Master

LA-8017-MS
Informal Report

UC-51
Issued: October 1980

**Uranium Hydrogeochemical Survey of Well Waters
from an Area Around Pie Town,
Catron County, West-Central New Mexico,
Including Concentrations of
Twenty-Three Additional Elements**

By
Terrance L. Morgan

AND

William E. George - Fluorometric Analyses
Walter K. Hensley - Delayed-Neutron Counting
Gayle J. Thomas - Data Base Management
Arthur L. Langhorns* - Plasma-Source Emission Spectrography

*Lawrence Livermore Laboratory, Livermore, California

U. S. DEPARTMENT OF ENERGY
Assistant Secretary for Resource Applications
Grand Junction Office, Colorado

DISCLAIMER
This book was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

JB

CONTENTS

LIST OF ILLUSTRATIONS	vi
LIST OF TABLES	vi
ABSTRACT	1
I. INTRODUCTION	2
II. DESCRIPTION OF STUDY AREA	2
III. GEOLOGY	3
Baca formation	3
Datil formation	4
IV. ANALYTICAL RESULTS	5
V. SUMMARY AND CONCLUSIONS	8
ACKNOWLEDGMENTS	9
APPENDIX I Listings of Field Data and Elemental Con- concentrations for Water Samples from the Pie Town Area, New Mexico	11
APPENDIX II Carbonate and Bicarbonate Ion Concentrations in Samples from the Pie Town Area, New Mexico	25
APPENDIX III Summary of Standard LASL HSSR Procedures and Codes	27
III-A Summary of Standard LASL HSSR Field and Analytical Procedures	27
III-B Explanation of Codes Used in Appendix I	33
III-C Key to Sample Types Listed in Appendix I	38
APPENDIX IV Procedure for Field Measurement of Carbonate and Bicarbonate Ion Concentrations	40
REFERENCES CITED	42

LIST OF ILLUSTRATIONS

Fig. No.

1.	Location map for the Pie Town study area, New Mexico.	3
2.	Histogram and statistical data for uranium in well waters from the Pie Town study area, New Mexico.	5
3.	Scattergram showing correlation of bicarbonate ion concentrations with uranium concentrations in samples from the Pie Town area, New Mexico.	6

Plate No.

I.	Geologic and sample location map of the Pie Town study area, New Mexico.	pocket
II.	Uranium concentrations in well water samples from the Pie Town study area, New Mexico.	pocket

LIST OF TABLES

Table No.

I.	Well Water Samples Having Over 20 ppb Uranium from the Pie Town Area, New Mexico	7

URANIUM HYDROGEOCHEMICAL SURVEY OF WELL WATERS
FROM AN AREA AROUND PIE TOWN, CATRON COUNTY, WEST-CENTRAL NEW MEXICO,
INCLUDING CONCENTRATIONS OF TWENTY-THREE ADDITIONAL ELEMENTS

by

Terrance L. Morgan

ABSTRACT

As a part of the Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the National Uranium Resource Evaluation (NURE) sponsored by the US Department of Energy (DOE), the Los Alamos Scientific Laboratory (LASL) conducted a detailed hydrogeochemical survey of well waters in a 4250-km² area near Pie Town in west-central New Mexico. A total of 300 well samples was collected and analyzed for uranium and 23 other elements. The results of these analyses and carbonate and bicarbonate ion concentrations are presented in the Appendixes of this report.

Uranium concentrations range from below the detection limit of 0.02 parts per billion (ppb) to 293.18 ppb and average 8.71 ppb. Samples containing high levels of uranium were collected from the Largo Creek valley west of Quemado, from a small area about 6 km east of Quemado, from a small area surrounding Pie Town, and from scattered locations in the area surrounding Adams Diggings north of Pie Town. Most of the samples containing high uranium concentrations were collected from wells associated with the volcanic sedimentary facies of the Datil formation. This formation is a likely source of mobile uranium that may be precipitating in the underlying Baca formation, a known uranium host unit. Bicarbonate ion concentration, while proportional to uranium concentration in some cases, is not a strong controlling factor in the uranium concentrations in samples from this area.

I. INTRODUCTION

This report describes the results of a detailed hydrogeochemical survey directed by the Los Alamos Scientific Laboratory (LASL) of well waters in parts of the Saint Johns, Arizona/New Mexico, and Socorro, New Mexico, National Topographic Map Series (NTMS) quadrangles. The LASL is responsible for conducting the Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) primarily in the Rocky Mountain states of New Mexico, Colorado, Wyoming, and Montana and in Alaska (Sharp, 1977). The HSSR is part of the United States Department of Energy (DOE) National Uranium Resource Evaluation (NURE), which is designed to provide an improved estimate of the availability and economics of nuclear fuel resources and make available to industry information for use in the development and production of uranium resources. The HSSR data will ultimately be integrated with data from other NURE programs (e.g., airborne radiometric surveys and geological investigations) to complete the entire NURE program.

The Pie Town region was first recognized as an area having high uranium concentrations in ground waters from HSSR data for the Saint Johns NTMS quadrangle (Sharp et al, 1978). It was proposed in 1978 that higher density sampling of the area be done to delineate more precisely the source areas of the anomalous values. A total of 300 water samples was collected by LASL personnel during June 1979 from an area of approximately 4250 km² (1640 mi²) centered around Pie Town.

An attempt was made to sample all wells (except immediately adjacent wells) within the study area. However, many wells were omitted because permission was denied in several areas and because wells were inoperative or dry. Most of the wells sampled are wind-driven stock wells, though many domestic wells with submersible pumps were also sampled.

The water samples were analyzed for uranium at the LASL and for 23 additional elements at the Lawrence Livermore Laboratory (LLL), Livermore, California. The field data, uranium concentrations, and elemental concentrations are listed in Appendix I. In addition, carbonate and bicarbonate ion concentrations (alkalinity) of the samples are listed in Appendix II. The analytical methods and field procedures used are briefly described in Appendix III. The alkalinity was measured in the field by a titration method described in Appendix IV.

The rear pocket of this report contains a geologic and sample location map (Plate I) and an overlay for uranium concentrations in waters (Plate II), both 1:126 720 scale. The geologic map was compiled from reconnaissance geologic maps at the same scale published by the New Mexico Bureau of Mines and Mineral Resources (Willard, 1957; Willard and Weber, 1958; Willard and Givens, 1958). The data presented in Appendix I are also available on magnetic tape from: GJOIS Project, UCC-ND Computer Applications Department, 4500 North Building, Oak Ridge National Laboratory, P.O. Box X, Oak Ridge, Tennessee 37830.

II. DESCRIPTION OF STUDY AREA

The study area lies wholly within Catron County in the southeastern part of the Saint Johns NTMS quadrangle and the southwestern part of the Socorro NTMS quadrangle. The approximate center of the study area is Pie Town, a small community of population 90 that is located along US Highway 60 about 37 km (23 mi) west of Datil, NM, and 89 km (55 mi) east of the Arizona-New Mexico state line (Fig. 1).

Fig. 1. Location map for the Pie Town study area, New Mexico.

Most of the land within the study area is privately owned, though much of the eastern portion is part of Cibola National Forest. In the eastern half of the study area, conifer trees predominate, whereas grass-covered rangeland covers most of the western half. Elevations range from approximately 1950 m (6400 ft) in the northwestern corner to 2913 m (9559 ft) on Madre Mountain north of Datil. Most of the area lies between 2070 m (6800 ft) and 2280 m (7500 ft) elevation. The land is used almost exclusively for cattle ranching.

III. GEOLOGY

Rocks of Triassic to Quaternary ages are exposed within the study area. The oldest units are exposed in the northern part of the study area and Tertiary units are exposed in the central to southern parts. A stratigraphic column and description of all units present within the study area are given on Plate I. A more detailed description of the units most important to this study is given below.

Baca Formation

The Baca formation was named by Wilpolt et al (1946) for a locality in Baca Canyon in Socorro County, to the east of the Pie Town study area. He correlated the Baca formation with exposures of a reddish conglomerate unit near the Joyita Hills-Carthage area on the east side of the Rio Grande. The Baca formation has also been correlated with the Tertiary McRae formation in the Elephant Butte Dam area (south-central New Mexico), the Raton formation in the vicinity of Taos (in northern New Mexico), and the Galisteo formation in

the Cerrillos Hills area (south of Santa Fe, New Mexico). Tonking (1957) concluded that the above formations "represent genetically related, although isolated, deposits."

The Baca formation is characteristically reddish in color and consists of conglomerate, sandstone, siltstone, and mudstone. The beds are made up of a variety of rock fragment types (granite, pegmatite, schist, quartzite, chert, limestone, sandstone, andesite, latite, rhyolite, greenstone, and petrified wood) that indicate multiple source areas (Snyder, 1971). The maximum measured thickness of the formation in outcrop is about 460 m (1500 ft), but up to 760 m (2500 ft) of sediments have been measured in oil test wells (Snyder, 1971). The Baca formation accumulated in a basin or several interconnected depressions that formed during latest Cretaceous to early Eocene (Laramide) time. Fossils confirm the Eocene age of the Baca formation (Anonymous, 1963; Snyder, 1971). Apparent sediment sources were the Mogollon Highlands of Arizona and possibly of New Mexico (to the southwest and the south of the study area), the Zuni-Defiance Mountains (to the north and northwest), the Joyita Hills (to the east), and peripheral areas of upper Paleozoic and Mesozoic strata. According to Snyder (1971, p. 85), "The Baca Formation is made up of a series of vertical and lateral accumulations of many flood-plains constructed over a period of time by rivers of different size, in flood and low water, and has undergone periods of aggradation and degradation during seasonal variations of climate and bed-load."

The Baca formation crops out in an east-west belt extending from a point about 72 km (45 miles) northwest of Socorro, NM, into western Arizona where it is correlative with the Eagar formation (Snyder, 1971). The formation dips to the south at 3° to 10°. The southern extent of the formation is unknown because it is covered with Tertiary volcanics of the Mogollon slope (Foster, 1964). Along the northern outcrop where relationships are visible, the Baca rests on the beveled surface of Cretaceous units. In the western part of the study area, north of Red Hill, the Baca lies on the Mancos shale, and overlies the Point Lookout (?) sandstone in the eastern part of the study area (Snyder, 1971).

Uranium ore has been mined from the Red Basin No. 1 mine in NE 1/2 sec. 19, T2N, R10W, in a basal carbonaceous sandstone lens of the Baca formation that was deposited in a channel cut into the underlying Cretaceous Point Lookout sandstone (Hilpert, 1965; 1969). In this area, the Baca formation and the underlying Cretaceous units dip 2° to 3° to the southwest. The Baca formation is considered a favorable host unit for uranium mineralization. Significant quantities of uranium ore reserves, both "probable" and "possible", have been assigned to the Baca formation (DOE, 1979).

Datil Formation

Elston (1975) has recommended that the term Datil formation, later changed to Datil Group (Weber and Willard, 1959a and 1959b; Weber, 1963; Dane and Bachman, 1965), be dropped. The type locality of the Datil formation is now known to be an incomplete section containing many units from several volcanic centers. However, for purposes of this report, the term Datil formation and its facies will be retained as used on the geologic map (Plate I).

The Datil formation, as used on the geologic map, is divided into four facies: the volcanic sedimentary facies, the latite facies, the andesite-basaltic andesite facies, and the rhyolite tuff facies (Willard, 1957; Willard and Givens, 1958; and Willard and Weber, 1958). Lithologic descriptions of these units are given on Plate I. In all but the latite facies, the formation

contains rhyolite tuff beds that could be a source of leachable uranium. The Datil formation is present only in the southern part of the study area. The upper part is eroded, but is possibly 450 m (1500 ft) thick.

The base of the Datil formation rests on the Baca formation. In many places, the contact is sharp, but in other places is gradational. The lowest stratigraphic unit that contains volcanic fragments is considered the base of the Datil formation (Weber, 1963; Snyder, 1971).

IV. ANALYTICAL RESULTS

Field data and results of analyses for 23 elements (Al, As, B, Ca, Cd, Co, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Se, Si, Sr, Ti, V, and Zn) determined by inductively-coupled plasma (ICP) source emission spectrography at the LLL and for uranium determined by fluorometry or delayed-neutron counting (DNC) at the LASL are presented in Appendix I. The results of the field titration for alkalinity are given in Appendix II and the method used is described in Appendix IV. A description of the analytical methods used, the results of the analyses of a National Bureau of Standards sample and control samples made up by the LASL, and a key to the codes used in Appendix I are presented in Appendix III. In order to expedite the open-filing of these data, only a brief discussion of the uranium results is presented here. No attempt was made to evaluate the multielement data and further detailed interpretation is left to the reader.

Uranium concentrations range from below the detection limit of 0.02 parts per billion (ppb) to 293.18 ppb. The average uranium concentration of all samples is 8.71 ppb (Fig. 2). This compares with an average of 10.10 ppb uranium for all well water samples collected during the regional HSSR in the New Mexico portion of the St. Johns NTMS quadrangle (Sharp et al, 1973), which includes the portion of the Pie Town study area west of 108°W longitude (Fig. 1). For the Socorro NTMS quadrangle (east of 108°W longitude), the average uranium concentration of all well samples is 5.04 ppb (Planner, 1980).

Fig. 2. Histogram and statistical data for uranium in well samples from the Pie Town study area, New Mexico.

Most of the wells sampled in 1976 during the HSSR of the New Mexico portion of the Saint Johns quadrangle (Sharp et al, 1978) were resampled during the current study. The uranium concentrations measured in these previously collected samples correlate well with the concentrations measured in the current (1979) samples. However, the Pie Town study samples generally contain slightly lower concentrations than the 1976 samples.

Bicarbonate ion concentrations are plotted against uranium concentrations in Fig. 3. A correlation factor of 0.28 was computed. Two populations of samples are apparent in the high bicarbonate portion of the scattergram. In one population (labeled A in Fig. 3) both uranium and bicarbonate have elevated

Fig. 3. Scattergram showing correlation of bicarbonate ion concentrations with uranium concentrations in samples from the Pie Town area, New Mexico.

concentrations and show a slight correlation. In the second population (labeled B in Fig. 3), high bicarbonate samples have low uranium concentrations, implying that high bicarbonate levels will not result in high concentrations of uranium unless uranium is enriched in the aquifer rocks. The lack of samples with high uranium concentrations and low bicarbonate levels may mean that uranium could be present in the aquifer, but without bicarbonate ions to complex with the uranium, no uranium is dissolved.

Samples containing over 20 ppb uranium are considered anomalous and are listed in Table I. The majority of anomalous samples are associated with the volcanic sedimentary facies of the Datil formation. It is likely, therefore, that the volcanic sedimentary facies is a source of leachable uranium. This unit is reported to contain rhyolite tuff beds (Willard, 1957; Willard and Weber, 1958; Willard and Givens, 1958) that may contain significant amounts of uranium. Overlying facies of the Datil may also have provided uranium before they were removed by erosion. Tuffaceous beds in the Datil formation have been suggested as the source of the uranium found in the Baca formation (Anonymous, 1959).

TABLE I
WELL WATER SAMPLES HAVING OVER 20 PPB URANIUM
FROM THE PIE TOWN AREA, NEW MEXICO

Sample Number	Uranium Concentration (ppb)	pH	Conductivity (μ mhos/cm)	Carbonate ion (ppm)	Bicarbonate ion (ppm)	Well Depth (feet)	Geology of Sample Site*	Location
303072	293.18	7.5	1663	0	470	100	Tdvs	From immediate vicinity of Pie Town
303073	44.79	7.8	869	0	216	100	Tdvs	
303132	35.93	8.3	867	26	339	335	Tdvs	
303139	149.83	8.0	802	0	255	80	Tdvs	
303048	33.16	7.3	522	0	206	200	Ts	4 km (2.5 mi) N of Pie Town
303280	134.95	7.2	1105	0	365	--	Tdvs	15 km (9.5 mi) SE of Pie Town
303282	25.03	8.0	803	0	238	175	Tdl	21 km (13 mi) SE of Pie Town
303228	51.11	7.7	788	0	298	--	Tdvs, Ts	15 km (9.5) mi E of Pie Town
303249	46.12	7.5	682	0	379	--	Ts	10.5 km (6.5) mi N of Pie Town at Tres Lagunas
303230	25.58	7.9	827	0	385	--	Ts	17 km (10.5) mi NE of Pie Town
303063	26.16	7.9	560	0	255	200	Tdvs	1.6 km (1 mi) E of Adams Diggings
303300	53.03	8.0	791	38	232	--	Tdvs	5 km (3 mi) SW of Adams Diggings
303301	112.28	7.3	304	0	374	--	Qal (Tdvs)	10 km (6 mi) S of Adams Diggings
303086	20.69	8.1	505	0	168	240	Ts, Tdvs	15 km (9.5) mi N of Quemado
303028	87.94	7.4	1762	0	242	120	Qal (Tdvs)	Along Highway 60 6 km (4 mi) E of Quemado
303029	69.92	7.9	878	0	326	50	Qal (Tdvs)	
303030	80.62	7.6	1143	0	425	--	Qal (Tdvs)	
303099	30.21	8.0	1013	0	235	--	Tdvs	5.6 km (3.5 mi) SW of Quemado
303093	22.63	7.6	695	0	790	--	Ts (Tdvs)	6.4 km (4 mi) NW of Quemado
303296	133.66	6.8	569	0	493	150	Tdvs	19 km (12 mi) SW of Quemado
303159	35.17	7.7	312	0	285	90	Km, Ksv	14 km (8.5 mi) NW of Quemado
303186	37.76	7.7	840	0	415	45	Ts, Kd, Km	From NW corner of study area

* Key to geologic symbols: Qal, Quaternary alluvium; Tdl, latite facies of the Datil formation; Tdvs, volcanic sedimentary facies of the Datil formation; Ts, Baca formation; Kd, Dakota sandstone; Km, Mancos shale; Tsc, Chinle formation.

