---	10 ± 1	< 1	< 1	< 1	< 1	< 1	0.5 ± 0.1	1.4 ± 0.1
	10/05/89	< 1	2.4 ± 0.3	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	0.5 ± 0.1	1.3 ± 0.1
	10/16/89	< 1	1.8 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	0.5 ± 0.1	1.1 ± 0.2
SF-18	10/05/89	< 1	0.5 ± 0.1	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.4 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
SF-19	8/21/88	< 1	1.3 ± 0.2	< 1	151 ± 15	< 10	< 1	100 ± 10	< 1	< 1	< 1	0.2 ± 0.1	5.0 ± 0.5
	9/15/88	< 1	0.4 ± 0.1	< 1	41 ± 4	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	9/25/88	< 1	1.0 ± 0.2	< 1	75 ± 8	< 10	< 1	< 50	< 1	< 1	< 1	0.2 ± 0.1	< 0.1
	1/12/89	< 1	< 0.2	< 1	5.0 ± 0.5	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.1
	8/15/89	< 1	1.5 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5
	10/16/89	< 1	0.8 ± 0.1	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	< 0.5

* Cond. = Conductivity

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Ga (ug/L)	Gd (ug/L)	Ge (ug/L)	Hf (ug/L)	Hg (ug/L)	Ho (ug/L)	I (ug/L)	In (ug/L)	Ir (ug/L)	K (mg/L)	La (ug/L)	Li (ug/L)
MV-5	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 1	1.8 ± 0.2	< 1	< 10
MV-11	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
MV-13	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	< 10
	9/13/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
MV-14A	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.4 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
MV-14B	9/13/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
	10/5/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
MV-20	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.6 ± 0.2	< 1	< 10
MV-25	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3 ± 0.1	< 1	< 10
	9/13/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.4 ± 0.1	< 1	< 10
MV-35	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.9 ± 0.1	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
SF-2	10/5/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
SF-8	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	0.98 ± 0.10	< 1	< 10
	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.4 ± 0.1	< 1	< 10
	9/25/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.6 ± 0.1	< 1	< 10
	1/12/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.36 ± 0.09	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.6 ± 0.1	< 1	< 10
	10/05/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.6 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.5 ± 0.1	< 1	< 10

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Ga (ug/L)	Gd (ug/L)	Ge (ug/L)	Hf (ug/L)	Hg (ug/L)	Ho (ug/L)	I (ug/L)	In (ug/L)	Ir (ug/L)	K (mg/L)	La (ug/L)	Li (ug/L)
SF-9A	10/05/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
SF-9B	7/28/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	---	< 1	< 10
SF-10B	7/28/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	---	< 1	< 10
	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	2.4 ± 0.2	< 1	< 10
	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	< 10
	9/25/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.4 ± 0.1	< 1	< 10
	1/12/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.20 ± 0.09	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.9 ± 0.1	< 1	< 10
	10/05/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.5 ± 0.2	< 1	< 10
SF-12A	7/28/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	---	< 1	< 10
	9/25/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.5 ± 0.2	< 1	< 10
SF-12B	7/28/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	---	< 1	< 10
	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	2.8 ± 0.3	< 1	< 10
	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	< 10
	9/25/88	< 1	< 1	< 1	< 1	< 1	< 1	25 ± 5	< 1	< 1	1.5 ± 0.2	< 1	< 10
	1/12/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.09	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	< 10
	10/05/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.9 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.6 ± 0.2	< 1	< 10
SF-13	7/28/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	---	< 1	< 10
	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	2.1 ± 0.2	< 1	< 10
	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.7 ± 0.1	< 1	< 10
	1/12/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.81 ± 0.09	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
	10/05/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.7 ± 0.1	< 1	< 10
SF-18	10/05/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.9 ± 0.1	< 1	< 10
SF-19	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	2.1 ± 0.2	< 1	< 10
	9/15/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.6 ± 0.1	< 1	< 10
	9/25/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.9 ± 0.1	< 1	< 10
	1/12/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.14 ± 0.09	< 1	< 10
	8/15/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	< 10
	10/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.5 ± 0.2	< 1	< 10

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Lu (ug/L)	Mg (mg/L)	Mn (ug/L)	Mo (ug/L)	Na (mg/L)	Nb (ug/L)	Nd (ug/L)	Ni (ug/L)	NO_3-N (mg/L)	Os (ug/L)
MV-5	8/15/89	< 1	0.8 ± 0.1	50 ± 10	< 1	0.9 ± 0.1	< 1	< 1	120 ± 15	< 0.2	< 1
	10/16/89	< 1	1.1 ± 0.1	100 ± 10	< 1	1.2 ± 0.1	< 1	< 1	< 50	0.4 ± 0.1	< 1
MV-11	9/15/88	< 1	0.9 ± 0.1	55 ± 11	< 1	0.8 ± 0.1	< 1	< 1	120 ± 24	< 0.2	< 1
	8/15/89	< 1	0.7 ± 0.1	80 ± 20	< 1	0.8 ± 0.1	< 1	< 1	90 ± 20	< 0.2	< 1
	10/16/89	< 1	0.8 ± 0.1	50 ± 10	< 1	0.7 ± 0.1	< 1	< 1	100 ± 20	< 0.2	< 1
MV-13	9/15/88	< 1	1.0 ± 0.1	< 50	< 1	0.8 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	9/13/89	< 1	1.2 ± 0.1	< 50	< 1	0.8 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/16/89	< 1	1.3 ± 0.1	< 50	< 1	0.9 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
MV-14A	8/15/89	< 1	1.1 ± 0.1	< 50	< 1	0.9 ± 0.1	< 1	< 1	40 ± 20	< 0.2	< 1
	10/16/89	< 1	1.0 ± 0.1	< 50	< 1	0.8 ± 0.1	< 1	< 1	< 10	< 0.2	< 1
MV-14B	9/13/89	< 1	1.4 ± 0.1	< 50	< 1	1.1 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/5/89	< 1	1.5 ± 0.1	< 50	< 1	0.6 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/16/89	< 1	1.0 ± 0.1	< 50	< 1	0.9 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
MV-20	8/15/89	< 1	1.8 ± 0.2	< 50	< 1	0.6 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
MV-25	9/15/88	< 1	1.0 ± 0.1	70 ± 14	< 1	0.6 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	8/15/89	< 1	1.3 ± 0.1	90 ± 15	< 1	0.8 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	9/13/89	< 1	1.3 ± 0.1	70 ± 10	< 1	0.8 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/16/89	< 1	1.1 ± 0.1	60 ± 10	< 1	0.7 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
MV-35	9/15/88	< 1	0.6 ± 0.1	54 ± 10	< 1	0.4 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	8/15/89	< 1	0.9 ± 0.1	60 ± 10	< 1	0.5 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/16/89	< 1	0.7 ± 0.1	50 ± 10	< 1	0.4 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
SF-2	10/5/89	< 1	0.6 ± 0.1	< 50	< 1	0.4 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/16/89	< 1	0.8 ± 0.1	< 50	< 1	0.4 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
SF-8	8/21/88	< 1	0.73 ± 0.1	100 ± 10	< 1	0.8 ± 0.1	< 1	< 1	100 ± 10	< 0.2	< 1
	9/15/88	< 1	0.5 ± 0.1	< 50	< 1	0.3 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	9/25/88	< 1	0.8 ± 0.1	< 50	< 1	0.5 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
	1/12/89	< 1	0.10 ± 0.04	6 ± 1	< 1	0.12 ± 0.04	< 1	< 1	< 1	0.6 ± 0.1	< 1
	8/15/89	< 1	0.7 ± 0.1	< 50	< 1	0.5 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/05/89	< 1	0.6 ± 0.1	< 50	< 1	0.6 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/16/89	< 1	0.5 ± 0.1	< 50	< 1	0.3 ± 0.2	< 1	< 1	< 1	< 0.2	< 1

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Lu (ug/L)	Mg (mg/L)	Mn (ug/L)	Mo (ug/L)	Na (mg/L)	Nb (ug/L)	Nd (ug/L)	Ni (ug/L)	NO_3-N (mg/L)	Os (ug/L)
SF-9A	10/05/89	< 1	0.6 ± 0.1	< 50	< 1	0.4 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	10/16/89	< 1	0.5 ± 0.1	< 50	< 1	0.6 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
SF-9B	7/28/88	< 1	---	1000 ± 100	< 1	< 0.1	< 1	< 1	10 ± 1	< 0.2	< 1
SF-10B	7/28/88	< 1	2.0 ± 0.2	---	< 1	< 0.1	< 1	< 1	< 1	< 0.2	< 1
	8/21/88	< 1	2.6 ± 0.3	1000 ± 100	< 1	1.6 ± 0.2	< 1	< 1	100 ± 10	< 0.2	< 1
	9/15/88	< 1	1.0 ± 0.1	61 ± 12	< 1	0.6 ± 0.1	< 1	< 1	630 ± 120	< 0.2	< 1
	9/25/88	< 1	1.9 ± 0.2	< 50	< 1	1.3 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
	1/12/89	< 1	0.15 ± 0.04	< 1	< 1	< 0.04	< 1	< 1	< 1	< 0.2	< 1
	8/15/89	< 1	1.8 ± 0.2	70 ± 15	< 1	1.5 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
	10/05/89	< 1	1.9 ± 0.2	60 ± 10	< 1	1.4 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
	10/16/89	< 1	1.5 ± 0.1	70 ± 20	< 1	1.5 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
SF-12A	7/28/88	< 1	1.0 ± 0.1	---	< 1	< 0.1	< 1	< 1	10 ± 1	< 0.2	< 1
	9/25/88	< 1	1.9 ± 0.2	< 50	< 1	1.2 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
SF-12B	7/28/88	< 1	5.0 ± 0.5	---	< 1	< 0.1	< 1	< 1	10 ± 1	< 0.2	< 1
	8/21/88	< 1	3.1 ± 0.3	1000 ± 100	< 1	1.6 ± 0.2	< 1	< 1	100 ± 10	< 0.2	< 1
	9/15/88	< 1	1.1 ± 0.1	57 ± 11	< 1	0.6 ± 0.1	< 1	< 1	474 ± 94	< 0.2	< 1
	9/25/88	< 1	1.3 ± 0.1	< 50	< 1	1.7 ± 0.2	< 1	< 1	70 ± 14	< 0.2	< 1
	1/12/89	< 1	< 0.04	< 1	< 1	< 0.04	< 1	< 1	< 1	0.6 ± 0.1	< 1
	8/15/89	< 1	1.5 ± 0.1	< 50	< 1	1.6 ± 0.2	< 1	< 1	< 50	< 0.2	< 1
	10/05/89	< 1	1.3 ± 0.1	< 50	< 1	1.8 ± 0.2	< 1	< 1	< 50	< 0.2	< 1
	10/16/89	< 1	1.4 ± 0.1	< 50	< 1	1.2 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
SF-13	7/28/88	< 1	1.0 ± 0.1	---	< 1	< 0.1	< 1	< 1	10 ± 1	< 0.2	< 1
	8/21/88	< 1	2.0 ± 0.2	1000 ± 100	< 1	2.0 ± 0.2	< 1	< 1	100 ± 10	< 0.2	< 1
	9/15/88	< 1	0.9 ± 0.1	180 ± 36	< 1	0.5 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	1/12/89	< 1	< 0.04	< 1	< 1	0.5 ± 0.05	< 1	< 1	< 1	0.4 ± 0.1	< 1
	8/15/89	< 1	1.5 ± 0.2	< 50	< 1	< 0.1	< 1	< 1	< 10	< 0.2	< 1
	10/05/89	< 1	1.8 ± 0.2	< 50	< 1	< 0.1	< 1	< 1	< 10	< 0.2	< 1
	10/16/89	< 1	1.4 ± 0.1	< 50	< 1	< 0.1	< 1	< 1	< 10	< 0.2	< 1
SF-18	10/05/89	< 1	1.5 ± 0.2	< 50	< 1	< 0.1	< 1	< 1	< 20	< 0.2	< 1
	10/16/89	< 1	1.3 ± 0.1	< 50	< 1	< 0.1	< 1	< 1	< 10	< 0.2	< 1
SF-19	8/21/88	< 1	1.5 ± 0.2	500 ± 50	< 1	0.8 ± 0.1	< 1	< 1	100 ± 10	< 0.2	< 1
	9/15/88	< 1	0.6 ± 0.1	< 1	< 1	0.5 ± 0.1	< 1	< 1	66 ± 13	< 0.2	< 1
	9/25/88	< 1	1.0 ± 0.1	< 50	< 1	0.6 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
	1/12/89	< 1	0.20 ± 0.04	< 1	< 1	< 0.04	< 1	< 1	< 1	< 0.2	< 1
	8/15/89	< 1	1.1 ± 0.1	< 50	< 1	0.8 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
	10/16/89	< 1	1.2 ± 0.1	< 50	< 1	0.5 ± 0.1	< 1	< 1	< 50	< 0.2	< 1

