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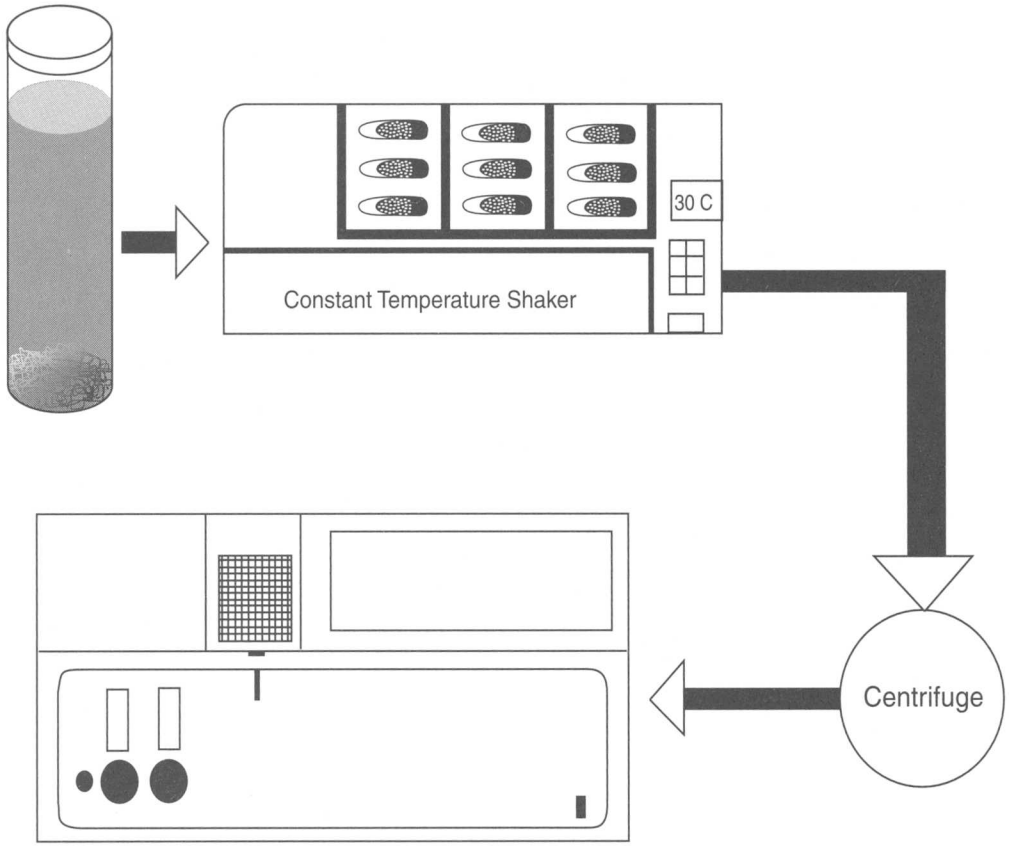
STRONTIUM DISTRIBUTION COEFFICIENTS OF SURFICIAL AND SEDIMENTARY INTERBED SAMPLES FROM THE IDAHO NATIONAL ENGINEERING AND ENVIRONMENTAL LABORATORY, IDAHO

U.S. GEOLOGICAL SURVEY
WATER-RESOURCES INVESTIGATIONS REPORT 98-4073



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Cover: Graphical representation of batch experiment showing test tube with water and sediment, constant-temperature shaker, centrifuge, and atomic-adsorption spectrometer.

Strontium Distribution Coefficients of Surficial and Sedimentary Interbed Samples from the Idaho National Engineering and Environmental Laboratory, Idaho

By MICHAEL J. LISZEWSKI, U.S. GEOLOGICAL SURVEY; JEFFREY J. ROSENTRETER, IDAHO STATE UNIVERSITY; KEVIN E. MILLER *and* ROY C. BARTHOLOMAY, U.S. GEOLOGICAL SURVEY

U.S. GEOLOGICAL SURVEY

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Idaho Falls, Idaho
April 1998

U.S. DEPARTMENT OF THE INTERIOR
BRUCE BABBITT, Secretary

U.S. GEOLOGICAL SURVEY
Thomas J. Casadevall, Acting Director

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CONVERSION FACTORS AND ABBREVIATED UNITS

Multiply	By	To obtain
cubic centimeter (cm^3)	0.06102	cubic inch
gram (g)	.03527	ounce
kilometer (km)	.6215	mile
square kilometer (km^2)	.3861	square mile
meter (m)	3.281	foot
millimeter (mm)	.03937	inches
becquerel per liter (Bq/L)	27	picocuries per liter
terra becquerel (TBq)	27	curies

For temperature, degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) by using the formula °F=(1.8)(°C) + 32.

Abbreviated units used in report: K_d (distribution coefficient), mg/L (milligrams per liter), mL/g, (milliliters per gram), mg/kg (milligrams per kilogram).

Strontium Distribution Coefficients of Surficial and Sedimentary Interbed Samples from the Idaho National Engineering and Environmental Laboratory, Idaho

By Michael J. Liszewski, U.S. Geological Survey; Jeffrey J. Rosentreter, Idaho State University; Kevin E. Miller *and* Roy C. Bartholomay, U.S. Geological Survey

Abstract

Strontium distribution coefficients (K_d's) were measured for 21 surficial and 17 sedimentary interbed samples collected from sediment cores from selected sites at the Idaho National Engineering and Environmental Laboratory (INEEL) to help assess the variability of strontium K_d's at the INEEL as part of an ongoing investigation of strontium chemical-transport properties. Batch experimental techniques were used to determine strontium K_d's of the sediments. Measured strontium K_d's of the surficial and interbedded sediments ranged from 26±1 to 328±41 milliliters per gram. These results indicate significant variability in the strontium sorptive capacities of surficial and interbedded sediments at the INEEL. Some of this variability can be attributed to physical and chemical properties of the sediment; other variability may be due to compositional changes in the equilibrated solutions after being mixed with the sediment.

INTRODUCTION

The transport and fate of waste constituents in geologic media is dependent on physical and chemical processes that govern the distribution of constituents between the solid, geologic, stationary phase and an aqueous, mobile phase. This distribution often is quantified, at thermodynamic equilibrium, by an empirically determined parameter called the distribution coefficient (K_d). K_d's can be used effectively to summarize the chemical factors that affect transport efficiency of ground-water constituents. Many transport models for radionuclides use K_d's to predict the extent to which the migration of the constituent will be lessened relative to the mean ground-water velocity (Sposito, 1989, p. 150–155; Bohn, 1985, p. 153–207; Fetter, 1993, p. 117–127).

The U.S. Geological Survey (USGS) and Idaho State University (ISU), in cooperation with the U.S. Department of Energy (DOE), are conducting a study to determine geochemical properties that affect strontium transport in surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory (INEEL), Idaho. The purpose of the study is to determine the fate and transport behavior of chemical constituents in wastewater discharged to infiltration ponds and the Snake River Plain aquifer at the INEEL. Study objectives include assessing the variability of strontium K_d's in surficial and interbedded sediments at the INEEL.

This report presents experimentally derived strontium K_d's for 38 surficial and sedimentary interbed samples collected from sediment cores from selected sites at the INEEL. Sediment samples were mixed with synthesized aqueous solutions using batch experimental techniques to determine the strontium distribution between the solid and aqueous phases. The synthesized aqueous solutions were representative of wastewater in disposal ponds at the INEEL with respect to major cations and pH. Strontium concentrations in the solutions were varied to define strontium sorption isotherms. Strontium K_d's were derived using the Freundlich sorption isotherm model described by Fetter (1993, p. 119–122).

Background

The INEEL comprises 2,300 km^2 of the eastern Snake River Plain in southeastern Idaho (fig. 1).

The INEEL was established in 1949 by the U.S. Atomic Energy Commission (now known as DOE) for the development of peacetime atomic-energy applications such as nuclear safety research, defense programs, and advanced energy concepts. More than 50 nuclear reactors have been operated at the INEEL since its inception. Facilities at the INEEL also are used to store nuclear waste, such as spent fuel rods from the U.S. Navy's nuclear fleet and other DOE sites, and wastes generated onsite.

Aqueous chemical and radiochemical wastes, including strontium-90 (^{90}Sr), have been discharged to waste-disposal ponds and wells at the INEEL since 1952. Since 1983, most of the wastewater has been discharged to unlined infiltration ponds. Some constituents in wastewater may enter the aquifer indirectly by percolation from the waste-disposal ponds through sediments in the unsaturated zone (Pittman and others, 1988). Disposal of radioactive wastewater to the Test Reactor Area (TRA) radioactive-waste ponds ceased in August of 1993 and the ponds were remediated (Eddie W. Chew, U.S. Department of Energy, written commun., 1995). Radioactive wastewater at the TRA now is discharged to two lined evaporation ponds. Disposal of radioactive wastewater to the Idaho Chemical Processing Plant (ICPP) disposal well ceased in 1983 and two infiltration ponds, installed during 1984–85, have been used since.

^{90}Sr is a radionuclide produced by the fission of uranium, has a half-life of 28.8 years, and decays by beta emission (Eisenbud, 1973, p. 83–97). The global deposition of ^{90}Sr is well documented (Eisenbud, 1973, p. 320–331). This radionuclide is present in ground water and was introduced to the environment from fallout from nuclear explosions and as a result of the waste-disposal practices used in the nuclear industry. Because of its tendency to concentrate uniformly throughout mineral bone tissues, ^{90}Sr is very toxic. The maximum contaminant level allowable in drinking water is 0.3 Bq/L (U.S. Environmental Protection Agency, 1989, p. 551).

Approximately 5.6 TBq of ^{90}Sr was discharged at the INEEL from the early 1950's to 1995, primarily at the ICPP and TRA facilities (Bartholomay and others, 1997, p. 30). Documented disposals include:

- 1.2 TBq of ^{90}Sr discharged into a pit at the ICPP during 1962–63 (Robertson and others, 1974, p. 119).
- 0.9 TBq of ^{90}Sr discharged to a disposal well and disposal ponds at the ICPP (fig. 2) during 1952–95, of which approximately 0.02 TBq was discharged to the waste-disposal ponds (Bartholomay and others, 1995, p. 26; Bartholomay and others, 1997, p. 30).
- 3.4 TBq of ^{90}Sr discharged to disposal ponds at the TRA (fig. 2) during 1952–95 (Bartholomay and others, 1997, p. 30).

Concentrations of ^{90}Sr in perched ground water beneath the ICPP ranged from 0 to 0.63±0.07 Bq/L during 1991 through 1995. Concentrations of ^{90}Sr in perched ground water beneath the TRA ranged from 0 to 5.3±0.2 Bq/L for the same period (Bartholomay, 1998, p. 24). Disposal of ^{90}Sr has resulted in a 10-km^2 plume within the eastern Snake River Plain aquifer beneath the ICPP (Bartholomay and others, 1997, p. 33) with concentrations greater than 0.3 Bq/L. Concentrations of ^{90}Sr in water from wells completed in the Snake River Plain aquifer have been as large as 2.8±0.1 Bq/L in 1995 (Bartholomay and others, 1997, p. 30). Strontium-90 has not yet been detected in the eastern Snake River Plain aquifer beneath the TRA (Bartholomay and others, 1997). This may, in part, be explained by the exclusive use of disposal ponds rather than the disposal well at this facility for radioactive-wastewater disposal. Sorption processes in the unsaturated and perched-water zones beneath the waste-disposal ponds have likely lessened ^{90}Sr migration at the TRA. In addition, stratigraphy beneath the TRA is different from that beneath the ICPP (Anderson, 1991, p. 22–28).

Geohydrologic Setting

The eastern Snake River Plain is a northeast-trending structural basin about 125 km long and 30 to 40 km wide. The plain is underlain by a layered sequence of basaltic rocks and cinder beds interbedded with alluvial and lakebed deposits. Individual basalt layers range from 3 to 15 m in thickness, although the average thickness may be from 6 to 8 m (Mundorf and others, 1964, p. 143). The sedimentary deposits consist mainly of lenticular beds of sand, silt, and clay, and lesser amounts of gravel.

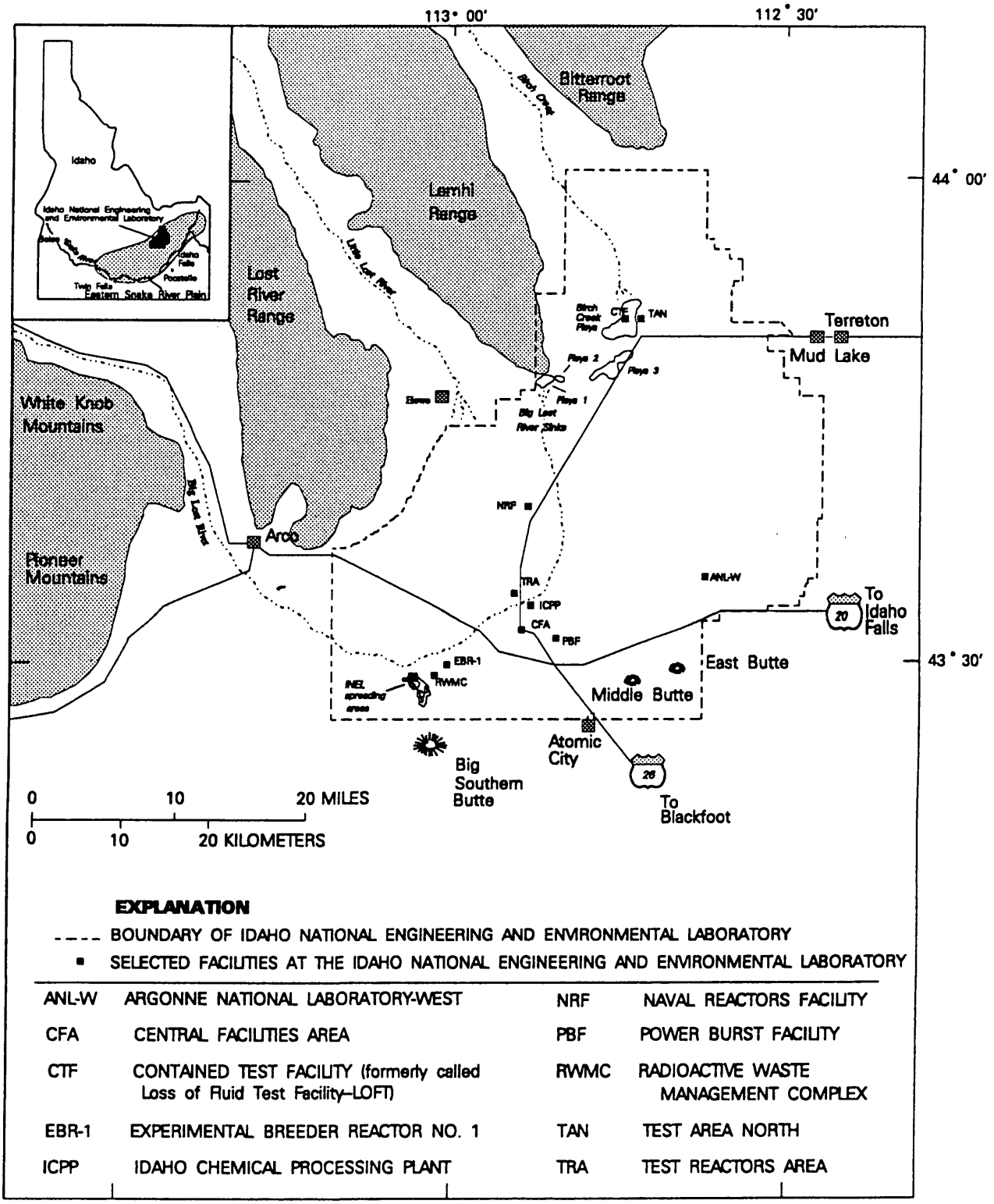

Figure 1. Location of the Idaho National Engineering and Environmental Laboratory and selected facilities.