A series of samples containing high (>20 ppb) and intermediate (5 to 20 ppb) concentrations of uranium was collected in the Largo Creek valley just west of Quemado. Though these wells are probably tapping alluvial valley material, the probable source of the water is the volcanic sedimentary facies of the Datil formation, which crops out on surrounding hills and probably underlies the valley fill.

A small group of three anomalous samples (303028, 303029, 303030) was collected near Highway 60 about four miles east of Quemado. These sample sites are located on alluvial valley fill, but are surrounded and probably underlain by the volcanic sedimentary facies of the Datil formation.

A group of four anomalous samples, including the sample (303072) containing the highest uranium concentration measured during this study (293.18 ppb), was collected in a small area just north of Pie Town. These samples are associated with the volcanic sedimentary facies of the Datil formation. Another sample (303048) containing 33.16 ppb uranium was collected 4 km (2.5 mi) to the north and is associated with the Baca formation.

Several other samples (303063, 303068, 303300, and 303301) containing over 20 ppb uranium were collected from the north-central part of the study area surrounding Adams Diggings. All of these wells penetrate or are down gradient from exposures of the volcanic sedimentary facies of the Datil formation. Most of the samples containing over five ppb uranium were also collected from this area.

The only two anomalous samples not associated with either the Datil or Baca formations were collected from the northwest corner of the area; one sample (303186) is associated with the Triassic Chinle formation and Cretaceous Dakota sandstone and Mancos shale, and the other (303159) was collected from the lower (northern) end of Largo Creek and is downstream from the series of high-uranium samples to the west of Quemado.

V. SUMMARY AND CONCLUSIONS

A total of 300 well water samples was collected from an area of approximately 4250 km² (1640 mi²) centered around Pie Town, New Mexico. All samples were analyzed for uranium at the LASL and for twenty-three additional elements at the LLL (Appendix I). The results of standard and control sample analyses by the ICP emission spectrography system at the LLL are reported in Appendix III. These results show good precision and accuracy for this system. The alkalinity of the water samples, expressed as carbonate and bicarbonate ion concentrations, was measured in the field along with the specific conductance, pH, and temperature. All these data are reported in the Appendixes of this report.

Uranium concentrations range from below the detection limit of 0.02 ppb to 293.18 ppb and average 8.71 ppb. High uranium concentrations are generally associated with elevated levels of bicarbonate ion, though high bicarbonate levels are not always accompanied by high uranium concentrations. Uranium concentrations in the samples collected during this survey were compared with the uranium concentrations measured in samples from the same wells collected in 1976 during the HSSR of the Saint Johns NTMS quadrangle. The comparison shows a generally good correlation, though the current samples contain a slightly lower average concentration.

Most samples containing high levels of uranium are associated with exposures of the volcanic sedimentary facies of the Datil formation. This unit seems to be the source of much of the soluble uranium in the Pie Town

area. Several other samples with high uranium levels were collected from wells associated with the Baca formation, a favorable uranium host unit. Areas where samples containing high uranium concentrations were collected include the Largo Creek drainage to the west of Quemado, a small area along Highway 60 about 6 km (4 mi) east of Quemado, the immediate vicinity of Pie Town, and a wide area around Adams Diggings in the northern part of the study area.

ACKNOWLEDGMENTS

The author wishes to express appreciation to the many landowners who cooperated with this study by allowing access to their land. Also, sincere appreciation is expressed to the following members of the Geosciences Division: Alcario Marquez, Helen Dawson, Scott Rosenthal, and Carl Povelites who helped with sample collection and processing; Mary K. Montoya who tediously and patiently typed and edited the elemental listings; Nancy L. Bazzell who typed and edited the report; Allan R. MacKinnon who drafted the figures and plates; and Harry L. Planner, Richard G. Warren, and David E. Broxton who critically reviewed the report.

APPENDIX I

LISTINGS OF FIELD DATA AND ELEMENTAL CONCENTRATIONS FOR WATER SAMPLES FROM THE PIE TOWN AREA, NEW MEXICO (Pages 12 through 23)

Note that two pages, numbered ① and ② in the upper right hand corner, are necessary to provide the complete data listing for each numerically ordered sequence of samples.

- ① - Lists field data and uranium concentrations determined by fluorometry or delayed-neutron counting.
- ② - Lists concentrations of 23 additional elements determined by plasma-source emission spectrography.

(See Appendix III-B for Code to Listings)

Elemental Concentrations for Water Samples

①

DOE SAMPLE NUMBER					IASI SAMPLE LOCATION NUMBER AND FIELD DATA																											U CONCENTRATION	
STATE	LATITUDE	LONGITUDE	DOE IAS SAMPLE TYPE	REMARKS	IAS SAMPLE LOCATION NUMBER	TIME SAMPLED		AIR TEMPERATURE	WATER TEMPERATURE	COMMENTS	SPECIAL MEASUREMENTS	pH	CONDUCTIVITY (umho/cm)	SOLUBLE SOLIDS (mg/l)	ROCK TYPE	POCK COLOR	SEDIMENT TYPE	SEDIMENT COLOR	WATER FLOW	WATER LEVEL	WATER COLOR	STREAM CHANNEL	VEGETATION TYPE	VEGETATION DENSITY	RELIEF	WEATHER	OWNERSHIP	CONTAMINANTS	WELL TYPE	WELL DIAMETER (INCHES)	WELL DEPTH (FEET)	WATER DEPTH (FEET)	WATER SAMPLES ANALYZED BY FLUOROMETRY OR DMC (H) UNITS IN PPB
						DATE	HOUR																										
35-34	3331-108.4908	-2-08	0-303001	05/04/77	15	22-14.9	-5	8.3	463	7-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.81	
35-34	3317-108.4903	-2-08	0-303002	06/04/77	15	22-14.1	-5	9.7	434	6-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.03
35-34	3303-108.4911	-2-08	0-303003	06/04/77	15	24-15.9	-5	9.1	515	11-1-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.56
35-34	3357-108.4897	-2-08	0-303004	06/04/77	16	21-13.5	-5	8.2	500	13-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41
35-34	3364-108.4908	-2-08	0-303005	06/05/77	9	17-11.4	-5	7.8	585	13-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.29
35-34	3347-108.4850	-2-08	0-303006	06/05/77	9	14-13.2	-5	9.1	645	10-1-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.81
35-34	3339-108.4883	-2-08	0-303007	06/05/77	9	14-12.0	-5	9.1	559	15-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.31
35-34	3333-108.4894	-2-08	0-303008	06/05/77	8	14-12.5	-5	8.9	671	15-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.51
35-34	3439-108.4981	-2-08	0-303009	06/05/77	9	14-19.2	-5	8.1	45	13-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
35-34	3428-108.4942	-2-08	0-303010	06/05/77	9	14-14.5	-5	8.1	923	10-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01
35-34	3419-108.4711	-2-08	0-303011	06/05/77	10	17-13.9	-5	9.0	440	11-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.15
35-34	3792-108.4592	-2-08	0-303012	06/05/77	11	14-12.5	-5	8.1	250	10-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.87
35-34	3636-108.4486	-2-08	0-303013	06/05/77	11	18-15.6	-5	7.9	243	13-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28
35-34	4003-108.4413	-2-08	0-303014	06/05/77	12	26-15.5	-5	8.7	260	10-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.78
35-34	3369-108.4847	-2-08	0-303015	06/05/77	13	26-15.1	-5	8.3	523	9-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.05
35-34	3367-108.4817	-2-08	0-303016	06/05/77	13	29-13.8	-5	8.5	475	9-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.06
35-34	3336-108.4747	-2-08	0-303017	06/05/77	13	22-23.1	-5	8.9	575	7-1-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.15
35-34	3292-108.4672	-2-08	0-303018	06/05/77	13	22-13.7	-5	9.2	598	7-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.16
35-34	3231-108.4706	-2-08	0-303019	06/05/77	14	25-18.4	-5	9.2	616	7-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.63
35-34	3183-108.4864	-2-08	0-303020	06/05/77	14	25-14.3	-5	9.3	403	10-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.77
35-34	3247-108.4536	-2-08	0-303021	06/05/77	14	15-3.0	-5	9.2	435	10-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.73
35-34	3242-108.4531	-2-08	0-303022	06/05/77	15	24-14.8	-5	8.1	550	10-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.96
35-34	3175-108.4503	-2-08	0-303023	06/05/77	17	25-13.3	-5	9.3	599	11-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.29
35-34	3156-108.4442	-2-08	0-303024	06/05/77	17	15-15.1	-5	9.4	522	10-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.57
35-34	3317-108.4750	-2-08	0-303025	06/05/77	18	15-14.6	-5	8.5	938	13-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.79
35-34	3069-108.4272	-2-08	0-303026	06/05/77	15	22-15.7	-5	9.3	522	10-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.35
35-34	3067-108.4253	-2-08	0-303027	06/05/77	19	12-13.7	-5	9.5	500	10-1-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.40
35-34	3125-108.4269	-2-08	0-303028	06/06/77	9	18-13.6	-5	7.4	1752	7-1-5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	87.94*
35-34	3128-108.4225	-2-08	0-303029	06/06/77	8	16-11.4	-5	7.9	878	5-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	69.92*
35-34	3144-108.4222	-2-08	0-303030	06/06/77	8	24-11.9	-5	7.6	1143	9-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	80.62*
35-34	3233-108.3742	-2-08	0-303031	06/06/77	9	17-15.0	-5	8.0	257	11-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.81
35-34	3206-108.3753	-2-08	0-303032	06/06/77	9	18-12.1	-5	7.3	296	18-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.33
35-34	3292-108.3747	-2-08	0-303033	06/06/77	10	20-14.4	-5	8.1	246	5-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.88
35-34	3300-108.3747	-2-08	0-303034	06/06/77	10	25-14.0	-5	8.0	222	7-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.15
35-34	3356-108.3697	-2-08	0-303035	06/06/77	10	26-14.0	-5	7.7	565	5-1-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.14
35-34	34653-108.3033	-2-08	0-303036	06/06/77	12	22-17.8	-5	8.2	578	7-3-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.71
35-34	34625-108.3050	-2-08	0-303037	06/06/77	12	22-15.0	-5	8.6	593	7-3-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.30
35-34	4694-108.2847	-2-08	0-303038	06/06/77	12	22-13.2	-5	8.6	546	18-3-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.29
35-34	4222-108.2239	-2-08	0-303039	06/06/77	13	25-34.4	-5	8.7	530	9-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.55
35-34	4100-108.2181	-2-08	0-303040	06/06/77	14	26-29.9	-5	8.8	607	11-1-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.66
35-34	3789-108.2203	-2-08	0-303041	06/06/77	14	26-18.4	-5	9.0	456	13-3-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.02
35-34	4481-108.1631	-2-08	0-303042	06/06/77	15	27-15.0	-5	8.7	464	3-3-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.67
35-34	4053-108.1592	-2-08	0-303043	06/06/77	15	28-17.5	-5	8.5	550	7-3-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.67
35-34	3653-108.2019	-2-08	0-303044	06/06/77	19	26-15.0	-5	7.8	209	10-3-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.16
35-34	3769-108.2433	-2-08	0-303045	06/06/77	20	22-19.9	-5	7.1	293	14-3-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.28
35-34	3756-108.2456	-2-08	0-303046	06/06/77	20	22-15.2	-5	7.5	240	13-3-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.41
35-34	3503-108.1478	-2-08	0-303047	06/07/77	7	19-14.0	-5	8.2	598	10-3-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11.20
35-34	3344-108.1533	-2-08	0-303048	06/07/77	9	23-13.5	-5	7.8	522	6-3-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33.16*
35-34	3642-108.1961	-2-08	0-303049	06/07/77	9	20-11.5	-5	7.9	202	13-3-6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.71
35-34	3539-108.1661	-2-08	0-303050	06/07/77	10	28-17.2	-5	7.9	560	11-3-7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.85
35-34	3331-10																																

APPENDIX I (continued). Elemental Concentrations for Water Samples

ELEMENTAL CONCENTRATIONS DETERMINED BY PLASMA-SOURCE EMISSION SPECTROGRAPHY

Concentrations reported in weight parts per billion (ppb)

LAS SAMPLE LOCATION NUMBER	Al	As	B	Ca	Cd	Co	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	Se	Si	Sr	Ti	V	Zn
303001	-16	56	948	1492	-4	-5	-2	18	455	10	203	-1	-6	147400	-20	-194	-33	-47	6557	-20	-2	123	29
303002	-16	47	1020	1520	-4	-5	16	28	344	10	229	-1	-12	162000	-20	-194	-33	-47	7158	-20	-2	119	9
303003	-16	83	1020	1437	-4	-5	4	13	686	10	177	-1	-6	166900	-20	-194	-33	-47	7402	-20	-2	113	32
303004	67	-13	1191	9918	-4	-5	4	271	1355	11	2982	34	-6	176700	-20	205	-33	-47	15680	120	4	-5	23
303005	-16	-13	1242	18350	-4	-5	4	148	1243	12	8749	179	-6	207900	-20	426	-33	-47	17000	244	-2	-5	23
303006	-16	-13	1171	3522	-4	-5	-2	77	895	12	577	5	21	212800	-20	-194	-33	-47	5284	55	-2	-5	7
303007	-16	-13	1040	2396	-4	-5	-2	80	548	17	346	3	7	193800	-20	-194	-33	-47	4521	40	-2	23	24
303008	50	-13	1162	2812	-4	-5	-2	97	770	22	411	7	22	239100	-20	-194	-33	-47	4760	35	-2	11	29
303009	160	-13	1060	44590	-4	-5	-2	716	2958	41	18390	208	30	372000	-20	501	-33	-47	25100	789	14	-5	120
303010	72	-13	1560	68080	-4	-5	23	944	3658	39	27540	420	48	520500	24	786	-33	-47	36190	1115	4	-5	252
303011	-16	-13	371	15360	-4	-5	5	16	609	22	4414	2	-6	150600	-20	-194	-33	-47	8721	206	-2	27	75
303012	-16	-13	24	15330	-4	-5	4	7	1401	11	7998	8	22	16040	-20	-194	-33	-47	12440	532	-2	11	281
303013	-16	-13	20	37370	-4	-5	14	85	1740	8	8587	12	12	24300	-20	-194	-33	-47	11300	493	-2	7	116
303014	-16	-13	65	16140	-4	-5	4	105	2238	12	3689	-1	-6	75020	-20	-194	-33	-47	11410	444	3	16	121
303015	23	-13	1213	21420	-4	-5	13	290	1796	16	6022	44	15	207400	-20	427	-33	-47	20520	276	-2	-5	137
303016	24	-13	1631	20190	-4	-5	5	286	1947	17	5675	39	13	264400	-20	544	-33	-47	23340	245	6	-5	179
303017	-16	62	1305	3812	-4	-5	4	81	862	13	743	-1	-6	190100	-20	-194	-33	-47	8541	67	-2	94	202
303018	47	49	1173	2416	-4	-5	30	293	568	13	305	9	10	213500	-20	-194	-33	-47	7756	26	-2	48	188
303019	8851	62	1264	8135	-4	-5	70	13880	2485	18	2959	182	-6	183500	-20	-194	-33	-47	7456	-20	104	233	9126
303020	126	90	1346	1825	-4	-5	15	123	596	9	202	8	-6	164300	-20	-194	-33	-47	6605	-20	-2	165	16
303021	31	86	817	1545	-4	-5	7	68	541	9	145	-1	-6	159300	-20	-194	-33	-47	6990	-20	-2	211	9
303022	-16	94	832	1451	-4	-5	4	77	655	9	114	-1	-6	158300	-20	-194	-33	-47	7031	-20	-2	263	13
303023	-16	89	732	1488	-4	-5	5	46	551	9	102	-1	-6	156300	-20	-194	-33	-47	7218	-20	-2	208	11
303024	-16	101	889	1648	-4	-5	5	72	573	9	149	-1	-6	167400	-20	-194	-33	-47	7799	-20	-2	290	7
303025	-16	71	2243	22400	-4	-5	73	35	1145	14	5193	2	16	327700	-20	-194	-33	-47	12770	492	-2	31	80
303026	-16	102	786	1678	-4	-5	5	10	469	8	119	-1	-6	145700	-20	-194	-33	-47	6762	-20	-2	165	16
303027	-16	66	889	1535	-4	-5	-2	65	533	9	117	4	-6	164300	-20	-194	-33	-47	6605	-20	-2	73	12
303028	113	47	2998	98180	-4	-5	20	73	1843	22	13610	39	69	683200	-20	-194	-33	-47	21670	1653	9	57	2534
303029	-16	-13	669	51570	-4	-5	-2	116	1266	21	15810	63	28	260500	-20	-194	-33	-47	14760	405	-2	48	111
303030	-16	53	669	51570	-4	-5	6	109	1704	37	38430	72	39	334900	-20	327	-33	-47	17060	703	-2	80	77
303031	-16	-13	59	21270	-4	-5	9	6	1496	8	4956	-1	14	49810	-20	-194	-33	-47	10570	244	-2	25	132
303032	-16	-13	49	32850	-4	-5	13	23	1761	11	12230	-1	19	44280	-20	-194	-33	-47	12460	467	-2	21	32
303033	-16	-13	54	25920	-4	-5	7	5	1861	8	4956	-1	11	49810	-20	-194	-33	-47	10570	265	-2	29	263
303034	-16	44	33	37310	-4	-5	9	-2	1733	9	6666	-1	19	20400	-20	-194	-33	-47	10050	355	-2	22	73
303035	-16	-13	61	88770	-4	-5	48	88	1578	14	22700	20	38	21830	-20	202	-33	-47	11510	783	-2	9	442
303036	-16	-13	175	49770	-4	-5	6	13	1660	20	284	-1	10	174200	-20	-194	-33	-47	11720	50	-2	-5	47
303037	-16	-13	1113	3558	-4	-5	55	865	663	7	286	18	-6	178300	-20	-194	-33	-47	4867	41	-2	-5	321
303038	-16	-13	750	2567	-4	-5	-4	150	1097	21	137	2	14	210100	-20	-194	-33	-47	9159	40	-2	-5	43
303039	-16	-13	770	5379	-4	-5	3	543	665	4	582	2	-6	105600	-20	-194	-33	-47	8081	76	-2	26	93
303040	159	73	1183	3520	-4	-5	-2	85	686	12	402	3	-6	165000	-20	-194	-33	-47	7652	29	4	78	23
303041	22	115	309	2359	-4	-5	7	968	1585	19	213	3	-6	125000	-20	-194	-33	-47	8583	-20	3	174	26
303042	-16	-13	263	2104	-4	-5	5	149	822	27	171	5	-6	147600	-20	-194	-33	-47	5527	21	3	24	134
303043	-16	-13	782	2316	-4	-5	-2	619	1852	4	2333	14	-6	163300	-20	-194	-33	-47	8374	311	3	-5	797
303044	-16	-13	20	21260	-4	-5	5	149	1852	4	2333	14	-6	163300	-20	-194	-33	-47	8374	311	3	-5	797
303045	-16	-13	29	41940	-4	-5	13	-2	1624	7	6075	2	19	19740	-20	-194	-33	-47	10470	451	-2	12	1575
303046	130	-13	17	42710	-4	-5	27	529	1560	12	6443	2	19	17570	-20	-194	-33	-47	12080	471	5	17	190
303047	-16	-13	149	7902	-4	-5	-2	99	1104	40	1072	2	-6	182900	-20	-194	-33	-47	4982	115	-2	7	31
303048	-16	-13	291	7636	-4	-5	10	84	1013	35	1366	22	-6	159200	-20	-194	-33	-47	4271	111	-2	-5	84
303049	-16	-13	21	9775	-4	-5	6	127	1482	4	1192	-1	8	54990	-20	-194	-33	-47	7411	168	-2	10	149
303050	-16	-13	45	36470	-4	-5	4	4	1296	7	1815	-1	14	117900	-20	-194	-33	-47	10160	125	-2	16	233
303051	-16	169	1131	2087	-4	-5	5	79	668	9	204	2	-6	147400	-20	-194	-33	-47	6793	-20	-2	112	17