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Pb (ug/L)	Pd (ug/L)	PO_4-P (mg/L)	Pr (ug/L)	Pt (ug/L)	Rb (ug/L)	Re (ug/L)	Rh (ug/L)	Ru (ug/L)	Sb (ug/L)	Sc (ug/L)
MV-5	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-11	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-13	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/13/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-14A	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-14B	9/13/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/5/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-20	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-25	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/13/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-35	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-2	10/5/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-8	8/21/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/25/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Pb (ug/L)	Pd (ug/L)	PO_4-P (mg/L)	Pr (ug/L)	Pt (ug/L)	Rb (ug/L)	Re (ug/L)	Rh (ug/L)	Ru (ug/L)	Sb (ug/L)	Sc (ug/L)
SF-9A	10/05/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-9B	7/28/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1000 ± 100
SF-10B	7/28/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1000 ± 100
	8/21/88	10 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	106 ± 21
	9/25/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-12A	7/28/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1000 ± 100
	9/25/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-12B	7/28/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1000 ± 100
	8/21/88	5.0 ± 0.5	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/25/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-13	7/28/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1000 ± 100
	8/21/88	5 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-18	10/05/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-19	8/21/88	5 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/15/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/25/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Se (ug/L)	Sm (ug/L)	Sn (ug/L)	SO_4 (mg/L)	Sr (ug/L)	Ta (ug/L)	T Alk.* (mg/L)	Tb (ug/L)	Te (ug/L)	Th (ug/L)
MV-5	8/15/89	< 10	< 1	< 1	8.1 ± 0.8	80 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	6.9 ± 0.7	400 ± 40	< 1	---	< 1	< 1	< 1
MV-11	9/15/88	< 10	< 1	< 1	8.7 ± 0.9	80 ± 16	< 1	25.2 ± 1.5	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	8.1 ± 0.8	90 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	8.1 ± 0.8	70 ± 25	< 1	---	< 1	< 1	< 1
MV-13	9/15/88	< 10	< 1	< 1	8.2 ± 0.8	130 ± 26	< 1	22.6 ± 1.4	< 1	< 1	< 1
	9/13/89	< 10	< 1	< 1	7.1 ± 0.7	80 ± 30	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	8.5 ± 0.8	100 ± 20	< 1	---	< 1	< 1	< 1
MV-14A	8/15/89	< 10	< 1	< 1	8.6 ± 0.8	100 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	8.9 ± 0.9	80 ± 20	< 1	---	< 1	< 1	< 1
MV-14B	9/13/89	< 10	< 1	< 1	9.1 ± 0.9	180 ± 30	< 1	---	< 1	< 1	< 1
	10/5/89	< 10	< 1	< 1	7 0 ± 0.7	150 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	8.1 ± 0.8	70 ± 20	< 1	---	< 1	< 1	< 1
MV-20	8/15/89	< 10	< 1	< 1	7.6 ± 0.8	100 ± 20	< 1	---	< 1	< 1	< 1
MV-25	9/15/88	< 10	< 1	< 1	6.3 ± 0.6	85 ± 17	< 1	31.8 ± 1.9	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	7.1 ± 0.7	90 ± 20	< 1	---	< 1	< 1	< 1
	9/13/89	< 10	< 1	< 1	6.6 ± 0.7	70 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	7.5 ± 0.8	70 ± 20	< 1	---	< 1	< 1	< 1
MV-35	9/15/88	< 10	< 1	< 1	6.9 ± 0.7	80 ± 16	< 1	13.4 ± 0.8	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	7.2 ± 0.7	80 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	6.1 ± 0.6	70 ± 20	< 1	---	< 1	< 1	< 1
SF-2	10/5/89	< 10	< 1	< 1	4.4 ± 0.4	< 1	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	4.3 ± 0.4	< 1	< 1	---	< 1	< 1	< 1
SF-8	8/21/88	50 ± 5	< 1	< 1	7.9 ± 0.8	100 ± 10	< 1	33.1 ± 3.3	< 1	< 1	< 1
	9/15/88	< 10	< 1	< 1	4.0 ± 0.4	< 1	< 1	9.2 ± 0.6	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	8.0 ± 0.8	88 ± 17	< 1	17.6 ± 1.1	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	0.4 ± 0.1	< 1	< 1	2.1 ± 0.2	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	7.4 ± 0.7	100 ± 10	< 1	---	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	6.5 ± 0.6	100 ± 10	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	6.2 ± 0.6	150 ± 10	< 1	---	< 1	< 1	< 1

* T Alk. = Total Alkalinity

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Se (ug/L)	Sm (ug/L)	Sn (ug/L)	SO_4 (mg/L)	Sr (ug/L)	Ta (ug/L)	T Alk.* (mg/L)	Tb (ug/L)	Te (ug/L)	Th (ug/L)
SF-9A	10/05/89	< 10	< 1	< 1	9.4 ± 0.9	200 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	9.1 ± 0.9	200 ± 20	< 1	---	< 1	< 1	< 1
SF-9B	7/28/88	10 ± 1	< 1	< 1	15.0 ± 1.5	100 ± 10	< 1	57.1 ± 5.7	< 1	< 1	< 1
SF-10B	7/28/88	< 10	< 1	< 1	23.0 ± 2.3	500 ± 50	< 1	82.1 ± 8.2	< 1	< 1	< 1
	8/21/88	50 ± 5	< 1	< 1	18.8 ± 1.9	100 ± 10	< 1	68.7 ± 6.9	< 1	< 1	< 1
	9/15/88	< 10	< 1	< 1	6.3 ± 0.6	120 ± 24	< 1	21.1 ± 1.3	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	14.6 ± 1.5	256 ± 51	< 1	49.1 ± 2.9	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	< 0.4	< 1	< 1	2.3 ± 0.2	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	9.2 ± 0.9	150 ± 25	< 1	---	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	8.5 ± 0.9	180 ± 30	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	7.3 ± 0.7	120 ± 20	< 1	---	< 1	< 1	< 1
SF-12A	7/28/88	< 10	< 1	< 1	52 ± 5.2	500 ± 50	< 1	79.7 ± 8	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	15.3 ± 1.5	286 ± 56	< 1	47.5 ± 2.8	< 1	< 1	< 1
SF-12B	7/28/88	< 10	< 1	< 1	16.0 ± 1.6	500 ± 50	< 1	73.8 ± 7.4	< 1	< 1	< 1
	8/21/88	50 ± 5	< 1	< 1	18.2 ± 1.8	500 ± 50	< 1	77.4 ± 7.7	< 1	< 1	< 1
	9/15/88	< 10	< 1	< 1	6.6 ± 0.7	76 ± 15	< 1	25.6 ± 1.5	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	20.2 ± 2.0	240 ± 48	< 1	42.4 ± 2.5	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	< 0.4	< 1	< 1	0.6 ± 0.1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	20.0 ± 2.0	300 ± 40	< 1	---	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	15.6 ± 1.6	350 ± 45	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	18.2 ± 1.8	280 ± 30	< 1	---	< 1	< 1	< 1
SF-13	7/28/88	< 10	< 1	< 1	15.6 ± 1.6	100 ± 10	< 1	72.6 ± 7.3	< 1	< 1	< 1
	8/21/88	50 ± 5	< 1	< 1	14.4 ± 1.4	500 ± 50	< 1	65.3 ± 6.5	< 1	< 1	< 1
	9/15/88	< 10	< 1	< 1	5.4 ± 0.5	119 ± 24	< 1	25.0 ± 1.5	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	0.5 ± 0.1	< 1	< 1	5.0 ± 0.5	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	14.9 ± 1.5	200 ± 20	< 1	---	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	13.3 ± 1.3	220 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	14.0 ± 1.4	190 ± 20	< 1	---	< 1	< 1	< 1
SF-18	10/05/89	< 10	< 1	< 1	10.9 ± 1.1	200 ± 20	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	10.2 ± 1.0	230 ± 20	< 1	---	< 1	< 1	< 1
SF-19	8/21/88	100 ± 10	< 1	< 1	10.6 ± 1.1	500 ± 50	< 1	64.9 ± 6.5	< 1	< 1	< 1
	9/15/88	< 10	< 1	< 1	4.5 ± 0.5	72 ± 14	< 1	18.0 ± 1.1	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	8.2 ± 0.8	132 ± 26	< 1	33.2 ± 2.0	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	0.5 ± 0.1	< 1	< 1	3.2 ± 0.3	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	8.0 ± 0.8	180 ± 30	< 1	---	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	6.9 ± 0.7	150 ± 25	< 1	---	< 1	< 1	< 1

* T Alk. = Total Alkalinity

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Ti (ug/L)	Tl (ug/L)	Tm (ug/L)	U (ug/L)	V (ug/L)	W (ug/L)	Y (ug/L)	Yb (ug/L)	Zn (ug/L)	Zr (ug/L)
MV-5	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-11	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-13	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/13/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-14A	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-14B	9/13/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/5/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-20	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-25	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/13/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MV-35	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-2	10/5/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-8	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	< 1	< 1	8 ± 2	< 1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Table B-I: Individual Constituent Concentrations in Grand County, Utah, BLM Pothole Waters (cont.)

Site No.	Collection Date	Ti (ug/L)	Tl (ug/L)	Tm (ug/L)	U (ug/L)	V (ug/L)	W (ug/L)	Y (ug/L)	Yb (ug/L)	Zn (ug/L)	Zr (ug/L)
SF-9A	10/05/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-9B	7/28/88	100 ± 10	< 1	< 1	< 1	10 ± 1	< 1	< 1	< 1	< 1	< 1
SF-10B	7/28/88	100 ± 10	< 1	< 1	10 ± 1	10 ± 1	< 1	< 1	< 1	< 1	< 1
	8/21/88	< 10	< 1	< 1	10 ± 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	< 1	< 1	5 ± 1	< 1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-12A	7/28/88	100 ± 10	< 1	< 1	10 ± 1	10 ± 1	< 1	< 1	< 1	10 ± 1	< 1
	9/25/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-12B	7/28/88	100 ± 10	< 1	< 1	< 1	10 ± 1	< 1	< 1	< 1	< 1	< 1
	8/21/88	< 10	< 1	< 1	5 ± 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	< 1	< 1	4 ± 1	< 1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-13	7/28/88	100 ± 10	< 1	< 1	< 1	10 ± 1	< 1	< 1	< 1	< 1	< 1
	8/21/88	< 10	< 1	< 1	5 ± 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	< 1	< 1	7 ± 2	< 1	< 1	5 ± 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/05/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-18	10/05/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
SF-19	8/21/88	< 10	< 1	< 1	10 ± 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/15/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/25/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	1/12/89	< 10	< 1	< 1	< 1	< 1	2 ± 1	< 1	< 1	< 1	< 1
	8/15/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	10/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Table B-II: Individual Constituent Concentrations in Arches National Park, Grand County, Utah, Pothole Waters

Site No.	Collection Date	Ag (ug/L)	Al (ug/L)	As (ug/L)	Au (ug/L)	B (ug/L)	Ba (ug/L)	Be (ug/L)	Bi (ug/L)	Br (ug/L)	Ca (mg/L)	Cd (ug/L)
DL-11	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	8.5 ± 0.9	< 1
	9/22/88	< 1	---	< 10	< 1	< 100	61 ± 12	< 10	< 1	146 ± 29	12.7 ± 1.3	< 1
	8/16/89	< 1	---	< 10	< 1	< 100	50 ± 20	< 10	< 1	< 100	10.0 ± 1.1	< 1
DL-14A	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	9.0 ± 0.9	< 1
	9/22/88	< 1	---	< 10	< 1	< 50	75 ± 15	< 10	< 1	91 ± 18	14.3 ± 1.4	< 1
	8/16/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	100 ± 20	14.0 ± 1.4	< 1
MF-5	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	8.9 ± 0.9	< 1
	8/16/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	8.0 ± 0.9	< 1
MF-6	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	7.6 ± 0.7	< 1
	9/22/88	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	100 ± 20	2.7 ± 0.3	< 1
	8/16/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	3.0 ± 0.3	< 1
MF-8	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	7.4 ± 0.7	< 1
	9/22/88	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	16.9 ± 1.7	< 1
	8/16/89	< 1	---	< 10	< 1	< 50	< 50	< 10	< 1	< 100	10.3 ± 1.1	< 1
MF-9	9/22/88	< 1	---	< 10	< 1	65 ± 13	110 ± 22	< 10	< 1	< 100	16.0 ± 1.6	< 1
TF-2	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	9.5 ± 1.1	< 1
	9/22/88	< 1	---	< 10	< 1	42 ± 8	70 ± 14	< 10	< 1	116 ± 23	14.7 ± 1.5	< 1
	8/16/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	9.0 ± 1.0	< 1
TF-4	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	8.7 ± 0.9	< 1
	9/22/88	< 1	---	< 10	< 1	60 ± 12	49 ± 10	< 10	< 1	150 ± 30	13.7 ± 1.4	< 1
TF-7	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	13.0 ± 1.3	< 1
	9/22/88	< 1	---	< 10	< 1	51 ± 10	75 ± 15	< 10	< 1	83 ± 16	12.7 ± 1.3	< 1
	8/16/89	< 1	< 10	< 10	< 1	< 100	< 100	< 10	< 1	< 100	13.0 ± 1.3	< 1
TF-11	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	13 ± 1.3	< 1
	9/22/88	< 1	---	< 10	< 1	56 ± 11	< 1	< 10	< 1	209 ± 41	18.2 ± 1.8	< 1
	8/16/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	10 ± 1.0	< 1
TF-14	8/21/88	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	23 ± 2	< 1
	9/22/88	< 1	---	< 10	< 1	55 ± 11	< 1	< 10	< 1	150 ± 30	12.8 ± 1.3	< 1
	8/16/89	< 1	< 10	< 10	< 1	< 100	100 ± 10	< 10	< 1	< 100	20 ± 2	< 1

Table B-II: Individual Constituent Concentrations in Arches National Park, Grand County, Utah, Pothole Waters (cont.)

Site No.	Collection Date	Ce (ug/L)	Cl (mg/L)	Co (ug/L)	Cond.* (uhos)	Cr (ug/L)	Cs (ug/L)	Cu (ug/L)	Dy (ug/L)	Er (ug/L)	Eu (ug/L)	F (mg/L)	Fe (mg/L)
DL-11	8/21/88	< 1	1.7 ± 0.2	< 1	81 ± 8	< 10	< 1	50 ± 5	< 1	< 1	< 1	< 0.2	5.0 ± 0.5
	9/22/88	< 1	2.6 ± 0.3	< 1	93 ± 9	< 10	< 1	< 1	< 1	< 1	< 1	0.2 ± 0.1	0.83 ± 0.16
	8/16/89	< 1	2.2 ± 0.3	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	< 0.2	4.4 ± 0.4
DL-14A	8/21/88	< 1	1.3 ± 0.1	< 1	82 ± 8	< 10	< 1	50 ± 5	< 1	< 1	< 1	< 0.2	5.0 ± 0.5
	9/22/88	< 1	1.6 ± 0.2	< 1	93 ± 9	< 10	< 1	< 50	< 1	< 1	< 1	0.2 ± 0.1	< 0.1
	8/16/89	< 1	1.1 ± 0.2	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	< 0.2	3.9 ± 0.4
MF-5	8/21/88	< 1	1.5 ± 0.2	< 1	75 ± 8	< 10	< 1	100 ± 10	< 1	< 1	< 1	< 0.2	5.0 ± 1.0
	8/16/89	< 1	1.7 ± 0.2	< 1	---	< 10	< 1	100 ± 10	< 1	< 1	< 1	< 0.2	5.5 ± 0.5
MF-6	8/21/88	< 1	0.9 ± 0.1	< 1	61 ± 6	< 10	< 1	100 ± 10	< 1	< 1	< 1	< 0.2	5.0 ± 0.5
	9/22/88	< 1	1.9 ± 0.2	< 1	85 ± 9	< 10	< 1	< 50	< 1	< 1	< 1	0.2 ± 0.1	< 0.1
	8/16/89	< 1	1.4 ± 0.2	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	< 0.2	4.3 ± 0.5
MF-8	8/21/88	< 1	0.9 ± 0.1	< 1	64 ± 6	< 10	< 1	100 ± 10	< 1	< 1	< 1	< 0.2	5.0 ± 0.5
	9/22/88	< 1	2.7 ± 0.3	< 1	116 ± 12	< 10	< 1	< 50	< 1	< 1	< 1	0.3 ± 0.1	< 0.1
	8/16/89	< 1	2.0 ± 0.2	< 1	---	< 10	< 1	< 50	< 1	< 1	< 1	< 0.2	2.2 ± 0.8
MF-9	9/22/88	< 1	1.9 ± 0.2	< 1	104 ± 10	< 10	< 1	< 50	< 1	< 1	< 1	0.2 ± 0.1	< 0.1
TF-2	8/21/88	< 1	1.6 ± 0.2	< 1	78 ± 8	< 10	< 1	100 ± 10	< 1	< 1	< 1	< 0.2	5.0 ± 0.5
	9/22/88	< 1	2.3 ± 0.2	< 1	98 ± 10	< 10	< 1	< 1	< 1	< 1	< 1	0.3 ± 0.1	0.40 ± 0.08
	8/16/89	< 1	1.3 ± 0.2	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	0.4 ± 0.1	< 0.5
TF-4	8/21/88	< 1	1.0 ± 0.1	< 1	80 ± 8	< 10	< 1	100 ± 10	< 1	< 1	< 1	0.2 ± 0.1	5.0 ± 0.5
	9/22/88	< 1	2.1 ± 0.2	< 1	94 ± 9	< 10	< 1	< 1	< 1	< 1	< 1	0.3 ± 0.1	0.84 ± 0.16
TF-7	8/21/88	< 1	2.5 ± 0.3	< 1	99 ± 10	< 10	< 1	10 ± 1	< 1	< 1	< 1	0.2 ± 0.1	5.0 ± 0.5
	9/22/88	< 1	1.5 ± 0.2	< 1	83 ± 8	< 10	< 1	< 1	< 1	< 1	< 1	0.3 ± 0.1	< 0.1
	8/16/89	< 1	2.4 ± 0.3	< 1	---	< 10	< 1	< 10	< 1	< 1	< 1	0.2 ± 0.1	< 0.5
TF-11	8/21/88	< 1	2.3 ± 0.2	< 1	104 ± 10	< 10	< 1	10 ± 1	< 1	< 1	< 1	0.3 ± 0.1	5.0 ± 0.5
	9/22/88	< 1	3.3 ± 0.3	< 1	115 ± 12	< 10	< 1	< 1	< 1	< 1	< 1	0.3 ± 0.1	< 0.1
	8/16/89	< 1	3.0 ± 0.3	< 1	---	< 10	< 1	< 1	< 1	< 1	< 1	0.3 ± 0.1	< 0.5
TF-14	8/21/88	< 1	1.7 ± 0.2	< 1	85 ± 9	< 10	< 1	50 ± 5	< 1	< 1	< 1	< 0.2	5.0 ± 0.5
	9/22/88	< 1	2.4 ± 0.2	< 1	75 ± 8	< 10	< 1	< 1	< 1	< 1	< 1	0.2 ± 0.1	0.23 ± 0.04
	8/16/89	< 1	1.4 ± 0.2	< 1	---	< 10	< 1	< 10	< 1	< 1	< 1	< 0.2	< 0.5