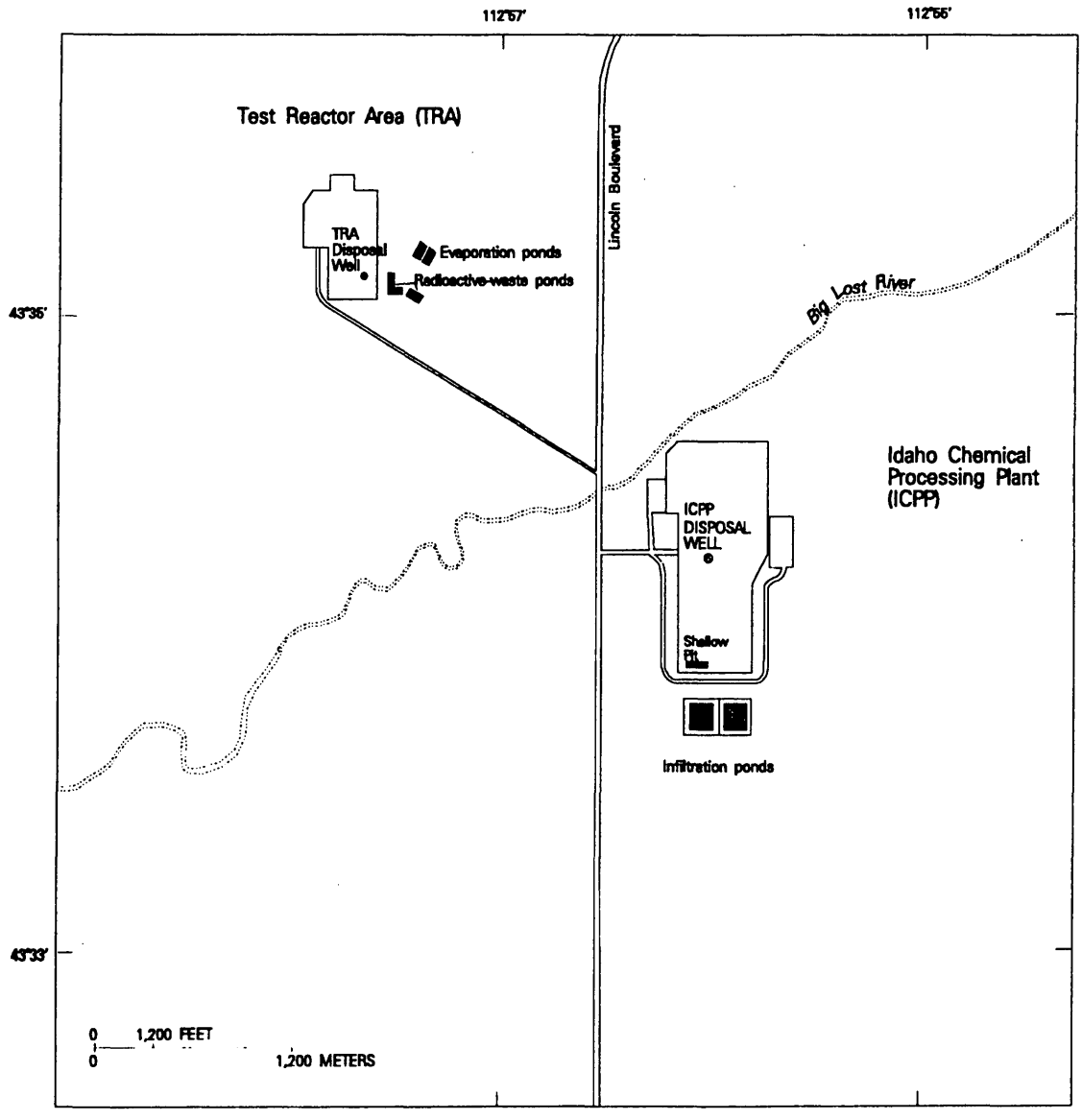

Figure 2. Location of the Idaho Chemical Processing Plant, Test Reactor Area, and selected waste-disposal sites, Idaho National Engineering and Environmental Laboratory.

Locally, rhyolitic rocks and tuffs are exposed at the land surface or occur at depth. The basaltic rocks and sedimentary interbed deposits combine to form the framework for the eastern Snake River Plain aquifer system, which is the main source of ground water on the plain. The depth to water in the aquifer system ranges from about 60 m below land surface in the northern part of the INEEL to more than 275 m in the southern part (Bartholomay and others, 1997, p. 20). The generalized direction of ground-water flow is from the northeast to the southwest. The INEEL obtains its entire water supply from the eastern Snake River Plain aquifer.

Previous Investigations

Strontium K_d's of sediment collected from the INEEL have been reported by Hawkins and Short (1965); Schmalz (1972); Del Debbio and Thomas (1989); Hemming and others (1997); Bunde and others (1997); Liszewski and others (1997); Bunde and others (1998); and Liszewski and others (1998). Additional strontium K_d's of sediment from nuclear facilities in the United States and Canada have been reported by Patterson and Spoel (1981), Jackson and Inch (1983), and Kipp and others (1986). A summary and review of available information on strontium and other radionuclide interactions with geologic media through 1976 has been compiled by Ames and Rai (1978).

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MATERIALS AND METHODS

Experiments for measuring K_d's required the collection and preparation of surficial and sedimentary interbed samples and the preparation of the synthesized aqueous solution. Once the samples and solution were prepared, they were combined in a reaction vessel and agitated using batch experimental techniques for a period of time sufficient for equilibrium to be reached. Then, solutions were analyzed for dissolved-strontium content. The amount of strontium sorbed to the sediment was calculated as the difference between the initial and equilibrium solution concentrations multiplied by the volume-to-mass ratio. Sorption isotherms and K_d's then were derived using the Freundlich isotherm model (Fetter, 1993, p. 119).

Collection, Description, and Preparation of Sediment Samples

Surficial and sedimentary interbed samples for this study were collected from sediment cores recovered from four sites at the INEEL: USGS 121, USGS 123, TAN CH-1, and RWMC-C1A (fig. 3). Sites were near the ICPP, the Test Area North, and the Radioactive Waste Management Complex facilities, where waste has been discharged to the subsurface. Approximately 200 to 300 g of surficial sediment was collected at discrete intervals of the core by subsampling the homogenized contents of core barrels using the cone-and-quartering method. Approximately 200 to 300 g of sedimentary interbed material was collected by compositing cored fragments and chips representative of complete interbeds, or visually distinct zones within interbeds, throughout selected cored intervals of the stratigraphic section.

Sediment textures, which were classified on the basis of grain-size distribution (Folk, 1974, p. 28), ranged from sandy mud to gravel; many interbed samples were cemented (table 1). Grain-size analysis techniques described by Bartholomay (1990, p. 58) were used to determine the grain-size distribution of sediment samples (table 2). Bulk mineralogy of the samples, which was determined using X-ray diffraction techniques (Reed and Bartholomay, 1994, p. 5–6), was variable; quartz, calcite, and feldspar generally were the most abundant (table 3). A wide range of sedimentary characteristics was represented in the 38 samples (tables 1-3).

Preparation of the synthesized aqueous solution

A synthesized aqueous solution that chemically represented wastewater in the ICPP disposal ponds was prepared because of the difficulty in obtaining wastewater from the ponds and because of the potential chemical changes associated with long-term storage of wastewater. The synthesized aqueous solution contained dissolved calcium, chloride, magnesium, potassium, sodium, strontium, silica,

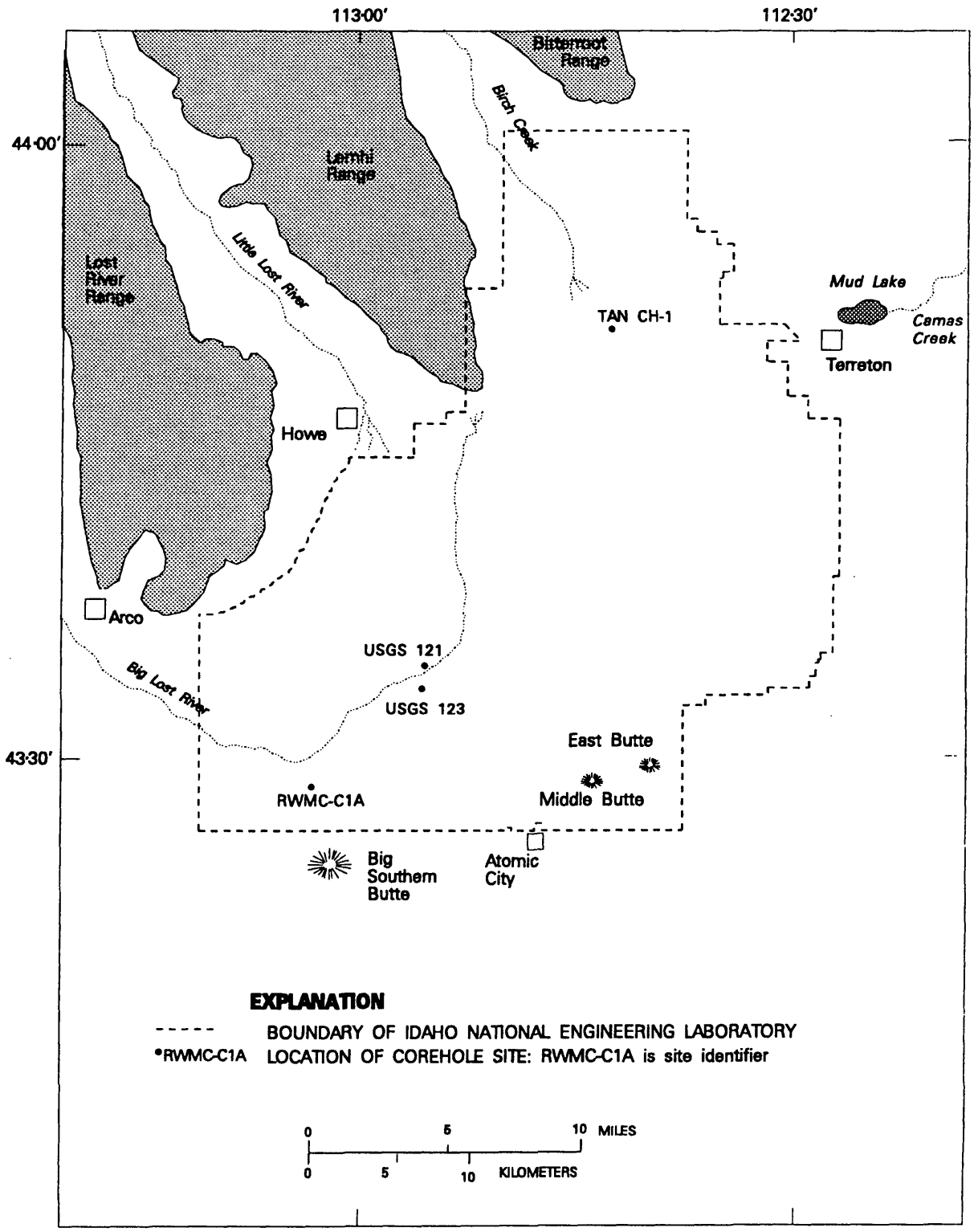

Figure 3. Location of corehole sites where surficial and sedimentary interbed samples were collected, Idaho National Engineering and Environmental Laboratory.

and carbonate alkalinity. The pH of the synthesized aqueous solution was fixed at 8.0±0.1. The use of a synthesized aqueous solution allowed for the control of experimental variables, addressed potential saturation problems and chemical phase modifications, and provided a constant supply of solution.

A concentrated stock solution containing 1,000 mg/L of calcium, 200 mg/L of magnesium, and 200 mg/L of potassium was prepared by adding American Chemical Society (ACS) certified reagents of calcium carbonate, magnesium carbonate, and potassium chloride along with concentrated trace-metal-grade hydrochloric acid to deionized water. A concentrated stock solution containing 1,000 mg/L of stable strontium was prepared separately by adding ACS-certified strontium carbonate and concentrated trace-metal-grade hydrochloric acid to deionized water. Stable strontium was substituted for the radioactive ^{90}Sr isotope so that no special handling was required. Stable strontium is assumed to behave geochemically in the same manner as ^{90}Sr. Concentrated trace-metal-grade hydrochloric acid was added to the stock solutions to enhance stability of the concentrated solutions and to evolve carbon dioxide. The resulting pH of the concentrated stock solutions was less than 2.0.

Four volumetric flasks of synthesized aqueous solution were prepared by first diluting the concentrated stock solution of calcium, magnesium, and potassium with deionized water. Solutions in each of the flasks then were spiked with different amounts of the strontium stock-solution concentrate. Next, silica, in the form of sodium silicate, was added directly to the solutions using a Fisher Scientific 1,000-mg/L atomic-absorption reference standard. The pH then was adjusted to 8.0±0.1 by adding 1.0-molar sodium hydroxide and hydrochloric acid. Sodium then was added in the form of solid sodium bicarbonate and the pH was readjusted to 8.0. Finally, the solutions were equilibrated with atmospheric gases by leaving the flasks open to the atmosphere overnight and then adjusting the pH again, if necessary.

Several batches of the synthesized aqueous solution were prepared and spiked with strontium. Target concentrations of alkalinity, calcium, magnesium, potassium, silica, sodium, and strontium and pH for each batch prepared are listed in table 4. Small variations between constituent concentrations in the batches were due to inconsistencies in the preparation. Also, because the strontium stock solution used for spiking was acidified, each of the spiked solutions required different amounts of sodium hydroxide and hydrochloric acid for pH adjustment, which caused slight variations in the concentrations of sodium and chloride. These slight variations were not expected to affect strontium sorption to a measurable degree. Chloride concentrations were not determined analytically. Target concentrations of calcium, magnesium, potassium, silica, sodium, and pH of the synthesized aqueous solutions were based on typical concentrations of these constituents in historical wastewater samples from ICPP waste-disposal ponds (table 5). Alkalinity concentrations depended on the amount of sodium bicarbonate added to the solution as described above.

Experimental Methods

The sorption studies were done using batch experimental techniques in 50-cm^3 polyethylene centrifuge tubes. Batch experimental techniques were used because they are relatively simple and inexpensive, and many experiments can be done simultaneously. The dried sediments were homogenized and split into 1-g subsamples using a riffler to minimize bias. The 1-g subsamples were equilibrated with 20.0 mL of the synthesized aqueous solution at 30° C in a constant-temperature shaker (Fisher Scientific Versa-Bath S Model 236) at a setting of 70 cycles per minute for 144 hours. The 1-to-20 mass-to-volume ratio, time of equilibration, and the agitation rate were selected to be consistent with those in previous investigations performed by Del Debbio and Thomas (1989); Bunde and others (1997); and Liszewski and others (1997). The time of equilibration was demonstrated to be sufficient by Bunde and others (1998). The aqueous phase was separated from the solid phase at the end of the experiment by centrifugation for 10 minutes at 3,500 revolutions per minute. The supernatant samples were preserved by adding several drops of trace-metal-grade concentrated nitric acid.

Sorption isotherms for each sediment sample were determined from strontium-distribution data at four initial solution concentrations of strontium

(table 4). Strontium linear sorption isotherms and K_d's were derived from the least squares regression of equilibrium concentrations of strontium sorbed to the sediment as a function of dissolved strontium in solution (Fetter, 1993, p. 118). Concentrations of dissolved strontium were measured directly by atomic-absorption spectroscopy. Concentrations of sorbed strontium were calculated as the difference between the initial and equilibrium concentrations of dissolved strontium multiplied by the volume-to-mass ratio. Initial concentrations were determined on the basis of the concentration in control samples measured at the conclusion of the experiment. Control samples consisted of reaction vessels containing the synthesized aqueous solution with no sediment. This determination assumed that any changes that occurred during the experiments in the solution concentrations of the control samples also occurred in the samples. To best represent field conditions in the unsaturated and perched ground-water zones, the sediment was not pretreated with the simulated wastewater solution before experimentation.

Experiments were grouped into sets consisting of 12 sediment samples mixed with synthesized aqueous solutions in centrifuge tubes, three tubes at each of the four strontium concentrations. Additionally, an experimental blank and four control samples were included in each experimental set. The blank consisted of a centrifuge tube containing only deionized water, and control samples consisted of centrifuge tubes containing only synthesized aqueous solution, one at each of the four strontium concentrations. Blanks and controls provided evidence that the constituents in these experiments did not adsorb onto or desorb from the reaction vessel walls or experimental apparatus.