APPENDIX I
(continued). Elemental Concentrations for Water Samples

[illegible]

APPENDIX I (continued). Elemental Concentrations for Water Samples

ELEMENTAL CONCENTRATIONS DETERMINED BY PLASMA-SOURCE EMISSION SPECTROGRAPHY

Concentrations reported in weight parts per billion (ppb)

LAB SAMPLE LOCATION NUMBER	Al	As	B	Ca	Cd	Co	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	Se	Si	Sr	Ti	V	Zn	
303052	-16	66	1010	1673	-4	-5	7	37	813	21	187	-1	-6	184000	-20	-194	-33	-47	4878	-20	-2	44	26	
303053	-16	43	407	3666	-4	-5	8	75	1296	37	512	-1	-6	167700	-20	-194	-33	-47	5924	73	-2	-5	37	
303054	-16	44	317	23310	-4	-5	14	61	1651	36	6267	-1	15	141300	-20	-194	-33	-47	9117	532	-2	-5	163	
303055	-16	43	268	8899	-4	-5	13	28	1545	47	1382	-1	7	153800	-20	-194	-33	-47	6397	087	3	-5	120	
303056	-16	44	124	51150	-4	-5	-2	4598	1652	41	15180	34	27	86300	-20	-194	-33	-47	5943	087	3	-5	338	
303057	-16	43	696	14820	-4	-5	19	66	1277	59	2251	3	19	326000	-20	-194	-33	-47	4924	332	3	-5	50	
303058	-16	43	347	3860	-4	-5	11	270	1277	59	628	4	17	268500	-20	-194	-33	-47	4470	102	-2	11	45	
303059	-16	43	181	53880	-4	-5	4	68	1911	31	14760	8	27	326000	-20	-194	-33	-47	4409	2208	3	-5	22	
303060	-16	43	202	2246	-4	-5	10	61	902	46	247	-1	-6	142500	-20	-194	-33	-47	4339	46	-2	18	40	
303061	-16	43	225	95370	-4	-5	6	418	3845	39	28060	162	38	201200	-20	-194	-33	-47	6883	3006	-2	-5	127	
303062	-16	43	229	10450	-4	-5	4	53	1450	20	2211	16	10	136600	-20	-194	-33	-47	7270	265	-2	-5	111	
303063	-16	43	158	37190	-4	-5	6	23	2374	65	9307	17	15	134500	-20	-194	-33	-47	8797	927	-2	-5	586	
303064	71	43	680	2987	-4	-5	5	71	897	27	401	-1	-6	138600	-20	-194	-33	-47	5009	34	-2	15	53	
303065	-16	43	77	50970	-4	-5	40	26	1355	12	11410	-1	21	88390	-20	-194	-33	-47	12420	586	-2	17	65	
303066	54	43	888	13890	-4	-5	6	83	448	9	4956	-1	11	134500	-20	-194	-33	-47	7901	231	-2	88	88	
303067	30	43	351	2779	-4	-5	15	52	1494	31	350	-1	-6	186600	-20	-194	-33	-47	5179	41	-2	9	37	
303068	-16	43	1637	7572	-4	-5	-2	47	-330	3	844	6	10	115800	-20	-194	-33	-47	2723	95	-2	-5	394	
303069	-16	43	624	4746	-4	-5	5	107	1537	22	8670	11	18	76980	-20	-194	-33	-47	9011	68	-2	31	72	
303070	-16	43	187	43390	-4	-5	3	157	-330	22	229	6	-6	170100	-20	-194	-33	-47	13870	496	-2	6	363	
303071	41	43	202	4463	-4	-5	11	53	1233	61	17630	97	52	580100	-20	-194	-33	-47	3411	35	-2	-5	78	
303072	28	43	144	100100	-4	-5	5	9	1291	19	19740	-1	34	247000	-20	-194	-33	-47	6679	947	-2	-5	365	
303073	-16	43	142	59410	-4	-5	4	13	383	21	675	-1	8	122000	-20	-194	-33	-47	5844	40	-2	17	22	
303074	-16	43	98	4878	-4	-5	26	69	875	17	6250	-1	17	171200	-20	-194	-33	-47	11910	360	-2	14	48	
303075	-16	43	129	29700	-4	-5	-2	1703	2467	115	6455	83	119	628300	-20	-194	-33	-47	2668	827	-2	-5	554	
303076	21	43	54	37620	-4	-5	5	15	46	1749	9	121	432600	-20	-194	-33	-47	3268	340	-2	-5	501		
303077	38	43	36	12090	-4	-5	15	46	1749	9	121	432600	-20	-194	-33	-47	143	9683	655	-2	16	249		
303078	28	43	-12	56910	-4	-5	5	20	1780	15	4830	4	23	19370	-20	-194	-33	-47	7788	283	-2	10	14	
303079	145	43	16	27690	-4	-5	-2	319	1022	7	8534	9	13	17990	-20	-194	-33	-47	8255	154	-2	104	35	
303080	-16	43	607	10000	-4	-5	-2	156	776	21	3653	52	12	213500	-20	-194	-33	-47	4625	35	-2	13	117	
303081	35	43	315	3306	-4	-5	-2	176	-330	5	593	4	-6	88340	-20	-194	-33	-47	16900	439	-2	12	146	
303082	25	43	24	51240	-4	-5	7	50	1615	7	10930	12	22	24400	-20	-194	-33	-47	9707	1771	-2	-5	411	
303083	26	43	116	72000	-4	-5	7	17	1902	14	12590	9	25	117900	-20	-194	-33	-47	15760	974	-2	19	143	
303084	41	43	190	56920	-4	-5	9	56	2004	14	10620	14	22	63940	-20	-194	-33	-47	10090	556	-2	-5	122	
303085	21	42	30	39950	-4	-5	5	7	563	3379	14	7703	71	19	24290	-20	-194	-33	-47	17630	423	-2	23	47
303086	-16	43	171	7772	-4	-5	8	26	952	43	652	-1	-6	146600	-20	-194	-33	-47	6015	157	-2	-5	122	
303087	22	43	50	33620	-4	-5	8	23	2218	18	18870	-1	15	47870	-20	-194	-33	-47	16590	732	-2	16	178	
303088	16	43	73	53230	-4	-5	14	40	3194	26	31930	3	22	77690	-20	-194	-33	-47	19190	194	-2	21	22	
303089	-16	43	44	36420	-4	-5	4	45	3502	19	19180	-1	21	204000	-20	-194	-33	-47	17630	493	-2	43	161	
303090	25	43	326	19090	-4	-5	28	14	714	25	15140	-1	21	204000	-20	-194	-33	-47	16750	381	-2	41	98	
303091	-16	43	277	17330	-4	-5	5	6	642	25	11800	-1	16	197600	-20	-194	-33	-47	13360	241	-2	-5	9	
303092	17	43	493	16410	-4	-5	-2	128	460	26	12620	32	42	317600	-20	-194	-33	-47	8559	1072	-2	21	150	
303093	35	43	1555	47720	-4	-5	-2	10	268	1384	90	14490	203	42	630100	-20	-194	-33	-47	23120	558	-2	-5	21
303094	68	43	278	41700	-4	-5	5	10	2850	27	18830	349	28	203700	-20	-194	-33	-47	9556	676	-2	-5	25	
303095	20	43	450	28450	-4	-5	-2	2400	917	29	11070	228	21	138600	-20	-194	-33	-47	15100	337	-2	50	22	
303096	18	43	358	15800	-4	-5	5	27	689	30	10550	-1	12	297400	-20	-194	-33	-47	22810	514	-2	-5	19	
303097	46	43	243	43000	-4	-5	-2	573	3127	31	18620	336	21	193400	-20	-194	-33	-47	17420	475	-2	-5	123	
303098	26	43	415	26350	-4	-5	26	70	1652	20	12760	59	16	244900	-20	-194	-33	-47	7695	1239	-2	7	142	
303099	22	43	283	51540	-4	-5	18	43	1506	66	17800	4	23	225000	-20	-194	-33	-47	15560	709	-2	24	196	
303100	-16	43	289	31300	-4	-5	36	14	353	30	10034	8	17	253400	-20	-194	-33	-47	15040	859	-2	35	931	
303101	17	43	411	26150	-4	-5	14	26	-330	32	23660	4	21	256500	-20	-194	-33	-47	9064	412	-2	17	450	
303102	19	43	442	4005	-4	-5	11	122	653	17	289	2	9	276500	-20	-194	-33	-47	9064	412	-2	17	450	

APPENDIX I
(continued). Elemental Concentrations for Water Samples

[illegible]

APPENDIX I (continued). Elemental Concentrations for Water Samples

ELEMENTAL CONCENTRATIONS DETERMINED BY PLASMA-SOURCE EMISSION SPECTROGRAPHY

Concentrations reported in weight parts per billion (ppb)

LAB SAMPLE LOCATION NUMBER	Al	As	B	Ca	Cd	Co	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	Se	Si	Sr	Ti	V	Zn	
303103	24	-43	173	42520	-4	-5	10	35	1160	17	30330	378	29	139100	-20	339	-33	69	18910	517	-2	-5	313	
303104	36	-43	115	56890	-4	-5	6	627	1649	16	34490	437	31	90030	-20	390	-33	51	20550	479	-2	-5	29	
303105	27	-43	302	60660	-4	-5	129	24	-330	39	20460	7	26	210700	-20	-194	-33	51	17060	1082	-2	26	701	
303106	23	-43	770	3375	-4	-5	8	176	451	5	122	-1	-6	222800	-20	-194	-33	56	11610	40	-2	113	39	
303107	21	-43	223	44250	-4	-5	9	1436	1720	17	25030	372	25	156300	-20	530	-33	-47	20140	391	-2	-5	194	
303108	42	-43	1133	3242	-4	-5	-2	89	1016	35	904	16	11	285300	-20	-194	-33	-47	5086	93	-2	-5	55	
303109	21	-43	403	1943	-4	-5	3	33	1008	25	431	2	-6	189200	-20	-194	-33	-47	5394	46	-2	-5	285	
303110	17	-43	923	2590	-4	-5	11	78	890	28	381	2	-6	230500	-20	-194	-33	-47	6032	58	-2	-5	74	
303111	47	-43	777	1985	-4	-5	5	56	887	27	305	2	-6	210900	-20	-194	-33	-47	5066	46	-2	-5	24	
303112	-16	-43	217	7263	-4	-5	48	1061	1756	26	986	16	-6	166500	-20	-194	-33	-47	5928	199	-2	17	1515	
303113	-16	-43	83	2152	-4	-5	3	87	663	28	249	-1	-6	135400	-20	-194	-33	-47	5014	44	-2	-5	45	
303114	29	-43	385	2758	-4	-5	6	283	819	18	199	-1	-6	250100	-20	-194	-33	-47	5148	74	-2	-5	58	
303115	-16	-43	463	7508	-4	-5	7	44	1333	22	944	2	-6	203000	-20	-194	-33	-47	5464	265	-2	-5	131	
303116	31	-43	39	24520	-4	-5	12	43	3147	21	12220	-1	14	38400	-20	-194	-33	-47	12230	727	-2	-5	121	
303117	35	-43	1205	3947	-4	-5	4	190	1724	34	773	27	12	240000	-20	-194	-33	-47	2774	77	-2	-5	145	
303118	102	101	673	1516	-4	-5	3	194	-330	7	125	2	-6	154000	-20	-194	-33	-47	7871	-20	-2	198	523	
303119	79	-43	281	51680	-4	-5	5	5	1513	25	20580	-1	21	116000	-20	-194	-33	-47	18840	567	-2	61	49	
303120	73	-05	2337	4100	-4	-5	13	186	538	11	231	5	11	281000	-20	-194	-33	-47	10320	-20	-2	-5	72	
303121	29	-43	764	4386	-4	-5	4	263	417	3	344	6	-6	85300	-20	-194	-33	-47	6979	65	-2	14	62	
303122	41	-43	56	64930	-4	-5	9	9	1067	10	18320	3	29	45800	-20	-194	-33	-47	19500	811	-2	34	107	
303123	29	-43	126	92080	-4	-5	9	17	585	13	32580	-1	24	62300	-20	366	-33	-47	19500	1255	-2	54	52	
303124	25	-43	36	31710	-4	-5	-2	253	1352	8	10930	2	16	19900	-20	-194	-33	-47	10890	519	-2	37	12	
303125	33	-43	44	15700	-4	-5	10	47	1560	7	4600	2	-6	64500	-20	-194	-33	-47	10890	309	-2	26	55	
303126	51	-43	69	44870	-4	-5	5	56	9	8919	8	21	26500	-20	-194	-33	-47	8545	557	-2	9	73		
303127	45	-43	12	17430	-4	-5	5	72	1192	14	3577	2	13	44680	-20	-194	-33	-47	8728	161	-2	19	142	
303128	32	-43	42	39930	-4	-5	4	114	1203	23	8731	7	21	75380	-20	-194	-33	-47	8284	483	-2	16	94	
303129	28	-43	19	17960	-4	-5	-2	10	1467	5	3216	-1	-6	85060	-20	-194	-33	-47	9134	233	-2	16	94	
303130	-16	-43	12	14890	-4	-5	-2	302	1407	-2	2148	17	12	35730	-20	-194	-33	-47	5463	184	-2	-5	49	
303131	24	-43	30	117300	-4	-5	11	19	2089	17	18240	-1	47	62870	-20	264	-33	-47	13120	1142	-2	9	48	
303132	-16	-43	178	5630	-4	-5	15	21	736	33	1093	-1	14	257600	-20	-194	-33	-47	8768	96	-2	36	40	
303133	32	-43	18	108900	-4	-5	15	5	69	1999	9	16760	9	46	43450	-20	-194	-33	72	9465	1470	-2	8	466
303134	34	-43	92	83630	-4	-5	15	54	1712	10	12180	4	34	27020	-20	-194	-33	57	13480	700	-2	16	150	
303135	-16	-43	121	101200	-4	-5	20	46	1511	17	18320	5	43	52050	-20	-194	-32	-47	15600	1059	-2	18	182	
303136	63	-43	91	95020	-4	-5	24	119	1486	14	15300	5	34	30950	-20	-194	-33	-47	16450	907	-2	30	551	
303137	36	-43	340	60130	-4	-5	9	99	2009	32	18630	6	26	37810	-20	-194	-33	-47	9842	1235	-2	9	457	
303138	27	-43	19	56870	-4	-5	11	55	2571	10	14150	3	26	18650	-20	-194	-33	50	11300	1031	-2	12	315	
303139	-16	-43	327	20400	-4	-5	36	160	733	22	1930	4	32	267500	-20	-194	-33	-47	8450	197	-2	39	85	
303140	-16	-43	30	65550	-4	-5	15	109	2971	9	15090	4	28	42070	-20	-194	-33	-47	11400	1309	-2	21	368	
303141	-16	-43	54	28650	-4	-5	16	99	2066	7	10270	5	14	47350	-20	-194	-33	-47	10400	376	-2	16	154	
303142	-16	-43	60	29010	-4	-5	10	28	1113	5	5483	2	14	42070	-20	-194	-33	-47	7780	-20	-2	11	22	
303143	-16	-43	237	1469	-4	-5	-2	9	351	6	166	-1	-6	175700	-20	-194	-33	-47	9030	-20	-2	47	62	
303144	-16	-43	592	1205	-4	-5	-2	64	-330	5	105	-1	-6	142500	-20	-194	-33	-47	9030	-20	-2	47	62	
303145	-16	-43	363	5702	-4	-5	44	711	1209	40	726	25	-6	268600	-20	-194	-33	-47	4860	112	-2	-5	207	
303146	-16	-43	427	3744	-4	-5	5	602	740	8	469	8	-6	94370	-20	-194	-33	-47	5570	69	-2	8	54	
303147	-16	-43	297	4822	-4	-5	5	11	884	16	1029	-1	-6	105300	-20	-194	-33	-47	6010	112	-2	35	30	
303148	-16	-43	371	34230	-4	-5	30	8	1061	51	8765	8	16	252900	-20	-194	-33	-47	8150	598	-2	15	530	
303149	18	-43	326	3499	-4	-5	8	9	1091	62	602	-1	-6	246000	-20	-194	-33	-47	4980	70	-2	16	18	
303150	-16	-43	269	24580	-4	-5	22	43	1985	21	3333	4	12	110200	-20	-194	-33	-47	11700	483	-2	-5	213	
303151	-16	-43	65	118400	-4	-5	19	142	2432	29	35870	47	54	45170	-20	-194	-33	-47	13200	1998	-2	18	1946	
303152	17	-43	483	199000	-4	-5	13	78	827	-2	150	2	-6	103300	-20	-194	-33	-47	7350	-20	-2	81	29	
303153	179	-43	386	16490	-4	-5	5	471	2881	49	6455	57	21	304100	-20	-194	-33	-47	7010	607	-2	6	42	