* Cond. = Conductivity

Table B-II: Individual Constituent Concentrations in Arches National Park, Grand County, Utah, Pothole Waters (cont.)

Site No.	Collection Date	Ga (ug/L)	Gd (ug/L)	Ge (ug/L)	Hf (ug/L)	Hg (ug/L)	Ho (ug/L)	I (ug/L)	In (ug/L)	Ir (ug/L)	K (mg/L)	La (ug/L)	Li (ug/L)
DL-11	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	1.9 ± 0.2	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3 ± 0.1	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.6 ± 0.2	< 1	< 10
DL-14A	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	1.6 ± 0.2	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3 ± 0.1	< 1	< 10
MF-5	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	1.9 ± 0.2	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 10	< 1	< 1	1.7 ± 0.2	< 1	< 10
MF-6	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	1.4 ± 0.1	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
MF-8	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	4.4 ± 0.4	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.7 ± 0.2	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.4 ± 0.1	< 1	< 10
MF-9	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.9 ± 0.2	< 1	< 10
TF-2	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	1.5 ± 0.2	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3 ± 0.1	< 1	< 10
TF-4	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	2.0 ± 0.2	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 10
TF-7	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	2.2 ± 0.2	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3 ± 0.1	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10
TF-11	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	1.9 ± 0.2	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.5 ± 0.2	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
TF-14	8/21/88	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 1	< 1	< 1	1.9 ± 0.2	< 1	< 10
	9/22/88	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.1 ± 0.1	< 1	< 10
	8/16/89	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 10

Table B-II: Individual Constituent Concentrations in Arches National Park, Grand County, Utah, Pothole Waters (cont.)

Site No.	Collection Date	Lu (ug/L)	Mg (mg/L)	Mn (ug/L)	Mo (ug/L)	Na (mg/L)	Nb (ug/L)	Nd (ug/L)	Ni (ug/L)	NO_3-N (mg/L)	Os (ug/L)
DL-11	8/21/88	< 1	1.0 ± 0.1	500 ± 50	< 1	1.0 ± 0.1	< 1	< 1	100 ± 10	1.0 ± 0.1	< 1
	9/22/88	< 1	1.3 ± 0.1	70 ± 14	< 1	1.3 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	8/16/89	< 1	1.3 ± 0.1	80 ± 10	< 1	1.1 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
DL-14A	8/21/88	< 1	0.93 ± 0.09	500 ± 50	< 1	1.0 ± 0.1	< 1	< 1	50 ± 5	0.8 ± 0.1	< 1
	9/22/88	< 1	1.2 ± 0.1	95 ± 19	< 1	1.1 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
	8/16/89	< 1	1.0 ± 0.1	110 ± 20	< 1	1.4 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
MF-5	8/21/88	< 1	0.99 ± 0.1	100 ± 10	< 1	0.9 ± 0.1	< 1	< 1	100 ± 10	0.6 ± 0.1	< 1
	8/16/89	< 1	1.0 ± 0.1	100 ± 10	< 1	1.5 ± 0.1	< 1	< 1	< 50	0.5 ± 0.1	< 1
MF-6	8/21/88	< 1	0.66 ± 0.07	100 ± 10	< 1	0.4 ± 0.1	< 1	< 1	100 ± 10	0.8 ± 0.1	< 1
	9/22/88	< 1	1.0 ± 0.1	< 50	< 1	1.2 ± 0.1	< 1	< 1	79 ± 16	< 0.2	< 1
	8/16/89	< 1	0.9 ± 0.1	< 50	< 1	1.1 ± 0.1	< 1	< 1	60 ± 10	< 0.2	< 1
MF-8	8/21/88	< 1	1.7 ± 0.2	100 ± 10	< 1	1.4 ± 0.1	< 1	< 1	100 ± 10	1.1 ± 0.1	< 1
	9/22/88	< 1	1.3 ± 0.1	< 50	< 1	1.6 ± 0.2	< 1	< 1	< 50	< 0.2	< 1
	8/16/89	< 1	1.0 ± 0.1	< 50	< 1	1.4 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
MF-9	9/22/88	< 1	1.6 ± 0.2	100 ± 20	< 1	1.2 ± 0.1	< 1	< 1	< 50	< 0.2	< 1
TF-2	8/21/88	< 1	0.9 ± 0.1	100 ± 10	< 1	1.0 ± 0.1	< 1	< 1	100 ± 10	1.5 ± 0.2	< 1
	9/22/88	< 1	1.2 ± 0.1	87 ± 17	< 1	1.3 ± 0.1	< 1	< 1	< 1	0.5 ± 0.1	< 1
	8/16/89	< 1	1.0 ± 0.1	70 ± 15	< 1	1.1 ± 0.1	< 1	< 1	< 1	0.8 ± 0.1	< 1
TF-4	8/21/88	< 1	0.97 ± 0.1	100 ± 10	< 1	1.0 ± 0.1	< 1	< 1	1000 ± 100	1.5 ± 0.2	< 1
	9/22/88	< 1	1.4 ± 0.1	48 ± 10	< 1	1.4 ± 0.1	< 1	< 1	< 1	0.2 ± 0.1	< 1
TF-7	8/21/88	< 1	1.1 ± 0.1	500 ± 50	< 1	1.0 ± 0.1	< 1	< 1	100 ± 10	0.6 ± 0.1	< 1
	9/22/88	< 1	1.3 ± 0.1	155 ± 31	< 1	1.1 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	8/16/89	< 1	1.0 ± 0.1	120 ± 20	< 1	1.4 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
TF-11	8/21/88	< 1	1.2 ± 0.1	100 ± 10	< 1	1.6 ± 0.2	< 1	< 1	100 ± 10	1.2 ± 0.1	< 1
	9/22/88	< 1	1.3 ± 0.1	380 ± 76	< 1	1.8 ± 0.2	< 1	< 1	81 ± 16	< 0.2	< 1
	8/16/89	< 1	1.4 ± 0.1	300 ± 50	< 1	1.4 ± 0.1	< 1	< 1	100 ± 20	< 0.2	< 1
TF-14	8/21/88	< 1	1.2 ± 0.1	500 ± 50	< 1	1.8 ± 0.2	< 1	< 1	100 ± 10	0.7 ± 0.1	< 1
	9/22/88	< 1	1.1 ± 0.1	56 ± 11	< 1	1.4 ± 0.1	< 1	< 1	< 1	< 0.2	< 1
	8/16/89	< 1	1.4 ± 0.1	50 ± 10	< 1	1.3 ± 0.1	< 1	< 1	< 1	0.4 ± 0.2	< 1

Table B-II: Individual Constituent Concentrations in Arches National Park, Grand County, Utah, Pothole Waters (cont.)

Site No.	Collection Date	Pb (ug/L)	Pd (ug/L)	PO_4-P (mg/L)	Pr (ug/L)	Pt (ug/L)	Rb (ug/L)	Re (ug/L)	Rh (ug/L)	Ru (ug/L)	Sb (ug/L)	Sc (ug/L)
Dl-11	8/21/88	5 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DL-14A	8/21/88	10 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-5	8/21/88	10 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-6	8/21/88	10 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-8	8/21/88	10 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-9	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-2	8/21/88	10 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-4	8/21/88	10 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-7	8/21/88	5 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-11	8/21/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-14	8/21/88	5 ± 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	9/22/88	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 1	< 1	< 0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Table B-II: Individual Constituent Concentrations in Arches National Park, Grand County, Utah, Pothole Waters (cont.)

Site No.	Collection Date	Se (ug/L)	Sm (ug/L)	Sn (ug/L)	SO_4 (mg/L)	Sr (ug/L)	Ta (ug/L)	T Alk.* (mg/L)	Tb (ug/L)	Te (ug/L)	Th (ug/L)
DL-11	8/21/88	100 ± 10	< 1	< 1	11.4 ± 1.1	500 ± 50	< 1	17.8 ± 1.8	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	16.3 ± 1.6	154 ± 31	< 1	26.9 ± 1.6	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	14.2 ± 1.4	300 ± 30	< 1	---	< 1	< 1	< 1
DL-14A	8/21/88	50 ± 5	< 1	< 1	12.2 ± 1.2	500 ± 50	< 1	19.6 ± 2	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	16.5 ± 1.7	170 ± 28	< 1	27.8 ± 1.7	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	14.5 ± 1.4	400 ± 40	< 1	---	< 1	< 1	< 1
MF-5	8/21/88	50 ± 5	< 1	< 1	8.7 ± 0.9	500 ± 50	< 1	23.0 ± 2.3	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	9.7 ± 0.9	500 ± 50	< 1	---	< 1	< 1	< 1
MF-6	8/21/88	50 ± 5	< 1	< 1	7.7 ± 0.8	500 ± 50	< 1	17.6 ± 1.7	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	15.5 ± 1.6	135 ± 27	< 1	30.4 ± 1.8	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	13.1 ± 1.3	300 ± 30	< 1	---	< 1	< 1	< 1
MF-8	8/21/88	50 ± 5	< 1	< 1	8.8 ± 0.9	500 ± 50	< 1	14.2 ± 1.4	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	24.8 ± 2.5	< 50	< 1	25.9 ± 1.6	< 1	< 1	< 1
	8/16/89	20 ± 10	< 1	< 1	10.7 ± 0.9	500 ± 50	< 1	---	< 1	< 1	< 1
MF-9	9/22/88	< 10	< 1	< 1	12.9 ± 1.3	200 ± 40	< 1	37.4 ± 2.2	< 1	< 1	< 1
TF-2	8/21/88	50 ± 5	< 1	< 1	11.6 ± 1.2	500 ± 50	< 1	18.4 ± 1.8	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	21.0 ± 2.1	190 ± 38	< 1	24.2 ± 1.4	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	20.2 ± 2.0	140 ± 20	< 1	---	< 1	< 1	< 1
TF-4	8/21/88	50 ± 5	< 1	< 1	12.0 ± 1.2	500 ± 50	< 1	15.6 ± 1.6	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	23.0 ± 2.3	130 ± 26	< 1	22.6 ± 1.4	< 1	< 1	< 1
TF-7	8/21/88	100 ± 10	< 1	< 1	12.8 ± 1.3	500 ± 50	< 1	28.8 ± 2.9	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	14.4 ± 1.4	129 ± 25	< 1	27.3 ± 1.6	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	14.0 ± 1.4	160 ± 30	< 1	---	< 1	< 1	< 1
TF-11	8/21/88	100 ± 10	< 1	< 1	18.2 ± 1.8	500 ± 50	< 1	21.6 ± 2.2	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	26.8 ± 2.7	193 ± 38	< 1	30.7 ± 1.8	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	19.8 ± 2.7	170 ± 25	< 1	---	< 1	< 1	< 1
TF-14	8/21/88	100 ± 10	< 1	< 1	13.9 ± 1.4	500 ± 50	< 1	19.4 ± 1.9	< 1	< 1	< 1
	9/22/88	< 10	< 1	< 1	17.7 ± 1.8	125 ± 25	< 1	16.2 ± 1.0	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	15.2 ± 1.5	100 ± 20	< 1	---	< 1	< 1	< 1

* T Alk. = Total Alkalinity

Table B-II: Individual Constituent Concentrations in Arches National Park, Grand County, Utah, Pothole Waters (cont.)