The synthesized aqueous solutions, controls, and blanks were analyzed for concentrations of alkalinity, calcium, magnesium, potassium, sodium, strontium, and pH before equilibration with the sediment and for calcium, magnesium, strontium, and pH after equilibration with the sediment. Cation concentrations were determined on a Thermo Jarrell Ash Smith-Hieftje 1000-flame atomic-absorption spectrometer with AA/ThermoSPEC version 3.01 software; pH was measured with an Orion Research model 231 pH meter, and alkalinity was determined with a Hach digital titrator. Analyses of historical pond water sampled in 1986-88 (table 5), presented as supporting data in this report, were performed by the USGS National Water Quality Laboratory using analytical techniques prescribed by Skougstad and others (1979).

Derivation of the Strontium Distribution Coefficient Using Freundlich Isotherm Model

Equilibrium sorption of strontium onto sedimentary material can be described by the Freundlich sorption isotherm equation:

$$[Sr]_s = k\,[Sr]_{eq}^{\,n}, \qquad (1)$$

where

$[S]_s$ = concentration of strontium sorbed per unit mass of sediment, in milligrams per kilogram,

$[Sr]_{eq}$ = concentration of strontium in the equilibrium solution, in milligrams per liter, and

k and n = constants.

As n approaches 1, solute sorption approaches linearity and k approaches the value of the distribution coefficient (K_d) measured by the batch sorption experiments:

$$K_d = [Sr]_s / [Sr]_{eq} \qquad (2)$$

Equations [1] and [2] can be combined to describe the K_d as a function of the equilibrium solute concentrations:

$$K_d = k\,[Sr]_{eq}^{\,n-1} \qquad (3)$$

As n approaches 1, the K_d becomes less dependent on $[Sr]_{eq}$ and approaches k.

Values of $[Sr]_s$ were determined using assayed aqueous concentrations and ratios of solution to sediment used in experimentation:

$$[Sr]_s = \{[Sr]_i - [Sr]_{eq}\}\ V/M, \qquad (4)$$

where

$[Sr]_i$ = initial aqueous concentration of strontium in the solution before equilibration with the sediment, in milligrams per liter,

V = volume of solution, in milliliters, and

M = mass of sediment, in grams.

$[Sr]_s$ values were corrected for strontium desorbed from the sediment by performing a linear regression on $[Sr]_{eq}$ versus $[Sr]_s$ using the three smallest initial strontium concentrations. The y intercept of this regression was taken as an esti-

mate of strontium desorbed from the sediment and was added to each individual $[Sr]_s$ value.

Using calculated values for $[Sr]_s$ (equation 4) and measured values of $[Sr]_{eq}$, Freundlich isotherms were derived by first taking the natural logs of both sides of equation 1

$$\ln [Sr]_s = n \ln [Sr]_{eq} + \ln k, \qquad (5)$$

and then performing a linear regression to obtain *k* and n.

STRONTIUM DISTRIBUTION COEFFICIENTS OF SURFICIAL AND SEDIMENTARY INTERBED SAMPLES

Strontium Fruendlich constants, k and n, texture, and sampling intervals of 38 surficial and sedimentary interbed samples are listed in table 1. Strontium K_d's are listed in table 6. Sediment mass and initial and final concentrations of dissolved calcium, magnesium, strontium, and pH, and initial concentrations of dissolved potassium, sodium, and alkalinity for the samples, controls, and blanks are presented in table 7. Concentrations of all dissolved constituents in the control samples and blanks were generally close to expected amounts; however, final concentrations of dissolved strontium in many sample blanks were 0.02 mg/L. Final concentrations of dissolved strontium in two blanks were 0.08 and 0.09 mg/L. These concentrations probably were the result of a small amount of carryover from one sample to another due to incomplete flushing of the aspirator chamber during analysis, and analytical uncertainty. The analytical uncertainty for the elemental analyses is ±5 percent based on the relative standard deviation of replicate elemental analyses. Strontium concentrations in the blanks are considered too small to have any effect on the reported K_d's but may indicate that the reporting level for strontium is too low.

Measured strontium K_d's of the 38 surficial and sedimentary interbed samples at initial target strontium concentrations of 0, 1.0, 2.5 and 5.0 mg/L ranged from 26±1 to 328±41 mL/g (table 6); the median K_d was 90.5±2. Uncertainties for measured K_d's are the standard deviation of 3 replicate K_d determinations reported to the least significant figure. K_d's of surficial sediments ranged from 26±1 to 147±9 mL/g; the median K_d was 63±6. K_d's of the sedimentary interbeds ranged from 38±7 to 328±41 mL/g; the median K_d was 175.5±10. Minimum, maximum, and median K_d's were all larger for samples collected from sedimentary interbeds than for samples collected from surficial sediments.

The dependence of strontium K_d's on dissolved-strontium concentration is best represented by the Freundlich n constant. An n constant of 1 indicates no dependence. The more the n constant deviates from 1, the greater the dependence of the K_d on strontium concentration. Freundlich n constants ranged from 0.82 to 1.3 (table 1), a range that indicates variable dependence of strontium K_d's on strontium concentration among the samples tested. This dependence will have to be taken into account when developing strontium transport models (Del Debbio, 1989, p. 4–8).

Calculated K_d's deviated from measured K_d's by as much as 32 percent; however, the median deviation was only 6 percent. This indicates that the Freundlich isotherm model is adequate for determining K_d's for the majority of sediments tested. The deviation may be the result of inadequacy of the Freundlich isotherm in modeling data from these experiments or error in the experimental data themselves.

Data presented in this report indicate that there is significant variability in strontium K_d's of surficial and interbedded sediment at the INEEL. Some of this variability can be attributed to physical and chemical properties of the sediment itself; other variability may be due to compositional changes in the equilibrated solutions after being mixed with the sediment (Bunde, Rosentreter, and Liszewski, 1997). The synthesized aqueous solutions reacted with the sediment by dissolving mineral phases and desorbing mineral-surface constituents to establish a new chemical equilibrium between the solid and liquid phases. These reactions caused detectable changes in concentrations of major ions and other constituents. For example, initial concentrations of dissolved calcium and magnesium ranged from 8 to 12 and 1.6 to 2.2 mg/L, respectively; however, the final concentrations of these two constituents ranged from 9 to 37 and 2.4 to 7.2 mg/L, respectively (table 7). The extent to which variability in strontium K_d's can be explained by differing properties of either the sediment or solution is as yet

unquantified and could be the subject of future study.

The variability in strontium K_d's determined in this study has important implications relative to the transport of strontium beneath waste-disposal ponds at the INEEL. When other factors that affect transport are equal, sediment having large K_d's can be expected to effectively lessen strontium movement more than sediment having small K_d's. The results of this study should be used with caution when applied to radioactive strontium, which normally is present at concentrations far less than the concentrations of stable strontium discussed in this study.

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Table 1. Sample interval and texture, and Freundlich constants, k and n, of surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory

[Interval sampled is approximate depth below land surface at which sample was collected. Abbreviations: m, meter; SS, surficial sediment; IB, interbed. Texture descriptions are from Folk (1974, p. 28)]

Sample name	Interval sampled (m)	Texture	k	n
121-SS1	0.0-0.7	Slightly gravelly, muddy sand	93	1.0
121-SS2	.7-1.3	Gravelly, muddy sand	145	1.1
121-SS3	1.3-1.9	Slightly gravelly, muddy sand	144	1.0
121-SS4	3.4-4.0	Gravel	61	.97
121-SS5	4.0-4.6	Gravel	61	.99
121-SS6	4.6-5.2	Sandy gravel	56	.99
121-SS7	5.2-5.8	Gravel	57	1.1
121-SS8	5.8-6.4	Gravel	59	1.0
121-SS9	6.4-7.0	Sandy gravel	70	1.0
121-SS10	7.6-8.2	Sandy gravel	62	1.1
121-SS11	8.2-8.8	Sandy gravel	73	.93
121-IB1	122.2-122.3	Muddy, sandy gravel	140	.84
121-IB2	122.3-122.4	Muddy sand	163	.82
121-IB3	122.4-122.8	Sandy mud	210	.95
121-IB4	122.8-123.4	Sandy mud	167	.94
121-IB5	123.4-125.0	Gravelly, muddy sand	158	.97
121-IB6	125.0-126.0	Gravelly mud	154	.98
123-SS1	.0-0.61	Muddy, sandy gravel	112	1.1
123-SS2	.73-1.3	Muddy, sandy gravel	52	.89
123-SS3	1.3-1.8	Sandy gravel	40	.92
123-SS4	2.4-3.0	Sandy gravel	48	1.1
123-SS5	3.0-3.7	Sandy gravel	48	1.1
123-SS6	3.7-4.3	Sandy gravel	57	.84
123-SS7	4.3-4.9	Sandy gravel	61	1.1
123-SS8	4.9-5.5	Sandy gravel	58	.92
123-SS9	5.8-6.4	Sandy gravel	85	.96
123-SS10	7.2-7.8	Sandy gravel	70	1.3
123-IB1	32.3-32.7	Slightly gravelly, muddy sand	131	.85
123-IB2	32.7-33.4	Gravelly, muddy sand	238	.88

Table 1. Sample interval and texture, and Freundlich constants, k and n, of surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory—Continued

Sample name	Interval sampled (m)	Texture	k	n
123-IB3	33.4-34.3	Slightly gravelly, muddy sand	240	1.0
123-IB4	47.1-47.5	Slightly gravelly, muddy sand	60	1.1
123-IB5	47.5-48.1	Gravelly mud	204	.84
123-IB6	48.1-49.1	Gravelly, muddy sand	155	.89
RWMC-IB1	69.9-70.1	Muddy sand	109	1.0
TAN-IB1	125.0-125.1	Gravelly, muddy sand	173	1.0
TAN-IB2	125.9-126.1	Slightly gravelly, sandy mud	67	.84
TAN-IB3	135.6-135.7	Slightly gravelly, muddy sand	205	.90
TAN-IB4	136.1-136.2	Gravelly, muddy sand	130	.91

Table 2. Grain-size distribution of surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory

[All size intervals are in millimeters. Grain-size distribution determined using grain-size analysis-techniques described by Batholomay (1990). Abbreviations: >, greater than; <, less than]

Sample name	Grain-size distribution, in weight percent								
	>4.75	4.75-4.00	4.00-2.00	2.00-1.00	1.00-0.500	0.500-0.250	0.250-0.125	0.125-0.063	<0.063
121-SS1	0	0.5	1.4	2.5	3.8	14.7	26.9	21.5	28.8
121-SS2	0	0	6.4	8.4	9.7	10.3	10.9	13.9	40.5
121-SS3	0	0	2.1	3.1	4.4	17.8	21.9	17.9	32.8
121-SS4	75.5	1.3	5.7	2.8	3.4	6.7	2.7	1.0	1.1
121-SS5	74.2	1.7	4.6	2.6	3.6	8.3	3.1	1.0	.9
121-SS6	68.0	3.4	7.1	3.8	4.4	6.7	3.9	1.4	1.3
121-SS7	74.4	2.0	6.6	3.6	2.8	3.9	3.6	1.6	1.3
121-SS8	76.5	2.8	6.8	3.8	2.9	3.7	2.1	.7	.7
121-SS9	57.2	2.2	2.2	4.7	5.8	14.4	9.7	2.4	1.5
121-SS10	68.1	1.6	7.6	5.1	3.9	5.4	5.3	1.9	1.3
121-SS11	57.2	3.8	14.2	9.8	6.1	4.5	2.3	1.1	.9
121-IB1	0	41.0	3.2	6.1	8.1	11.3	10.3	9.4	10.6
121-IB2	0	0	0	1.1	11.0	25.6	18.1	16.1	28.1
121-IB3	0	0	0	1.1	5.2	10.7	14.0	13.8	55.1
121-IB4	0	0	0	.3	3.1	4.8	5.8	8.5	77.6
121-IB5	0	17	6.2	10.4	11.7	12.5	8.3	7.0	27.0
121-IB6	0	12.8	6.0	5.9	6.9	7.3	6.0	4.7	50.4
123-SS1	36.8	2.7	6.2	4.7	8.0	14.8	8.1	6.2	12.4
123-SS2	59.7	2.6	8.3	5.1	4.4	8.0	5.5	2.2	4.2
123-SS3	55.7	2.2	8.9	7.8	9.0	9.8	3.5	1.4	1.9
123-SS4	54.7	1.4	6.2	3.7	4.2	12.7	12.6	2.7	1.7
123-SS5	69.6	2.1	5.8	3.4	3.8	8.4	4.3	1.4	1.1
123-SS6	66.0	1.7	9.3	7.0	6.0	5.3	2.8	1.1	.9
123-SS7	62.4	1.9	8.7	6.2	6.4	8.8	4.2	.8	.6
123-SS8	50.0	2.0	7.8	7.9	8.6	13.2	6.7	2.3	1.6
123-SS9	54.6	2.0	10.0	8.8	8.8	8.0	4.0	1.9	1.9
123-SS10	65.2	2.1	9.2	7.1	5.3	4.8	2.9	1.7	1.6
123-IB1	0	0	2.6	13.5	24.4	21.2	13.4	9.4	15.5

Table 2. Grain-size distribution of surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory—Continued

Sample name	Grain-size distribution, in weight percent								
	>4.75	4.75-4.00	4.00-2.00	2.00-1.00	1.00-0.500	0.500-0.250	0.250-0.125	0.125-0.063	<0.063
123-IB2	0	1.0	16.4	23.0	19.2	12.6	7.5	5.4	14.9
123-IB3	0	0	2.5	12.1	15.8	13.2	9.6	7.2	39.5
123-IB4	0	1.1	2.4	5.2	11.3	21.8	21.2	11.8	25.3
123-IB5	0	6.6	12.0	10.6	8.4	8.2	6.3	4.1	43.7
123-IB6	0	7.3	2.3	4.0	6.6	9.7	12.2	21.6	36.2
RWMC-IB1	0	0	0	.9	4.8	8.7	16.3	38.9	30.5
TAN-IB1	0	1.9	4.3	10.9	11.7	12.0	13.5	17.6	28.1
TAN-IB2	0	.2	.2	.4	.7	1.9	13.9	18.2	64.3
TAN-IB3	0	.9	1.3	4.0	6.9	10.4	17.4	25.0	34.0
TAN-IB4	0	11.2	1.8	4.4	8.6	15.9	21.0	17.3	19.8

Table 3. Bulk mineralogy of surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory

[Bulk mineralogy determined using X-ray diffraction techniques (Reed and Bartholomay, 1994, p. 5-6). Abbreviations: Qz, quartz; Pg, plagioclase feldspar; Ksp, potassium feldspar; Cc, calcite; Tc, total clay minerals; Dol, Dolomite; Py, pyroxene; Ol, olivine; He, hematite]

Sample name	Bulk mineralogy, in weight percent								
	Qz	Pg	Ksp	Cc	Tc	Dol	Py	Ol	He
121-SS1	44	21	6	6	10	4	9	0	0
121-SS2	33	21	0	4	25	4	12	0	0
121-SS3	31	27	13	0	18	0	11	0	0
121-SS4	44	20	0	15	9	2	10	0	0
121-SS5	39	23	0	5	19	0	14	0	0
121-SS6	46	25	0	3	14	0	12	0	0
121-SS7	41	23	7	3	19	0	8	0	0
121-SS8	30	33	9	0	12	0	11	7	0
121-SS9	40	25	0	0	15	0	21	0	0
121-SS10	36	23	8	0	16	0	17	0	0
121-SS11	35	31	8	0	9	0	17	0	0
121-IB1	31	15	10	0	24	0	9	10	0
121-IB2	30	18	9	0	28	0	16	0	0
121-IB3	27	14	8	16	25	0	11	0	0
121-IB4	26	16	10	21	17	0	10	0	0
121-IB5	31	17	0	12	33	0	7	0	0
121-IB6	22	10	10	25	22	0	12	0	0
123-SS1	38	23	0	0	25	0	15	0	0
123-SS2	40	22	7	10	6	3	10	0	0
123-SS3	35	24	0	14	12	0	14	0	0
123-SS4	34	19	11	14	12	0	9	0	0
123-SS5	38	26	0	11	12	3	11	0	0
123-SS6	33	15	6	14	10	0	21	0	0
123-SS7	53	22	0	5	11	0	9	0	0
123-SS8	39	23	8	8	12	0	9	0	0
123-SS9	32	21	9	0	21	0	16	0	0
123-SS10	48	17	8	0	13	0	14	0	0
123-IB1	26	15	7	0	12	0	13	0	26