DOE SAMPLE NUMBER					LAST SAMPLE LOCATION NUMBER AND FIELD DATA																											U CONCENTRATION			
STATE	LATITUDE	LONGITUDE	DOE LAB	SAMPLE TYPE	REPLICATE	LAST SAMPLE LOCATION NUMBER	TIME SAMPLED		AIR TEMPERATURE	WATER TEMPERATURE	COMMENTS	SPECIAL MEASUREMENTS	pH	CONDUCTIVITY	SCATTERED	TSS	DOCK TYPE	ROCK COLOR	SEDIMENT TYPE	SEDIMENT COLOR	WATER COLOR	WATER TOL.	WATER CO2	SOLUBLE CHLORIDE	VEGETATION TYPE	VEGETATION DENSITY	PEDEST	WIND-HEAT	CLOUDS/FP	CONTAMINANTS	WELL TYPE	WELL DIAMETER (INCHES)	WELL DEPTH (FEET)	WATER GPH (FEET)	WATER SAMPLES ANALYZED BY FLUOROMETRY OR DVC (PPB)
							DATE	HOUR																											
35-34.4728-108.7075-2-08	0-303154-04/13/79-15	24-22.7	-5	8.7	979	10-1-2	-	-	-1	-4-2-2-1	-1-1	8-140	-	0.53																					
35-34.4575-108.6703-2-09	0-303155-06/19/79-15	26-15.7	-5	7.2	604	6-1-1	-	-	-1	-3-3-1-1	-1-	6-90	-	16.82																					
35-34.4617-108.6478-2-09	0-303156-06/19/79-17	24-13.5	-5	7.1	372	11-1-2	-	-	-1	-4-2-2-1	-1-	6-	-	8.04																					
35-34.4272-108.7092-2-08	0-303157-06/19/79-17	24-15.6	-5	7.8	675	14-1-2	-	-	-1	-4-2-1-1	-1-3	8-	-	0.45																					
35-34.4425-108.7256-2-08	0-303158-06/19/79-17	25-15.7	-5	7.9	202	15-1-2	-	-	-1	-4-3-1-1	-1-1	-	-	1.05																					
35-34.4192-108.6156-2-09	0-303159-05/20/79-9	11-15.1	-5	7.7	312	14-1-6	-	-	-2	-4-3-2-1	-1-2	6-90	-	35.17*																					
35-34.4047-108.5953-2-08	0-303160-06/20/79-9	19-14.3	-5	7.1	942	13-1-1	-	-	-1	-3-3-1-1	-1-	6-120	-	5.14																					
35-34.3914-108.6592-2-09	0-303161-06/20/79-10	22-15.5	-5	7.0	633	9-1-1	-	-	-1	-4-3-2-1	-1-1	6-	-	1.53																					
35-34.4278-108.6392-2-08	0-303162-06/20/79-10	25-14.5	-5	7.1	211	18-1-6	-	-	-1	-4-3-1-1	-1-1	6-	-	17.87																					
35-34.4981-108.7797-2-08	0-303163-06/20/79-12	27-16.1	-5	7.5	63	15-1-1	-	-	-1	-3-2-1-1	-1-9	6-	-	2.41																					
35-34.4144-108.7667-2-08	0-303164-06/20/79-12	24-15.5	-5	7.8	951	10-1-1	-	-	-1	-4-4-2-1	-1-3	3-	-	0.29																					
35-34.3936-108.7928-2-08	0-303165-06/20/79-13	32-18.1	-5	8.1	712	6-1-2	-	-	-1	-4-3-2-1	-1-3	-	-	0.24																					
35-34.3742-108.7889-2-09	0-303166-06/20/79-14	32-27.3	-5	7.8	930	19-1-2	-	-	-1	-4-3-2-1	-1-2	-	-	1.22																					
35-34.3517-108.8500-2-08	0-303167-06/20/79-14	34-20.5	-5	8.2	159	19-1-1	-	-	-1	-3-3-1-1	-1-2	-	-	1.31																					
35-34.4011-108.7328-2-08	0-303168-06/20/79-15	34-19.8	-5	8.4	871	6-1-1	-	-	-1	-3-2-1-1	-1-9	-345	-	0.97																					
35-34.2786-108.8128-2-08	0-303169-06/20/79-15	32-17.0	-5	8.1	442	10-1-1	-	-	-1	-4-2-2-1	-1-1	6-	-	0.39																					
35-34.2942-108.7989-2-08	0-303170-06/20/79-15	35-13.6	-5	8.1	820	9-1-5	-	-	-1	-4-3-1-1	-1-1	6-	-	0.38																					
35-34.2619-108.8094-2-08	0-303171-06/20/79-16	33-25.5	-5	7.8	511	10-1-6	-	-	-1	-4-3-1-1	-1-1	6-	-	1.53																					
35-34.2892-108.5119-2-08	0-303172-06/20/79-15	28-15.7	-5	7.8	1012	10-1-1	-	-	-1	-4-3-2-1	-1-3	-125-100	-	9.34																					
35-34.2569-108.7714-2-08	0-303173-06/21/79-8	15-12.9	-5	7.5	430	17-3-6	-	-	-1	-4-3-2-1	-1-3	6-	-	3.43																					
35-34.2178-108.7828-2-08	0-303174-06/21/79-9	26-19.1	-5	8.5	442	14-1-7	-	-	-1	-4-3-1-1	-1-1	-	-	1.57																					
35-34.2181-108.8722-2-08	0-303175-06/21/79-11	27-16.3	-5	8.0	439	10-1-2	-	-	-1	-4-3-1-1	-1-3	-250-	-	0.22																					
35-34.2467-108.9792-2-08	0-303176-06/21/79-11	29-17.7	-5	7.7	730	13-1-2	-	-	-1	-4-3-2-1	-1-1	-	-	4.30																					
35-34.3186-108.9328-2-09	0-303177-06/21/79-13	32-25.8	-5	8.3	592	18-1-2	-	-	-1	-4-2-4-2	-1-3	-	-	0.49																					
35-34.2403-108.9722-2-08	0-303178-06/21/79-14	31-24.1	-5	7.8	515	10-2-1	-	-	-1	-4-2-2-2	-1-1	6-	-	0.87																					
35-34.2253-108.9447-2-08	0-303179-06/21/79-15	31-17.3	-5	7.9	354	11-3-7	-	-	-2	-2-3-2-2	-1-9	6-	-	2.05																					
35-34.2025-108.9325-2-08	0-303180-06/21/79-15	30-15.6	-5	7.5	392	11-1-7	-	-	-1	-1-3-2-2	-1-3	6-	-	4.34																					
35-34.1300-108.9606-2-08	0-303181-06/21/79-17	33-15.1	-5	7.5	443	15-1-7	-	-	-1	-3-4-3-2	-1-1	6-	-	0.74																					
35-34.1514-108.9650-2-08	0-303182-06/21/79-17	33-14.8	-5	6.5	720	21-1-6	-	-	-1	-3-3-2-2	-1-3	-	-	3.97																					
35-34.1892-108.9797-2-08	0-303183-06/21/79-17	33-19.6	-5	7.7	375	14-1-6	-	-	-2	-4-3-1-2	-1-1	6-	-	0.47																					
35-34.3892-108.5922-2-08	0-303184-06/22/79-8	17-17.7	-5	8.5	508	18-1-2	-	-	-1	-4-3-3-1	-1-3	-250-	-	0.56																					
35-34.4922-108.9708-2-08	0-303185-06/22/79-9	25-15.6	-5	7.1	833	11-1-1	-	-	-1	-4-3-1-1	-1-1	8-	-	9.49																					
35-34.4131-108.9761-2-08	0-303186-06/22/79-11	33-24.5	-5	7.7	840	14-1-2	-	-	-1	-4-4-3-1	-1-3	-45-	-	37.76*																					
35-34.4197-108.8203-2-08	0-303187-06/23/79-13	32-20.4	-5	8.4	394	9-1-2	-	-	-2	-4-3-2-2	-1-1	6-	-	0.34																					
35-34.4339-108.8103-2-08	0-303188-06/22/79-13	32-20.0	-5	7.9	409	11-1-2	-	-	-1	-4-3-2-2	-1-1	6-	-	3.16																					
35-34.4433-108.7969-2-08	0-303189-06/23/79-14	33-20.8	-5	8.0	889	10-1-2	-	-	-2	-4-3-3-2	-1-1	6-	-	0.81																					
35-34.4986-108.8683-2-08	0-303190-05/22/79-15	32-18.0	-5	7.4	645	9-1-1	-	-	-1	-3-2-2-2	-1-1	6-	-	2.79																					
35-34.3633-108.9961-2-08	0-303191-06/22/79-17	32-15.5	-5	8.1	448	7-1-1	-	-	-2	-1-3-3-2	-1-2	6-	-	2.76																					
35-34.3042-108.7769-2-08	0-303192-06/26/79-13	35-15.9	-5	7.9	642	14-1-1	-	-	-2	-4-3-1-2	-1-1	6-	-	12.39																					
35-34.2197-108.7603-2-08	0-303193-06/25/79-14	34-22.8	-5	9.1	429	11-1-2	-	-	-1	-4-3-2-2	-1-1	6-426-	-	0.50																					
35-34.1400-108.8236-2-08	0-303194-06/26/79-14	34-22.7	-5	7.5	126	14-1-1	-	-	-1	-4-3-2-2	-1-1	6-	-	12.21																					
35-34.1436-108.7761-2-08	0-303195-06/26/79-16	35-18.3	-5	8.1	537	11-1-1	-	-	-3	-1-3-2-2	-9-1	6-	-	0.23																					
35-34.1594-108.9233-2-08	0-303196-06/26/79-16	34-20.9	-5	7.8	516	11-1-1	-	-	-1	-3-1-2-2	-1-1	6-	-	3.12																					
35-34.2597-108.9050-2-08	0-303197-06/26/79-16	34-13.0	-5	8.0	479	11-1-1	-	-	-1	-4-3-3-2	-1-1	6-110-	-	3.36																					
35-34.3286-108.9939-2-08	0-303198-06/26/79-17	34-13.5	-5	7.3	404	10-1-1	-	-	-1	-1-3-4-2	-1-1	6-	-	0.25																					
35-34.2372-108.8300-2-08	0-303199-06/26/79-16	34-10.5	-5	8.5	490	9-1-1	-	-	-1	-4-3-3-2	-1-3	6-	-	0.05																					
35-34.3025-108.6939-2-08	0-303200-05/26/79-19	31-23.6	-5	8.9	744	17-1-2	-	-	-1	-1-2-2-2	-1-9	2-430-410-	-	14.79																					
35-34.1450-107.8436-2-08	0-303201-06/12/79-9	15-15.8	-5	7.5	750	13-3-7	-	-	-1	-4-2-2-1	-3-	-220-140-	-	4.28																					
35-34.1447-107.8414-2-08	0-303202-06/12/79-9	20-15.0	-5	7.5	724	11-3-7	-	-	-1	-4-3-2-1	-3-	6-130-100-	-	3.26																					
35-34.1433-107.8319-2-08	0-303203-06/12/79-10	22-13.4	-5	7.5	819	11-3-7	-	-	-1	-4-3-2-1	-1-3	6-72-60-	-	3.34																					
35-34.1428-107.8314-2-08	0-303204-06/12/79-10	22-13.8	-5	7.3	819	11-3-7	-	-	-2	-4-2-2-1	-9-3	6-125-45-	-	2.69																					

APPENDIX I (continued). Elemental Concentrations for Water Samples

ELEMENTAL CONCENTRATIONS DETERMINED BY PLASMA-SOURCE EMISSION SPECTROGRAPHY

Concentrations reported in weight parts per billion (ppb)