Site No.	Collection Date	Ti (ug/L)	Tl (ug/L)	Tm (ug/L)	U (ug/L)	V (ug/L)	W (ug/L)	Y (ug/L)	Yb (ug/L)	Zn (ug/L)	Zr (ug/L)
DL-11	8/21/88	< 10	< 1	< 1	5 ± 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
DL-14A	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-5	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-6	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-8	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
MF-9	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-2	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-4	8/21/88	< 10	< 1	< 1	10 ± 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-7	8/21/88	< 10	< 1	< 1	5 ± 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	87 ± 17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-11	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
TF-14	8/21/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	100 ± 10	< 1
	9/22/88	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	8/16/89	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Table B-III: Individual Constituent Concentrations in LAME Pothole Waters

Site No.	Collection Date	Ag (ug/L)	Al (ug/L)	As (ug/L)	Au (ug/L)	B (ug/L)	Ba (ug/L)	Be (ug/L)	Bi (ug/L)	Br (ug/L)	Ca (mg/L)	Cd (ug/L)
LAKE-1	05/29/90	18 ± 2	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	12 ± 2	< 0.1
CAT-1	05/29/90	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	13 ± 2	< 0.1
CAT-2	05/29/90	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	12 ± 2	< 0.1
CAT-3	05/29/90	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	15 ± 3	< 0.1
CAT-4	05/29/90	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	12 ± 2	< 0.1
CAT-5	05/29/90	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	11 ± 2	< 0.1
GRAPE-1	05/31/90	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	14 ± 2	< 0.1
GRAPE-2	05/31/90	< 1	---	< 10	< 1	< 100	< 100	< 10	< 1	< 100	16 ± 3	0.2 ± 0.1

Site No.	Collection Date	Ce (ug/L)	Cl (mg/L)	Co (ug/L)	Cond.* (uhos)	Cr (ug/L)	Cs (ug/L)	Cu (ug/L)	Dy (ug/L)	Er (ug/L)	Eu (ug/L)	F (mg/L)	Fe (mg/L)
LAKE-1	05/29/90	< 1	5.5 ± 0.6	< 1	---	2.6 ± 0.4	< 1	5.1 ± 0.8	< 1	< 1	< 1	< 0.2	< 0.5
CAT-1	05/29/90	< 1	4.4 ± 0.4	< 1	---	1.9 ± 0.4	< 1	14.4 ± 0.5	< 1	< 1	< 1	< 0.2	< 0.5
CAT-2	05/29/90	< 1	3.8 ± 0.4	< 1	---	2.4 ± 0.4	< 1	4.4 ± 0.8	< 1	< 1	< 1	< 0.2	< 0.5
CAT-3	05/29/90	< 1	4.2 ± 0.4	< 1	---	2.0 ± 0.4	< 1	3.8 ± 0.8	< 1	< 1	< 1	< 0.2	< 0.5
CAT-4	05/29/90	< 1	4.4 ± 0.4	< 1	---	1.9 ± 0.4	< 1	4.8 ± 0.8	< 1	< 1	< 1	< 0.2	< 0.5
CAT-5	05/29/90	< 1	3.6 ± 0.4	< 1	---	1.8 ± 0.4	< 1	5.3 ± 0.8	< 1	< 1	< 1	< 0.2	< 0.5
GRAPE-1	05/31/90	< 1	2.9 ± 0.3	< 1	---	3.1 ± 0.4	< 1	6.0 ± 0.8	< 1	< 1	< 1	< 0.2	< 0.5
GRAPE-2	05/31/90	< 1	4.5 ± 0.4	< 1	---	2.9 ± 0.4	< 1	10.6 ± 0.4	< 1	< 1	< 1	< 0.2	< 0.5

Site No.	Collection Date	Ga (ug/L)	Gd (ug/L)	Ge (ug/L)	Hf (ug/L)	Hg (ug/L)	Ho (ug/L)	I (ug/L)	In (ug/L)	Ir (ug/L)	K (mg/L)	La (ug/L)	Li (ug/L)
LAKE-1	05/29/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.3 ± 0.1	< 1	< 100
CAT-1	05/29/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.0 ± 0.1	< 1	< 100
CAT-2	05/29/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.9 ± 0.1	< 1	< 100
CAT-3	05/29/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.4 ± 0.1	< 1	< 100
CAT-4	05/29/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.8 ± 0.1	< 1	< 100
CAT-5	05/29/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.2 ± 0.1	< 1	< 100
GRAPE-1	05/31/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.6 ± 0.1	< 1	< 100
GRAPE-2	05/31/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.7 ± 0.1	< 1	< 100

Site No.	Collection Date	Lu (ug/L)	Mg (mg/L)	Mn (ug/L)	Mo (ug/L)	Na (mg/L)	Nb (ug/L)	Nd (ug/L)	Ni (ug/L)	NO_3-N (mg/L)	Os (ug/L)
LAKE-1	05/29/90	< 1	1.8 ± 0.1	25 ± 2	< 1	1.4 ± 0.1	< 1	< 1	< 1	---	< 1
CAT-1	05/29/90	< 1	1.9 ± 0.1	65 ± 1	< 1	1.0 ± 0.1	< 1	< 1	< 1	---	< 1
CAT-2	05/29/90	< 1	1.3 ± 0.1	3 ± 1	< 1	1.0 ± 0.1	< 1	< 1	< 1	---	< 1
CAT-3	05/29/90	< 1	1.7 ± 0.1	10 ± 1	< 1	1.2 ± 0.1	< 1	< 1	< 1	---	< 1
CAT-4	05/29/90	< 1	3.0 ± 0.4	3 ± 1	< 1	1.3 ± 0.1	< 1	< 1	< 1	---	< 1
CAT-5	05/29/90	< 1	1.9 ± 0.1	9 ± 1	< 1	1.3 ± 0.1	< 1	< 1	< 1	---	< 1
GRAPE-1	05/31/90	< 1	2.1 ± 0.2	3 ± 1	< 1	1.6 ± 0.2	< 1	< 1	< 1	---	< 1
GRAPE-2	05/31/90	< 1	2.3 ± 0.2	16 ± 2	< 1	1.7 ± 0.2	< 1	< 1	< 1	---	< 1

* Cond. = Conductivity

Table B-III: Individual Constituent Concentrations in LAME Pothole Waters (cont.)

Site No.	Collection Date	Pb (ug/L)	Pd (ug/L)	PO_4-P (mg/L)	Pr (ug/L)	Pt (ug/L)	Rb (ug/L)	Re (ug/L)	Rh (ug/L)	Ru (ug/L)	Sb (ug/L)	Sc (ug/L)
LAKE-1	05/29/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CAT-1	05/29/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CAT-2	05/29/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CAT-3	05/29/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CAT-4	05/29/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
CAT-5	05/29/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
GRAPE-1	05/31/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
GRAPE-2	05/31/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Site No.	Collection Date	Se (ug/L)	Sm (ug/L)	Sn (ug/L)	SO_4 (mg/L)	Sr (ug/L)	Ta (ug/L)	T Alk.* (mg/L)	Tb (ug/L)	Te (ug/L)	Th (ug/L)
LAKE-1	05/29/90	< 10	< 1	< 1	22 ± 3	100 ± 15	< 1	---	< 1	< 1	< 1
CAT-1	05/29/90	< 10	< 1	< 1	21 ± 2	88 ± 10	< 1	---	< 1	< 1	< 1
CAT-2	05/29/90	< 10	< 1	< 1	25 ± 2	42 ± 4	< 1	---	< 1	< 1	< 1
CAT-3	05/29/90	< 10	< 1	< 1	31 ± 3	39 ± 1	< 1	---	< 1	< 1	< 1
CAT-4	05/29/90	< 10	< 1	< 1	24 ± 2	49 ± 3	< 1	---	< 1	< 1	< 1
CAT-5	05/29/90	< 10	< 1	< 1	24 ± 3	66 ± 1	< 1	---	< 1	< 1	< 1
GRAPE-1	05/31/90	< 10	< 1	< 1	25 ± 2	100 ± 15	< 1	---	< 1	< 1	< 1
GRAPE-2	05/31/90	< 10	< 1	< 1	27 ± 3	88 ± 10	< 1	---	< 1	< 1	< 1

Site No.	Collection Date	Ti (ug/L)	Tl (ug/L)	Tm (ug/L)	U (ug/L)	V (ug/L)	W (ug/L)	Y (ug/L)	Yb (ug/L)	Zn (ug/L)	Zr (ug/L)
LAKE-1	05/29/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	47 ± 7	< 1
CAT-1	05/29/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	23 ± 13	< 1
CAT-2	05/29/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	5 ± 7	< 1
CAT-3	05/29/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	9 ± 6	< 1
CAT-4	05/29/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	12 ± 7	< 1
CAT-5	05/29/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	23 ± 18	< 1
GRAPE-1	05/31/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	46 ± 11	< 1
GRAPE-2	05/31/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	15 ± 6	< 1

* T Alk. = Total Alkalinity

Table B-IV: Individual Constituent Concentrations in JOTR Pothole Waters

Site No.	Collection Date	Ag (ug/L)	Al (ug/L)	As (ug/L)	Au (ug/L)	B (ug/L)	Ba (ug/L)	Be (ug/L)	Bi (ug/L)	Br (ug/L)	Ca (mg/L)	Cd (ug/L)
HO-1	06/11/90	< 1	---	< 10	< 1	1600 ± 200	< 100	< 10	< 1	< 100	27 ± 2	< 0.1
	07/11/90	< 1	---	< 10	< 1	1000 ± 100	< 100	< 10	< 1	< 100	23 ± 4	< 0.1
HO-2	06/11/90	< 1	---	< 10	< 1	1800 ± 300	< 100	< 10	< 1	< 100	31 ± 3	< 0.1
	07/11/90	< 1	---	< 10	< 1	1100 ± 200	< 100	< 10	< 1	< 100	25 ± 3	< 0.1
HO-3	06/11/90	< 1	---	< 10	< 1	1300 ± 200	< 100	< 10	< 1	< 100	20 ± 2	< 0.1
	07/11/90	< 1	---	< 10	< 1	1000 ± 100	< 100	< 10	< 1	< 100	22 ± 3	< 0.1
BO-2	02/21/90	< 1	---	< 10	< 1	1600 ± 200	< 100	< 10	< 1	< 100	28 ± 3	< 0.1
	07/18/90	< 1	---	< 10	< 1	2500 ± 300	< 100	< 10	< 1	< 100	33 ± 3	< 0.1
BO-3	02/21/90	< 1	---	< 10	< 1	1200 ± 300	< 100	< 10	< 1	< 100	23 ± 2	< 0.1
BO-4	07/18/90	< 1	---	< 10	< 1	1800 ± 300	< 100	< 10	< 1	< 100	24 ± 2	< 0.1
BO-5	07/18/90	< 1	---	< 10	< 1	2400 ± 300	< 100	< 10	< 1	< 100	34 ± 3	< 0.1

Site No.	Collection Date	Ce (ug/L)	Cl (mg/L)	Co (ug/L)	Cr (ug/L)	Cs (ug/L)	Cu (ug/L)	Dy (ug/L)	Er (ug/L)	Eu (ug/L)	F (mg/L)	Fe (mg/L)
HO-1	06/11/90	< 1	18.1 ± 1.8	< 1	4.7 ± 0.4	< 1	10.3 ± 0.5	< 1	< 1	< 1	< 0.2	0.56 ± 0.06
	07/11/90	< 1	16.9 ± 1.7	< 1	3.7 ± 0.5	< 1	14.5 ± 0.5	< 1	< 1	< 1	< 0.2	0.61 ± 0.06
HO-2	06/11/90	< 1	14.6 ± 1.5	< 1	1.3 ± 0.4	< 1	0.8 ± 0.8	< 1	< 1	< 1	< 0.2	0.46 ± 0.05
	07/11/90	< 1	11.2 ± 1.1	< 1	1.8 ± 0.4	< 1	1.8 ± 0.6	< 1	< 1	< 1	< 0.2	0.44 ± 0.04
HO-3	06/11/90	< 1	11.8 ± 1.2	< 1	1.9 ± 0.4	< 1	2.2 ± 0.8	< 1	< 1	< 1	< 0.2	0.55 ± 0.06
	07/11/90	< 1	13.2 ± 1.3	< 1	1.6 ± 0.4	< 1	2.6 ± 0.8	< 1	< 1	< 1	< 0.2	0.56 ± 0.06
BO-2	02/21/90	< 1	12.3 ± 1.2	< 1	7.5 ± 0.8	< 1	27 ± 3	< 1	< 1	< 1	0.46 ± 0.05	0.25 ± 0.03
	07/18/90	< 1	15.2 ± 1.6	< 1	6.2 ± 0.6	< 1	30 ± 3	< 1	< 1	< 1	0.52 ± 0.05	0.33 ± 0.03
BO-3	02/21/90	2 ± 1	15.6 ± 1.6	< 1	6.0 ± 0.7	< 1	15 ± 2	< 1	< 1	< 1	< 0.04	0.85 ± 0.09
BO-4	07/18/90	< 1	13.2 ± 1.4	< 1	5.0 ± 0.6	< 1	20 ± 2	< 1	< 1	< 1	< 0.1	0.75 ± 0.07
BO-5	07/18/90	< 1	20.2 ± 2.0	< 1	5.2 ± 0.6	< 1	18 ± 2	< 1	< 1	< 1	< 0.1	0.66 ± 0.07

Site No.	Collection Date	Ga (ug/L)	Gd (ug/L)	Ge (ug/L)	Hf (ug/L)	Hg (ug/L)	Ho (ug/L)	I (ug/L)	In (ug/L)	Ir (ug/L)	K (mg/L)	La (ug/L)	Li (ug/L)
HO-1	06/11/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.7 ± 0.1	< 1	< 100
	07/11/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1.5 ± 0.1	< 1	< 100
HO-2	06/11/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2.2 ± 0.2	< 1	< 100
	07/11/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2.8 ± 0.3	< 1	< 100
HO-3	06/11/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.8 ± 0.1	< 1	780 ± 100
	07/11/90	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.6 ± 0.1	< 1	850 ± 130
BO-2	02/21/90	< 1	< 1	< 1	< 1	< 1	< 1	7 ± 1	< 1	< 1	2.1 ± 0.2	< 1	120 ± 50
	07/18/90	< 1	< 1	< 1	< 1	< 1	< 1	9 ± 2	< 1	< 1	2.3 ± 0.2	< 1	190 ± 60
BO-3	02/21/90	< 1	< 1	< 1	< 1	< 1	< 1	6 ± 1	< 1	< 1	2.0 ± 0.2	1 ± 1	100 ± 40
BO-4	07/18/90	< 1	< 1	< 1	< 1	< 1	< 1	5 ± 1	< 1	< 1	2.1 ± 0.2	< 1	140 ± 50
BO-5	07/18/90	< 1	< 1	< 1	< 1	< 1	< 1	10 ± 2	< 1	< 1	2.6 ± 0.3	< 1	220 ± 70

Site No.	Collection Date	Lu (ug/L)	Mg (mg/L)	Mn (ug/L)	Mo (ug/L)	Na (mg/L)	Nb (ug/L)	Nd (ug/L)	Ni (ug/L)	NO_3-N (mg/L)	Os (ug/L)
HO-1	06/11/90	< 1	1.0 ± 0.1	9 ± 1	< 1	10.2 ± 1.1	< 1	< 1	< 1	14.9 ± 1.5	< 1
	07/11/90	< 1	1.1 ± 0.1	7 ± 1	< 1	11.3 ± 1.1	< 1	< 1	< 1	16.1 ± 1.6	< 1
HO-2	06/11/90	< 1	1.5 ± 0.1	3 ± 1	< 1	12.6 ± 1.2	< 1	< 1	< 1	14.4 ± 1.4	< 1
	07/11/90	< 1	1.8 ± 0.2	1 ± 1	< 1	11.4 ± 1.1	< 1	< 1	< 1	13.8 ± 1.4	< 1
HO-3	06/11/90	< 1	1.3 ± 0.1	3 ± 1	< 1	10.2 ± 1.1	< 1	< 1	< 1	14.1 ± 1.4	< 1
	07/11/90	< 1	1.2 ± 0.1	4 ± 1	< 1	12.3 ± 1.1	< 1	< 1	< 1	14.6 ± 1.4	< 1
BO-2	02/21/90	< 1	3.7 ± 0.4	6 ± 1	1.5 ± 0.8	13.4 ± 1.3	< 1	< 1	2 ± 1	17.6 ± 1.8	< 1
	07/18/90	< 1	3.5 ± 0.3	8 ± 2	< 1	18.4 ± 1.9	< 1	< 1	2 ± 1	19.2 ± 2.0	< 1
BO-3	02/21/90	< 1	3.3 ± 0.3	16 ± 3	2 ± 1	10.8 ± 1.1	< 1	< 1	6 ± 1	15.6 ± 1.6	< 1
BO-4	07/18/90	< 1	3.4 ± 0.3	12 ± 2	2 ± 1	9.8 ± 1.0	< 1	< 1	4 ± 1	16.2 ± 1.6	< 1
BO-5	07/18/90	< 1	3.8 ± 0.4	15 ± 3	< 1	10.9 ± 1.1	< 1	< 1	6 ± 1	13.2 ± 1.3	< 1

* Cond. = Conductivity

Table B-IV: Individual Constituent Concentrations in JOTR Pothole Waters (cont.)