Table 3. Bulk mineralogy of surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory—Continued

Sample name	Bulk mineralogy, in weight percent								
	Qz	Pg	Ksp	Cc	Tc	Dol	Py	Ol	He
123-IB2	32	27	16	0	0	0	25	0	0
123-IB3	21	16	8	18	23	0	15	0	0
123-IB4	36	28	8	0	0	0	16	0	13
123-IB5	27	24	10	14	12	0	14	0	0
123-IB6	24	15	7	30	24	0	0	0	0
RWMC-IB1	42	20	10	2	8	0	18	0	0
TAN-IB1	12	8	0	60	20	0	0	0	0
TAN-IB2	18	2	0	68	12	0	0	0	0
TAN-IB3	6	9	18	52	16	0	0	0	0
TAN-IB4	9	7	0	65	15	4	0	0	0

Table 4. Target concentrations of alkalinity, calcium, magnesium, potassium, silica, sodium, strontium, and pH in the synthesized aqueous solutions used in the strontium batch experiments

[Alkalinity determined using digital titration with 0.16 normal sulfuric acid. Calcium, magnesium, potassium, sodium, and strontium concentrations determined by assay using atomic-absorption spectroscopy. Silica concentration determined by calculation on the basis of the amount added. Sodium concentrations include sodium additions from sodium bicarbonate, sodium hydroxide, and sodium silicate. Abbreviations: mg/L, milligrams per liter; $CaCO_3$, calcium carbonate; SiO_2, silicon dioxide]

Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Silica (mg/L as SiO_2)	Sodium (mg/L)	Strontium (mg/L)	pH
99	11	2.0	1.9	21	84	0.0	7.98
98	11	2.0	1.9	21	86	1.0	7.98
100	11	2.1	1.9	21	92	2.5	8.03
96	11	2.1	1.9	21	104	5.0	7.94

Table 5. Concentrations of alkalinity, calcium, magnesium, potassium, silica, sodium, strontium, and pH in samples collected from waste-disposal ponds at the Idaho Chemical Processing Plant

[Analyses were performed by the U.S. Geological Survey National Water Quality Laboratory using analytical techniques prescribed by Skougstad and others (1979). Abbreviations: mg/L, milligrams per liter; $CaCO_3$ calcium carbonate; SiO_2, silicon dioxide. Location of ponds shown on fig. 2]

Date sampled	Alkalinity (mg/L as $CaCO_3$)	Calcium (mg/L)	Magnesium (mg/L)	Potassium (mg/L)	Silica (mg/L as SiO_2)	Sodium (mg/L)	Strontium (mg/L)	pH
10/27/86	158	3.7	1.2	1.2	21	87	0.017	8.30
1/28/87	159	5.7	1.4	2.5	21	84	.029	8.29
10/26/87	150	9.7	2.5	1.6	21	88	.051	8.50
1/25/88	125	2.5	.65	.90	24	87	.012	8.00
4/26/88	103	67	29	2.8	21	92	.34	7.20
7/28/88	137	260	53	1.5	24	340	1.3	8.00
10/31/88	145	11	3.0	1.1	22	98	.057	8.00

Table 6. Measured and calculated strontium distribution coefficients of surficial and sedimentary interbed samples from the Idaho National Engineering and Environmental Laboratory

[Distribution coefficients (K_d's) are the average of 3 replicate determinations reported to the largest whole number. Uncertainties for measured K_d's are the standard deviation of three replicate determinations reported to the least significant figure of the K_d. Abbreviations: K_d, distribution coefficient; mg/L, milligrams per liter; mL/g, milliliters per gram]

Sample name	Initial target strontium concentration (mg/L)	Measured K_d (mL/g)	Calculated K_d (mL/g)
121-SS1	0.0	80±0	86
	1.0	99±5	89
	2.5	91±4	91
	5.0	90±4	93
121-SS2	.0	129±1	132
	1.0	141±14	135
	2.5	136±4	140
	5.0	145±8	143
121-SS3	.0	147±9	143
	1.0	137±5	143
	2.5	144±7	143
	5.0	146±3	144
121-SS4	.0	69±6	65
	1.0	55±6	63
	2.5	63±7	62
	5.0	64±2	60
121-SS5	.0	59±0	62
	1.0	66±1	61
	2.5	65±4	61
	5.0	56±2	61
121-SS6	.0	54±8	58
	1.0	63±4	57
	2.5	60±1	57
	5.0	51±1	56
121-SS7	.0	46±1	50
	1.0	63±10	54
	2.5	58±2	56
	5.0	53±3	58

Table 6. Measured and calculated strontium distribution coefficients of surficial and interbedded sediment samples from the Idaho National Engineering and Environmental Laboratory—Continued

Sample name	Initial target strontium concentration (mg/L)	Measured K_d (mL/g)	Calculated K_d (mL/g)
121-SS8	.0	54±1	56
	1.0	63±2	58
	2.5	60±4	59
	5.0	57±1	60
121-SS9	.0	65±1	70
	1.0	78±6	70
	2.5	75±3	70
	5.0	63±2	70
121-SS10	.0	45±0	50
	1.0	71±4	57
	2.5	64±0	61
	5.0	54±3	63
121-SS11	.0	86±1	87
	1.0	79±1	79
	2.5	81±3	75
	5.0	68±2	72
121-IB1	.0	192±43	203
	1.0	169±15	179
	2.5	197±31	168
	5.0	150±45	148
121-IB2	.0	231±13	262
	1.0	253±33	229
	2.5	246±26	205
	5.0	156±4	180
121-IB3	.0	208±1	214
	1.0	208±29	206
	2.5	214±17	200
	5.0	189±20	195
121-IB4	.0	188±8	188
	1.0	145±15	180
	2.5	226±27	179
	5.0	172±17	172

Table 6. Measured and calculated strontium distribution coefficients of surficial and interbedded sediment samples from the Idaho National Engineering and Environmental Laboratory—Continued

Sample name	Initial target strontium concentration (mg/L)	Measured K_d (mL/g)	Calculated K_d (mL/g)
121-IB5	.0	159±53	174
	1.0	194±37	168
	2.5	181±11	164
	5.0	146±24	161
121-IB6	.0	136±25	161
	1.0	197±21	159
	2.5	166±7	157
	5.0	144±12	155
123-SS1	.0	91±0	93
	1.0	106±18	99
	2.5	99±5	106
	5.0	115±6	111
123-SS2	.0	62±5	66
	1.0	61±4	59
	2.5	61±3	54
	5.0	44±3	49
123-SS3	.0	47±2	48
	1.0	42±2	43
	2.5	44±2	40
	5.0	36±3	38
123-SS4	.0	41±9	43
	1.0	49±2	46
	2.5	46±2	48
	5.0	50±6	49
123-SS5	.0	32±5	42
	1.0	64±4	45
	2.5	53±3	47
	5.0	40±4	50
123-SS6	.0	85±14	85
	1.0	60±5	66
	2.5	71±3	61
	5.0	50±2	53

Table 6. Measured and calculated strontium distribution coefficients of surficial and interbedded sediment samples from the Idaho National Engineering and Environmental Laboratory—Continued

Sample name	Initial target strontium concentration (mg/L)	Measured K_d (mL/g)	Calculated K_d (mL/g)
123-SS7	.0	48±7	53
	1.0	67±6	56
	2.5	61±8	59
	5.0	58±3	62
123-SS8	.0	69±22	70
	1.0	63±11	63
	2.5	65±2	59
	5.0	55±8	57
123-SS9	.0	97±35	94
	1.0	88±3	90
	2.5	90±4	87
	5.0	87±5	85
123-SS10	.0	26±1	31
	1.0	72±8	49
	2.5	61±2	63
	5.0	63±2	74
123-IB1	.0	176±18	180
	1.0	161±15	163
	2.5	161±21	146
	5.0	128±13	134
123-IB2	.0	275±45	289
	1.0	284±21	279
	2.5	290±25	268
	5.0	246±8	252
123-IB3	.0	237±53	232
	1.0	219±35	234
	2.5	242±14	236
	5.0	250±5	237
123-IB4	.0	38±7	49
	1.0	80±17	54
	2.5	69±6	59
	5.0	49±5	62

Table 6. Measured and calculated strontium distribution coefficients of surficial and interbedded sediment samples from the Idaho National Engineering and Environmental Laboratory—Continued

Sample name	Initial target strontium concentration (mg/L)	Measured K_d (mL/g)	Calculated K_d (mL/g)
123-IB5	.0	292±45	293
	1.0	233±14	262
	2.5	294±25	252
	5.0	220±24	223
123-IB6	.0	222±5	209
	1.0	161±20	189
	2.5	197±23	174
	5.0	163±20	163
RWMC-IB1	.0	98±33	100
	1.0	112±17	104
	2.5	110±8	107
	5.0	107±8	109
TAN-IB1	.0	151±43	153
	1.0	167±11	159
	2.5	159±7	164
	5.0	175±9	169
TAN-IB2	.0	119±68	116
	1.0	85±14	86
	2.5	89±7	76
	5.0	62±3	66
TAN-IB3	.0	215±31	272
	1.0	328±41	259
	2.5	277±25	240
	5.0	195±10	221
TAN-IB4	.0	199±47	177
	1.0	146±23	154
	2.5	165±7	144
	5.0	128±8	135

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions

[Sample set refers to all the samples associated with the determination of a single distribution coefficient. Sample numbers 1-3, 5-7, 9-11, and 13-15 represent triplicate experiments at each of 4 strontium concentrations. Sample type 1 refers to regular samples containing sediment and synthesized aqueous solution, type 2 refers to control samples containing only synthesized aqueous solution without sediment, and type 3 (samples numbered 17) refers to a blank sample containing only deionized water. Sediment mass is mixed with 20.0 milliliters of synthesized aqueous solution. Initial concentrations are concentrations of each constituent in the synthesized aqueous solution before mixing with the sediment. Initial concentrations for sample numbers, 4, 8, 12, and 16 (control samples) are those determined for the synthesized aqueous solution before experiments began. Initial concentrations for potassium and sodium for sample numbers 1-3, 5-7, 9-11, and 13-15 (regular samples) are those determined for the synthesized aqueous solution before experiments began. Initial concentrations for calcium, magnesium, and strontium for sample numbers 1-3, 5-7, 9-11, and 13-15 (regular samples) were determined on the basis of the final concentrations of the control samples measured after the conclusion of the experiments. This determination assumes that any changes in solution concentrations that occurred during the experiments in the control samples also occurred in the regular samples. Final concentrations are of dissolved constituents after being equilibrated with the sediment for a period of 144 hours. Alkalinity is reported as mass equivalents of calcium carbonate. Calcium, magnesium, potassium, strontium, and sodium concentrations were determined by assay using atomic-absorption spectroscopy. Abbreviations: mg/L, milligrams per liter, <, less than; --, data not available]

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS1	1	1	.981	10	35	1.8	4.8	-.03	.12	1.9	84	92	8.20	8.22
	2	1	.985	10	34	1.8	4.9	-.03	.12	1.9	84	92	8.20	8.25
	3	1	.978	10	32	1.8	4.8	-.03	.12	1.9	84	92	8.20	8.16
	5	1	.922	9	33	1.8	5.3	1.0	.29	1.9	86	91	8.17	8.13
	6	1	.998	9	34	1.8	4.9	1.0	.29	1.9	86	91	8.17	8.19
	7	1	1.014	9	31	1.8	4.8	1.0	.26	1.9	86	91	8.17	8.22
	9	1	.987	10	36	1.8	5.1	2.5	.59	1.9	92	93	8.19	8.19
	10	1	.982	10	37	1.8	5.1	2.5	.60	1.9	92	93	8.19	8.20
	11	1	.981	10	34	1.8	4.9	2.5	.56	1.9	92	93	8.19	8.23
	13	1	.959	10	35	1.8	4.9	4.8	1.0	1.9	104	88	8.07	8.21
	14	1	.955	10	36	1.8	5.0	4.8	1.0	1.9	104	88	8.07	8.20
	15	1	1.035	10	37	1.8	5.3	4.8	1.0	1.9	104	88	8.07	8.12
	4	2	none	11	10	1.7	1.8	.0	-.03	1.9	84	92	7.96	8.20
	8	2	none	11	9	1.8	1.8	1.1	1.0	1.9	86	91	7.95	8.17

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS1	12	2	none	11	10	1.8	1.8	2.6	2.5	1.9	92	93	7.98	8.19
	16	2	none	11	10	1.7	1.8	5.2	4.8	1.9	104	88	7.98	8.07
	17	3	none	0	0	.0	.0	.0	-.02	<.1	<.1	--	--	6.16
121 SS2	1	1	.944	9	30	1.8	6.5	.00	.17	1.9	84	92	8.05	8.20
	2	1	1.009	9	32	1.8	7.2	.00	.17	1.9	84	92	8.05	8.13
	3	1	1.071	9	32	1.8	7.0	.00	.17	1.9	84	92	8.05	8.08
	5	1	.968	9	31	1.8	6.6	.83	.27	1.9	86	91	8.18	8.17
	6	1	.940	9	32	1.8	6.6	.83	.29	1.9	86	91	8.18	8.18
	7	1	.924	9	31	1.8	7.1	.83	.25	1.9	86	91	8.18	8.13
	9	1	1.005	10	34	1.8	7.2	2.6	.51	1.9	92	93	8.20	8.17
	10	1	1.025	10	33	1.8	6.6	2.6	.48	1.9	92	93	8.20	8.15
	11	1	1.035	10	35	1.8	7.2	2.6	.48	1.9	92	93	8.20	8.11
	13	1	.947	10	33	1.7	6.9	5.1	.79	1.9	104	88	8.20	8.01
	14	1	.916	10	32	1.7	6.7	5.1	.79	1.9	104	88	8.20	8.22
	15	1	.969	10	35	1.7	7.2	5.1	.84	1.9	104	88	8.20	8.23
	4	2	none	11	9	1.7	1.8	.0	.00	1.9	84	92	7.96	8.05
	8	2	none	11	9	1.8	1.8	1.1	.83	1.9	86	91	7.95	8.18
	12	2	none	11	10	1.8	1.8	2.6	2.6	1.9	92	93	7.98	8.20
	16	2	none	11	10	1.7	1.7	5.2	5.1	1.9	104	88	7.98	8.20
	17	3	none	0	0	.0	.0	.0	-.01	<.1	<.1	--	--	6.14