NUMBER	Al	As	B	Ca	Cd	Co	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	Se	Si	Sr	Ti	V	Zn	
303154	-16	-43	619	1705	-4	-5	5	76	943	68	274	2	9	278500	-20	-194	-33	-47	7680	47	-2	-5	37	
303155	40	-43	843	56000	-4	-5	12	102	1328	32	56000	5	44	175300	-20	374	-33	-33	56	12400	1105	-2	15	137
303156	23	-43	561	56190	-4	-5	-2	23	2656	22	31390	9	46	398500	-20	226	-33	-47	7180	1325	-2	-5	122	
303157	36	-43	540	10690	-4	-5	-2	64	3425	6	6780	29	60	625100	-20	612	-33	-47	17760	304	-2	-5	8	
303158	-16	-43	638	7040	-4	-5	-2	133	1587	56	1749	13	16	357000	-20	-194	-33	-47	4964	236	-2	-5	28	
303159	18	-43	569	24270	-4	-5	-2	840	1245	18	16980	27	27	380100	-20	-194	-33	-47	7023	570	-2	-5	100	
303160	-16	-43	348	40060	-4	-5	-2	440	3254	17	20160	581	23	233900	-20	-194	-33	-47	7658	1098	-2	-5	156	
303161	26	-43	345	104000	-4	-5	-2	1833	4761	76	31790	523	58	457700	21	-194	-33	-47	6730	3650	3	-5	616	
303162	-16	-43	227	68950	-4	-5	-2	352	1798	4	23770	411	39	273200	-20	-194	-33	-47	5267	943	-2	-5	186	
303163	-16	-43	395	29590	-4	-5	-2	158	7522	17	14550	127	39	304800	-20	-194	-33	-47	15850	606	-2	-5	17	
303164	-16	-43	329	4680	-4	-5	-2	91	1142	34	376	24	17	263700	-20	-194	-33	-47	5348	152	-2	-5	17	
303165	-16	-43	324	2643	-4	-5	-2	93	796	51	397	5	-6	209500	-20	-194	-33	-47	5489	57	-2	-5	40	
303166	-16	-43	347	6449	-4	-5	-2	17	1090	11	1358	40	10	245000	-20	-194	-33	-47	4248	179	-2	-5	96	
303167	-16	-43	437	10330	-4	-5	-2	6	1963	89	3344	-1	8	320000	-20	-194	-33	-47	4964	352	-2	-5	88	
303168	-16	-43	521	2901	-4	-5	15	5	976	39	176	6	16	248100	-20	-194	-33	-47	5418	81	-2	-5	52	
303169	-16	-43	784	10850	-4	-5	5	105	2191	36	3018	6	15	106100	-20	-194	-33	-47	6841	326	-2	-5	169	
303170	-16	-43	345	13210	-4	-5	3	96	1293	35	2311	17	11	195400	-20	-194	-33	-47	5903	325	-2	-5	41	
303171	-16	-43	271	34440	-4	-5	5	3	3287	19	17170	3	23	57430	-20	-194	-33	-47	13720	757	-2	-5	134	
303172	-16	-43	770	28780	-4	-5	6	24	1323	20	7993	2	20	254900	-20	-194	-33	-47	16950	433	-2	-5	269	
303173	-16	-43	137	34820	-4	-5	-2	15	2665	17	21230	3	24	72310	-20	-194	-33	-47	12920	674	-2	-5	252	
303174	-16	-43	326	1746	-4	-5	-2	10	738	11	360	-1	7	119000	-20	-194	-33	-47	7255	44	-2	129	11	
303175	-16	-43	1193	9100	-4	-5	11	34	1818	32	2846	-1	15	111800	-20	-194	-33	-47	6191	234	-2	-5	119	
303176	-16	-43	136	70450	-4	-5	28	33	3735	31	43210	3	36	55400	-20	238	-33	-47	10890	1242	-2	15	461	
303177	32	59	169	208400	-4	-5	3	1071	13370	107	60140	19	76	110830	-20	-194	-33	-47	8074	1575	-2	7	40	
303178	-16	-43	208	19690	-4	-5	-2	144	5071	83	11630	13	18	89860	-20	-194	-33	-47	8960	843	-2	-5	646	
303179	-16	-43	37	40340	-4	-5	8	15	2762	9	18590	17	25	21450	-20	-194	-33	-47	11870	580	-2	12	508	
303180	-16	-43	88	31170	-4	-5	3	13	3509	19	19840	-1	22	49910	-20	-194	-33	-47	12120	716	-2	16	282	
303181	-16	-43	25	50310	-4	-5	3	63	3325	5	21150	13	27	36390	-20	220	-33	-47	19550	607	-2	32	21	
303182	20	-43	38	88930	-4	-5	9	36	2541	16	42510	3	44	117900	-20	249	-33	-47	21690	1518	3	29	787	
303183	24	-43	34	40960	-4	-5	4	367	1798	11	12650	18	24	26730	-20	-194	-33	-47	11100	497	-2	4	117	
303184	-16	-43	348	1479	-4	-5	-2	12	681	15	185	3	7	142300	-20	-194	-33	-47	5274	22	-2	-5	22	
303185	49	90	271	233500	-4	-5	9	8116	9722	269	125400	829	94	621100	28	653	66	126	10590	5359	6	15	34	
303186	35	104	463	129400	-4	-5	6	7	22	7744	156	120300	36	73	541800	26	626	59	148	12520	4259	4	16	850
303187	-16	-43	568	4162	-4	-5	5	303	2031	106	1460	11	13	405800	-20	-194	-33	-47	4052	225	-2	-5	23	
303188	23	-43	515	7468	-4	-5	-2	235	4891	228	2468	7	13	440500	-20	-194	-33	-47	6791	273	-2	-5	951	
303189	20	-43	582	32160	-4	-5	5	78	7658	250	15420	38	28	961900	-20	-194	-33	-47	2780	1824	3	-5	288	
303190	46	80	386	75380	-4	-5	-2	448	7854	104	60950	216	44	519300	-20	432	47	74	9204	1845	4	-5	511	
303191	-16	-43	135	40530	-4	-5	19	34	2601	14	20150	-1	29	52250	-20	-194	-33	-47	11400	899	-2	32	44	
303192	56	79	244	236000	-4	-5	8	2050	15230	33	94200	1344	87	377400	29	471	54	108	5681	3036	7	11	270	
303193	48	-43	320	1648	-4	-5	33	171	495	7	152	3	10	117700	-20	-194	-33	-47	8182	37	-2	38	67	
303194	20	68	135	98170	-4	-5	47	73	2932	35	40790	5	46	125100	-20	283	48	66	16900	2294	4	32	643	
303195	69	-43	172	8875	-4	-5	5	8	1830	16	960	108	10	160400	-20	-194	-33	-47	2489	312	-2	-5	188	
303196	-16	-43	144	22030	-4	-5	8	26	3013	46	5319	14	15	114400	-20	-194	-33	-47	7425	581	-2	-5	994	
303197	27	-43	116	42760	-4	-5	11	51	2608	27	24490	3	25	45140	-20	-194	-33	-47	11300	981	3	21	173	
303198	37	-43	576	39620	-4	-5	-2	1356	15670	273	18240	90	22	470100	-20	-194	-33	-47	5476	1330	5	-5	223	
303199	34	-43	949	2896	-4	-5	5	51	1424	27	524	6	22	147800	-20	-194	-33	-47	5651	94	3	-5	49	
303200	-16	-43	960	6040	-4	-5	9	49	1503	39	906	-1	18	199800	-20	-194	-33	-47	5168	165	3	20	56	
303201	-16	-43	61	97720	-4	-5	18	17	2429	27	23670	2	44	49640	-20	-194	-33	-47	18290	779	4	27	93	
303202	18	70	104	126600	-4	-5	200	23	2921	20	36310	17	53	71790	-20	199	37	47	16170	972	4	13	1959	
303203	25	61	81	122700	-4	-5	5	16	18	2738	20	35660	3	53	72920	-20	280	46	55	15310	846	5	26	155
303204	23	-43	70	104100	-4	-5	-2	4270	3116	26	29820	44	42	63920	-20	-194	-33	-47	15410	550	5	9	110	

APPENDIX I (continued). Elemental Concentrations for Water Samples

①

DOE SAMPLE NUMBER						LAST SAMPLE LOCATION NUMBER AND FIELD DATA																							U CONCENTRATION			
STATE	LATITUDE	LONGITUDE	DOE LAB	SAMPLE TYPE	REPLICATE	LAST SAMPLE LOCATION NUMBER	TIME SAMPLED		AIR TEMPERATURE	WATER TEMPERATURE	COMMENTS	SPECIAL MEASUREMENTS	pH	CONDUCTIVITY	SCT/FLUORIMETER	DOO TYPE	DOO COLOR	SEDIMENT TYPE	SEDIMENT COLOR	WATER COLOR	WATER LEVEL	STEAM CHUTE	VEGETATION TYPE	VEGETATION DENSITY	RELIEF	WEATHER	OWNERSHIP	CONTAMINANTS	WELL TYPE	WELL DEPTH (FEET)	WATER DEPTH (FEET)	WATER SAMPLES ANALYZED BY FLUOROMETRY OR DNC (H) UNITS IN PPB
							DATE	HOUR																								
35-34	1686	-107.8586	-2-08-	0-303205	-06/12/79-10-	23-14.1-C-5-	7.3-	640-	14-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.90	
35-34	1535	-107.8564	-2-08-	0-303206	-06/12/79-11-	24-15.8-C-5-	7.3-	492-	17-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.99
35-34	1542	-107.8478	-2-08-	0-303207	-06/12/79-11-	27-16.7-C-5-	7.5-	739-	6-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.18
35-34	1381	-107.8569	-2-08-	0-303208	-06/12/79-12-	26-15.2-C-5-	7.5-	697-	13-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10.50
35-34	1361	-107.8586	-2-08-	0-303209	-06/12/79-12-	28-15.8-C-5-	7.5-	558-	14-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.05
35-34	1414	-107.8547	-2-08-	0-303210	-06/12/79-14-	28-15.5-C-5-	7.1-	477-	8-3-5-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.69
35-34	1414	-107.8883	-2-08-	0-303211	-06/12/79-14-	29-14.3-C-5-	7.5-	451-	-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.98
35-34	1367	-107.9217	-2-08-	0-303212	-06/12/79-17-	27-17.1-C-5-	6.8-	810-	13-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.66
35-34	1986	-107.8625	-2-08-	0-303213	-06/13/79-4-	28-15.5-C-5-	6.9-	695-	11-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.93
35-34	1706	-107.8628	-2-08-	0-303214	-06/13/79-9-	27-14.8-C-5-	7.7-	849-	8-3-1-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.52
35-34	2075	-107.8556	-2-08-	0-303215	-06/13/79-10-	26-13.9-C-5-	7.7-	592-	11-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.29
35-34	2603	-107.8569	-2-08-	0-303216	-06/13/79-11-	27-15.4-C-5-	7.3-	513-	13-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.39
35-34	2206	-107.8842	-2-08-	0-303217	-06/13/79-11-	26-19.3-C-5-	7.5-	469-	11-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.22
35-34	2085	-107.8992	-2-08-	0-303218	-06/13/79-13-	26-19.5-C-5-	8.7-	363-	11-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.89
35-34	1939	-107.8939	-2-08-	0-303219	-06/13/79-13-	26-15.2-C-5-	7.6-	580-	9-3-1-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.68
35-34	1928	-107.9017	-2-08-	0-303220	-06/13/79-13-	28-15.9-C-5-	8.5-	380-	9-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.52
35-34	1817	-107.9106	-2-08-	0-303221	-06/13/79-14-	29-19.4-C-5-	7.5-	529-	15-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.95
35-34	1892	-107.9042	-2-08-	0-303222	-06/13/79-15-	30-17.7-C-5-	7.6-	453-	13-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.72
35-34	1817	-107.8833	-2-08-	0-303223	-06/13/79-15-	20-17.1-C-5-	7.6-	784-	13-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.13
35-34	1825	-107.8794	-2-08-	0-303224	-06/13/79-14-	28-14.4-C-5-	7.8-	897-	-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.81
35-34	2503	-107.9125	-2-08-	0-303225	-06/13/79-17-	24-19.6-C-5-	7.6-	362-	12-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.57
35-34	2803	-107.9472	-2-08-	0-303226	-06/13/79-17-	25-13.8-C-5-	7.3-	476-	8-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.28
35-34	2475	-107.9386	-2-08-	0-303227	-06/13/79-17-	24-19.4-C-5-	7.6-	630-	11-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.85
35-34	2767	-107.9775	-2-08-	0-303228	-06/13/79-18-	26-14.6-C-5-	7.7-	799-	6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	51.11*
35-34	2731	-107.9756	-2-08-	0-303229	-06/13/79-18-	24-13.5-C-5-	8.1-	711-	5-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.23
35-34	3706	-107.9789	-2-08-	0-303230	-06/14/79-10-	25-16.5-C-5-	7.9-	827-	6-1-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	25.58
35-34	3933	-107.9850	-2-08-	0-303231	-06/14/79-14-	26-17.5-C-5-	9.0-	939-	-1-1-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.33
35-34	4131	-107.9008	-2-08-	0-303232	-06/14/79-12-	27-16.8-C-5-	7.9-	649-	11-1-5-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.84
35-34	3894	-107.9103	-2-08-	0-303233	-06/14/79-13-	26-15.7-C-5-	8.2-	342-	13-1-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.09
35-34	3989	-107.8667	-2-08-	0-303234	-06/14/79-17-	26-15.6-C-5-	7.8-	534-	13-1-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13.11
35-34	4353	-107.8672	-2-08-	0-303235	-06/14/79-18-	-15.1-C-5-	8.9-	1055-	8-1-5-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.18
35-34	4636	-107.8881	-2-08-	0-303236	-06/14/79-18-	22-17.4-C-5-	7.5-	1037-	11-1-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.42
35-34	4283	-107.8822	-2-08-	0-303237	-06/14/79-19-	21-14.2-C-5-	7.6-	763-	12-1-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.60
35-34	1486	-107.8192	-2-08-	0-303238	-06/15/79-4-	22-17.0-C-5-	7.1-	768-	18-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.62
35-34	1383	-107.8283	-2-08-	0-303239	-06/15/79-4-	28-15.2-C-5-	7.5-	599-	12-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.03
35-34	1686	-108.0199	-2-08-	0-303240	-06/15/79-9-	21-15.5-C-5-	9.4-	279-	13-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.61
35-34	2061	-107.9689	-2-08-	0-303241	-06/15/79-10-	25-15.9-C-5-	7.6-	716-	11-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.82
35-34	1686	-108.0178	-2-08-	0-303242	-06/15/79-12-	21-14.2-C-5-	7.6-	930-	14-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.97
35-34	2364	-107.9981	-2-08-	0-303243	-06/15/79-13-	22-14.8-C-5-	7.3-	619-	5-4-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14.18
35-34	2497	-107.9981	-2-08-	0-303244	-06/15/79-13-	24-13.4-C-5-	7.7-	541-	8-3-7-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.25
35-34	2614	-108.0903	-2-08-	0-303245	-06/15/79-16-	21-22.4-C-5-	8.9-	630-	9-1-5-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.12
35-34	2017	-108.0033	-2-08-	0-303246	-06/15/79-16-	21-13.5-C-5-	7.7-	682-	6-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40
35-34	1953	-108.0092	-2-08-	0-303247	-06/15/79-16-	21-13.2-C-5-	7.3-	741-	11-3-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.83
35-34	3861	-108.0092	-2-08-	0-303248	-06/15/79-17-	22-15.7-C-5-	7.5-	682-	12-4-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46.12*
35-34	4658	-108.0528	-2-08-	0-303249	-06/15/79-17-	26-14.7-C-5-	7.5-	431-	9-1-6-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.16
35-34	4656	-108.0522	-2-08-	0-303250	-06/15/79-11-	23-14.2-C-5-	8.5-	686-	14-1-6-	-	-	-	-	-	-	-	-	-	-	-	-	-										

APPENDIX I (continued). Elemental Concentrations for Water Samples

ELEMENTAL CONCENTRATIONS DETERMINED BY PLASMA-SOURCE EMISSION SPECTROGRAPHY

Concentrations reported in weight parts per billion (ppb)

LASL SAMPLE LOCATION NUMBER	ELEMENTAL CONCENTRATIONS DETERMINED BY PLASMA-SOURCE EMISSION SPECTROGRAPHY																							
	Concentrations reported in weight parts per billion (ppb)																							
Al	As	B	Ca	Cd	Co	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	Se	Si	Sr	Ti	V	Zn		
303205	18	61	79	96130	-4	-5	5	345	1893	6	30520	456	42	94410	-20	506	47	-47	16070	751	4	7	110	
303206	18	-43	75	63240	-4	-5	8	14	938	48	10360	4	32	51470	-20	-194	39	-47	18770	548	3	21	535	
303207	-16	70	94	78810	-4	-5	6	28	1320	19	16820	6	38	128300	-20	265	37	-47	19970	738	3	21	414	
303208	56	49	59	102500	-4	-5	38	49	2211	26	25280	23	44	60960	-20	254	55	72	18980	1010	5	20	1017	
303209	19	-43	53	77860	-4	-5	8	12	2052	19	17520	2	35	51360	-20	237	32	-47	19290	741	3	34	280	
303210	44	-43	104	13100	-4	-5	8	27	1011	89	2024	2	12	135900	-20	-194	-33	-47	15560	257	3	8	486	
303211	28	-43	51	78550	-4	-5	12	77	2358	22	18390	5	38	47720	-20	317	35	-47	21050	685	4	27	47	
303212	49	-43	92	108000	-4	-5	31	59	2212	17	28670	5	48	148100	-20	325	34	-47	14730	699	5	35	260	
303213	27	68	59	72520	-4	-5	11	18	1693	8	41240	8	39	78700	-20	374	63	72	23440	883	4	29	2171	
303214	32	59	109	133400	-4	-5	6	13	148	958	7	56200	25	61	115000	-20	732	59	71	22710	1196	5	28	60
303215	23	49	35	104000	-4	-5	13	47	488	3	31470	8	45	38840	-20	395	47	53	24790	868	4	12	58	
303216	28	-43	31	98880	-4	-5	30	36	1506	4	21610	7	43	24620	-20	767	36	-47	22920	748	4	16	2585	
303217	57	-43	44	88590	-4	-5	20	40	1015	20	16090	3	30	37540	-20	446	-33	-47	21900	440	-2	20	288	
303218	29	-43	38	6224	-4	-5	5	22	605	11	654	-1	-6	114500	-20	-194	-33	-47	11300	-20	-2	21	23	
303219	194	-43	66	92220	-4	-5	10	90	1233	5	26130	9	38	67080	-20	901	-33	-47	22500	582	6	173	55	
303220	106	-43	48	6422	-4	-5	6	77	564	58	354	3	-6	126100	-20	-194	-33	-47	11200	28	-2	11	85	
303221	59	-43	34	81710	-4	-5	5	39	1081	14	18860	2	30	49730	-20	412	-33	-47	20180	659	-2	20	1257	
303222	24	-43	37	65970	-4	-5	5	8	1153	25	14550	7	18	56620	-20	-194	-33	-47	19170	454	-2	17	2493	
303223	20	-43	45	127800	-4	-5	11	23	969	9	37510	5	43	52300	-20	589	-33	-47	23210	904	3	28	304	
303224	39	-43	72	122900	-4	-5	16	38	1636	9	43040	2	49	93840	-20	671	-33	-47	21290	901	3	19	33	
303225	-16	-43	31	52870	-4	-5	9	32	1092	-2	12630	3	17	21780	-20	851	-33	-47	18060	223	-2	12	144	
303226	-16	-43	31	83660	-4	-5	3	110	453	-2	18480	18	29	36190	-20	618	-33	-47	15540	421	-2	11	23	
303227	61	-43	39	91720	-4	-5	13	45	419	-2	24130	3	33	45270	-20	605	-33	-47	15840	515	-2	143	107	
303228	32	-43	43	129800	-4	-5	17	37	2457	16	28650	19	58	111900	-20	297	-33	-47	13020	1381	-2	34	717	
303229	29	-43	35	105900	-4	-5	5	11	30	1595	10	23470	14	40	56540	-20	217	-33	-47	12030	876	-2	9	272
303230	73	-43	181	3449	-4	-5	9	124	1153	32	267	3	-6	272200	-20	-194	-33	-47	8462	722	-2	-5	31	
303231	27	-43	43	42450	-4	-5	23	131	864	16	10680	4	24	368000	-20	-194	-33	-47	6680	737	-2	-5	46	
303232	-16	-43	43	26720	-4	-5	4	35	2026	45	4036	8	12	136100	-20	-194	-33	-47	3961	1259	-2	-5	120	
303233	90	-43	115	3449	-4	-5	12	121	719	30	8206	9	8	116800	-20	-194	-33	-47	6496	544	-2	-5	236	
303234	27	-43	43	26720	-4	-5	5	49	3029	15	15550	2	19	285000	-20	-194	-33	-47	4836	93	-2	-5	11	
303235	85	-43	82	47280	-4	-5	6	44	945	16	10720	19	23	108700	-20	-194	-33	-47	4297	1453	-2	-5	36	
303236	36	-43	43	42450	-4	-5	15	31	2119	17	20180	3	28	105500	-20	-194	-33	-47	5642	664	-2	-5	67	
303237	-16	51	79	37660	-4	-5	14	43	2094	22	19370	3	34	6770	-20	-194	-33	-47	19600	475	-2	22	117	
303238	29	-43	83	84570	-4	-5	3	55	-330	3	208	2	-6	98090	-20	-194	-33	-47	13070	-20	-2	-5	14	
303239	22	53	73	77280	-4	-5	14	43	2094	22	19370	3	34	6770	-20	-194	-33	-47	1082	1082	-2	32	587	
303240	26	-43	321	2236	-4	-5	3	55	-330	3	208	2	-6	98090	-20	-194	-33	-47	17410	1082	-2	32	587	
303241	-16	-43	41	106200	-4	-5	26	33	1022	8	33180	8	42	52450	-20	402	-33	-47	14360	644	-2	20	70	
303242	24	-43	86	108200	-4	-5	10	1103	999	8	42510	14	43	113900	-20	268	-33	-47	14360	644	-2	19	204	
303243	27	-43	47	90070	-4	-5	9	114	1423	8	17520	8	37	67290	-20	-194	-33	-47	3686	438	-2	-5	1330	
303244	-16	-43	44	83080	-4	-5	-2	1633	1333	3	20110	57	31	66680	-20	-194	-33	-47	6007	-20	-2	-5	69	
303245	-16	-43	54	2737	-4	-5	17	608	-330	36	200	6	26	176900	-20	-194	-33	-47	6007	-20	-2	-5	69	
303246	38	-43	58	99510	-4	-5	-2	3465	1473	13	25820	462	40	83150	-20	390	-33	-47	15480	331	3	-5	48	
303247	28	-43	70	104200	-4	-5	-2	2882	881	7	32280	370	43	100200	-20	652	-33	-47	13050	520	3	-5	496	
303249	27	-43	117	4258	-4	-5	91	35	912	59	516	11	-6	236800	-20	-194	-33	-47	5133	113	-2	38	4640	
303251	48	58	214	196600	-4	-5	28	108	1957	40	75430	7	77	341400	-20	371	-33	-47	10580	7651	5	6	196	
303252	-16	-43	145	9832	-4	-5	5	105	1187	30	1023	5	-6	219500	-20	-194	-33	-47	6535	465	-2	-5	58	
303253	23	-43	27	8130	-4	-5	10	90	780	-2	18730	-1	28	26720	-20	786	-33	-47	18200	581	-2	26	278	
303254	46	-43	208	9183	-4	-5	18	314	1530	37	825	67	-6	324500	-20	-194	-33	-47	4860	361	-2	-5	4084	
303255	-16	-43	32	88690	-4	-5	13	27	883	3	20280	2	34	24190	-20	560	-33	-47	19530	1016	-2	25	1123	
303256	-16	-43	28	54430	-4	-5	10	45	1192	20	24070	5	21	32900	-20	-194	-33	-47	14660	572	-2	6	378	
303257	31	-43	16	33680	-4	-5	4	21	1053	4	1576	2	8	29830	-20	-194	-33	-47	18530	98	-2	12	433	