Site No.	Collection Date	Pb (ug/L)	Pd (ug/L)	PO_4-P (mg/L)	Pr (ug/L)	Pt (ug/L)	Rb (ug/L)	Re (ug/L)	Rh (ug/L)	Ru (ug/L)	Sb (ug/L)	Sc (ug/L)
HO-1	06/11/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	07/11/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
HO-2	06/11/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	07/11/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
HO-3	06/11/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	07/11/90	< 2	< 1	---	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
BO-2	02/21/90	26 ± 4	< 1	< 0.2	< 1	< 1	2 ± 1	< 1	< 1	< 1	< 1	< 1
	07/18/90	35 ± 5	< 1	< 0.2	< 1	< 1	4 ± 1	< 1	< 1	< 1	< 1	< 1
BO-3	02/21/90	19 ± 3	< 1	0.6 ± 0.2	< 1	< 1	3 ± 1	< 1	< 1	< 1	< 1	< 1
BO-4	07/18/90	18 ± 3	< 1	0.5 ± 0.2	< 1	< 1	2 ± 1	< 1	< 1	< 1	< 1	< 1
BO-5	07/18/90	25 ± 3	< 1	0.6 ± 0.2	< 1	< 1	3 ± 1	< 1	< 1	< 1	< 1	< 1

Site No.	Collection Date	Se (ug/L)	Sm (ug/L)	Sn (ug/L)	SO_4 (mg/L)	Sr (ug/L)	Ta (ug/L)	T Alk.* (mg/L)	Tb (ug/L)	Te (ug/L)	Th (ug/L)
HO-1	06/11/90	< 10	< 1	< 1	25 ± 2	110 ± 10	< 1	---	< 1	< 1	< 1
	07/11/90	< 10	< 1	< 1	33 ± 3	150 ± 20	< 1	---	< 1	< 1	< 1
HO-2	06/11/90	< 10	< 1	< 1	38 ± 4	44 ± 6	< 1	---	< 1	< 1	< 1
	07/11/90	< 10	< 1	< 1	42 ± 4	55 ± 8	< 1	---	< 1	< 1	< 1
HO-3	06/11/90	< 10	< 1	< 1	32 ± 3	100 ± 10	< 1	---	< 1	< 1	< 1
	07/11/90	< 10	< 1	< 1	40 ± 4	90 ± 10	< 1	---	< 1	< 1	< 1
BO-2	02/21/90	3 ± 1	< 1	6 ± 1	36 ± 4	180 ± 20	< 1	---	< 1	< 1	< 1
	07/18/90	8 ± 2	< 1	5 ± 1	40 ± 4	280 ± 30	< 1	---	< 1	< 1	< 1
BO-3	02/21/90	4 ± 1	< 1	5 ± 1	28 ± 3	130 ± 10	< 1	---	< 1	< 1	< 1
BO-4	07/18/90	4 ± 1	< 1	5 ± 1	18 ± 2	150 ± 20	< 1	---	< 1	< 1	< 1
BO-5	07/18/90	4 ± 1	< 1	3 ± 1	22 ± 3	140 ± 10	< 1	---	< 1	< 1	< 1

Site No.	Collection Date	Ti (ug/L)	Tl (ug/L)	Tm (ug/L)	U (ug/L)	V (ug/L)	W (ug/L)	Y (ug/L)	Yb (ug/L)	Zn (ug/L)	Zr (ug/L)
HO-1	06/11/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	13 ± 8	< 1
	07/11/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 7	< 1
HO-2	06/11/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1
	07/11/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 5	< 1
HO-3	06/11/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	19 ± 8	< 1
	07/11/90	< 10	< 1	< 1	< 1	< 1	< 1	< 1	< 1	25 ± 9	< 1
BO-2	02/21/90	110 ± 20	< 1	< 1	< 1	1.7 ± 0.5	2 ± 1	< 1	< 1	12 ± 4	1 ± 1
	07/18/90	140 ± 20	< 1	< 1	< 1	1.6 ± 0.5	1 ± 1	< 1	< 1	14 ± 4	< 1
BO-3	02/21/90	120 ± 20	< 1	< 1	< 1	3.0 ± 0.8	1 ± 1	< 1	< 1	17 ± 5	< 1
BO-4	07/18/90	100 ± 10	< 1	< 1	< 1	2.9 ± 0.8	< 1	< 1	< 1	19 ± 5	< 1
BO-5	07/18/90	100 ± 10	< 1	< 1	< 1	2.6 ± 0.7	< 1	< 1	< 1	14 ± 3	< 1

* T Alk. = Total Alkalinity

Appendix C: Individual Elemental Concentrations and Enrichment Factors in Pothole Sediment Samples

Table C-I: Elemental Concentrations in BLM, Grand County, Utah, Pothole Sediments

Site No.	Depth (cm)	Ag (ug/g)	Al (%)	As (ug/g)	Au (ng/g)	Ba (ug/g)	Br (ug/g)	Ca (ug/g)	Ce (ug/g)	Cl (ug/g)
MV-13	0	< 1.2	2.06 ± 0.06	4.1 ± 0.4	< 4	362 ± 20	3.6 ± 0.4	4300 ± 300	14.9 ± 0.7	32 ± 6
	1-2	< 0.8	1.68 ± 0.05	2.1 ± 0.2	< 2	291 ± 15	0.49 ± 0.07	< 900	8.1 ± 0.4	26 ± 7
MV-35	0	< 3.0	4.11 ± 0.12	8.1 ± 0.8	< 5	380 ± 30	2.5 ± 0.3	1900 ± 300	31.1 ± 1.5	< 50
	1-2	< 1.2	2.24 ± 0.06	3.8 ± 0.4	< 3	340 ± 30	0.64 ± 0.11	< 900	15.4 ± 0.7	< 30
MV-43	0	< 1.3	2.57 ± 0.07	8.9 ± 0.9	< 3	410 ± 40	2.2 ± 0.3	2900 ± 300	19.7 ± 0.9	38 ± 7
	1-2	< 1.1	2.41 ± 0.07	7.1 ± 0.7	< 4	323 ± 18	0.96 ± 0.13	770 ± 140	16.9 ± 0.8	34 ± 6
SF-8	0	< 1.3	2.04 ± 0.06	2.7 ± 0.3	< 3	320 ± 20	0.63 ± 0.09	< 800	12.1 ± 0.6	< 30
	1-2	< 1.0	1.94 ± 0.10	2.7 ± 0.3	< 3	284 ± 16	0.72 ± 0.11	< 800	11.7 ± 0.6	< 30
	>3	< 0.9	1.56 ± 0.05	2.3 ± 0.3	< 2	293 ± 17	0.48 ± 0.07	< 800	10.7 ± 0.5	24 ± 4
SF-10B	0	< 1.7	3.53 ± 0.10	8.8 ± 0.9	< 5	380 ± 20	3.1 ± 0.4	2700 ± 1000	28 ± 1.3	52 ± 9
	1	< 1.5	2.57 ± 0.07	3.4 ± 0.4	< 3	320 ± 20	0.9 ± 0.2	< 900	15.4 ± 0.8	< 30
SF-12B	0	< 2.0	4.01 ± 0.12	8.6 ± 0.9	< 6	360 ± 40	8.6 ± 0.9	3300 ± 300	35 ± 2	< 50
	1-2	< 1.1	1.99 ± 0.06	3.4 ± 0.4	< 3	340 ± 30	1.63 ± 0.18	< 1000	15.6 ± 0.7	28 ± 5
SF-13	0	< 1.7	3.39 ± 0.10	8.5 ± 0.9	< 5	380 ± 30	4.5 ± 0.5	3900 ± 400	28.5 ± 1.4	< 60
	1-2	< 1.3	2.24 ± 0.07	3.2 ± 0.3	< 3	339 ± 19	1.15 ± 0.14	< 1000	13.8 ± 0.7	26 ± 5
SF-19	0	< 2.0	3.92 ± 0.11	9.2 ± 1.0	< 6	360 ± 40	3.9 ± 0.4	4000 ± 400	34 ± 2	< 70
	1-2	< 1.2	2.14 ± 0.06	3.7 ± 0.4	< 3	350 ± 30	1.03 ± 0.13	950 ± 140	18 ± 0.8	23 ± 4

Site No.	Depth (cm)	Co (ug/g)	Cr (ug/g)	Cs (ug/g)	Cu (ug/g)	Dy (ug/g)	Eu (ug/g)	Fe (%)	Ga (ug/g)	Hf (ug/g)
MV-13	0	2.39 ± 0.13	13.1 ± 0.8	1.82 ± 0.11	< 120	0.88 ± 0.15	0.38 ± 0.02	0.56 ± 0.03	5.1 ± 0.9	3.0 ± 0.17
	1-2	0.79 ± 0.06	6.7 ± 0.4	1.05 ± 0.07	< 60	0.80 ± 0.09	0.21 ± 0.02	0.26 ± 0.01	< 3	2.07 ± 0.09
MV-35	0	4.0 ± 0.2	24.9 ± 1.6	3.20 ± 0.04	< 170	3.3 ± 0.4	0.75 ± 0.06	1.08 ± 0.06	6.1 ± 1.1	4.5 ± 0.4
	1-2	1.46 ± 0.12	13.3 ± 0.8	1.52 ± 0.09	< 80	1.29 ± 0.13	0.29 ± 0.02	0.47 ± 0.02	< 4	5.3 ± 0.3
MV-43	0	2.40 ± 0.13	16 ± 1	2.29 ± 0.14	< 100	1.59 ± 0.18	0.47 ± 0.03	0.66 ± 0.03	5.6 ± 1.1	4.0 ± 0.2
	1-2	1.52 ± 0.09	17 ± 1	1.60 ± 0.12	< 80	1.54 ± 0.14	0.39 ± 0.03	0.54 ± 0.03	4.9 ± 0.9	7.6 ± 0.3
SF-8	0	1.43 ± 0.08	11.1 ± 0.7	1.35 ± 0.09	< 80	1.11 ± 0.13	0.28 ± 0.02	0.41 ± 0.02	3.3 ± 0.6	3.32 ± 0.16
	1-2	1.42 ± 0.11	10.4 ± 0.7	1.22 ± 0.08	< 70	0.9 ± 0.3	0.27 ± 0.02	0.40 ± 0.02	3.5 ± 0.7	3.78 ± 0.2
	>3	1.44 ± 0.10	10.0 ± 0.6	1.13 ± 0.08	< 70	0.92 ± 0.11	0.24 ± 0.02	0.367 ± 0.019	< 3	2.88 ± 0.14
SF-10B	0	4.1 ± 0.2	22.3 ± 1.4	2.65 ± 0.16	< 160	2.3 ± 0.3	0.67 ± 0.05	1.03 ± 0.05	9.4 ± 1.8	4.9 ± 0.4
	1	1.77 ± 0.10	13.3 ± 0.9	1.68 ± 0.11	< 90	1.59 ± 0.16	0.37 ± 0.02	0.50 ± 0.03	4.4 ± 0.9	4.03 ± 0.18
SF-12B	0	5.3 ± 0.3	27.5 ± 1.7	2.9 ± 0.2	< 150	2.4 ± 0.2	0.73 ± 0.05	1.31 ± 0.07	7.8 ± 1.5	5.6 ± 0.3
	1-2	2.12 ± 0.12	14.4 ± 0.9	1.61 ± 0.10	< 80	1.53 ± 0.16	0.36 ± 0.02	0.53 ± 0.03	3.7 ± 0.9	4.2 ± 0.2
SF-13	0	4.4 ± 0.2	22.5 ± 1.4	2.55 ± 0.16	< 190	2.1 ± 0.2	0.70 ± 0.04	1.07 ± 0.06	7.2 ± 1.3	5.1 ± 0.3
	1-2	1.45 ± 0.08	13.6 ± 0.9	1.39 ± 0.09	< 80	1.33 ± 0.14	0.32 ± 0.02	0.43 ± 0.02	< 4	4.5 ± 0.2
SF-19	0	5.5 ± 0.3	24.4 ± 1.5	3.02 ± 0.18	< 200	2.3 ± 0.3	0.73 ± 0.04	1.34 ± 0.07	7.1 ± 1.4	5.1 ± 0.2
	1-2	2.31 ± 0.13	15.7 ± 1	1.89 ± 0.18	< 90	1.58 ± 0.16	0.38 ± 0.03	0.63 ± 0.03	4.6 ± 0.8	4.7 ± 0.3

Table C-I: Elemental Concentrations in BLM, Grand County, Utah, Pothole Sediments (cont.)