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS3	1	1	.961	11	25	1.8	4.5	.04	.15	1.9	84	92	8.19	8.14
	2	1	1.027	11	25	1.8	4.7	.04	.15	1.9	84	92	8.19	8.17
	3	1	1.020	11	25	1.8	4.6	.04	.17	1.9	84	92	8.19	8.15
	5	1	1.048	11	26	1.8	4.7	1.0	.30	1.9	86	91	8.22	8.15
	6	1	.956	11	25	1.8	4.5	1.0	.30	1.9	86	91	8.22	8.16
	7	1	1.020	11	25	1.8	4.6	1.0	.28	1.9	86	91	8.22	8.15
	9	1	.932	10	25	1.8	4.6	2.5	.47	1.9	92	93	8.24	8.13
	10	1	.976	10	25	1.8	4.7	2.5	.49	1.9	92	93	8.24	8.15
	11	1	1.057	10	25	1.8	4.7	2.5	.47	1.9	92	93	8.24	8.08
	13	1	1.057	11	26	1.8	4.9	5.5	.79	1.9	104	88	8.23	8.16
	14	1	.948	11	26	1.8	4.8	5.5	.83	1.9	104	88	8.23	8.15
	15	1	.986	11	26	1.8	4.9	5.5	.83	1.9	104	88	8.23	8.11
	4	2	none	11	11	1.7	1.8	.0	.04	1.9	84	92	7.96	8.19
	8	2	none	11	11	1.8	1.8	1.1	1.0	1.9	86	91	7.95	8.22
	12	2	none	11	10	1.8	1.8	2.6	2.5	1.9	92	93	7.98	8.24
	16	2	none	11	11	1.7	1.8	5.2	5.5	1.9	104	88	7.98	8.23
	17	3	none	0	0	.0	.0	.0	.08	<.1	<.1	--	--	6.28
121 SS4	1	1	.941	10	18	1.7	3.3	.06	.11	1.9	84	92	8.21	8.18
	2	1	1.194	10	18	1.7	3.5	.06	.13	1.9	84	92	8.21	8.19
	3	1	.855	10	17	1.7	3.1	.06	.11	1.9	84	92	8.21	8.2
	5	1	.968	10	17	1.7	3.1	1.1	.44	1.9	86	91	8.12	8.23

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS4	6	1	1.133	10	19	1.7	3.0	1.1	.42	1.9	86	91	8.12	8.3
	7	1	.918	10	17	1.7	2.9	1.1	.40	1.9	86	91	8.12	8.2
	9	1	.977	10	15	1.8	3.0	2.6	.70	1.9	92	93	8.12	8.2
	10	1	.989	10	18	1.8	3.2	2.6	.81	1.9	92	93	8.12	8.27
	11	1	.811	10	17	1.8	3.0	2.6	.85	1.9	92	93	8.12	8.18
	13	1	.859	10	18	1.8	3.1	6.0	1.7	1.9	104	88	8.12	8.19
	14	1	1.068	10	18	1.8	3.2	6.0	1.5	1.9	104	88	8.12	8.18
	15	1	1.007	10	18	1.8	3.4	6.0	1.6	1.9	104	88	8.12	8.22
	4	2	none	11	10	1.7	1.7	.0	.06	1.9	84	92	7.96	8.21
	8	2	none	11	10	1.8	1.7	1.1	1.1	1.9	86	91	7.95	8.12
	12	2	none	11	10	1.8	1.8	2.6	2.6	1.9	92	93	7.98	8.12
	16	2	none	11	10	1.7	1.8	5.2	6.0	1.9	104	88	7.98	8.12
	17	3	none	0	0	.0	.0	-.02	.09	<.1	<.1	--	--	6.23
121 SS5	1	1	.981	10	15	1.7	2.9	-.02	.07	1.9	84	92	8.02	8.02
	2	1	.979	10	15	1.7	2.7	-.02	.07	1.9	84	92	8.02	8.03
	3	1	.988	10	15	1.7	2.9	-.02	.07	1.9	84	92	8.02	8.01
	5	1	.939	10	15	1.7	2.8	1.0	.31	1.9	86	91	8.13	8.09
	6	1	.910	10	15	1.7	2.7	1.0	.32	1.9	86	91	8.13	8.14
	7	1	.981	10	15	1.7	2.8	1.0	.31	1.9	86	91	8.13	8.16
	9	1	.968	10	15	1.8	3.0	2.5	.71	1.9	92	93	8.20	8.18
	10	1	.937	10	15	1.8	2.9	2.5	.67	1.9	92	93	8.20	8.17

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS5	11	1	1.032	10	15	1.8	2.9	2.5	.62	1.9	92	93	8.20	8.16
	13	1	.944	10	16	1.8	2.9	4.8	1.4	1.9	104	88	8.20	8.21
	14	1	.967	10	16	1.8	2.9	4.8	1.4	1.9	104	88	8.20	8.15
	15	1	1.031	10	16	1.8	3.0	4.8	1.3	1.9	104	88	8.20	8.19
	4	2	none	11	10	1.7	1.7	.0	-.02	1.9	84	92	7.96	8.02
	8	2	none	11	10	1.8	1.7	1.1	1.0	1.9	86	91	7.95	8.13
	12	2	none	11	10	1.8	1.8	2.6	2.5	1.9	92	93	7.98	8.20
	16	2	none	11	10	1.7	1.8	5.2	4.8	1.9	104	88	7.98	8.20
	17	3	none	0	0	.0	.0	.0	-.04	<.1	<.1	--	--	6.32
121 SS6	1	1	.958	10	14	1.8	3.0	.00	.05	1.9	84	92	8.20	8.24
	2	1	1.057	10	15	1.8	3.0	.00	.07	1.9	84	92	8.20	8.22
	3	1	.888	10	14	1.8	2.8	.00	.05	1.9	84	92	8.20	8.20
	5	1	1.016	10	15	1.8	2.9	.97	.29	1.9	86	91	8.20	8.20
	6	1	1.031	10	15	1.8	2.8	.97	.28	1.9	86	91	8.20	8.18
	7	1	1.007	10	15	1.8	2.9	.97	.27	1.9	86	91	8.20	8.23
	9	1	.885	10	15	1.8	3.0	2.4	.70	1.9	92	93	8.13	8.18
	10	1	1.072	10	15	1.8	3.0	2.4	.63	1.9	92	93	8.13	8.17
	11	1	.891	10	14	1.8	3.2	2.4	.71	1.9	92	93	8.13	8.15
	13	1	.943	10	15	1.7	3.2	4.6	1.4	1.9	104	88	8.12	8.14
	14	1	.967	10	16	1.7	3.2	4.6	1.3	1.9	104	88	8.12	8.11
	15	1	1.044	10	15	1.7	3.2	4.6	1.3	1.9	104	88	8.12	8.17

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS6	4	2	none	11	10	1.7	1.8	.0	.00	1.9	84	92	7.96	8.20
	8	2	none	11	10	1.8	1.8	1.1	.97	1.9	86	91	7.95	8.20
	12	2	none	11	10	1.8	1.8	2.6	2.4	1.9	92	93	7.98	8.13
	16	2	none	11	10	1.7	1.7	5.2	4.6	1.9	104	88	7.98	8.12
	17	3	none	0	0	.0	.0	.0	.02	<.1	<.1	--	--	6.32
121 SS7	1	1	.850	11	16	2.1	3.1	.00	.08	1.9	84	92	8.16	8.12
	2	1	.896	11	16	2.1	3.1	.00	.08	1.9	84	92	8.16	8.18
	3	1	.930	11	16	2.1	3.1	.00	.08	1.9	84	92	8.16	8.14
	5	1	.963	11	14	2.2	2.9	1.0	.28	1.9	86	91	8.15	8.18
	6	1	.961	11	16	2.2	3.2	1.0	.36	1.9	86	91	8.15	8.16
	7	1	.938	11	16	2.2	3.2	1.0	.33	1.9	86	91	8.15	8.16
	9	1	.915	11	16	1.9	2.9	2.6	.79	1.9	92	93	8.12	8.17
	10	1	.965	11	17	1.9	2.9	2.6	.75	1.9	92	93	8.12	8.14
	11	1	.979	11	17	1.9	2.9	2.6	.78	1.9	92	93	8.12	8.16
	13	1	.891	11	17	1.9	3.0	5.0	1.62	1.9	104	88	8.12	8.13
	14	1	.955	11	17	1.9	3.1	5.0	1.42	1.9	104	88	8.12	8.14
	15	1	1.010	11	17	1.9	3.1	5.0	1.45	1.9	104	88	8.12	8.16
	4	2	none	11	11	1.7	2.1	.0	.00	1.9	84	92	8.03	8.16
	8	2	none	11	11	1.8	2.2	1.1	1.0	1.9	86	91	8.05	8.15
	12	2	none	11	11	1.8	1.9	2.6	2.6	1.9	92	93	7.99	8.12
	16	2	none	11	11	1.7	1.9	5.2	5.0	1.9	104	88	8.05	8.12

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS7	17	3	none	0	0	.0	.0	.0	-.01	<.1	<.1	--	--	6.43
121 SS8	1	1	.982	11	16	1.8	2.8	.00	.06	1.9	84	92	8.11	8.15
	2	1	1.108	11	16	1.8	2.9	.00	.06	1.9	84	92	8.11	8.14
	3	1	.984	11	16	1.8	2.7	.00	.06	1.9	84	92	8.11	8.17
	5	1	.953	11	16	1.8	2.7	.95	.30	1.9	86	91	8.14	8.16
	6	1	.887	11	16	1.8	2.7	.95	.30	1.9	86	91	8.14	8.14
	7	1	.867	11	16	1.8	2.6	.95	.30	1.9	86	91	8.14	8.17
	9	1	1.129	11	17	1.7	2.9	2.4	.65	1.9	92	93	8.14	8.19
	10	1	1.123	11	16	1.7	2.9	2.4	.62	1.9	92	93	8.14	8.15
	11	1	.832	11	16	1.7	2.8	2.4	.72	1.9	92	93	8.14	8.17
	13	1	.845	11	16	1.7	2.9	4.6	1.4	1.9	104	88	8.17	8.13
	14	1	1.041	11	17	1.7	2.8	4.6	1.2	1.9	104	88	8.17	8.12
	15	1	.876	11	17	1.7	2.8	4.6	1.4	1.9	104	88	8.17	8.14
	4	2	none	11	11	1.7	1.8	.0	.00	1.9	84	92	8.03	8.11
	8	2	none	11	11	1.8	1.8	1.1	.95	1.9	86	91	8.05	8.14
	12	2	none	11	11	1.8	1.7	2.6	2.4	1.9	92	93	7.99	8.14
	16	2	none	11	11	1.7	1.7	5.2	4.6	1.9	104	88	8.05	8.17
	17	3	none	0	0	.0	.0	.0	-.01	<.1	<.1	--	--	6.43
121 SS9	1	1	1.030	11	16	1.8	2.8	-.01	.05	1.9	84	92	8.14	8.12
	2	1	.940	11	16	1.8	2.7	-.01	.05	1.9	84	92	8.14	8.14
	3	1	1.036	11	16	1.8	2.8	-.01	.05	1.9	84	92	8.14	8.15

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS9	5	1	1.005	11	16	1.8	2.8	.92	.25	1.9	86	91	8.14	8.13
	6	1	1.001	11	15	1.8	2.8	.92	.23	1.9	86	91	8.14	8.15
	7	1	1.018	11	16	1.8	2.8	.92	.23	1.9	86	91	8.14	8.16
	9	1	.962	11	16	1.8	2.9	2.5	.59	1.9	92	93	8.16	8.09
	10	1	.943	11	15	1.8	2.8	2.5	.60	1.9	92	93	8.16	8.15
	11	1	1.011	11	16	1.8	2.9	2.5	.60	1.9	92	93	8.16	8.14
	13	1	1.069	11	17	1.7	3.3	4.6	1.1	1.9	104	88	8.17	8.13
	14	1	.923	11	17	1.7	3.2	4.6	1.2	1.9	104	88	8.17	8.20
	15	1	1.039	11	16	1.7	3.3	4.6	1.1	1.9	104	88	8.17	8.15
	4	2	none	11	11	1.7	1.8	.0	-.01	1.9	84	92	8.03	8.14
	8	2	none	11	11	1.8	1.8	1.1	.92	1.9	86	91	8.05	8.14
	12	2	none	11	11	1.8	1.8	2.6	2.5	1.9	92	93	7.99	8.16
	16	2	none	11	11	1.7	1.7	5.2	4.6	1.9	104	88	8.05	8.17
	17	3	none	0	0	.0	.0	.0	-.04	<.1	<.1	--	--	6.53
121 SS10	1	1	.972	11	15	1.8	2.7	-.02	.05	1.9	84	92	8.14	8.12
	2	1	.954	11	15	1.8	2.7	-.02	.05	1.9	84	92	8.14	8.13
	3	1	.961	11	15	1.8	2.8	-.02	.05	1.9	84	92	8.14	8.13
	5	1	.960	11	16	1.8	2.7	.98	.27	1.9	86	91	8.16	8.14
	6	1	.908	11	16	1.8	2.7	.98	.28	1.9	86	91	8.16	8.16
	7	1	1.046	11	16	1.8	2.8	.98	.24	1.9	86	91	8.16	8.13
	9	1	.967	11	16	1.7	2.8	2.5	.64	1.9	92	93	8.18	8.15

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS10	10	1	.878	11	15	1.7	2.7	2.5	.69	1.9	92	93	8.18	8.14
	11	1	.990	11	16	1.7	2.8	2.5	.63	1.9	92	93	8.18	8.13
	13	1	1.089	11	17	1.7	2.9	4.7	1.2	1.9	104	88	8.17	8.14
	14	1	1.086	11	17	1.7	2.9	4.7	1.3	1.9	104	88	8.17	8.16
	15	1	1.124	11	17	1.7	2.9	4.7	1.2	1.9	104	88	8.17	8.13
	4	2	none	11	11	1.7	1.8	.0	-.02	1.9	84	92	8.03	8.14
	8	2	none	11	11	1.8	1.8	1.1	.98	1.9	86	91	8.05	8.16
	12	2	none	11	11	1.8	1.7	2.6	2.5	1.9	92	93	7.99	8.18
	16	2	none	11	11	1.7	1.7	5.2	4.7	1.9	104	88	8.05	8.17
	17	3	none	0	0	.0	.0	.0	-.02	<.1	<.1	--	--	6.36
121 SS11	1	1	.969	11	16	1.7	2.9	-.01	.07	1.9	84	92	8.14	8.13
	2	1	1.094	11	15	1.7	2.8	-.01	.07	1.9	84	92	8.14	8.15
	3	1	1.062	11	16	1.7	2.8	-.01	.07	1.9	84	92	8.14	8.18
	5	1	.935	11	16	1.8	2.7	1.0	.30	1.9	86	91	8.19	8.21
	6	1	.914	11	16	1.8	2.8	1.0	.30	1.9	86	91	8.19	8.17
	7	1	1.119	11	16	1.8	2.8	1.0	.26	1.9	86	91	8.19	8.18
	9	1	1.050	11	17	1.7	2.9	2.6	.58	1.9	92	93	8.14	8.19
	10	1	.823	11	16	1.7	2.7	2.6	.66	1.9	92	93	8.14	8.17
	11	1	.819	11	16	1.7	3.1	2.6	.66	1.9	92	93	8.14	8.16
	13	1	.954	11	17	1.7	3.1	5.1	1.3	1.9	104	88	8.06	8.13
	14	1	.877	11	16	1.7	3.0	5.1	1.3	1.9	104	88	8.06	8.12

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 SS11	15	1	1.053	11	17	1.7	3.1	5.1	1.2	1.9	104	88	8.06	8.12
	4	2	none	11	11	1.7	1.7	.0	-.01	1.9	84	92	8.03	8.14
	8	2	none	11	11	1.8	1.8	1.1	1.0	1.9	86	91	8.05	8.19
	12	2	none	11	11	1.8	1.7	2.6	2.6	1.9	92	93	7.99	8.14
	16	2	none	11	11	1.7	1.7	5.2	5.1	1.9	104	88	8.05	8.06
	17	3	none	0	0	.0	.0	.0	-.01	<.1	<.1	--	--	6.36
121 IB1	1	1	0.804	9	14	1.8	3.6	.05	.08	1.9	84	99	8.21	8.26
	2	1	.830	9	14	1.8	3.6	.05	.12	1.9	84	99	8.21	8.31
	3	1	.920	9	15	1.8	3.7	.05	.11	1.9	84	99	8.21	8.28
	5	1	.839	10	14	1.8	3.4	1.0	.21	1.9	86	98	8.09	8.25
	6	1	1.005	10	14	1.8	3.6	1.0	.23	1.9	86	98	8.09	8.20
	7	1	.855	10	14	1.8	3.7	1.0	.23	1.9	86	98	8.09	8.30
	9	1	.880	9	15	1.8	4.0	2.2	.28	1.9	92	100	8.26	8.21
	10	1	.805	9	15	1.8	3.6	2.2	.35	1.9	92	100	8.26	8.31
	11	1	.932	9	15	1.8	3.8	2.2	.36	1.9	92	100	8.26	8.38
	13	1	.918	10	16	1.9	4.1	4.4	.64	1.9	104	96	8.25	8.22
	14	1	.846	10	16	1.9	3.8	4.4	.99	1.9	104	96	8.25	8.37
	15	1	.835	10	16	1.9	4.0	4.4	.59	1.9	104	96	8.25	8.29
	4	2	none	11	9	2.1	1.8	.0	.05	1.9	84	99	8.01	8.21
	8	2	none	11	10	1.7	1.8	1.0	1.0	1.9	86	98	7.98	8.09
	12	2	none	11	9	2.0	1.8	2.3	2.2	1.9	92	100	7.95	8.26