[illegible]

APPENDIX I (continued). Elemental Concentrations for Water Samples

ELEMENTAL CONCENTRATIONS DETERMINED BY PLASMA-SOURCE EMISSION SPECTROGRAPHY

Concentrations reported in weight parts per billion (ppb)

	Al	As	B	Ca	Cd	Co	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	Se	Si	Sr	Ti	V	Zn	
303258	53	-43	25	76140	-4	-5	13	53	2196	13	14190	7	28	28500	-20	-194	-33	-47	21610	380	-2	15	179	
303259	41	-43	14	53080	-4	-5	30	90	843	58	13530	9	24	152700	-20	-194	-33	-47	6803	1325	-2	-5	1265	
303260	20	-43	88	62010	-4	-5	21	18	3459	56	10070	69	29	275700	-20	-194	-33	-47	6481	2764	3	-5	301	
303261	22	-43	44	61470	-4	-5	6	40	-330	12	12300	-1	-23	79130	-20	-194	-33	-47	6076	1052	-2	-5	53	
303262	21	-43	163	7846	-4	-5	-2	41	1639	25	1902	17	-6	400800	-20	-194	-33	-47	5828	371	-2	-5	22	
303263	882	-43	141	30750	-4	-5	38	415	3479	21	7283	21	12	276700	-20	-194	-33	-47	6336	982	8	-5	365	
303264	69	-43	136	30850	-4	-5	6	3121	3448	25	6894	4622	23	208100	-28	-194	-33	-47	7049	1819	-2	-5	2153	
303265	107	-43	327	24560	-4	-5	6	85	3345	55	6274	29	10	833300	-20	-194	-33	-47	7727	1439	6	-5	288	
303266	30	-43	105	132500	-4	-5	-2	11130	3818	32	49080	151	45	350600	-20	-194	-33	-47	5179	3699	3	7	455	
303267	47	51	288	122800	-4	-5	4	351	7832	129	52230	66	53	908100	-20	-194	-33	-47	7840	6669	4	7	416	
303268	22	-43	320	13250	-4	-5	13	30	2707	56	6568	12	-6	593500	-20	-194	-33	-47	4809	1001	-2	-5	221	
303269	22	-43	154	14040	-4	-5	6	27	2210	96	1811	24	129	618200	-20	-194	-33	-47	5320	684	-2	-5	840	
303270	-16	-43	57	12950	-4	-5	3	61	2037	82	2324	43	16	532000	-20	-194	-33	-47	4055	606	-2	-5	30	
303271	-16	-43	150	2529	-4	-5	3	57	862	20	104	4	-6	264200	-20	-194	-33	-47	6160	90	-2	-5	136	
303272	28	-43	61	46800	-4	-5	-2	1360	5287	15	18940	130	31	483400	-20	-194	-33	-47	1244	1700	-2	-5	698	
303273	39	-43	61	79360	-4	-5	-2	7746	3425	10	31540	45	26	339100	-20	-194	-33	-47	2084	978	-2	-5	432	
303274	47	-43	150	2171	-4	-5	5	10	169	1643	18	154	4	-6	257800	-20	-194	-33	-47	5828	86	-2	-5	84
303275	27	-43	78	110500	-4	-5	38	77	1215	19	17490	3	40	97650	-20	-194	-33	-47	15760	716	-2	18	113	
303276	43	-43	254	95200	-4	-5	-2	1152	1621	21	21790	240	43	279700	-20	-194	-33	-47	18190	746	3	-5	11	
303277	80	-43	221	85080	-4	-5	21	879	2332	23	28400	685	32	239500	-20	-194	-33	-47	30830	739	4	-5	31	
303278	41	-43	195	93500	-4	-5	5	51	1924	65	24890	593	35	240000	-20	-194	-33	-47	17880	706	-2	-5	289	
303279	21	-43	159	93500	-4	-5	16	23	1067	12	24270	11	33	124100	-20	-194	-33	-47	19420	398	-2	35	545	
303280	36	-13	56	103000	-4	-5	5	38	86	1052	10	27700	92	55	226500	-20	-194	-33	-47	14830	564	3	90	55
303281	19	-43	70	99010	-4	-5	16	15	1819	11	27990	6	33	73580	-20	-194	-33	-47	17570	413	-2	24	1329	
303282	26	-43	143	67640	-4	-5	19	68	798	30	11260	24	20	186100	-20	-194	-33	-47	13460	196	-2	22	328	
303283	28	-59	60	145500	-4	-5	70	71	1160	4	49500	13	57	60330	-20	-194	-33	-47	21590	1078	-2	15	35	
303284	24	45	172	95180	-4	-5	17	34	1567	6	45510	419	41	170700	-20	-194	-33	-47	20870	522	-2	42	74	
303285	-16	-43	76	19960	-4	-5	-2	32	1944	16	7557	2	8	39230	-20	-194	-33	-47	14560	293	-2	35	338	
303286	-16	-43	182	1160	-4	-5	-2	84	-330	7	81	-1	-6	125100	-20	-194	-33	-47	8319	-20	-2	41	40	
303287	25	-43	333	30090	-4	-5	3	21	1852	29	13770	-1	13	100200	-20	-194	-33	-47	9795	660	-2	18	104	
303288	30	-43	542	5831	-4	-5	11	107	557	164	1093	2	8	167500	-20	-194	-33	-47	6455	132	-2	-5	77	
303289	23	-43	160	51320	-4	-5	5	79	2049	19	24010	3	24	86530	-20	-194	-33	-47	19260	687	-2	40	68	
303290	23	-43	217	1567	-4	-5	-2	18	-330	6	74	-1	15	133200	-20	-194	-33	-47	9105	29	-2	53	34	
303291	23	-43	161	19580	-4	-5	9	237	2039	29	4660	12	-6	113300	-20	-194	-33	-47	10570	348	-2	12	245	
303292	45	-43	282	46320	-4	-5	11	72	1223	29	12190	37	25	248000	-20	-194	-33	-47	8043	1112	3	9	933	
303293	110	-43	310	2287	-4	-5	6	373	472	9	233	14	-6	111800	-20	-194	-33	-47	6378	48	3	7	57	
303294	35	-43	339	5381	-4	-5	3	63	-330	15	71	-1	7	141300	-20	-194	-33	-47	7083	104	-2	9	47	
303295	22	-43	117	29390	-4	-5	-2	141	664	6	11770	93	17	151500	-20	-194	-33	-47	16180	437	-2	-5	19	
303296	36	90	322	90690	-4	-5	23	102	645	43	53190	3	48	408600	-20	-194	-33	-47	13690	1316	3	35	129	
303297	23	45	341	1197	-4	-5	14	90	327	5	59	-1	-6	114700	-20	-194	-33	-47	7662	-20	-2	92	53	
303298	39	-43	1787	3522	-4	-5	5	7	90	843	11	265	7	137500	-20	-194	-33	-47	1308	63	-2	-5	82	
303299	-16	-43	122	30870	-4	-5	3	24	1808	47	6209	2	15	226400	-20	-194	-33	-47	5966	1044	-2	-5	57	
303300	25	48	365	2810	-4	-5	5	49	835	14	359	3	-6	262500	-20	-194	-33	-47	6207	65	-2	61	36	
303301	21	-43	969	44720	-4	-5	10	58	1265	10	8920	32	56	401000	-20	-194	-33	-47	13500	676	3	25	398	
303302	-16	47	769	12070	-4	-5	15	14	1346	23	1872	4	20	211900	-20	-194	-33	-47	8866	247	-2	69	53	

APPENDIX II

CARBONATE AND BICARBONATE ION CONCENTRATIONS IN SAMPLES
FROM THE PIE TOWN AREA, NEW MEXICO

APPENDIX 11

Carbonate and Bicarbonate Ion Concentrations in Samples from the Pie Town Area, New Mexico

SAMPLE NUMBER	CARBONATE ION, ppm	BICARBONATE ION, ppm	SAMPLE NUMBER	CARBONATE ION, ppm	BICARBONATE ION, ppm	SAMPLE NUMBER	CARBONATE ION, ppm	BICARBONATE ION, ppm	SAMPLE NUMBER	CARBONATE ION, ppm	BICARBONATE ION, ppm	SAMPLE NUMBER	CARBONATE ION, ppm	BICARBONATE ION, ppm	SAMPLE NUMBER	CARBONATE ION, ppm	BICARBONATE ION, ppm
303001	56	146	303052	48	173	303103	0	390	303154	42	192	303205	0	447	303258	0	125
303002	52	53	303053	12	184	303104	0	280	303155	0	457	303206	0	243	303259	0	195
303003	90	96	303054	0	223	303105	0	380	303156	0	450	303207	0	440	303260	0	144
303004	16	203	303055	0	224	303106	52	198	303157	48	314	303208	0	386	303261	0	190
303005	0	320	303056	0	218	303107	0	420	303158	0	193	303209	0	271	303262	40	247
303006	56	142	303057	2	238	303108	110	185	303159	0	295	303210	0	202	303263	12	141
303007	68	132	303058	22	148	303109	90	60	303160	0	313	303211	0	250	303264	0	196
303008	34	177	303059	0	219	303110	42	168	303161	0	223	303212	0	487	303265	0	412
303009	0	330	303060	42	167	303111	60	170	303162	0	183	303213	0	275	303266	0	311
303010	0	360	303061	0	196	303112	0	230	303163	0	350	303214	0	333	303267	0	211
303011	32	113	303062	0	192	303113	34	171	303164	0	350	303215	0	243	303268	12	510
303012	0	86	303063	0	255	303114	52	233	303165	30	181	303216	0	168	303269	18	137
303013	0	75	303064	24	165	303115	0	235	303166	0	323	303217	0	160	303270	36	41
303014	10	140	303065	0	215	303116	0	140	303167	0	275	303218	24	150	303271	44	146
303015	2	178	303066	56	123	303117	40	230	303168	32	188	303219	0	214	303272	0	183
303016	16	199	303067	60	178	303118	50	85	303169	0	145	303220	16	138	303273	0	198
303017	36	182	303068	32	98	303119	0	270	303170	0	165	303221	0	272	303274	54	119
303018	68	102	303069	20	54	303120	68	82	303171	0	153	303222	0	271	303275	0	211
303019	50	152	303070	0	180	303121	60	15	303172	0	179	303223	0	300	303276	0	335
303020	74	155	303071	80	64	303122	0	185	303173	0	140	303224	0	399	303277	0	263
303021	56	112	303072	0	470	303123	0	345	303174	40	65	303225	0	120	303278	0	313
303022	60	110	303073	0	216	303124	0	130	303175	6	123	303226	0	219	303279	0	268
303023	82	109	303074	0	214	303125	0	110	303176	0	175	303227	0	267	303280	0	365
303024	0	0	303075	20	115	303126	0	95	303177	0	470	303228	0	298	303281	0	255
303025	0	212	303076	0	65	303127	0	72	303178	0	173	303229	0	253	303282	0	238
303026	54	109	303077	8	84	303128	0	200	303179	0	115	303230	0	385	303283	0	235
303027	76	123	303078	0	48	303129	0	70	303180	0	180	303231	74	256	303284	0	310
303028	0	242	303079	0	65	303130	12	43	303181	0	170	303232	0	295	303285	0	94
303029	0	326	303080	20	280	303131	0	235	303182	0	250	303233	16	284	303286	58	81
303030	0	425	303081	52	63	303132	26	239	303183	0	145	303234	0	188	303287	0	200
303031	0	110	303082	0	93	303133	0	67	303184	50	145	303235	84	234	303288	28	62
303032	0	0	303083	0	120	303134	0	100	303185	0	451	303236	0	283	303289	0	199
303033	0	117	303084	0	203	303135	0	165	303186	0	415	303237	0	0	303290	38	64
303034	0	103	303085	0	165	303136	0	120	303187	30	288	303238	0	245	303291	0	130
303035	0	190	303086	0	168	303137	0	195	303188	0	455	303239	0	240	303292	0	188
303036	2	185	303087	0	219	303138	0	155	303189	0	238	303240	68	36	303293	48	42
303037	14	156	303088	0	235	303139	0	255	303190	0	564	303241	0	389	303294	40	0
303038	34	152	303089	0	303140	0	132	303191	0	142	303242	0	162	303295	0	235	
303039	6	92	303090	0	228	303141	0	135	303192	0	152	303243	0	239	303296	0	493
303040	22	129	303091	0	346	303142	0	110	303193	28	37	303244	0	210	303297	72	28
303041	48	93	303092	0	415	303143	84	56	303194	0	123	303245	46	254	303298	48	102
303042	38	133	303093	0	790	303144	90	98	303195	0	143	303246	0	0	303299	0	193
303043	36	139	303094	0	430	303145	44	166	303196	0	171	303247	0	332	303300	38	232
303044	0	80	303095	0	555	303146	46	34	303197	0	132	303248	0	379	303301	0	374
303045	0	78	303096	0	370	303147	50	160	303198	0	313	303251	0	420	303302	0	218
303046	0	78	303097	0	175	303148	0	495	303199	20	130	303252	40	250			
303047	0	198	303098	0	410	303149	24	236	303200	54	122	303253	0	133			
303048	0	206	303099	0	235	303150	0	185	303201	0	382	303254	0	305			
303049	4	71	303100	26	284	303151	0	140	303202	0	377	303255	0	133			
303050	0	148	303101	0	340	303152	50	20	303203	0	412	303256	0	125			
303051	34	143	303102	16	351	303153	0	291	303204	0	417	303257	0	0			

APPENDIX III

STANDARD LASL HSSR PROCEDURES AND CODES

APPENDIX III-A

Summary of Standard LASL HSSR Field and Analytical Procedures

APPENDIX III-A

SUMMARY OF STANDARD LASL HSSR FIELD AND ANALYTICAL PROCEDURES

I. FIELD PROCEDURES

Water Sampling

Water samples are collected first, directly from the source wherever possible, filtered through a 0.45- μ membrane filter directly into two prewashed and sealed, 25-ml polyethylene vials. Water samples in both vials are then acidified to a pH <1 with 8N reagent-grade HNO_3 . All sample containers are doubly labeled with preprinted, adhesive labels carrying the same sample location number as that preprinted on the field data form. Well waters are taken near the wellhead if the well is pumping or from a holding tank if not.