Site No.	Depth (cm)	Hg (ng/g)	I (ug/g)	In (ng/g)	K (%)	La (ug/g)	Lu (ng/g)	Mg (ug/g)	Mn (ug/g)	Mo (ug/g)
MV-13	0	< 200	< 9	< 90	1.97 ± 0.12	7.5 ± 0.4	128 ± 9	1700 ± 200	288 ± 12	< 16
	1-2	< 160	< 3	< 60	1.66 ± 0.10	4.1 ± 0.2	77 ± 6	750 ± 120	27 ± 1	< 9
MV-35	0	< 500	< 11	< 140	2.84 ± 0.18	13.3 ± 0.8	206 ± 15	3700 ± 400	560 ± 20	3.4 ± 1.4
	1-2	< 200	< 5	< 60	1.89 ± 0.12	6.9 ± 0.4	133 ± 8	790 ± 130	83 ± 3	0.9 ± 0.5
MV-43	0	< 300	< 7	< 90	2.44 ± 0.15	9.2 ± 0.5	131 ± 8	1610 ± 190	134 ± 5	< 14
	1-2	< 200	< 4	< 70	2.28 ± 0.14	9.0 ± 0.5	158 ± 9	1370 ± 120	60 ± 3	< 70
SF-8	0	< 300	< 4	< 60	1.65 ± 0.10	5.5 ± 0.3	93 ± 7	1700 ± 400	63 ± 3	< 20
	1-2	< 190	< 5	< 50	1.51 ± 0.10	5.7 ± 0.3	90 ± 6	1030 ± 140	66 ± 3	0.9 ± 0.4
	>3	< 170	< 4	< 50	1.49 ± 0.09	5.3 ± 0.3	92 ± 6	840 ± 80	29 ± 1	1.1 ± 0.4
SF-10B	0	< 300	< 12	< 140	2.55 ± 0.16	14.4 ± 0.9	185 ± 12	3400 ± 500	580 ± 20	16 ± 3
	1	< 300	< 4	< 70	2.00 ± 0.13	7.0 ± 0.4	130 ± 9	1850 ± 140	43 ± 2	< 30
SF-12B	0	< 400	< 12	< 120	2.35 ± 0.15	16.0 ± 0.9	211 ± 14	3700 ± 300	450 ± 18	< 20
	1-2	< 200	< 5	< 70	1.85 ± 0.12	7.4 ± 0.5	135 ± 8	1420 ± 110	52 ± 2	< 12
SF-13	0	< 300	< 14	< 160	2.33 ± 0.15	14.6 ± 0.9	197 ± 12	3500 ± 400	980 ± 40	6 ± 2
	1-2	< 300	< 4	< 70	1.90 ± 0.12	6.4 ± 0.3	123 ± 8	1360 ± 130	54 ± 2	1.8 ± 0.8
SF-19	0	< 400	< 19	< 160	2.37 ± 0.15	14.9 ± 0.8	223 ± 14	3900 ± 400	970 ± 40	1.2 ± 0.8
	1-2	< 200	< 5	< 70	1.92 ± 0.12	8.2 ± 0.5	147 ± 9	1380 ± 110	46 ± 2	1.0 ± 0.5

Site No.	Depth (cm)	Na (ug/g)	Nd (ug/g)	Rb (ug/g)	Sb (ug/g)	Sc (ug/g)	Se (ug/g)	Sm (ug/g)	Sr (ug/g)	Ta (ng/g)
MV-13	0	1010 ± 40	10 ± 2	58 ± 3	1.45 ± 0.09	2.20 ± 0.12	0.6 ± 0.4	1.42 ± 0.07	< 170	260 ± 30
	1-2	620 ± 30	< 3	47 ± 2	0.98 ± 0.05	0.89 ± 0.05	0.58 ± 0.19	0.67 ± 0.03	< 60	129 ± 15
MV-35	0	1770 ± 80	17 ± 3	78 ± 4	2.03 ± 0.11	4.4 ± 0.2	1.4 ± 0.5	2.54 ± 0.12	< 200	450 ± 40
	1-2	850 ± 40	6.1 ± 1.6	58 ± 3	1.32 ± 0.08	1.78 ± 0.09	1.3 ± 0.4	1.26 ± 0.06	< 100	250 ± 20
MV-43	0	1090 ± 50	11 ± 2	72 ± 4	1.82 ± 0.09	2.56 ± 0.14	1.1 ± 0.3	1.70 ± 0.08	< 130	300 ± 30
	1-2	1100 ± 50	7.5 ± 1.4	57 ± 3	1.73 ± 0.09	1.94 ± 0.10	0.5 ± 0.3	1.87 ± 0.09	< 80	310 ± 30
SF-8	0	810 ± 30	5.1 ± 1.6	49 ± 2	1.03 ± 0.06	1.44 ± 0.08	0.8 ± 0.3	0.89 ± 0.04	< 80	170 ± 20
	1-2	770 ± 30	4.1 ± 1.2	46 ± 2	1.02 ± 0.07	1.39 ± 0.08	1.1 ± 0.3	1.01 ± 0.05	< 90	158 ± 19
	>3	740 ± 30	4.8 ± 1.5	47 ± 2	1.00 ± 0.06	1.32 ± 0.07	0.6 ± 0.2	0.84 ± 0.04	< 70	140 ± 20
SF-10B	0	1930 ± 80	< 8	62 ± 3	1.79 ± 0.10	3.67 ± 0.19	1.7 ± 0.5	3.29 ± 0.15	< 200	400 ± 30
	1	1120 ± 50	6.3 ± 1.6	58 ± 3	1.11 ± 0.06	1.88 ± 0.10	0.7 ± 0.3	1.19 ± 0.06	< 80	260 ± 30
SF-12B	0	1970 ± 80	16 ± 3	74 ± 4	1.86 ± 0.12	4.7 ± 0.2	1.4 ± 0.8	3.43 ± 0.16	< 200	370 ± 40
	1-2	1050 ± 40	8.9 ± 1.8	57 ± 3	1.23 ± 0.07	2.03 ± 0.11	1.1 ± 0.3	1.31 ± 0.06	< 90	230 ± 20
SF-13	0	1910 ± 80	13 ± 2	63 ± 3	1.80 ± 0.10	3.8 ± 0.2	1.6 ± 0.5	3.27 ± 0.15	< 200	360 ± 40
	1-2	1080 ± 50	7.7 ± 1.8	53 ± 3	1.03 ± 0.06	1.60 ± 0.09	1.0 ± 0.3	1.02 ± 0.05	< 80	230 ± 20
SF-19	0	2020 ± 80	15 ± 3	73 ± 4	2.27 ± 0.14	4.7 ± 0.2	1.7 ± 0.5	3.17 ± 0.15	< 300	450 ± 40
	1-2	1140 ± 50	11 ± 2	60 ± 3	1.42 ± 0.08	2.35 ± 0.12	1.4 ± 0.4	1.45 ± 0.07	< 90	320 ± 30

Table C-I: Elemental Concentrations in BLM, Grand County, Utah, Pothole Sediments (cont.)

Site No.	Depth (cm)	Tb (ng/g)	Th (ug/g)	Ti (ug/g)	U (ug/g)	V (ug/g)	W (ug/g)	Yb (ug/g)	Zn (ug/g)	Zr (ug/g)
MV-13	0	190 ± 20	2.13 ± 0.09	860 ± 140	0.99 ± 0.04	12.8 ± 1.0	< 1.3	0.79 ± 0.07	32 ± 5	112 ± 17
	1-2	87 ± 18	1.10 ± 0.06	610 ± 90	0.57 ± 0.03	5.5 ± 0.5	1.3 ± 0.5	0.44 ± 0.04	7.5 ± 1.5	86 ± 14
MV-35	0	430 ± 60	4.1 ± 0.2	1900 ± 300	4.09 ± 0.15	28.6 ± 1.9	0.83 ± 0.17	1.24 ± 0.09	44 ± 6	190 ± 40
	1-2	190 ± 20	1.99 ± 0.09	1040 ± 140	1.80 ± 0.07	11.3 ± 0.8	< 1.2	0.93 ± 0.06	< 3	250 ± 30
MV-43	0	250 ± 30	2.37 ± 0.15	1060 ± 150	1.25 ± 0.05	12.8 ± 0.9	0.40 ± 0.14	0.84 ± 0.06	35 ± 5	160 ± 60
	1-2	230 ± 20	2.46 ± 0.16	1260 ± 200	2.21 ± 0.08	13.4 ± 0.9	1.8 ± 0.5	1.33 ± 0.08	19 ± 3	280 ± 30
SF-8	0	122 ± 19	1.69 ± 0.1	800 ± 110	1.10 ± 0.04	8.5 ± 0.7	0.67 ± 0.15	0.56 ± 0.04	21 ± 3	130 ± 20
	1-2	140 ± 20	1.67 ± 0.07	810 ± 120	1.21 ± 0.05	8.9 ± 0.7	< 1.1	0.73 ± 0.08	< 3	210 ± 30
	>3	101 ± 14	1.55 ± 0.07	490 ± 70	1.32 ± 0.05	6.7 ± 0.5	0.5 ± 0.3	0.59 ± 0.04	23 ± 3	110 ± 30
SF-10B	0	350 ± 40	3.89 ± 0.16	1500 ± 200	2.64 ± 0.10	27.7 ± 1.8	1.1 ± 0.2	1.42 ± 0.10	46 ± 6	170 ± 30
	1	181 ± 20	2.26 ± 0.10	1130 ± 150	1.53 ± 0.06	12.0 ± 0.8	0.37 ± 0.11	0.79 ± 0.06	26 ± 4	180 ± 30
SF-12B	0	420 ± 50	4.68 ± 0.19	1600 ± 200	3.16 ± 0.11	32.8 ± 1.9	1.1 ± 0.3	1.49 ± 0.10	60 ± 20	260 ± 40
	1-2	200 ± 20	2.16 ± 0.09	800 ± 110	1.62 ± 0.06	12.2 ± 0.8	0.68 ± 0.17	0.94 ± 0.11	35 ± 5	160 ± 20
SF-13	0	350 ± 50	3.9 ± 0.3	1400 ± 200	2.22 ± 0.08	27 ± 2	0.7 ± 0.4	1.37 ± 0.09	47 ± 7	180 ± 30
	1-2	143 ± 18	1.94 ± 0.08	1190 ± 160	1.34 ± 0.05	11.9 ± 0.8	< 1.1	0.71 ± 0.05	22 ± 3	180 ± 20
SF-19	0	380 ± 40	4.38 ± 0.18	2100 ± 300	3.41 ± 0.12	30 ± 2	0.8 ± 0.5	1.29 ± 0.09	50 ± 20	220 ± 40
	1-2	200 ± 20	2.43 ± 0.1	950 ± 130	2.06 ± 0.08	11.1 ± 0.7	1.4 ± 0.4	0.94 ± 0.06	34 ± 5	180 ± 20

Table C-II: Elemental Concentrations in Arches National Park, Grand County, Utah, Pothole Sediments

Site	Depth (cm)	Ag (ug/g)	Al (%)	As (ug/g)	Au (ng/g)	Ba (ug/g)	Br (ug/g)	Ca (ug/g)	Ce (ug/g)	Cl (ug/g)
DL-11	0	< 2	4.26 ± 0.12	6.4 ± 0.7	< 6	380 ± 50	6.1 ± 0.7	3800 ± 300	41 ± 2	< 50
	1-2	< 0.8	1.56 ± 0.05	1.9 ± 0.2	< 3	304 ± 20	1.06 ± 0.13	< 700	11.6 ± 0.6	26 ± 4
DL-14A	0	< 1.7	3.68 ± 0.11	5.7 ± 0.6	< 4	380 ± 30	3.9 ± 0.4	4900 ± 400	29.1 ± 1.4	36 ± 8
	1-2	< 1.5	2.29 ± 0.07	2.6 ± 0.3	< 4	290 ± 30	1.59 ± 0.18	< 1000	14.5 ± 0.7	37 ± 6
MF-5	0	< 1.1	2.23 ± 0.06	2.6 ± 0.3	< 3	310 ± 20	1.17 ± 0.14	< 1100	12.5 ± 0.6	< 30
	1-2	< 0.8	1.60 ± 0.05	1.9 ± 0.2	< 3	340 ± 20	0.67 ± 0.10	< 700	10.6 ± 0.5	24 ± 5
MF-6	0	< 1	2.03 ± 0.06	2.1 ± 0.2	< 2	306 ± 17	0.82 ± 0.1	820 ± 140	11.5 ± 0.6	< 30
	1-2	< 1.2	1.90 ± 0.06	1.9 ± 0.2	< 3	300 ± 19	0.76 ± 0.1	< 800	9.9 ± 0.5	27 ± 6
MF-8	0	< 1.7	3.27 ± 0.09	4.6 ± 0.5	< 4	330 ± 30	2.7 ± 0.3	2400 ± 300	21 ± 1	< 40
	1-2	< 1	1.84 ± 0.05	2.4 ± 0.3	< 3	320 ± 30	0.94 ± 0.12	< 800	11.8 ± 0.6	23 ± 4
TF-2	0	< 1	1.88 ± 0.06	2.6 ± 0.3	< 3	268 ± 15	1.28 ± 0.15	1350 ± 170	11.5 ± 0.6	< 30
	1-2	< 1.2	1.85 ± 0.06	1.63 ± 0.18	< 3	256 ± 18	0.82 ± 0.10	< 800	9.6 ± 0.5	24 ± 4
TF-4	0	< 1.8	3.70 ± 0.11	4.7 ± 0.5	< 5	340 ± 30	2.9 ± 0.3	2600 ± 300	26.8 ± 1.3	< 40
	1-2	< 0.9	1.83 ± 0.05	1.9 ± 0.2	< 2	341 ± 19	0.59 ± 0.08	< 900	13.8 ± 0.7	20 ± 4
TF-7	0	< 1.2	2.48 ± 0.07	3.3 ± 0.3	< 4	305 ± 17	2.8 ± 0.3	3400 ± 300	14.9 ± 0.7	94 ± 12
	1-2	< 1.1	1.90 ± 0.06	1.52 ± 0.17	< 3	290 ± 16	0.53 ± 0.08	590 ± 120	9.5 ± 0.5	< 20
TF-11	0	< 1.4	2.83 ± 0.08	3.6 ± 0.4	< 4	350 ± 30	3.7 ± 0.4	3100 ± 300	18.1 ± 0.9	< 40
	1-2	< 0.8	1.36 ± 0.04	2.2 ± 0.3	< 2	292 ± 16	0.7 ± 0.09	< 900	8.9 ± 0.4	17 ± 4
TF-14	0	< 1.7	3.52 ± 0.10	5.9 ± 0.7	< 5	330 ± 40	5.0 ± 0.5	2900 ± 300	31 ± 2	< 50
	1-2	< 1.2	1.80 ± 0.05	2.1 ± 0.2	< 3	262 ± 16	1.10 ± 0.14	< 800	11.1 ± 0.6	18 ± 8