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 IB1	16	2	none	11	10	2.1	1.9	4.6	4.4	1.9	104	96	8.00	8.25
	17	3	none	0	0	.0	.0	.0	.05	<.1	<.1	--	--	6.14
121 IB2	1	1	.880	10	16	2.0	3.6	-.04	.08	1.9	84	99	8.19	8.27
	2	1	1.030	10	16	2.0	3.8	-.04	.07	1.9	84	99	8.19	8.19
	3	1	1.183	10	17	2.0	4.1	-.04	.08	1.9	84	99	8.19	8.18
	5	1	.933	9	15	1.8	3.9	1.1	.14	1.9	86	98	8.23	8.17
	6	1	.831	9	15	1.8	3.4	1.1	.18	1.9	86	98	8.23	8.22
	7	1	.981	9	17	1.8	4.0	1.1	.15	1.9	86	98	8.23	8.21
	9	1	.970	9	15	1.9	3.8	2.7	.29	1.9	92	100	8.21	8.28
	10	1	.847	9	15	1.9	3.6	2.7	.28	1.9	92	100	8.21	8.23
	11	1	1.029	9	15	1.9	4.0	2.7	.30	1.9	92	100	8.21	8.32
	13	1	.830	9	16	2.0	4.0	4.0	.65	1.9	104	96	8.23	8.19
	14	1	1.115	9	16	2.0	4.3	4.0	.53	1.9	104	96	8.23	8.22
	15	1	.954	9	16	2.0	4.2	4.0	.57	1.9	104	96	8.23	8.26
	4	2	none	11	10	2.1	2.0	.0	-.04	1.9	84	99	8.01	8.19
	8	2	none	11	9	1.7	1.8	1.0	1.1	1.9	86	98	7.98	8.23
	12	2	none	11	9	2.0	1.9	2.3	2.7	1.9	92	100	7.95	8.21
	16	2	none	11	9	2.1	2.0	4.6	4.0	1.9	104	96	8.00	8.23
	17	3	none	0	0	.0	.0	.0	-.03	<.1	<.1	--	--	6.18
121 IB3	1	1	1.154	10	16	1.9	4.4	-.04	.08	1.9	84	99	8.28	8.31
	2	1	.903	10	17	1.9	4.4	-.04	.08	1.9	84	99	8.28	8.24

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 IB3	3	1	1.087	10	17	1.9	4.4	-.04	.08	1.9	84	99	8.28	8.25
	5	1	.838	10	17	2.1	4.2	.96	.21	1.9	86	98	8.31	8.35
	6	1	.835	10	17	2.1	4.1	.96	.18	1.9	86	98	8.31	8.29
	7	1	.891	10	17	2.1	4.0	.96	.16	1.9	86	98	8.31	8.38
	9	1	.906	10	16	1.8	3.9	2.7	.36	1.9	92	100	8.28	8.29
	10	1	.870	10	16	1.8	4.0	2.7	.34	1.9	92	100	8.28	8.34
	11	1	.932	10	16	1.8	3.7	2.7	.31	1.9	92	100	8.28	8.25
	13	1	.975	10	17	1.9	4.3	5.4	.57	1.9	104	96	8.17	8.25
	14	1	.952	10	19	1.9	4.6	5.4	.61	1.9	104	96	8.17	8.17
	15	1	.940	10	18	1.9	4.6	5.4	.71	1.9	104	96	8.17	8.13
	4	2	none	11	10	2.1	1.9	.0	-.04	1.9	84	99	8.01	8.28
	8	2	none	11	10	1.7	2.1	1.0	.96	1.9	86	98	7.98	8.31
	12	2	none	11	10	2.0	1.8	2.3	2.7	1.9	92	100	7.95	8.28
	16	2	none	11	10	2.1	1.9	4.6	5.4	1.9	104	96	8.00	8.17
	17	3	none	0	0	.0	.0	.0	.04	<.1	<.1	--	--	6.16
121 IB4	1	1	1.044	11	20	2.1	4.1	.09	.13	1.9	84	99	8.29	8.23
	2	1	.888	11	20	2.1	3.9	.09	.12	1.9	84	99	8.29	8.29
	3	1	.821	11	19	2.1	3.8	.09	.13	1.9	84	99	8.29	8.31
	5	1	.867	11	18	2.0	4.1	.97	.27	1.9	86	98	8.19	8.29
	6	1	.811	11	18	2.0	4.0	.97	.26	1.9	86	98	8.19	8.28
	7	1	1.036	11	20	2.0	4.0	.97	.29	1.9	86	98	8.19	8.40

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 IB4	9	1	.970	11	20	2.2	4.4	2.4	.26	1.9	92	100	8.14	8.23
	10	1	.829	11	20	2.2	4.1	2.4	.35	1.9	92	100	8.14	8.25
	11	1	1.234	11	19	2.2	4.0	2.4	.27	1.9	92	100	8.14	8.23
	13	1	1.008	11	20	2.1	4.9	4.7	.63	1.9	104	96	8.18	8.12
	14	1	1.271	11	24	2.1	5.1	4.7	.56	1.9	104	96	8.18	8.17
	15	1	.896	11	19	2.1	4.6	4.7	.60	1.9	104	96	8.18	8.18
	4	2	none	11	11	2.1	2.1	.0	.09	1.9	84	99	8.00	8.29
	8	2	none	11	11	1.7	2.0	1.0	.97	1.9	86	98	7.94	8.19
	12	2	none	11	11	2.0	2.2	2.3	2.4	1.9	92	100	7.93	8.14
	16	2	none	11	11	2.1	2.1	4.6	4.7	1.9	104	96	8.06	8.18
	17	3	none	0	0	.0	.0	.0	.01	<.1	<.1	--	--	6.14
121 IB5	1	1	.858	11	18	2.0	3.8	-.07	.04	1.9	84	99	8.22	8.29
	2	1	1.038	11	18	2.0	4.3	-.07	.03	1.9	84	99	8.22	8.21
	3	1	.886	11	18	2.0	4.2	-.07	.05	1.9	84	99	8.22	8.31
	5	1	.881	10	18	1.9	4.2	.94	.12	1.9	86	98	8.18	8.27
	6	1	.820	10	19	1.9	4.1	.94	.13	1.9	86	98	8.18	8.29
	7	1	.922	10	18	1.9	4.3	.94	.17	1.9	86	98	8.18	8.15
	9	1	1.008	11	18	2.0	4.3	2.7	.33	1.9	92	100	8.24	8.29
	10	1	1.090	11	21	2.0	4.6	2.7	.28	1.9	92	100	8.24	8.26
	11	1	.936	11	20	2.0	4.4	2.7	.32	1.9	92	100	8.24	8.20
	13	1	1.269	10	22	2.2	4.8	4.6	.51	1.9	104	96	8.25	8.23

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 IB5	14	1	.898	10	21	2.2	4.2	4.6	.58	1.9	104	96	8.25	8.23
	15	1	1.092	10	19	2.2	4.4	4.6	.66	1.9	104	96	8.25	8.25
	4	2	none	11	11	2.1	2.0	.0	-.07	1.9	84	99	8.00	8.22
	8	2	none	11	10	1.7	1.9	1.0	.94	1.9	86	98	7.94	8.18
	12	2	none	11	11	2.0	2.0	2.3	2.7	1.9	92	100	7.93	8.24
	16	2	none	11	10	2.1	2.2	4.6	4.6	1.9	104	96	8.06	8.25
	17	3	none	0	0	.0	.0	.0	-.01	<.1	<.1	--	--	6.37
121 IB6	1	1	1.089	10	23	1.8	4.8	-.01	.10	1.9	84	99	8.31	8.29
	2	1	1.130	10	21	1.8	4.8	-.01	.09	1.9	84	99	8.31	8.26
	3	1	.971	10	24	1.8	5.0	-.01	.12	1.9	84	99	8.31	8.35
	5	1	.865	11	22	2.0	4.4	1.1	.20	1.9	86	98	8.09	8.33
	6	1	1.085	11	22	2.0	4.5	1.1	.15	1.9	86	98	8.09	8.36
	7	1	1.033	11	23	2.0	4.9	1.1	.18	1.9	86	98	8.09	8.32
	9	1	.955	10	21	2.0	5.0	2.6	.38	1.9	92	100	8.21	8.32
	10	1	.997	10	22	2.0	4.8	2.6	.38	1.9	92	100	8.21	8.37
	11	1	.848	10	21	2.0	4.9	2.6	.39	1.9	92	100	8.21	8.29
	13	1	.865	11	21	1.9	4.9	4.7	.80	1.9	104	96	8.27	8.30
	14	1	.990	11	24	1.9	5.4	4.7	.68	1.9	104	96	8.27	8.38
	15	1	.811	11	23	1.9	5.0	4.7	.73	1.9	104	96	8.27	8.32
	4	2	none	11	10	2.1	1.8	.0	-.01	1.9	84	99	8.00	8.31
	8	2	none	11	11	1.7	2.0	1.0	1.1	1.9	86	98	7.94	8.09

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
121 IB6	12	2	none	11	10	2.0	2.0	2.3	2.6	1.9	92	100	7.93	8.21
	16	2	none	11	11	2.1	1.9	4.6	4.7	1.9	104	96	8.06	8.27
	17	3	none	0	0	.0	.0	.0	-.03	<.1	<.1	--	--	6.40
123 SS1	1	1	1.011	9	18	1.7	4.0	.01	.13	1.9	84	99	8.07	8.12
	2	1	1.184	9	17	1.7	3.5	.01	.13	1.9	84	99	8.07	8.13
	3	1	.926	9	16	1.7	2.9	.01	.13	1.9	84	99	8.07	8.1
	5	1	.955	9	15	1.7	2.9	.94	.23	1.9	86	98	8.01	8.06
	6	1	1.009	9	18	1.7	3.2	.94	.26	1.9	86	98	8.01	8.08
	7	1	1.072	9	17	1.7	3.2	.94	.29	1.9	86	98	8.01	8.01
	9	1	1.063	9	19	1.9	3.6	2.4	.52	1.9	92	99	8.1	8.07
	10	1	.912	9	16	1.9	2.9	2.4	.52	1.9	92	99	8.1	8.08
	11	1	.983	9	18	1.9	3.7	2.4	.51	1.9	92	99	8.1	8.05
	13	1	.918	9	18	1.8	3.1	5.2	.89	1.9	104	100	7.95	7.99
	14	1	1.068	9	18	1.8	3.5	5.2	.87	1.9	104	100	7.95	8.02
	15	1	.991	9	18	1.8	3.4	5.2	.89	1.9	104	100	7.95	8.03
	4	2	none	9	9	1.8	1.7	.0	.01	1.9	84	99	8.1	8.07
	8	2	none	10	9	1.9	1.7	1.0	.94	1.9	86	98	7.98	8.01
	12	2	none	10	9	1.8	1.9	2.6	2.4	1.9	92	99	8.06	8.1
	16	2	none	9	9	1.8	1.8	5.2	5.2	1.9	104	100	7.9	7.95
	17	3	none	0	0	.0	.1	.0	.03	<.1	<.1	--	7.25	7.18
123 SS2	1	1	1.031	9	15	1.8	2.5	.05	.11	2.0	79	99	8.1	8.16

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS2	2	1	.977	9	16	1.8	2.4	.05	.12	2.0	79	99	8.1	8.17
	3	1	.998	9	15	1.8	2.6	.05	.12	2.0	79	99	8.1	8.19
	5	1	1.015	9	16	1.9	2.6	.95	.34	2.0	79	98	7.99	8.06
	6	1	.976	9	17	1.9	2.7	.95	.32	2.0	79	98	7.99	8.13
	7	1	.986	9	17	1.9	3.1	.95	.35	2.0	79	98	7.99	8.14
	9	1	1.026	9	18	1.9	2.6	2.7	.75	2.0	82	99	8.07	8.2
	10	1	1.108	9	17	1.9	2.8	2.7	.76	2.0	82	99	8.07	8.17
	11	1	.934	9	17	1.9	2.9	2.7	.78	2.0	82	99	8.07	8.19
	13	1	.959	9	19	1.9	3.0	5.3	1.9	2.0	83	100	8.03	8.07
	14	1	.862	9	19	1.9	3.0	5.3	1.9	2.0	83	100	8.03	8.04
	15	1	1.096	9	20	1.9	3.4	5.3	1.7	2.0	83	100	8.03	8.03
	4	2	none	9	9	1.8	1.8	.0	.05	1.9	80	99	8.1	8.1
	8	2	none	10	9	1.9	1.9	1.0	.95	1.9	82	98	7.98	7.99
	12	2	none	10	9	1.8	1.9	2.6	2.7	2.0	83	99	8.06	8.07
	16	2	none	9	9	1.8	1.9	5.2	5.3	2.0	85	100	7.9	8.03
	17	3	none	0	0	.0	.0	.0	.05	<.1	<.1	--	7.25	7.1
123 SS3	1	1	1.116	9	14	1.9	2.9	.07	.13	2.0	82	99	8.09	8.12
	2	1	.912	9	13	1.9	2.6	.07	.13	2.0	82	99	8.09	8.09
	3	1	.842	9	14	1.9	2.8	.07	.13	2.0	82	99	8.09	8.15
	5	1	.945	9	13	1.9	2.5	.92	.41	2.0	83	98	8.03	8.09
	6	1	.944	9	16	1.9	2.7	.92	.44	2.0	83	98	8.03	8.1

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS3	7	1	1.088	9	18	1.9	3.3	.92	.40	2.0	83	98	8.03	8.05
	9	1	.920	9	20	1.8	3.3	2.6	1.0	1.9	80	99	8.09	8.14
	10	1	.989	9	16	1.8	3.1	2.6	.94	1.9	80	99	8.09	8.1
	11	1	.934	9	19	1.8	3.6	2.6	.95	1.9	80	99	8.09	8.13
	13	1	1.026	9	21	2.0	3.8	5.0	2.0	2.0	83	100	8.04	8.07
	14	1	1.020	9	17	2.0	3.4	5.0	1.8	2.0	83	100	8.04	8.12
	15	1	1.079	9	18	2.0	3.6	5.0	1.8	2.0	83	100	8.04	8.11
	4	2	none	9	9	1.8	1.9	.0	.07	1.9	80	99	8.1	8.09
	8	2	none	10	9	1.9	1.9	1.0	.92	1.9	82	98	7.98	8.03
	12	2	none	10	9	1.8	1.8	2.6	2.6	2.0	83	99	8.06	8.09
	16	2	none	9	9	1.8	2.0	5.2	5.0	2.0	85	100	7.9	8.04
	17	3	none	0	0	.0	.0	.0	.02	<.1	<.1	--	7.25	7.1
123 SS4	1	1	.932	9	9	1.8	3.7	.04	.12	2.0	82	99	8.13	8.14
	2	1	1.039	9	10	1.8	4.2	.04	.12	2.0	82	99	8.13	8.1
	3	1	.975	9	10	1.8	3.9	.04	.09	2.0	82	99	8.13	8.09
	5	1	1.017	9	10	1.8	4.4	1.0	.36	1.9	83	98	8.06	8.04
	6	1	1.104	9	12	1.8	5.0	1.0	.37	1.9	83	98	8.06	8.06
	7	1	1.085	9	11	1.8	5.0	1.0	.35	1.9	83	98	8.06	8.04
	9	1	1.059	9	13	1.8	5.2	2.5	.83	2.0	81	99	8.05	8.09
	10	1	1.006	9	11	1.8	4.5	2.5	.81	2.0	81	99	8.05	8.16
	11	1	.992	9	12	1.8	4.7	2.5	.84	2.0	81	99	8.05	8.12