Field Measurements

The air temperature, read in the shade at the time of sampling, is recorded to the nearest whole degree Celsius. For this study, the water temperature, pH, and conductivity were all measured with a single, digital-readout unit, utilizing a parameter selector switch and a composite probe that is placed into the water source. Care was taken to see that these measurements were made after the sample was collected. The water temperature is measured in the source water and recorded to the nearest one-tenth degree Celsius. The pH of the source water is measured and recorded to the nearest one-tenth of a pH unit. The scintillometer readings are measured with a portable scintillometer on a flat, dry spot within a few meters of the sample location. Two readings are recorded, the first with a radiation shield in place (blocking out ground radiation) and the second with the shield removed. The readings (in counts/s) are converted by computer, using measured calibration factors, to the equivalent uranium (eU) value in the data listings.

Field Observations

These represent the best judgment of the field sampler at a location and include general descriptions of the local bedrock, sediment, water, vegetation, terrain, weather, possible contaminants, and well configuration, if applicable. Because these observations are subjective and made quickly in the field, they should be held subordinate to formally documented information such as that provided by published topographic or geologic maps, etc.

Sample Location Verification

As each location is sampled, a unique sample location number, preprinted on transparent adhesive labels (also used for labeling the samples) that are provided with each identically numbered field data form, is placed on top of the precisely marked point representing the sample site on the field map. When a desired sample as specified cannot be obtained, an identical or alternate sample type (as near as possible to the original one) is picked, and the new sample type and/or location is/are marked on the field map and properly labeled as above. The latitude and longitude of each location is computed at the LASL by digitizing the sample locations on each map. A final visual check of sample locations is made by overlaying computer-produced

location plots on the field maps used. The computer program for generating the Universal Transverse Mercator map projection overlays is described by Cheadle (1977).

II. ANALYTICAL PROCEDURES

Uranium Determination in Water Samples by Fluorometry

Under normal procedures, the 25-ml water vial is vigorously shaken and duplicate 0.20-ml aliquots of water are transferred to platinum dishes. The aliquots are evaporated under heat lamps and a 0.4-g pellet of 2% LiF-98% NaF flux is added to each dish. The pellets are first preheated under lamps, then fused over special propane burners. After each pellet/sample cools, it is excited with ultraviolet radiation in the fluorometer and the fluorescence is read and recorded. The uranium concentrations are determined by using a computer routine which compares the fluorescence from each pellet with those from other pellets, run at the same time, containing uranium-standard solutions and blanks. The uranium concentration of the sample, as given in the appropriate data listings, is then the average obtained from the duplicate aliquots. The lower limit of detection for each aliquot by the normal procedure is 0.2 ppb; however, in some areas many samples have uranium concentrations below this. Consequently, when a sample run by the normal procedure is determined to have <0.2 ppb uranium, it is routinely reanalyzed using new duplicate aliquots that have been put through an additional evaporative concentration step that provides a 10X concentration factor. This additional procedure, using the same basic fluorometric method, reduces the lower limit of detection of uranium in natural waters to 0.02 ppb. When a uranium concentration lower than 0.02 ppb is found in an aliquot, it is arbitrarily assigned a value of 0.01 ppb. If the uranium value given in the data listings is 0.01 ppb, both aliquots had uranium concentrations below the detection limit. Whether concentrated or not (which can be determined from the uranium level in the listing), the fluorometric analytical precision is $\approx 30\%$ at the lower detection limit, $\approx 20\%$ at one order of magnitude above this, and $\approx 10\%$ at two or more orders of magnitude above the lower detection limit. The basic fluorometric method used is described in detail by Hues et al (1977).

Uranium Determination in Water Samples by Delayed-Neutron Counting (DNC)

Only waters with >40 ppb uranium (as determined by fluorometry at the LASL, where this is the upper limit of detection without recalibration) or those with impurities that cause interference with uranium-induced fluorescence are analyzed using DNC. Samples are received and analyzed in clean, labeled, 25-ml vials. Each water sample is weighed, and its weight (less that of the vial) and location number are recorded. The vials are then loaded into a 25-sample transfer clip. The reactor pneumatic transfer system and background radiation levels are checked and four standards are run for calibration. The transfer clip is installed on the pneumatic feed line and the samples are cycled through the system (typically, a 60-s irradiation, 30-s delay, and 60-s count cycle is used). The uranium concentration is automatically measured, converted to ppb, and entered into a computer data base. The lower detection limit for uranium in water by DNC as used at the LASL is 0.5 ppb. The statistical error of this method is $\approx 20\%$ at a uranium concentration of 1 ppb, $\approx 6\%$ at 10 ppb, and $<4\%$ at 40 ppb or greater. Statistical treatments of uranium concentrations obtained from the same suites

of samples analyzed both by fluorometry and DNC have shown that there is no significant difference between the results of the two analytical methods as used at the LASL. This analytical comparability is rechecked periodically.

Elemental Determinations in Water Samples by Inductively-Coupled Plasma-Source Emission Spectrometry

The concentrations of Al, As, B, Ca, Cd, Co, Cu, Fe, K, Li, Mg, Mn, Mo, Na, Ni, P, Pb, Se, Si, Sr, Ti, V, and Zn were determined at the Lawrence Livermore Laboratory (LLL) under the direction of Arthur L. Langhorst on a Jarrel-Ash Model 975 Atomcomp inductively-coupled plasma arc-source optical emission spectrometer. The system is fully automated with a microcomputer, sample changer, card reader, high-speed printer terminal, dual floppy disk drive, and the spectrometer's basic computer. Samples are placed in the automatic sample changer, which holds 60 samples. A punched-card deck that lists the samples in their order in the sample changer and any other descriptive comments such as dilution factor is placed in the card reader. After the initial commands are made to the computer, the sample run is under computer control. Every sixth sample, a standard sample is analyzed and compared to the previous result for the standard. A drift factor is calculated, if necessary, and automatically applied to the data for the previous six samples. During a three-hour run, the normal drift correction is approximately 5%. In general, two sample runs of 60 samples each are made daily.

The detection limits listed below and in Appendix I are equivalent to the value for four times the standard deviation of the signal generated by a blank free of the element (in ppb).

Al = 16	As = 43	B = 12	Ca = 6	Cd = 4	Co = 5
Cu = 2	Fe = 2	K = 330	Li = 2	Mg = 0.4	Mn = 1
Mo = 6	Na = 10	Ni = 20	P = 194	Pb = 33	Se = 47
Si = 13	Sr = 20	Ti = 2	V = 5	Zn = 3	

In order to allow the users of these data to determine the accuracy of the ICP system, the results of two analyses of a suite of control samples are listed in the table on the following page. In addition, the results of two analyses of the nitric acid used to acidify the samples are also included. The control samples were submitted and analyzed concurrently with the field samples. Control sample NBS 1643 is a National Bureau of Standards standard reference material. Samples SPEXN1 and 600001 through 600010 were made up at the LASL with a variety of combinations and concentrations of matrix constituents (Ca, K, Mg, Na, and Si) and no added trace elements in order to estimate the effect of scattered light from these major elements on the indicated concentration of the trace elements. For NBS 1643, both reported sets of concentrations are very close to the certified values for all elements. Only for the standards containing the highest matrix concentrations (e.g., 600006 and 600007) is there a noticeable effect on the trace element concentrations. The data in Appendix I are presented as analyzed and no correction for background or scattered light effect was applied to the data.

RESULTS OF STANDARD AND CONTROL SAMPLE ANALYSES BY PLASMA-SOURCE EMISSION SPECTROGRAPHY

	Al	As	B	Ca	Cd	Co	Cu	Fe	K	Li	Mg	Mn	Mo	Na	Ni	P	Pb	Se	Si	Sr	Ti	V	Zn
NBS 1643																							
Certified concentration:	77±1	76±1		27000	8±1	17±1	16±1	75±1	2000		7000	29±1	105±3	10000	49±1		20±1	12±1		212±4		50±1	65±3
Run 1:	75	64	-12	28840	6	12	16	72	1397	-2	6068	28	117	10850	45	-194	-33	-47	32	202	-2	48	60
Run 2:	64	111	-12	26080	8	18	18	72	1623	-2	6163	29	117	10410	60	-194	40	55	33	209	-2	48	61
SPEXN1																							
Made-up concentration:	1000			1000	1000	1000	1000				1000	1000			1000		1000						1000
Run 1:	-16	-43	-12	1225	-4	1328	1277	1277	-330	-2	1268	1313	-6	12	1293	-194	1330	50	45	-20	-2	-5	1366
Run 2:	-16	-43	-12	1188	5	1171	1215	1254	-330	-2	1269	1314	8	-10	1298	-194	1256	-47	41	-20	-2	-5	1295
600001																							
Made-up concentration:	200000			200000					20000		100000			1020000					10000				
Run 1:	40	124	-12	200300	7	13	11	19	19320	3	104500	10	80	1129000	35	625	100	111	10060	37	5	14	23
Run 2:	38	126	-12	197800	7	15	11	21	18550	3	101800	10	82	1078000	33	575	109	124	10310	45	6	16	22
600002																							
Made-up concentration:	1000			1000					1000		1000			2000					1000				
Run 1:	-16	-43	-12	1027	-4	-5	-2	-2	1059	-2	1015	-1	7	2321	-20	-194	-33	-47	1033	-20	-2	-5	4
Run 2:	-16	49	-12	1014	-4	-5	-2	-2	1045	-2	1020	-1	-6	2239	-20	-194	-33	-47	1040	-20	-2	-5	7
600003																							
Made-up concentration:	50000			50000					3000		5000			10000					5000				
Run 1:	-16	46	-12	52740	-4	-5	9	9	3129	-2	5247	-1	21	12300	-20	-194	-33	-47	5188	-20	-2	-5	16
Run 2:	-16	49	-12	50090	-4	-5	8	8	3086	-2	5278	-1	28	11360	-20	-194	-33	-47	5177	-20	-2	-5	13
600004																							
Made-up concentration:	10000			10000					1000		2000			4000					2000				
Run 1:	-16	49	-12	10170	-4	-5	12	-2	1079	-2	2039	-1	8	4492	-20	-194	-33	-47	2039	-20	-2	-5	15
Run 2:	-16	54	-12	9979	-4	-5	12	-2	1019	-2	2058	-1	10	4347	-20	-194	32	-47	2092	-20	-2	-5	18
600005																							
Made-up concentration:	100000			100000					2000		20000			50000					5000				
Run 1:	-16	53	-12	96730	-4	-5	3	5	2230	-2	20450	-1	43	55620	-20	-194	33	-47	5262	-20	-2	-5	8
Run 2:	-16	63	-12	95800	-4	-5	-2	6	2183	-2	20680	-1	42	52740	-20	-194	42	-47	5220	-20	3	-5	10
600006																							
Made-up concentration:	500000			500000					10000		200000			500000					20000				
Run 1:	60	184	14	503400	9	15	17	31	9957	3	205500	10	139	550800	46	1020	134	148	20080	59	10	23	32
Run 2:	59	173	14	492000	9	14	17	34	9665	3	203700	10	137	531600	44	1006	125	154	19860	64	10	23	31
600007																							
Made-up concentration:	1000000			1000000					10000		500000			500000					50000				
Run 1:	123	334	30	1011000	62	29	24	62	9767	4	514300	22	216	544400	90	2010	249	280	49980	96	17	42	55
Run 2:	125	336	30	997900	62	31	23	60	9490	4	507200	22	216	527400	85	1934	261	305	49450	102	18	43	59
600008																							
Made-up concentration:	20000			20000					5000		5000			220000					10000				
Run 1:	-16	-43	-12	20220	-4	-5	6	-2	5556	-2	5339	-1	9	244900	-20	-194	-33	-47	10180	-20	-2	-5	9
Run 2:	-16	-43	-12	19460	-4	-5	5	-2	5317	-2	5339	-1	12	235600	-20	-194	-33	-47	10130	-20	-2	-5	10
600009																							
Made-up concentration:	5000			5000					5000		1000			100000					5000				
Run 1:	-16	-43	-12	5276	-4	-5	-2	-2	5396	-2	1028	-1	-6	108000	-20	-194	-33	-47	5114	-20	-2	-5	-3
Run 2:	-16	-43	-12	5250	-4	-5	-2	-2	5303	-2	974	-1	-6	107000	-20	-194	-33	-47	5051	-20	-2	-5	-3
600010																							
Made-up concentration:	20000			20000					2000		10000			54000					2000				
Run 1:	-16	-43	-12	21020	-4	-5	-2	-2	2190	-2	10530	-1	11	58610	-20	-194	-33	-47	2082	-20	-2	-5	6
Run 2:	-16	46	-12	20960	-4	-5	-2	-2	2129	-2	9963	-1	13	58610	-20	-194	-33	-47	2060	-20	-2	-5	7
0.1M HNO ₃																							
Run 1:	-16	-43	-12	7	-4	-5	-2	-2	-330	-2	3	-1	-6	14	-20	-194	33	-47	22	-20	-2	-5	5
Run 2:	-16	-43	-12	-6	-4	-5	-2	-2	-330	-2	15	-1	7	-10	-20	-194	33	-47	25	-20	-2	-5	6

APPENDIX III-B

Explanation of Codes Used in Appendix I

APPENDIX III-B

EXPLANATION OF CODES USED

DOE SAMPLE NUMBER

STATE: A two-digit Federal Information Processing Standards (FIPS) code that designates the state from which each sample came. For the states being sampled by the LASL, the code numbers are:

Alaska	= 02	Montana	= 30	South Dakota	= 46
Arizona	= 04	Nebraska	= 31	Texas	= 48
Colorado	= 08	New Mexico	= 35	Utah	= 49
Idaho	= 16	North Dakota	= 38	Wyoming	= 56
Kansas	= 20	Oklahoma	= 40		

LATITUDE AND LONGITUDE: Sample location, in degrees and decimal degrees to four places. Although generally much better, locational accuracy cannot be guaranteed closer than about 300 m (1000 ft).

DOE LAB: A Department of Energy (DOE) one-digit identifier designating the DOE laboratory responsible for taking the samples and data shown in the listings, as well as providing the analyses of the uranium and other elemental concentrations, if any. The LASL is designated by the numeral 2.

SAMPLE TYPE: A two-digit identifier which specifically designates the pertinent properties defining the sample type to which the listed data relate. For explanation of the code used, refer to the attached "Key to Sample Types," in section C of this appendix.

REPLICATE: A three-digit sequential number assigned to indicate a multiple sample of a single sample type from a single location. The largest number in use indicates the most recent sample taken and there will always be all smaller sequential numbers representing earlier samples back to 0, which is the initial sample from any given location. Except in the case of special studies, there will be no replicate samples and this entry will therefore be a single zero.

LASL SAMPLE LOCATION NUMBER AND FIELD DATA

LASL SAMPLE LOCATION NUMBER: A unique six-place alphanumeric designator permanently assigned by the LASL to every location sampled. For internal use, these numbers are assigned in blocks to the various areas individually treated and reported upon, and therefore serve to generally locate the samples within various areas for which the LASL is responsible.

TIME SAMPLED: The DATE the sample was taken, in terms of the number of the MONTH, followed by the DAY and finally the YEAR, separated by slashes, and then the TIME it was taken on that date to the nearest whole HOUR on a 24-hour clock.

AIR TEMPERATURE: The temperature measured in the shade at the time of sampling, to the nearest whole degree Celsius ($^{\circ}\text{C}$).

WATER TEMPERATURE: The temperature measured in the sample water (in situ whenever possible) at the time of sampling, to the nearest one-tenth of one degree Celsius (0.1°C).

COMMENTS: A "C" in this column indicates that some secondary comment not included in the listing was recorded at the sample location. This information will be used by the LASL in evaluating the data, and if appropriate, it will be mentioned in the final report.

SPECIAL MEASUREMENTS: An "S" in this column indicates that one or more field measurements in addition to those listed were made at the sample location. A description of any special parameters measured and the measured value at each sample location will be included in the final HSSR survey report on the area.

pH: The pH, to the nearest one-tenth (0.1) of a pH unit, measured in the water at the sample location at the time of sampling.

CONDUCTIVITY: The conductivity, in $\mu\text{mho/cm}$, measured in the water at the sample location at the time of sampling.

SCINTILLOMETER: The equivalent uranium (eU), in ppm, as measured on a flat ground surface within 10 m of the sample location using a scintillometer fitted with a differential gamma sampler (DGS). The effect of the DGS is to introduce a fixed geometry into the measurement and remove the background.

ROCK TYPE: The single digit in this column provides a general description of the dominant lithologic regime at or near the sample location, as given below.

1 = Sedimentary	3 = Igneous
2 = Metamorphic	4 = Unknown

ROCK COLOR: The single digit in this column provides an indication of the observed dominant color of local bedrock exposures at or near the sample location, as given below.