Site	Depth (cm)	Co (ug/g)	Cr (ug/g)	Cs (ug/g)	Cu (ug/g)	Dy (ug/g)	Eu (ug/g)	Fe (%)	Ga (ug/g)	Hf (ug/g)
DL-11	0	5.1 ± 0.3	30 ± 2	3.4 ± 0.2	< 130	3.0 ± 0.3	0.93 ± 0.06	1.27 ± 0.06	11.6 ± 1.4	5.4 ± 0.5
	1-2	1.32 ± 0.08	10.6 ± 0.7	1.17 ± 0.07	< 70	1.0 ± 0.1	0.26 ± 0.02	0.33 ± 0.02	3.6 ± 0.6	2.82 ± 0.15
DL-14A	0	4.0 ± 0.2	24.6 ± 1.5	2.78 ± 0.18	< 140	2.3 ± 0.2	0.71 ± 0.04	1.10 ± 0.06	7.5 ± 1.3	5.6 ± 0.4
	1-2	1.86 ± 0.11	14.4 ± 0.9	1.62 ± 0.1	< 80	< 1.8	0.36 ± 0.02	0.50 ± 0.03	4.9 ± 0.8	3.83 ± 0.18
MF-5	0	1.38 ± 0.11	12.8 ± 0.8	1.35 ± 0.09	< 80	1.01 ± 0.13	0.30 ± 0.02	0.43 ± 0.02	3.9 ± 0.8	3.04 ± 0.15
	1-2	1.22 ± 0.07	10.6 ± 0.7	1.26 ± 0.08	< 70	0.84 ± 0.11	0.27 ± 0.02	0.337 ± 0.017	3.0 ± 0.7	3.42 ± 0.19
MF-6	0	1.19 ± 0.08	10.5 ± 0.7	1.30 ± 0.08	< 70	0.8 ± 0.1	0.30 ± 0.02	0.377 ± 0.019	4.2 ± 0.8	2.8 ± 0.2
	1-2	1.01 ± 0.06	10.1 ± 0.7	1.27 ± 0.08	< 70	1.4 ± 0.4	0.24 ± 0.02	0.316 ± 0.016	3.5 ± 0.7	3.26 ± 0.16
MF-8	0	2.62 ± 0.18	19.5 ± 1.2	2.11 ± 0.14	< 110	1.58 ± 0.18	0.50 ± 0.03	0.78 ± 0.04	6.4 ± 1.1	4.25 ± 0.19
	1-2	1.34 ± 0.08	11.5 ± 0.7	1.5 ± 0.09	< 70	0.91 ± 0.11	0.30 ± 0.03	0.40 ± 0.02	3.5 ± 0.7	4.0 ± 0.2
TF-2	0	1.37 ± 0.09	9.6 ± 0.6	1.22 ± 0.08	< 80	0.90 ± 0.11	0.29 ± 0.02	0.39 ± 0.02	3.8 ± 0.8	2.5 ± 0.2
	1-2	1.14 ± 0.07	12.5 ± 0.8	1.19 ± 0.08	< 70	< 1.5	0.26 ± 0.02	0.321 ± 0.017	2.8 ± 0.6	3.0 ± 0.16
TF-4	0	3.27 ± 0.2	21.9 ± 1.4	2.79 ± 0.16	< 110	2.08 ± 0.19	0.61 ± 0.03	0.92 ± 0.05	5 ± 1	4.9 ± 0.2
	1-2	1.42 ± 0.08	13.7 ± 0.9	1.50 ± 0.09	< 70	1.12 ± 0.12	0.31 ± 0.03	0.43 ± 0.02	3.6 ± 0.8	4.7 ± 0.3
TF-7	0	1.79 ± 0.11	12.4 ± 0.8	1.53 ± 0.18	< 100	1.15 ± 0.13	0.37 ± 0.03	0.53 ± 0.03	5.7 ± 1.0	2.9 ± 0.3
	1-2	0.89 ± 0.06	9.0 ± 0.6	1.18 ± 0.08	< 70	< 1.4	0.22 ± 0.02	0.288 ± 0.015	3.3 ± 1.4	2.94 ± 0.17
TF-11	0	2.42 ± 0.16	14.7 ± 1	1.79 ± 0.13	< 100	1.61 ± 0.17	0.41 ± 0.03	0.63 ± 0.030	5.0 ± 1.1	3.57 ± 0.15
	1-2	1.17 ± 0.07	10.5 ± 0.7	1.04 ± 0.07	< 70	0.68 ± 0.11	0.20 ± 0.01	0.33 ± 0.017	< 3	4.22 ± 0.16
TF-14	0	4.0 ± 0.2	26 ± 2	2.81 ± 0.17	< 130	2.4 ± 0.2	0.68 ± 0.05	1.13 ± 0.06	6.8 ± 1.3	5.2 ± 0.4
	1-2	1.35 ± 0.08	15.7 ± 1	1.20 ± 0.08	< 70	1.5 ± 0.5	0.23 ± 0.01	0.38 ± 0.02	< 4	5.9 ± 0.4

Table C-II: Elemental Concentrations in Arches National Park, Grand County, Utah, Pothole Sediments (cont.)

Site	Depth (cm)	Hg (ng/g)	I (ug/g)	In (ng/g)	K (%)	La (ug/g)	Lu (ng/g)	Mg (ug/g)	Mn (ug/g)	Mo (ug/g)
DL-11	0	< 400	< 11	< 110	2.46 ± 0.16	17.8 ± 1.0	237 ± 14	3800 ± 300	325 ± 13	9.7 ± 1.8
	1-2	< 170	< 3	< 50	1.49 ± 0.09	5.6 ± 0.3	94 ± 6	760 ± 70	24.9 ± 1.1	0.3 ± 0.3
DL-14A	0	< 300	< 10	< 130	2.40 ± 0.15	13.4 ± 0.8	172 ± 10	3100 ± 200	477 ± 20	2.1 ± 0.7
	1-2	< 300	< 4	< 70	1.86 ± 0.12	7.3 ± 0.5	111 ± 8	1220 ± 120	47 ± 2	3.8 ± 1.8
MF-5	0	< 200	< 6	< 60	1.99 ± 0.12	5.9 ± 0.4	85 ± 6	1440 ± 170	116 ± 5	< 20
	1-2	< 170	< 3	< 50	1.65 ± 0.10	5.3 ± 0.3	102 ± 6	630 ± 70	22 ± 1	0.9 ± 0.4
MF-6	0	< 190	< 4	< 70	1.80 ± 0.11	5.7 ± 0.3	90 ± 6	1090 ± 100	74 ± 3	< 11
	1-2	< 300	< 3	< 60	1.74 ± 0.11	5.3 ± 0.3	92 ± 7	930 ± 90	36 ± 2	4.9 ± 1.6
MF-8	0	< 300	< 8	< 90	2.43 ± 0.15	10.2 ± 0.5	155 ± 10	2000 ± 200	172 ± 7	4.6 ± 1.2
	1-2	< 190	< 4	< 60	1.91 ± 0.12	5.8 ± 0.3	95 ± 6	810 ± 80	25 ± 1	< 14
TF-2	0	< 190	< 6	< 80	1.75 ± 0.11	6.1 ± 0.4	84 ± 6	1050 ± 110	169 ± 9	< 40
	1-2	< 300	< 3	< 50	1.55 ± 0.10	4.9 ± 0.2	86 ± 6	990 ± 90	34 ± 2	2.4 ± 0.8
TF-4	0	< 300	< 8	< 90	2.45 ± 0.15	12.6 ± 0.7	193 ± 12	3000 ± 300	164 ± 7	2.4 ± 0.9
	1-2	< 190	< 4	< 60	1.83 ± 0.12	6.7 ± 0.4	124 ± 8	920 ± 120	25 ± 1	0.6 ± 0.4
TF-7	0	< 200	< 7	< 100	2.11 ± 0.13	8.2 ± 0.5	117 ± 8	1600 ± 140	251 ± 10	< 50
	1-2	< 200	< 3	< 50	1.72 ± 0.11	4.5 ± 0.2	93 ± 7	760 ± 110	26 ± 1	< 20
TF-11	0	< 300	< 8	< 80	2.07 ± 0.13	8.8 ± 0.5	130 ± 9	1510 ± 180	181 ± 7	< 17
	1-2	< 160	< 5	< 60	1.50 ± 0.09	4.5 ± 0.3	93 ± 6	640 ± 110	84 ± 3	0.5 ± 0.3
TF-14	0	< 300	< 8	< 120	2.33 ± 0.15	16.1 ± 1.0	188 ± 12	3500 ± 400	303 ± 13	20 ± 3
	1-2	< 300	< 3	< 50	1.44 ± 0.09	5.4 ± 0.3	129 ± 9	500 ± 400	36 ± 2	3.0 ± 0.9

Site	Depth (cm)	Na (ug/g)	Nd (ug/g)	Rb (ug/g)	Sb (ug/g)	Sc (ug/g)	Se (ug/g)	Sm (ug/g)	Sr (ug/g)	Ta (ng/g)
DL-11	0	2210 ± 100	16 ± 3	79 ± 4	1.45 ± 0.08	5.3 ± 0.3	1.4 ± 0.5	3.47 ± 0.16	< 200	440 ± 40
	1-2	770 ± 30	5.8 ± 1.6	46 ± 2	0.58 ± 0.04	1.31 ± 0.07	0.7 ± 0.2	0.98 ± 0.05	< 70	174 ± 18
DL-14A	0	1640 ± 70	11 ± 2	67 ± 3	1.76 ± 0.1	4.2 ± 0.2	1.1 ± 0.4	2.71 ± 0.12	< 170	350 ± 30
	1-2	910 ± 40	6.0 ± 1.6	53 ± 3	1.08 ± 0.07	1.93 ± 0.1	1.9 ± 0.5	1.55 ± 0.07	< 80	240 ± 20
MF-5	0	800 ± 40	5.5 ± 1.4	57 ± 3	0.96 ± 0.05	1.60 ± 0.09	0.7 ± 0.2	1.04 ± 0.05	< 110	164 ± 18
	1-2	660 ± 30	6.1 ± 1.5	55 ± 3	0.88 ± 0.06	1.25 ± 0.07	1.1 ± 0.3	0.93 ± 0.04	< 70	161 ± 17
MF-6	0	760 ± 30	6.7 ± 1.3	51 ± 3	0.86 ± 0.05	1.38 ± 0.08	0.6 ± 0.2	0.98 ± 0.05	< 80	175 ± 18
	1-2	680 ± 30	< 5	49 ± 3	0.90 ± 0.05	1.18 ± 0.06	0.5 ± 0.2	1.02 ± 0.05	< 70	190 ± 30
MF-8	0	1320 ± 60	12 ± 3	71 ± 4	1.41 ± 0.08	3.13 ± 0.17	0.8 ± 0.3	1.90 ± 0.09	< 150	310 ± 30
	1-2	750 ± 30	< 5	60 ± 3	0.95 ± 0.06	1.53 ± 0.08	1.2 ± 0.4	1.03 ± 0.05	< 80	200 ± 20
TF-2	0	750 ± 30	< 4	45 ± 2	0.90 ± 0.05	1.37 ± 0.07	0.6 ± 0.2	1.26 ± 0.06	< 100	128 ± 15
	1-2	620 ± 30	4.8 ± 1.4	44 ± 2	0.72 ± 0.04	1.25 ± 0.07	0.5 ± 0.2	0.81 ± 0.04	52 ± 13	148 ± 20
TF-4	0	1590 ± 70	9 ± 2	77 ± 4	1.74 ± 0.11	3.8 ± 0.2	0.8 ± 0.3	2.70 ± 0.13	< 150	340 ± 30
	1-2	880 ± 40	5.2 ± 1.5	55 ± 3	0.86 ± 0.05	1.64 ± 0.09	1.3 ± 0.4	1.12 ± 0.05	< 70	220 ± 40
TF-7	0	1200 ± 50	< 5	52 ± 3	1.10 ± 0.06	2.02 ± 0.11	0.6 ± 0.2	1.75 ± 0.08	120 ± 40	220 ± 20
	1-2	700 ± 30	6.4 ± 1.5	48 ± 3	0.81 ± 0.05	1.05 ± 0.06	0.7 ± 0.3	0.71 ± 0.03	59 ± 17	120 ± 18
TF-11	0	1120 ± 50	7.3 ± 1.9	61 ± 3	1.14 ± 0.08	2.53 ± 0.13	0.6 ± 0.3	1.74 ± 0.08	< 140	250 ± 30
	1-2	540 ± 20	< 4	43 ± 2	0.78 ± 0.05	1.03 ± 0.06	0.9 ± 0.3	0.74 ± 0.03	< 90	151 ± 17
TF-14	0	1960 ± 80	13 ± 2	65 ± 3	1.59 ± 0.09	4.1 ± 0.2	1.1 ± 0.3	3.55 ± 0.16	< 140	360 ± 40
	1-2	690 ± 30	< 5	42 ± 2	0.77 ± 0.04	1.31 ± 0.07	0.8 ± 0.3	0.87 ± 0.04	< 60	191 ± 19

Table C-II: Elemental Concentrations in Arches National Park, Grand County, Utah, Pothole Sediments (cont.)

Site No.	Depth (cm)	Tb (ng/g)	Th (ug/g)	Ti (ug/g)	U (ug/g)	V (ug/g)	W (ug/g)	Yb (ug/g)	Zn (ug/g)	Zr (ug/g)
DL-11	0	480 ± 50	5.5 ± 0.2	1800 ± 300	7.3 ± 0.2	39 ± 2	1.2 ± 0.3	1.57 ± 0.10	70 ± 20	270 ± 40
	1-2	129 ± 14	1.6 ± 0.07	480 ± 70	1.89 ± 0.07	8.5 ± 0.6	< 1	0.58 ± 0.05	24 ± 3	104 ± 16
DL-14A	0	390 ± 50	4.01 ± 0.16	1600 ± 200	3.42 ± 0.12	29.7 ± 1.7	0.81 ± 0.2	1.31 ± 0.09	47 ± 7	180 ± 50
	1-2	169 ± 19	2.04 ± 0.09	1000 ± 140	1.74 ± 0.07	14.2 ± 0.9	< 1.2	0.86 ± 0.06	25 ± 4	190 ± 30
MF-5	0	141 ± 19	1.66 ± 0.12	790 ± 110	1.22 ± 0.05	10.9 ± 0.8	< 1.1	0.63 ± 0.04	16 ± 15	160 ± 40
	1-2	102 ± 12	1.44 ± 0.06	640 ± 90	1.24 ± 0.05	6.9 ± 0.5	0.7 ± 0.5	0.64 ± 0.05	23 ± 3	127 ± 18
MF-6	0	100 ± 14	1.49 ± 0.06	750 ± 110	1.05 ± 0.04	8.8 ± 0.7	< 1	0.67 ± 0.05	14 ± 2	122 ± 17
	1-2	108 ± 14	1.33 ± 0.06	670 ± 100	1.24 ± 0.05	7.6 ± 0.7	< 1	0.61 ± 0.05	16 ± 3	130 ± 20
MF-8	0	250 ± 30	2.95 ± 0.12	1260 ± 170	2.92 ± 0.11	23.5 ± 1.4	0.63 ± 0.13	1.01 ± 0.07	31 ± 19	170 ± 40
	1-2	123 ± 14	1.59 ± 0.07	650 ± 90	1.21 ± 0.05	8.1 ± 0.6	< 1.2	0.64 ± 0.05	24 ± 4	150 ± 30
TF-2	0	122 ± 15	1.61 ± 0.07	610 ± 100	1.35 ± 0.05	10.7 ± 0.8	< 1.1	0.62 ± 0.05	17 ± 3	98 ± 15
	1-2	110 ± 20	1.42 ± 0.06	590 ± 90	1.85 ± 0.07	10.0 ± 0.7	0.5 ± 0.4	0.51 ± 0.04	17 ± 2	140 ± 20
TF-4	0	340 ± 30	3.75 ± 0.15	1500 ± 200	5.52 ± 0.19	27.5 ± 1.5	0.85 ± 0.18	1.17 ± 0.09	41 ± 18	220 ± 40
	1-2	134 ± 18	1.89 ± 0.08	720 ± 100	2.13 ± 0.08	9.2 ± 0.6	0.6 ± 0.4	0.72 ± 0.05	26 ± 4	190 ± 20
TF-7	0	190 ± 20	2.10 ± 0.09	860 ± 130	1.39 ± 0.05	14.7 ± 1	< 1.4	0.81 ± 0.06	20 ± 3	80 ± 30
	1-2	97 ± 19	1.27 ± 0.06	730 ± 100	0.88 ± 0.04	8.1 ± 0.7	< 1	0.53 ± 0.04	13 ± 2	121 ± 18
TF-11	0	220 ± 30	2.53 ± 0.1	1130 ± 170	2.53 ± 0.09	16.9 ± 1.2	0.4 ± 0.3	0.94 ± 0.07	25 ± 17	180 ± 40
	1-2	112 ± 13	1.21 ± 0.05	470 ± 80	1.07 ± 0.04	5.9 ± 0.6	< 0.9	0.60 ± 0.04	18 ± 3	151 ± 19
TF-14	0	370 ± 40	4.31 ± 0.17	1500 ± 200	5.55 ± 0.19	36.8 ± 1.8	1.0 ± 0.3	1.57 ± 0.10	52 ± 7	190 ± 100
	1-2	120 ± 15	1.63 ± 0.07	800 ± 110	2.19 ± 0.08	9.8 ± 0.7	0.7 ± 0.3	0.74 ± 0.05	16 ± 3	260 ± 30