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS4	13	1	.951	9	11	1.8	4.5	5.1	1.6	2.0	85	100	7.98	8.09
	14	1	.950	9	12	1.8	4.6	5.1	1.5	2.0	85	100	7.98	8.07
	15	1	1.073	9	13	1.8	5.9	5.1	1.6	2.0	85	100	7.98	8.03
	4	2	none	9	9	1.8	1.8	.0	.04	1.9	80	99	8.1	8.13
	8	2	none	10	9	1.9	1.8	1.0	1.0	1.9	82	98	7.98	8.06
	12	2	none	10	9	1.8	1.8	2.6	2.5	2.0	83	99	8.06	8.05
	16	2	none	9	9	1.8	1.8	5.2	5.1	2.0	85	100	7.9	7.98
	17	3	none	0	0	.0	.0	.0	.03	<.1	<.1	--	7.25	7.16
123 SS5	1	1	1.003	8	9	1.8	3.9	.05	.11	1.9	82	99	8.16	8.24
	2	1	1.014	8	9	1.8	3.9	.05	.09	1.9	82	99	8.16	8.26
	3	1	.926	8	9	1.8	3.5	.05	.09	1.9	82	99	8.16	8.17
	5	1	.905	9	9	1.8	3.7	1.0	.32	2.0	79	98	8.03	8.11
	6	1	.976	9	10	1.8	4.8	1.0	.28	2.0	79	98	8.03	8.14
	7	1	1.035	9	10	1.8	4.8	1.0	.29	2.0	79	98	8.03	8.11
	9	1	.955	9	12	1.8	5.0	2.6	.83	2.0	82	99	8.1	8.2
	10	1	1.035	9	11	1.8	4.8	2.6	.73	2.0	82	99	8.1	8.23
	11	1	1.109	9	11	1.8	5.1	2.6	.72	2.0	82	99	8.1	8.17
	13	1	.929	9	13	1.8	5.1	5.2	1.9	1.9	80	100	8.06	8.11
	14	1	1.093	9	11	1.8	5.1	5.2	1.6	1.9	80	100	8.06	8.11
	15	1	.964	9	12	1.8	5.4	5.2	2.0	1.9	80	100	8.06	8.14
	4	2	none	9	8	1.8	1.8	.0	.05	1.9	80	99	8.1	8.16

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS5	8	2	none	10	9	1.9	1.8	1.0	1.0	1.9	82	98	7.98	8.03
	12	2	none	10	9	1.8	1.8	2.6	2.6	2.0	83	99	8.06	8.1
	16	2	none	9	9	1.8	1.8	5.2	5.2	2.0	85	100	7.9	8.06
	17	3	none	0	0	.0	.0	.0	.03	<.1	<.1	--	7.25	7.07
123 SS6	1	1	.910	9	10	1.8	3.6	.01	.08	2.0	78	99	8.09	8.15
	2	1	.995	9	10	1.8	3.3	.01	.08	2.0	78	99	8.09	8.17
	3	1	1.042	9	11	1.8	4.2	.01	.10	2.0	78	99	8.09	8.17
	5	1	.988	9	10	1.7	3.6	1.1	.38	2.0	78	98	8.06	8.21
	6	1	.965	9	9	1.7	3.1	1.1	.43	2.0	78	98	8.06	8.19
	7	1	.965	9	10	1.7	3.3	1.1	.39	2.0	78	98	8.06	8.19
	9	1	1.044	9	11	1.8	4.0	2.6	.63	1.9	80	99	8.1	8.16
	10	1	.985	9	11	1.8	4.3	2.6	.68	1.9	80	99	8.1	8.17
	11	1	.966	9	11	1.8	4.0	2.6	.71	1.9	80	99	8.1	8.2
	13	1	1.058	9	11	1.7	3.6	5.2	1.5	1.9	79	100	8.01	8.18
	14	1	1.121	9	13	1.7	5.0	5.2	1.5	1.9	79	100	8.01	8.15
	15	1	.980	9	12	1.7	4.4	5.2	1.7	1.9	79	100	8.01	8.15
	4	2	none	9	9	1.8	1.8	.0	.01	1.9	80	99	8.07	8.09
	8	2	none	10	9	1.9	1.7	1.0	1.1	1.94	82	98	8.02	8.06
	12	2	none	10	9	1.8	1.8	2.6	2.6	2.0	83	99	8.1	8.1
	16	2	none	9	9	1.8	1.7	5.2	5.2	2.0	85	100	7.93	8.01
	17	3	none	0	0	.0	.0	.0	.01	<.1	<.1	--	6.87	6.69

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS7	1	1	.913	9	10	1.7	4.0	.04	.09	2.0	81	99	8.12	8.1
	2	1	.841	9	10	1.7	4.7	.04	.09	2.0	81	99	8.12	8.15
	3	1	1.079	9	11	1.7	4.3	.04	.11	2.0	81	99	8.12	8.13
	5	1	1.161	9	11	1.8	4.0	1.0	.28	2.0	80	98	8.06	8.11
	6	1	.865	9	12	1.8	4.7	1.0	.31	2.0	80	98	8.06	8.13
	7	1	1.148	9	11	1.8	3.9	1.0	.30	2.0	80	98	8.06	8.11
	9	1	.858	9	11	1.7	3.7	2.5	.68	2.0	85	99	8.15	7.87
	10	1	.938	9	11	1.7	3.8	2.5	.75	2.0	85	99	8.15	7.84
	11	1	1.096	9	11	1.7	3.5	2.5	.70	2.0	85	99	8.15	7.85
	13	1	.902	9	11	1.7	3.5	5.2	1.5	2.1	81	100	8.03	8.1
	14	1	.978	9	12	1.7	4.2	5.2	1.5	2.1	81	100	8.03	8.07
	15	1	1.088	9	11	1.7	4.8	5.2	1.3	2.1	81	100	8.03	8.1
	4	2	none	9	9	1.8	1.7	.0	.04	1.9	80	99	8.07	8.12
	8	2	none	10	9	1.9	1.8	1.0	1.0	1.9	82	98	8.02	8.06
	12	2	none	10	9	1.8	1.7	2.6	2.5	2.0	83	99	8.1	8.15
	16	2	none	9	9	1.8	1.7	5.2	5.2	2.0	85	100	7.93	8.03
	17	3	none	0	0	.0	.0	.0	.05	<.1	<.1	--	6.87	6.6
123 SS8	1	1	.946	9	10	1.8	3.6	.03	.07	2.0	78	99	8.1	8.03
	2	1	.912	9	11	1.8	3.5	.03	.10	2.0	78	99	8.1	8.05
	3	1	.920	9	10	1.8	3.7	.03	.12	2.0	78	99	8.1	8.06
	5	1	.995	9	12	1.9	4.2	1.0	.37	2.0	78	98	8	8.15

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS8	6	1	1.044	9	11	1.9	3.9	1.0	.29	2.0	78	98	8	8.1
	7	1	.926	9	11	1.9	3.9	1.0	.38	2.0	78	98	8	8.12
	9	1	.973	9	11	1.8	3.7	2.7	.73	2.0	79	99	8.09	8.11
	10	1	.910	9	11	1.8	4.0	2.7	.79	2.0	79	99	8.09	8.13
	11	1	.942	9	10	1.8	3.5	2.7	.77	2.0	79	99	8.09	8.09
	13	1	1.028	9	12	1.8	3.7	5.1	1.4	2.1	77	100	7.97	8.04
	14	1	.991	9	11	1.8	3.4	5.1	1.7	2.1	77	100	7.97	8.07
	15	1	1.002	9	13	1.8	4.4	5.1	1.3	2.1	77	100	7.97	8.05
	4	2	none	9	9	1.8	1.8	.0	.03	1.9	80	99	8.07	8.1
	8	2	none	10	9	1.9	1.9	1.0	1.0	1.9	82	98	8.02	8
	12	2	none	10	9	1.8	1.8	2.6	2.7	2.0	83	99	8.1	8.09
	16	2	none	9	9	1.8	1.8	5.2	5.1	2.0	85	100	7.93	7.97
	17	3	none	0	0	.0	.0	.0	.00	<.1	<.1	--	6.87	6.74
123 SS9	1	1	1.022	9	11	1.7	4.2	.01	.05	2.1	81	99	8.07	7.86
	2	1	.952	9	11	1.7	4.0	.01	.09	2.1	81	99	8.07	7.84
	3	1	.947	9	11	1.7	3.4	.01	.08	2.1	81	99	8.07	7.8
	5	1	.906	9	11	1.7	4.0	1.0	.28	2.2	85	98	7.96	7.98
	6	1	.954	9	10	1.7	3.4	1.0	.26	2.2	85	98	7.96	7.93
	7	1	.888	9	10	1.7	3.5	1.0	.28	2.2	85	98	7.96	7.9
	9	1	.952	9	12	1.7	4.8	2.6	.59	2.1	79	99	8.06	7.97
	10	1	.982	9	11	1.7	4.0	2.6	.54	2.1	79	99	8.06	7.94

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS9	11	1	.954	9	12	1.7	4.0	2.6	.58	2.1	79	99	8.06	7.93
	13	1	1.006	9	12	1.7	4.0	5.2	1.1	2.1	83	100	8.04	7.9
	14	1	1.041	9	11	1.7	3.9	5.2	1.0	2.1	83	100	8.04	7.94
	15	1	.983	9	11	1.7	3.7	5.2	1.0	2.1	83	100	8.04	7.94
	4	2	none	9	9	1.8	1.7	.0	.01	1.9	80	99	8.07	8.07
	8	2	none	10	9	1.9	1.7	1.0	1.0	1.9	82	98	8.02	7.96
	12	2	none	10	9	1.8	1.7	2.6	2.6	2.0	83	99	8.1	8.06
	16	2	none	9	9	1.8	1.7	5.2	5.2	2.0	85	100	7.93	8.04
	17	3	none	0	0	.0	.0	.0	.02	<.1	<.1	--	6.87	6.73
123 SS10	1	1	1.041	9	11	1.7	3.8	.01	.05	2.3	73	99	8.15	7.75
	2	1	1.008	9	10	1.7	3.4	.01	.05	2.3	73	99	8.15	7.78
	3	1	.974	9	11	1.7	2.9	.01	.05	2.3	73	99	8.15	7.8
	5	1	1.001	9	11	1.8	3.3	1.1	.27	2.1	75	98	8.1	7.76
	6	1	.960	9	11	1.8	3.9	1.1	.28	2.1	75	98	8.1	7.74
	7	1	.961	9	11	1.8	3.5	1.1	.24	2.1	75	98	8.1	7.7
	9	1	.942	9	11	1.8	3.6	2.4	.64	2.2	75	99	8.07	7.9
	10	1	.904	9	11	1.8	3.6	2.4	.69	2.2	75	99	8.07	7.91
	11	1	.973	9	11	1.8	4.0	2.4	.63	2.2	75	99	8.07	7.94
	13	1	.946	9	11	1.9	3.2	4.9	1.2	2.1	79	100	7.94	7.8
	14	1	.907	9	11	1.9	3.1	4.9	1.3	2.1	79	100	7.94	7.73
	15	1	1.069	9	11	1.9	3.5	4.9	1.2	2.1	79	100	7.94	7.87

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 SS10	4	2	none	9	9	1.8	1.7	0.0	.01	1.9	80	99	8.07	8.15
	8	2	none	10	9	1.9	1.8	1.0	1.1	1.9	82	98	8.02	8.1
	12	2	none	10	9	1.8	1.8	2.6	2.4	2.0	83	99	8.1	8.07
	16	2	none	9	9	1.8	1.9	5.2	4.9	2.0	85	100	7.93	7.94
	17	3	none	0	0	0	0	0	.03	0	0	--	6.87	6.51
123 IB1	1	1	.942	10	12	2.0	2.8	.03	.12	1.9	84	99	8.12	8.07
	2	1	.863	10	11	2.0	3.1	.03	.10	1.9	84	99	8.12	7.94
	3	1	.886	10	12	2.0	3.0	.03	.12	1.9	84	99	8.12	7.97
	5	1	.923	11	12	2.0	3.0	.90	.21	1.9	86	98	8.24	7.93
	6	1	.937	11	12	2.0	2.9	.90	.22	1.9	86	98	8.24	7.91
	7	1	.983	11	12	2.0	3.0	.90	.24	1.9	86	98	8.24	7.93
	9	1	.934	11	13	2.1	3.2	3.1	.43	1.9	92	100	8.35	7.91
	10	1	.917	11	14	2.1	3.2	3.1	.49	1.9	92	100	8.35	7.93
	11	1	.910	11	12	2.1	3.3	3.1	.55	1.9	92	100	8.35	7.97
	13	1	.957	10	13	2.1	3.1	5.0	.77	1.9	104	96	8.25	7.93
	14	1	.908	10	13	2.1	2.9	5.0	.93	1.9	104	96	8.25	7.97
	15	1	.890	10	13	2.1	2.9	5.0	.93	1.9	104	96	8.25	8.03
	4	2	none	11	10	2.1	2.0	.0	.03	1.9	84	99	7.98	8.12
	8	2	none	11	11	1.7	2.0	1.0	.90	1.9	86	98	7.98	8.24
	12	2	none	11	11	2.0	2.1	2.3	3.1	1.9	92	100	8.03	8.35
	16	2	none	11	10	2.1	2.1	4.6	5.0	1.9	104	96	7.94	8.25

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 IB1	17	3	none	0	0	.0	.0	.0	.00	<.1	<.1	--	--	6.21
123 IB2	1	1	1.109	11	18	2.0	5.0	.01	.21	1.9	84	99	8.27	8.17
	2	1	.992	11	18	2.0	4.9	.01	.17	1.9	84	99	8.27	8.21
	3	1	.932	11	19	2.0	4.7	.01	.23	1.9	84	99	8.27	8.21
	5	1	.947	11	19	2.0	5.1	1.1	.26	1.9	86	98	8.19	8.24
	6	1	.909	11	18	2.0	5.0	1.1	.27	1.9	86	98	8.19	8.25
	7	1	1.023	11	20	2.0	5.0	1.1	.29	1.9	86	98	8.19	8.21
	9	1	.997	11	18	2.1	5.1	2.7	.37	1.9	92	100	8.14	8.25
	10	1	.893	11	18	2.1	5.0	2.7	.42	1.9	92	100	8.14	8.26
	11	1	.892	11	19	2.1	4.9	2.7	.36	1.9	92	100	8.14	8.24
	13	1	.938	11	20	2.2	5.2	5.1	.64	1.9	104	96	8.11	8.17
	14	1	.923	11	20	2.2	5.2	5.1	.62	1.9	104	96	8.11	8.19
	15	1	.957	11	20	2.2	5.5	5.1	.64	1.9	104	96	8.11	8.21
	4	2	none	11	11	2.1	2.0	.0	.01	1.9	84	99	7.98	8.27
	8	2	none	11	11	1.7	2.0	1.0	1.1	1.9	86	98	7.98	8.19
	12	2	none	11	11	2.0	2.1	2.3	2.7	1.9	92	100	8.03	8.14
	16	2	none	11	11	2.1	2.2	4.6	5.1	1.9	104	96	7.94	8.11
	17	3	none	0	0	.0	.0	.0	.02	<.1	<.1	--	--	6.22
123 IB3	1	1	.884	12	20	2.1	5.4	.00	.18	1.9	84	99	8.17	8.13
	2	1	.883	12	20	2.1	5.3	.00	.12	1.9	84	99	8.17	8.19
	3	1	.975	12	21	2.1	5.5	.00	.15	1.9	84	99	8.17	8.17