1 = White/Buf	4 = Pink/Red	7 = Gray
2 = Yellow	5 = Green	8 = Black
3 = Orange	6 = Brown	9 = Other

SEDIMENT TYPE: The single digit in this column provides a subjective evaluation of the dominant sediment type at the sample location, as given below.

1 = Boulders	4 = Sand	7 = Other
2 = Cobbles	5 = Mud	
3 = Gravel	6 = Muck	

SEDIMENT COLOR: The single digit in this column indicates the observed dominant color of the bottom sediment (stream channel, lake bed, etc.) at the sample location at the time of sampling, as given below.

1 = White/Buf	4 = Pink/Red	7 = Gray
2 = Yellow	5 = Green	8 = Black
3 = Orange	6 = Brown	9 = Other

WATER FLOW: The single digit in this column provides a subjective evaluation of the water movement at the sample location at the time of sampling, as given below.

1 = Stagnant	3 = Moderate	5 = Torrent
2 = Slow	4 = Fast	

WATER LEVEL: The single digit in this column provides a subjective estimate of water quantity at the time of sampling, relative to its usual condition at the sample location, as given below.

1 = Dry	3 = Normal	5 = Flood
2 = Low	4 = High	

WATER COLOR: The single digit in this column provides a subjective evaluation of suspended load in the sample water, as given below.

1 = Clear	3 = Cloudy	5 = Algal
2 = Murky	4 = Muddy	6 = Other

STREAM CHANNEL: The single digit here gives a subjective evaluation of stream channel character at the sample location at the time of sampling, as given below.

1 = Depositing	2 = Eroding	3 = Unknown
----------------	-------------	-------------

VEGETATION TYPE: The single digit in this column provides a subjective evaluation of the dominant plant type in the vicinity of the sample location, as given below.

1 = Conifers	4 = Grass	7 = Other
2 = Deciduous	5 = Moss	
3 = Brush	6 = Marsh	

VEGETATION DENSITY: The single digit in this column provides a subjective estimate of the amount of plant cover in the vicinity of the sample location, as given below.

1 = Barren	3 = Moderate	5 = Very Dense
2 = Sparse	4 = Dense	

RELIEF: The single digit in this column provides a subjective evaluation of the topography within a few hundred meters of the sample location, as given below.

1 = Flat	3 = Gentle (15-60 m)	5 = High (>300 m)
2 = Low (<15 m)	4 = Moderate (60-300 m)	6 = Other

WEATHER: The single digit in this column gives the observed climatic condition at the sample location at the time of sampling, as given below.

1 = Clear	3 = Overcast	5 = Snowy
2 = Partly cloudy	4 = Rainy	6 = Other

OWNERSHIP: Not used.

CONTAMINANTS: The single digit here indicates known or suspected local factors likely to influence analytical results, as given below.

1 = None	4 = Industry	7 = Urban
2 = Mining	5 = Sewage	8 = Recreation
3 = Agriculture	6 = Power generation	9 = Other

WELL TYPE: If a well water sample, the single digit in this column provides a general description of the type of well from which the sample was taken, as given below.

1 = Windmill-stock	4 = Suction pump	7 = Hand bail
2 = Windmill-domestic	5 = Jet pump	8 = Unknown
3 = Submersible pump	6 = Large turbine	9 = Other

WELL DIAMETER: When shown, the one or two digits in this column give the measured or estimated inside diameter, in inches, of the well casing from which the water sample came.

WELL DEPTH: When shown, the one, two, or three digits in this column give the total drilled depth from the surface, in feet, of the well from which the sample came. Three 9s in this column indicates a well depth greater than 1000 ft.

WATER DEPTH: When shown, the one, two, or three digits in this column give the known depth, in feet, from the surface to the standing water in the well. A -1 in this column indicates a flowing artesian well.

URANIUM CONCENTRATION: The value given in this column is the analytically derived value of the total uranium concentration found in the water sample (in ppb) or in the sediment sample (in ppm). Those uranium concentrations in water that are shown with an asterisk were measured using the delayed-neutron counting method, while those without an asterisk were determined fluorometrically. The uranium analyses in water samples as determined by both of these methods at the LASL are directly comparable, as noted in section A of this appendix.

REMAINING ENTRIES: The data presented in the remaining entries of the listings utilize no codes as such and are described in the respective column headings. However, there are four conventions used throughout the listings of elemental concentrations: a) all concentrations in waters are reported in ppb; b) all concentrations in sediments are reported in ppm; c) concentrations "less than" the lower detection limit are denoted by a minus sign before this limit for the specific sample (except for fluorometrically determined uranium in waters, the convention for which is described in section A of this appendix); and d) a blank space in the data listings for any elemental concentration signifies that no analytical result was obtained for that element.

APPENDIX III-C

Key to Sample Types Listed in Appendix I

APPENDIX III-C

KEY TO SAMPLE TYPES

This numerical key provides the necessary tie between the specific type or form of each sample taken and each individual suite of field and laboratory data to which the sample relates. It defines the various sample types collected by the LASL in the DOE HSSR for uranium.

The two-digit key number assigned to each sample type designates three distinct properties of the samples taken. These properties are: (a) The general sample source (spring, stream, dry stream, etc.); (b) The sample medium (water or sediment); and (c) The treatment given the sample in the field or laboratory prior to its analysis by the LASL.

The key numbers are inserted in the sample type columns of the specially formatted DOE sample numbering system to positively identify the sample type for all LASL sample data submitted.

<u>KEY NO.</u>	<u>SOURCE</u> / <u>MEDIUM</u> / <u>TREATMENT</u>
----------------	--

08	- <u>Well water</u> sample <u>filtered</u> through a 0.45- μ membrane filter <u>and acidified</u> to a pH of <u><1</u> with reagent-grade nitric acid (HNO_3).
----	--

APPENDIX IV

PROCEDURE FOR FIELD MEASUREMENT OF CARBONATE AND BICARBONATE ION CONCENTRATIONS

APPENDIX IV

PROCEDURE FOR FIELD MEASUREMENT OF CARBONATE AND BICARBONATE ION CONCENTRATIONS

The alkalinity of the Pie Town water samples (expressed as carbonate and bicarbonate ion concentrations) was measured in the field by a titration method described in the Water Handbook (Third Edition, pages 2-5 to 2-6), published by the Hach Chemical Co. of Ames, Iowa. The procedure involves titration with a standard 0.020N sulfuric acid solution to an end point evidenced by the color change of a standard indicator solution. Fifty milliliters of the sample water were measured in a plastic 50 ml graduated cylinder and then poured into a pre-rinsed 250-ml Erlenmyer flask. Six drops of phenolphthalein indicator solution were then added to the sample. If a pink color developed (indicating a pH >8.3), the sample was titrated with the acid solution to a colorless endpoint and the number of drops used was recorded as the P (phenolphthalein) alkalinity. After adding the phenolphthalein and titrating (if necessary), six drops of Brom Cresol Green-Methyl Red indicator solution were added and titration continued with the acid solution to a light bluish pink-gray (pH 4.8). The total number of drops of acid added to the sample was recorded as the T (total) alkalinity. To determine the alkalinity in mg/l (essentially equivalent to ppm), the number of milliliters of acid used is multiplied by 20. It was found that there are approximately 20 drops per milliliter of acid, so the number of drops used is equal to the alkalinity in mg/l. To determine the amounts of carbonate and bicarbonate ion present, the relationships given in the following table were used. The resulting values are given in Appendix II.

ALKALINITY RELATIONSHIP TABLE

Result of Titration	Hydroxide Alkalinity	Carbonate Alkalinity	Bicarbonate Alkalinity
P-Alkalinity = 0	0	0	Equal to Total
P-Alkalinity less than one half T-Alkalinity	0	2 times the P-Alkalinity	T-Alkalinity minus two times P-Alkalinity
P-Alkalinity equal to one half T-Alkalinity	0	2 times the P-Alkalinity	0
P-Alkalinity greater than one half T-Alkalinity	2 times P-Alkalinity minus T-Alkalinity	2 times the difference between P- and T-Alkalinity	0
P-Alkalinity equal to T-Alkalinity	Equal to T-Alkalinity	0	0

From Hach Chemical Co.

REFERENCES CITED

- Anonymous, 1959, Uranium deposits in the Datil Mountains-Bear Mountains region, New Mexico, 10th Field Conference Guidebook, west-central New Mexico, NM Geol. Soc., Socorro, NM, pp. 135-143.
- Anonymous, 1963, Baca formation in the area around Socorro, New Mexico, 14th Field Conference Guidebook, Socorro Region, NM Geol. Soc., Socorro, NM, pp. 100-101.
- Cheadle, J., III, 1977, Computer program for universal Transverse Mercator map projection, GJBX-54(77), US ERDA, Grand Junction, CO, 11 p.
- Dane, C. H., and Bachman, G. O., 1965, Geologic map of New Mexico, USGS, Washington, DC, 2 sheets, 1:500 000 scale.
- DOE, 1979, NURE Interim Report, June 1979, GJO-111(79), US DOE, Grand Junction, CO, pp. 52-59.
- Elston, W. E., 1975, Glossary of stratigraphic terms of the Mogollon-Datil Volcanic province, New Mexico, in Cenozoic Volcanism in Southwestern New Mexico, NM Geol. Soc. Special Publication No. 5, Socorro, NM, pp. 131-144.
- Foster, R. W., 1964, Stratigraphy and petroleum possibilities of Catron County New Mexico, NM Bur. of Mines and Min. Res. Bull. 85, Socorro, NM, p. 36-37.
- Hilpert, L. S., 1965, Uranium, in Mineral and water resources of New Mexico, NM Bur. Mines and Min. Res. Bull. 87, Socorro, NM, p. 221.
- Hilpert, L. S., 1969, Uranium resources of northwestern New Mexico, USGS Prof. Paper 603, Washington, DC, 166 p.
- Hues, A. D., Henicksman, A. L., Ashley, W. H., and Romero, D., 1977, The fluorometric determination of uranium in natural waters, GJBX-24(77), US ERDA, Grand Junction, CO, 11 p.
- Planner, H. L., 1980, Uranium hydrogeochemical and stream sediment reconnaissance data release of the Socorro NTMS quadrangle, New Mexico, including concentrations of forty-two additional elements, US DOE, Grand Junction, CO, in press.
- Sharp, R. R., Jr., 1977, The LASL approach to uranium geochemical reconnaissance, Proc. Symposium on Hydrogeochemical and Stream Sediment Reconnaissance for Uranium in the United States, GJBX-77(77), US ERDA, Grand Junction, CO, pp. 353-373.
- Sharp, Jr., R. R., Morris, W. A., and Aamodt, P. L., 1978, Uranium hydrogeochemical and stream sediment reconnaissance data release for the New Mexico portions of the Douglas, Silver City, Clifton, and Saint Johns NTMS quadrangles, New Mexico/Arizona, GJBX-69(78), US DOE, Grand Junction, CO, 123 p.

- Snyder, D. O., 1971, Stratigraphic analysis of the Baca formation, west-central New Mexico, Ph.D. dissertation, University of New Mexico, Albuquerque, NM, 160 p.
- Tonking, W. H., 1957, Geology of the Puertecito quadrangle, Socorro County, New Mexico, NM Bur. of Mines and Mineral Res. Bull. 41, Socorro, NM, 67 p.
- Weber, R. H., 1963, Cenozoic volcanic rocks of Socorro County, 14th Field Conf. Guidebook, Socorro Region, NM Geol. Soc., Socorro, NM, pp. 132-143.
- Weber, R. H., and Willard, M. E., 1959a, Reconnaissance geologic map of Mogollon thirty-minute quadrangle, Geol. Map 10, NM Bur. Mines and Min. Res., Socorro, NM, 1:126 720 scale.
- Weber, R. H., and Willard, M. E., 1959b, Reconnaissance geologic map of Reserve thirty-minute quadrangle, Geol. Map 12, NM Bur. Mines and Min. Res., Socorro, NM, 1:126 720 scale.
- Willard, M. E., 1957, Reconnaissance geologic map of Pinonville thirty-minute quadrangle, Geologic map 3, NM Bur. of Mines and Mineral Res., Socorro, NM, 1:126 720 scale.
- Willard, M. E., and Givens, D.B., 1958, Reconnaissance geologic map of Datil thirty-minute quadrangle, Geologic map 5, NM Bur. of Mines and Mineral Res., Socorro, NM, 1:126 720 scale.
- Willard, M. E., and Weber, R. H., 1958, Reconnaissance geologic map of Canon Largo thirty-minute quadrangle, Geologic map 6, NM Bur. of Mines and Mineral Res., Socorro, NM, 1:126 720 scale.
- Wilpolt, R. H., MacAlpin, A. J., Bates, R.L., and Vorbe, Georges, 1946, Geologic map and stratigraphic sections of Paleozoic rocks of Joyita Hills, Los Pinos Mountains, and northern Chupadera Mesa, Valencia, Torrance, and Socorro Counties, New Mexico; US Geol. Survey Oil and Gas Inv. Map 61, Washington, DC.

LA-8017-MS

109° 00' W
34° 30' N

50'

PLATE I

ARGO
Weber, 1958

ANDESITE-BASALTIC ANDESITE FACIES - Gray to black coarsely porphyritic flows, sills, and dikes; contains lathlike feldspar phenocrysts as much as half an inch (1.3 cm) long; at places vesicular and brecciated. In part interlayered with rhyolite tuff (Tdt).

LATITE FACIES - Light-gray latite and coarse latitic pyroclastics, in part equivalent to the Spears Ranch member of Puertecito quadrangle. Includes beds of sandstone and conglomerate, largely of latite and green to purple altered andesite and smaller amounts of nonvolcanic detrital material. East of Green's Gap contains, in its lower part, an iron-stained breccia.

VOLCANIC SEDIMENTARY FACIES - Gray to light-gray, locally greenish-gray to reddish-gray volcanic conglomerate, graywacke, sandstone, siltstone, and mudstone. Largely comprised of volcanic rock fragments. Locally contains thin beds of water-laid rhyolite tuff and ash.

DIORITE PORPHYRY INTRUSIVE - Light-gray, coarsely porphyritic, contains phenocrysts of plagioclase, hornblende, and biotite. Exposed in isolated outcrops near Rock Candy, south of Datil. Relative age not determined; may be hypabyssal equivalent of andesite facies (Tda).

NONVOLCANIC SEDIMENTARY ROCKS - Tan to brown and red conglomerate sandstone, graywacke, and siltstone, with pebbles of altered purple to gray andesite; red and gray to greenish-gray clays and shales. Largely friable reddish sandstone in Tres Lagunas area. At places grades laterally and vertically into the volcanic sedimentary facies (Tdvs) and is interbedded in its lower parts with Mesaverde-like sandstone. In part equivalent to sediments that elsewhere have been designated as the Baca formation.

UNCONFORMITY (?)

MESAVERDE GROUP and gray shale. May be formations.

MANCOS SHALE - Light gray interlayered beds of yellow and gray sandstone.

DAKOTA (?) SANDSTONE - Tan to brown quartzose sandstone.

UNCONFORMITY

CHINLE FORMATION includes in its upper part the Chinle sandstone.

Contact

Approximately located

Fault

Dashed where approximately located; D, downthrown side; U, upthrown side.

Quaternary basaltic cone

Compiled from Reconnaissance Geology thirty-minute quadrangles, by Williams and Weber, 1958, respectively.

P - Yellow and reddish-brown sandstone and conglomerate in part equivalent to the Gallup and Crevasse Canyon

light-gray slightly sandy carbonaceous shale and thin yellow to light-tan quartzose sandstone. Includes the one.

ONE - One 20-foot bed of yellow silica-cemented

N - Red, purple, and greenish-gray shale and mudstone; parts thin beds of gray sandstone.

imately located.

J, upth. own side.

nes, necks, and craters.

ologic Maps of Datil, Piñonville, and Cañon Largo
Willard and Givens, 1958; Willard, 1957; and Willard

GEOLOGY OF THE

Note: The sample numbers above are the same as those in Appendix I except the leading three digits have been dropped.

GEOLOGIC AND SAMPLE LOCATION MAP THE PIE TOWN STUDY AREA, NEW MEXICO.

same as those used in
have been dropped.

108° 00' W 50' 107° 45' W 34° 00' N

DATIL
After Willard and Givens, 1958

MAP LOCATION MAP Y AREA, NEW MEXICO.

University of California
LOS ALAMOS SCIENTIFIC LABORATORY
Post Office Box 1663 Los Alamos, New Mexico 87545
An affirmative action/equal opportunity employer

LA-8017-MS

10'

108 ° 00' W

PLATE II

Uranium concentrations shown are in parts per billion

billion (ppb).

URANIUM CONCENTRATION
FROM THE PIE TOWN

● 4.17

● 0.04

● 0.15

● 15.80

● 3.46

20'

10'

Scale 1:126 720

**ATIONS IN WELL WATER SAMPLES
/N STUDY AREA, NEW MEXICO.**

10'

108 ° 00' W

University of California
LOS ALAMOS SCIENCE CENTER
Post Office Box 1663 Los Alamos, NM 87545
An affirmative action/equal opportunity institution

University of California
LOS ALAMOS SCIENTIFIC LABORATORY
 Post Office Box 1663 Los Alamos, New Mexico 87545
 An affirmative action/equal opportunity employer