Table C-III: Individual Enrichment Factors in BLM, Grand County, Utah, Pothole Sediments

Site No.	Depth (cm)	As	Ba	Br	Ca	Co	Cs	Eu	Fe	Mg	Mn	Sb	Sc	Se	U	V	Zn
MV-13	0	10.7	2.6	5.6	0.56	0.9	1.9	1.7	0.6	0.5	1.9	28	0.7	47	1.4	0.8	1.8
	1-2	6.7	2.5	0.9	< 0.14	0.4	1.4	1.1	0.4	0.3	0.2	23	0.4	56	1.0	0.4	0.5
MV-35	0	10.6	1.4	2.0	0.12	0.8	1.7	1.7	0.6	0.5	1.8	20	0.8	55	2.9	0.9	1.2
	1-2	9.1	2.2	0.9	< 0.11	0.5	1.5	1.2	0.5	0.2	0.5	24	0.6	93	2.3	0.7	< 0.2
MV-43	0	18.6	2.3	2.8	0.30	0.8	1.9	1.7	0.6	0.4	0.7	28	0.7	69	1.5	0.7	1.5
	1-2	15.8	2.0	1.5	0.09	0.5	1.4	1.5	0.5	0.3	0.3	29	0.6	33	2.6	0.8	0.9
SF-8	0	7.1	2.3	1.0	< 0.11	0.6	1.4	1.2	0.5	0.5	0.4	20	0.5	63	1.6	0.6	1.2
	1-2	7.5	2.1	1.2	< 0.11	0.6	1.4	1.3	0.5	0.3	0.5	21	0.5	91	1.9	0.6	< 0.2
	>3	7.9	2.8	1.0	< 0.14	0.7	1.6	1.4	0.5	0.3	0.2	26	0.6	62	2.4	0.6	1.7
SF-10B	0	13.4	1.6	2.8	0.20	0.9	1.6	1.7	0.7	0.6	2.2	20	0.8	77	2.2	1.1	1.5
	1	7.1	1.8	1.1	< 0.09	0.6	1.4	1.3	0.4	0.4	0.2	17	0.5	44	1.8	0.6	1.2
SF-12B	0	11.5	1.3	6.9	0.22	1.1	1.6	1.7	0.8	0.6	1.5	19	0.9	56	2.3	1.1	1.7
	1-2	9.2	2.5	2.6	< 0.13	0.9	1.8	1.6	0.6	0.4	0.4	25	0.8	89	2.3	0.8	2.0
SF-13	0	13.4	1.6	4.3	0.31	1.0	1.6	1.9	0.7	0.6	3.9	21	0.8	76	2.0	1.1	1.6
	1-2	7.7	2.2	1.6	< 0.12	0.5	1.4	1.3	0.4	0.4	0.3	18	0.5	72	1.8	0.7	1.1
SF-19	0	12.6	1.3	3.2	0.27	1.1	1.7	1.7	0.8	0.6	3.3	23	0.9	70	2.5	1.0	1.4
	1-2	9.3	2.4	1.6	0.12	0.9	1.9	1.6	0.7	0.4	0.3	27	0.8	105	2.8	0.7	1.8

Table C-IV: Individual Enrichment Factors in Arches National Park, Grand County, Utah, Pothole Sediments

Site No.	Depth (cm)	As	Ba	Br	Ca	Co	Cs	Eu	Fe	Mg	Mn	Sb	Sc	Se	U	V	Zn
DL-11	0	8.0	1.3	4.6	0.24	1.0	1.7	2.0	0.7	0.5	1.0	14	0.9	53	5.0	1.2	1.9
	1-2	6.5	2.8	2.2	< 0.12	0.7	1.6	1.5	0.5	0.3	0.2	15	0.6	72	3.5	0.7	1.7
DL-14A	0	8.3	1.5	3.4	0.36	0.9	1.6	1.8	0.7	0.5	1.7	19	0.8	48	2.7	1.1	1.5
	1-2	6.1	1.8	2.2	< 0.12	0.6	1.5	1.4	0.5	0.3	0.3	19	0.6	133	2.3	0.8	1.2
MF-5	0	6.2	2.0	1.7	< 0.13	0.5	1.3	1.2	0.4	0.4	0.7	17	0.5	50	1.6	1.5	0.8
	1-2	6.4	3.1	1.4	< 0.12	0.6	1.7	1.5	0.5	0.2	0.2	22	0.6	111	2.3	0.6	1.6
MF-6	0	5.5	2.2	1.3	0.11	0.5	1.4	1.4	0.4	0.3	0.5	17	0.5	48	1.5	0.6	0.8
	1-2	5.4	2.3	1.3	< 0.11	0.4	1.4	1.2	0.4	0.3	0.2	19	0.4	42	1.9	0.5	1.0
MF-8	0	7.5	1.5	2.7	0.20	0.6	1.4	1.4	0.6	0.4	0.7	17	0.8	39	2.6	1.0	1.1
	1-2	7.0	2.5	1.6	< 0.12	0.6	1.8	1.5	0.5	0.3	0.2	21	0.4	105	2.0	0.6	1.5
TF-2	0	7.4	2.1	2.2	0.19	0.6	1.4	1.4	0.5	0.3	1.2	19	0.5	51	2.1	0.8	1.0
	1-2	4.7	2.0	1.4	< 0.12	0.5	1.4	1.3	0.4	0.3	0.2	16	0.5	43	2.9	0.7	1.0
TF-4	0	6.8	1.3	2.5	0.19	0.7	1.6	1.5	0.6	0.5	0.6	19	0.8	35	4.3	1.0	1.3
	1-2	5.6	2.7	1.0	< 0.13	0.6	1.8	1.6	0.5	0.3	0.2	19	0.7	114	3.4	0.7	1.6
TF-7	0	7.1	1.8	3.6	0.37	0.6	1.3	1.4	0.5	0.4	1.4	18	0.6	39	1.7	0.8	0.9
	1-2	4.3	2.2	0.9	0.08	0.4	1.4	1.1	0.4	0.2	0.2	17	0.4	59	1.4	0.6	0.8
TF-11	0	6.8	1.8	4.2	0.29	0.7	1.4	1.3	0.5	0.3	0.9	16	0.6	34	2.6	0.8	1.0
	1-2	8.7	3.1	1.7	< 0.18	0.7	1.7	1.3	0.6	0.3	0.8	23	0.6	106	2.3	0.6	1.5
TF-14	0	9.0	1.4	4.6	0.22	0.9	1.7	1.8	0.7	0.6	1.2	18	0.8	50	4.6	1.4	1.7
	1-2	6.2	2.1	2.0	< 0.12	0.6	1.4	1.2	0.5	0.2	0.3	17	0.5	71	3.5	0.7	1.0

Appendix D: *In Situ* Temperature, pH, and Alkalinity Measurements in Potholes

Table D-I: In Situ Measurements of Temperature, pH, and Alkalinity, BLM Potholes, Grand County, Utah

Site No.	Date	Time	Temp	pH	Alk
SF-2	10/05/89	1100	19.5	8.20	72.7
	10/16/89	1030	17.5	7.61	38.5
SF-8	8/21/88	----	22.7	9.61	38.5
	9/25/88	----	19.6	9.25	21.4
	7/31/89	0825	21.0	7.28	21.4
	8/15/89	1150	24.6	6.91	17.1
	10/05/89	1150	19.9	7.42	29.9
	10/16/89	1220	19.4	7.36	17.1
SF-9A	10/05/89	1225	19.0	7.40	38.5
	10/16/89	1210	18.6	7.38	21.4
SF-10B	8/21/88	----	22.6	9.06	81.2
	9/25/88	----	14.4	8.89	55.6
	7/25/89	1340	33.2	7.31	21.4
	7/31/89	0855	21.0	7.87	21.4
	8/15/89	1110	24.1	6.83	21.4
	10/05/89	1255	18.0	7.42	29.9
	10/16/89	1105	16.5	7.33	21.4
SF-12B	8/21/88	----	22.5	7.97	77.0
	9/25/88	----	14.3	9.16	55.6
	7/25/89	1340	30.3	7.30	29.9
	7/31/89	0910	22.6	7.84	25.6
	8/15/89	1115	24.5	6.98	21.4
	10/05/89	1320	23.6	8.07	38.5
	10/16/89	1130	18.3	7.34	21.4
SF-13	8/21/88	----	22.4	8.99	72.7
	9/25/88	----	14.4	9.40	51.3
	7/25/89	1350	34.6	7.47	47.0
	7/31/89	0915	21.8	7.89	25.6
	8/15/89	1120	24.2	7.10	21.4
	10.05/89	1340	25.3	8.46	34.2
	10/16/89	1150	19.1	7.30	17.1
SF-18	10/05/89	1410	24.4	8.52	51.3
	10/16/89	1255	23.9	7.69	25.6
SF-19	8/21/88	----	22.5	8.90	72.7
	9/25/88	----	15.8	9.22	38.5
	7/25/89	0930	22.5	7.47	29.9
	8/15/89	1130	25.0	7.31	21.4
	10/16/89	1315	22.5	7.57	21.4
MV-5	7/31/89	1010	26.0	8.20	25.6
	8/15/89	1500	32.8	8.33	21.4
	10/16/89	1355	23.0	8.78	29.9
MV-11	7/31/89	1020	24.1	7.72	29.9
	8/15/89	1450	31.4	7.62	25.6
	10/16/89	1415	19.6	7.52	25.6
MV-13	7/25/89	1435	35.3	7.40	34.2
	7/31/89	1035	27.6	6.55	25.6
	9/13/89	1055	22.8	7.80	17.0
	10/16/89	1440	20.9	8.52	29.9
MV-14A	7/31/89	1045	28.1	8.27	38.5
	8/15/89	1435	33.1	7.56	25.6
	10/05/89	1455	19.7	9.01	38.5
	10/16/89	1515	21.5	8.87	21.4
MV-14B	9/13/89	1125	23.4	7.28	29.9
	10/16/89	1500	19.2	7.76	17.1
MV-25	7/31/89	1100	28.1	7.71	12.0
	8/15/89	1420	33.9	7.92	29.9
	9/13/89	1150	24.5	8.18	28.0
	10/16/89	1550	15.0	8.67	11.0
MV-35	8/15/89	1400	32.0	6.88	21.4
	10/16/89	1610	16.5	8.25	34.2

Note: Temperature in degrees C, pH in units, and Alkalinity in mg/L $CaCO_3$.

Table D-II: In Situ Measurements of Temperature, pH, and Alkalinity, Arches National Park Potholes, Grand County, Utah

Site No.	Date	Time	Temp	pH	Alk
TF-2	8/21/88	----	29.5	7.35	22.4
	9/22/88	----	26.8	8.85	29.9
	6/12/89	1715	24.5	7.35	21.4
	7/24/89	1020	29.0	6.63	25.6
	7/30/89	1350	34.0	9.62	25.6
	8/16/89	1120	28.1	7.47	29.9
TF-4	8/21/88	----	28.8	7.19	17.1
	9/22/88	----	24.0	8.28	29.9
	7/30/89	1335	35.9	8.64	21.4
TF-7	8/21/88	----	29.2	8.80	29.9
	9/22/88	----	25.3	9.07	29.9
	6/12/89	1735	26.8	8.80	47.0
	7/24/89	1035	30.4	6.79	38.5
	7/30/89	1320	35.6	9.04	21.4
	8/16/89	1135	28.1	6.93	29.9
TF-11	8/21/88	----	29.2	7.69	21.4
	9/22/88	----	26.0	9.55	34.2
	6/12/89	1820	21.8	8.55	42.8
	7/30/89	1300	33.9	9.26	25.6
	8/16/89	1150	29.0	7.57	29.9
TF-14	8/21/88	----	30.8	7.68	21.4
	9/22/88	----	28.3	9.51	21.4
	8/16/89	1245	32.3	9.20	21.4
DL-11	8/21/88	----	26.6	7.46	17.1
	9/22/88	----	26.5	9.50	29.9
	7/30/89	1050	28.8	6.49	25.6
	8/16/89	1715	26.0	6.67	29.9
DL-14A	8/21/88	----	28.7	7.33	22.4
	9/22/88	----	23.8	8.28	34.2
	7/30/89	1115	29.1	7.09	25.6
	8/16/89	1105	26.8	7.13	38.5
MF-5	8/21/88	----	30.5	8.83	25.7
	7/30/89	1205	32.5	7.90	17.1
	8/16/89	1225	29.4	7.77	25.6
MF-6	8/21/88	----	31.2	8.97	21.4
	9/22/88	----	28.3	9.47	29.9
	6/12/89	1850	23.1	8.3	25.6
	7/30/89	1215	34.0	6.72	29.9
	8/16/89	1220	32.3	9.14	21.4
MF-8	8/21/88	----	30.0	8.14	21.4
	9/22/88	----	27.7	9.24	29.9
	6/12/89	1915	22.1	7.71	21.4
	7/24/89	1110	32.0	6.89	21.4
	7/30/89	1235	33.3	7.54	34.2
	8/16/89	1230	25.7	8.14	21.4
MF-9	9/22/88	----	25.9	8.92	47.0

Note: Temperature in degrees C, pH in units, and Alkalinity in mg/L $CaCO_3$.

Table D-III: In Situ Measurements of Temperature, pH, and Alkalinity in LAME and JOTR

Lake Meade National Recreation Area

Site No.	Date	Time	Temp	pH	Alk
CAT-1	5/29/90	1400	26.5	7.64	42.7
CAT-2	5/29/90	1040	22.4	8.41	17.1
CAT-3	5/29/90	1055	23.3	8.97	12.8
CAT-4	5/29/90	1145	26.1	8.98	12.8
CAT-5	5/29/90	1310	27.0	9.46	17.1
LAKE-1	5/29/90	1540	29.9	9.84	34.2
GRAPE-1	5/31/90	1240	20.5	10.63	29.9
GRAPE-2	5/31/90	1300	19.4	9.20	34.2

Joshua Tree National Monument

Site No.	Date	Time	Temp	pH	Alk
HO-1	6/11/90	1430	30.4	9.99	42.8
	7/11/90	1405	35.4	9.56	12.8
HO-2	6/11/90	1530	25.4	8.81	< 1
	7/11/90	1505	33.1	9.00	4.3
HO-3	6/11/90	1600	24.3	8.83	< 1
	7/11/90	1530	32.4	9.20	8.6
BO-2	2/21/90	1410	8.8	9.14	34.2
	7/18/90	1530	32.2	10.05	51.3
BO-3	2/21/90	1450	9.6	9.09	---
BO-4	7/18/90	1340	32.3	10.01	17.1
BO-5	7/18/90	1405	33.4	10.21	38.5

Note: Temperature in degrees C, pH in units, and Alkalinity in mg/L $CaCO_3$.

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