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 IB3	5	1	.949	11	23	1.9	5.7	.99	.21	1.9	86	98	8.11	8.12
	6	1	.873	11	21	1.9	5.6	.99	.25	1.9	86	98	8.11	8.11
	7	1	.960	11	22	1.9	5.5	.99	.28	1.9	86	98	8.11	8.17
	9	1	1.035	12	22	2.0	6.1	2.7	.35	1.9	92	100	8.17	8.18
	10	1	.907	12	21	2.0	5.6	2.7	.38	1.9	92	100	8.17	8.17
	11	1	.961	12	22	2.0	6.0	2.7	.34	1.9	92	100	8.17	8.21
	13	1	.936	11	21	2.1	5.9	5.4	.56	1.9	104	96	8.07	8.19
	14	1	.955	11	23	2.1	6.3	5.4	.57	1.9	104	96	8.07	8.26
	15	1	.986	11	23	2.1	6.3	5.4	.54	1.9	104	96	8.07	8.17
	4	2	none	11	12	2.1	2.1	.0	.00	1.9	84	99	7.98	8.17
	8	2	none	11	11	1.7	1.9	1.0	.99	1.9	86	98	7.98	8.11
	12	2	none	11	12	2.0	2.0	2.3	2.7	1.9	92	100	8.03	8.17
	16	2	none	11	11	2.1	2.1	4.6	5.4	1.9	104	96	7.94	8.07
	17	3	none	0	0	.0	.0	.0	-.03	<.1	<.1	--	--	6.51
123 IB4	1	1	1.032	10	13	1.9	3.0	-.01	.09	1.9	84	99	8.06	8.14
	2	1	.933	10	13	1.9	2.9	-.01	.07	1.9	84	99	8.06	8.17
	3	1	.883	10	13	1.9	2.9	-.01	.08	1.9	84	99	8.06	8.05
	5	1	1.023	11	15	1.9	3.2	1.1	.31	1.9	86	98	8.11	8.15
	6	1	.910	11	14	1.9	3.6	1.1	.31	1.9	86	98	8.11	8.11
	7	1	.911	11	14	1.9	3.8	1.1	.24	1.9	86	98	8.11	8.15
	9	1	.918	11	15	1.9	3.9	3.0	.78	1.9	92	100	8.19	8.17

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 IB4	10	1	.846	11	14	1.9	3.6	3.0	.88	1.9	92	100	8.19	8.17
	11	1	.996	11	15	1.9	3.9	3.0	.69	1.9	92	100	8.19	8.17
	13	1	.879	11	16	1.8	3.6	5.3	1.9	1.9	104	96	8.17	8.17
	14	1	.908	11	15	1.8	3.5	5.3	1.6	1.9	104	96	8.17	8.15
	15	1	.877	11	16	1.8	3.8	5.3	1.8	1.9	104	96	8.17	8.17
	4	2	none	11	10	2.1	1.9	.0	-.01	1.9	84	99	7.98	8.06
	8	2	none	11	11	1.7	1.9	1.0	1.1	1.9	86	98	7.98	8.11
	12	2	none	11	11	2.0	1.9	2.3	3.0	1.9	92	100	8.03	8.19
	16	2	none	11	11	2.1	1.8	4.6	5.3	1.9	104	96	7.94	8.17
	17	3	none	0	0	.0	.0	.0	.00	<.1	<.1	--	--	6.28
123 IB5	1	1	.901	11	16	2.0	4.3	.02	.10	1.9	84	99	8.17	8.19
	2	1	.910	11	17	2.0	4.5	.02	.13	1.9	84	99	8.17	8.28
	3	1	.955	11	17	2.0	4.5	.02	.10	1.9	84	99	8.17	8.19
	5	1	.929	12	17	1.9	4.5	1.0	.21	1.9	86	98	8.12	8.27
	6	1	.940	12	16	1.9	4.5	1.0	.23	1.9	86	98	8.12	8.27
	7	1	.919	12	19	1.9	4.6	1.0	.22	1.9	86	98	8.12	8.31
	9	1	1.123	11	17	2.1	4.9	2.9	.27	1.9	92	100	8.30	8.28
	10	1	1.103	11	17	2.1	4.7	2.9	.26	1.9	92	100	8.30	8.21
	11	1	1.208	11	18	2.1	5.1	2.9	.29	1.9	92	100	8.30	8.28
	13	1	1.210	11	20	1.9	5.3	5.3	.52	1.9	104	96	8.24	8.31
	14	1	.857	11	17	1.9	4.7	5.3	.70	1.9	104	96	8.24	8.24

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 IB5	15	1	.953	11	19	1.9	5.1	5.3	.54	1.9	104	96	8.24	8.29
	4	2	none	11	11	2.1	2.0	.0	.02	1.9	84	99	7.98	8.17
	8	2	none	11	12	1.7	1.9	1.0	1.0	1.9	86	98	7.98	8.12
	12	2	none	11	11	2.0	2.1	2.3	2.9	1.9	92	100	8.03	8.30
	16	2	none	11	11	2.1	1.9	4.6	5.3	1.9	104	96	7.94	8.24
	17	3	none	0	0	.0	.0	.0	-.02	<.1	<.1	--	--	6.16
123 IB6	1	1	.934	9	15	1.6	4.4	.01	.07	1.9	84	99	8.30	8.31
	2	1	.891	9	15	1.6	4.6	.01	.07	1.9	84	99	8.30	8.32
	3	1	.925	9	15	1.6	4.5	.01	.07	1.9	84	99	8.30	8.36
	5	1	1.110	9	14	1.7	4.7	.81	.16	1.9	86	98	8.17	8.34
	6	1	1.211	9	13	1.7	4.5	.81	.18	1.9	86	98	8.17	8.32
	7	1	1.139	9	14	1.7	4.5	.81	.19	1.9	86	98	8.17	8.30
	9	1	.829	10	14	1.8	4.5	2.7	.37	1.9	92	100	8.31	8.34
	10	1	.891	10	14	1.8	4.2	2.7	.32	1.9	92	100	8.31	8.33
	11	1	.894	10	14	1.8	4.2	2.7	.39	1.9	92	100	8.31	8.34
	13	1	1.074	9	15	1.7	4.5	5.0	.69	1.9	104	96	8.19	8.38
	14	1	1.007	9	16	1.7	4.6	5.0	.60	1.9	104	96	8.19	8.33
	15	1	.917	9	15	1.7	4.6	5.0	.63	1.9	104	96	8.19	8.23
	4	2	none	11	9	2.1	1.6	.0	.01	1.9	84	99	8.01	8.30
	8	2	none	11	9	1.7	1.7	1.0	.81	1.9	86	98	7.98	8.17
	12	2	none	11	10	2.0	1.8	2.3	2.7	1.9	92	100	7.95	8.31

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
123 IB6	16	2	none	11	9	2.1	1.7	4.6	5.0	1.9	104	96	8.00	8.19
	17	3	none	0	0	.0	.0	.0	.02	<.1	<.1	--	--	6.25
RWMC IB1	1	1	.849	11	14	1.7	5.8	.00	.03	1.9	84	99	8.14	7.96
	2	1	.893	11	14	1.7	5.8	.00	.03	1.9	84	99	8.14	8.07
	3	1	.806	11	15	1.7	6.1	.00	.05	1.9	84	99	8.14	8.11
	5	1	.950	11	15	1.8	6.3	.92	.16	1.9	86	98	8.15	8.12
	6	1	.893	11	14	1.8	6.1	.92	.17	1.9	86	98	8.15	8.22
	7	1	.822	11	14	1.8	6.2	.92	.22	1.9	86	98	8.15	8.12
	9	1	.955	11	14	2.0	6.4	2.6	.45	1.9	92	100	8.15	8.08
	10	1	.817	11	14	2.0	5.9	2.6	.53	1.9	92	100	8.15	8.10
	11	1	.896	11	14	2.0	6.5	2.6	.43	1.9	92	100	8.15	8.17
	13	1	.914	11	15	2.0	6.4	5.0	.84	1.9	104	96	8.24	8.12
	14	1	.844	11	15	2.0	6.3	5.0	1.0	1.9	104	96	8.24	8.21
	15	1	.866	11	14	2.0	6.8	5.0	.92	1.9	104	96	8.24	8.17
	4	2	none	11	11	2.1	1.7	2.0	.00	1.9	84	99	8.00	8.14
	8	2	none	11	11	1.7	1.8	1.0	.92	1.9	86	98	7.94	8.15
	12	2	none	11	11	2.0	2.0	2.3	2.6	1.9	92	100	7.93	8.15
	16	2	none	11	11	2.1	2.0	4.6	5.0	1.9	104	96	8.06	8.24
	17	3	none	0	0	.0	.0	.0	.02	<.1	<.1	--	--	6.38
TAN IB1	1	1	.993	10	17	2.1	6.6	.02	.05	1.9	84	99	8.21	8.18
	2	1	1.002	10	18	2.1	6.4	.02	.05	1.9	84	99	8.21	8.20

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
TAN IB1	3	1	1.034	10	19	2.1	6.3	.02	.08	1.9	84	99	8.21	8.25
	5	1	1.037	10	19	2.1	6.2	.87	.13	1.9	86	98	8.25	8.24
	6	1	.983	10	18	2.1	6.4	.87	.15	1.9	86	98	8.25	8.24
	7	1	.845	10	17	2.1	5.8	.87	.16	1.9	86	98	8.25	8.23
	9	1	1.122	11	20	2.0	6.8	2.3	.29	1.9	92	100	8.20	8.24
	10	1	1.246	11	20	2.0	6.8	2.3	.25	1.9	92	100	8.20	8.22
	11	1	.904	11	18	2.0	6.3	2.3	.33	1.9	92	100	8.20	8.24
	13	1	1.005	10	20	1.9	7.0	5.1	.58	1.9	104	96	8.18	8.30
	14	1	1.191	10	21	1.9	7.0	5.1	.50	1.9	104	96	8.18	8.20
	15	1	.855	10	19	1.9	6.4	5.1	.61	1.9	104	96	8.18	8.25
	4	2	none	11	10	2.1	2.1	.0	.02	1.9	84	99	7.92	8.21
	8	2	none	11	10	1.7	2.1	1.0	.87	1.9	86	98	7.95	8.25
	12	2	none	11	11	2.0	2.0	2.3	2.3	1.9	92	100	7.98	8.20
	16	2	none	11	10	2.1	1.9	4.6	5.1	1.9	104	96	7.95	8.18
	17	3	none	0	0	.0	.0	.0	.02	<.1	<.1	--	--	6.25
TAN IB2	1	1	.881	10	15	1.7	4.5	-.01	.05	1.9	84	99	8.07	8.30
	2	1	.943	10	15	1.7	4.6	-.01	.04	1.9	84	99	8.07	8.32
	3	1	.964	10	14	1.7	4.4	-.01	.02	1.9	84	99	8.07	8.29
	5	1	1.108	11	15	1.8	4.6	.90	.21	1.9	86	98	8.26	8.37
	6	1	1.033	11	15	1.8	4.5	.90	.18	1.9	86	98	8.26	8.33
	7	1	1.066	11	16	1.8	4.6	.90	.24	1.9	86	98	8.26	8.35

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
TAN IB2	9	1	1.046	10	17	1.8	4.8	2.5	.47	1.9	92	100	8.21	8.26
	10	1	.989	10	15	1.8	4.7	2.5	.48	1.9	92	100	8.21	8.29
	11	1	1.269	10	17	1.8	5.4	2.5	.45	1.9	92	100	8.21	8.22
	13	1	1.164	11	19	1.9	5.4	4.5	.99	1.9	104	96	8.16	8.20
	14	1	.865	11	17	1.9	5.0	4.5	1.3	1.9	104	96	8.16	8.20
	15	1	1.078	11	17	1.9	5.5	4.5	1.1	1.9	104	96	8.16	8.18
	4	2	none	11	10	2.1	1.7	.0	-.01	1.9	84	99	7.92	8.07
	8	2	none	11	11	1.7	1.8	1.0	.90	1.9	86	98	7.95	8.26
	12	2	none	11	10	2.0	1.8	2.3	2.5	1.9	92	100	7.98	8.21
	16	2	none	11	11	2.1	1.9	4.6	4.5	1.9	104	96	7.95	8.16
	17	3	none	0	0	.0	.0	.0	-.03	<.1	<.1	--	--	6.14
TAN IB3	1	1	1.182	10	19	1.7	6.8	-.05	.06	1.9	84	99	8.28	8.24
	2	1	1.172	10	18	1.7	6.9	-.05	.07	1.9	84	99	8.28	8.26
	3	1	1.085	10	16	1.7	5.7	-.05	.05	1.9	84	99	8.28	8.30
	5	1	.863	10	17	1.7	6.1	.85	.10	1.9	86	98	8.29	8.30
	6	1	.940	10	18	1.7	6.6	.85	.10	1.9	86	98	8.29	8.28
	7	1	.820	10	18	1.7	6.1	.85	.09	1.9	86	98	8.29	8.25
	9	1	1.034	10	19	1.7	6.6	2.3	.21	1.9	92	100	8.28	8.22
	10	1	.980	10	19	1.7	6.3	2.3	.22	1.9	92	100	8.28	8.23
	11	1	.985	10	17	1.7	5.8	2.3	.19	1.9	92	100	8.28	8.29
	13	1	1.051	10	20	1.6	6.9	4.4	.44	1.9	104	96	8.20	8.23

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
TAN IB3	14	1	1.079	10	22	1.6	7.2	4.4	.47	1.9	104	96	8.20	8.22
	15	1	.879	10	19	1.6	6.8	4.4	.54	1.9	104	96	8.20	8.26
	4	2	none	11	10	2.1	1.7	.0	-.05	1.9	84	99	7.92	8.28
	8	2	none	11	10	1.7	1.7	1.0	.85	1.9	86	98	7.95	8.29
	12	2	none	11	10	2.0	1.7	2.3	2.3	1.9	92	100	7.98	8.28
	16	2	none	11	10	2.1	1.6	4.6	4.4	1.9	104	96	7.95	8.20
	17	3	none	0	0	.0	.0	.0	-.05	<.1	<.1	--	--	6.33
TAN IB4	1	1	.873	10	16	1.9	4.8	-.03	.03	1.9	84	99	8.29	8.27
	2	1	.906	10	16	1.9	5.1	-.03	.04	1.9	84	99	8.29	8.26
	3	1	1.000	10	17	1.9	5.2	-.03	.05	1.9	84	99	8.29	8.27
	5	1	1.068	10	18	1.8	5.1	.90	.14	1.9	86	98	8.22	8.26
	6	1	.908	10	15	1.8	4.9	.90	.16	1.9	86	98	8.22	8.27
	7	1	.969	10	16	1.8	4.9	.90	.19	1.9	86	98	8.22	8.29
	9	1	.945	10	16	1.7	5.2	2.5	.34	1.9	92	100	8.27	8.28
	10	1	.954	10	16	1.7	5.1	2.5	.33	1.9	92	100	8.27	8.26
	11	1	.944	10	17	1.7	5.3	2.5	.32	1.9	92	100	8.27	8.22
	13	1	.952	10	18	2.0	5.5	4.3	.66	1.9	104	96	8.28	8.21
	14	1	.976	10	18	2.0	5.4	4.3	.69	1.9	104	96	8.28	8.22
	15	1	.921	10	18	2.0	5.6	4.3	.65	1.9	104	96	8.28	8.22
	4	2	none	11	10	2.1	1.9	.0	-.03	1.9	84	99	7.92	8.29
	8	2	none	11	10	1.7	1.8	1.0	.90	1.9	86	98	7.95	8.22

Table 7. Sediment mass; initial and final calcium, magnesium, and strontium concentrations; initial potassium, sodium, and alkalinity concentrations; and initial and final pH of synthesized aqueous solutions—Continued

Sample set	Sample number	Sample type	Sediment mass (grams)	Initial calcium (mg/L)	Final calcium (mg/L)	Initial magnesium (mg/L)	Final magnesium (mg/L)	Initial strontium (mg/L)	Final strontium (mg/L)	Initial potassium (mg/L)	Initial sodium (mg/L)	Initial alkalinity (mg/L)	Initial pH (pH units)	Final pH (pH units)
TAN IB4	12	2	none	11	10	2.0	1.7	2.3	2.5	1.9	92	100	7.98	8.27
	16	2	none	11	10	2.1	2.0	4.6	4.3	1.9	104	96	7.95	8.28
	17	3	none	0	0	.0	.0	.0	-.03	<.1	<.1	--	--	6.45