

REPORT
PUTAH CREEK SEDIMENT
AND WATER SAMPLING
FOR
UNIVERSITY OF CALIFORNIA, DAVIS
ENVIRONMENTAL HEALTH AND SAFETY

DAMES & MOORE

**REPORT
PUTAH CREEK SEDIMENT
AND WATER SAMPLING
FOR
UNIVERSITY OF CALIFORNIA, DAVIS
ENVIRONMENTAL HEALTH AND SAFETY**

 **DAMES & MOORE**

December 1990
Job No. 00234-213-044



DAMES & MOORE

A PROFESSIONAL LIMITED PARTNERSHIP

9300 TECH CENTER DRIVE, SUITE 100, SACRAMENTO, CALIFORNIA 95826 (916) 364-8698

December 21, 1990

University of California
Office of Environmental Health and Safety
Davis, CA 95616

Attention: Mr. Steve Eckberg

Re: Report
Putah Creek Sediment
and Water Sampling
Job No. 00234-213-044

Dear Mr. Eckberg:

This report presents the analytical results of the Putah Creek sediment and water samples collected August 7 and 8, 1990. Sampling of the creek was requested by Ms. Carolyn Owen of University of California, Davis (UCD) Environmental Health and Safety (EHS). The purpose of the sampling was to collect data on creek water and sediment during low water conditions. At the time of sample collection, it was Dames & Moore's understanding that water in the section of Putah Creek south of LEHR was supplied only by the UCD Wastewater Treatment Plant's effluent outfall located west of the Old Davis Road bridge (Figure 1). However, on August 8, 1990 Mr. Steve Eckberg of EHS informed Dames & Moore that an unknown quantity of water was released into Putah Creek from the UCD Institute of Ecology.

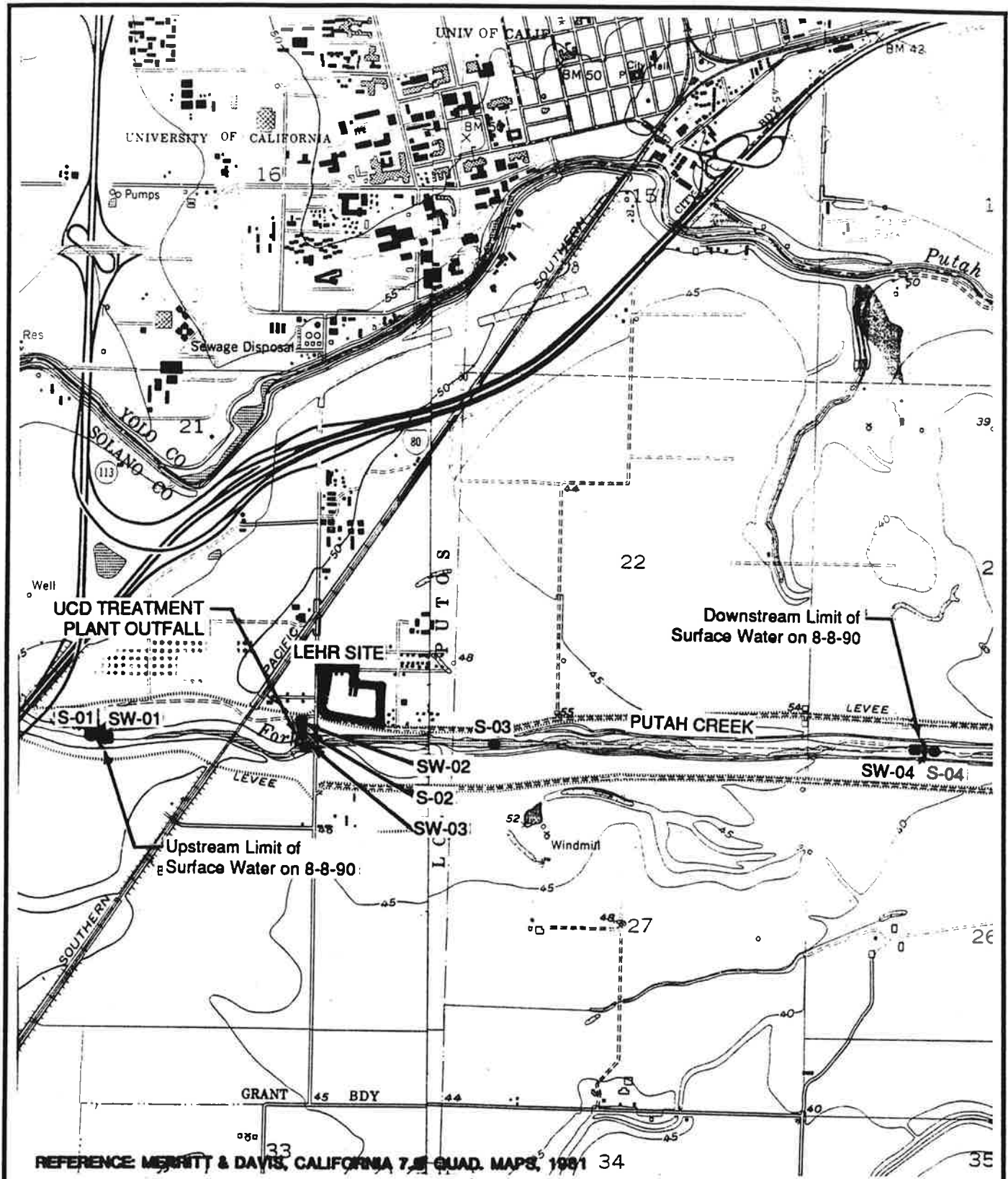
The scope of work completed is outlined in our proposal dated July 31, 1990 as amended August 2, 1990. A description of that work is presented below.

Water Sampling

Water samples were collected from four locations shown on Figure 1 and described below:

- In Putah Creek upstream from the effluent discharge at the furthest upstream extent of continuous surface water (SW-01);
- In the effluent stream upstream from its point of discharge into Putah Creek (SW-02);
- In Putah Creek at or near the point of effluent discharge (SW-03); and
- In Putah Creek at the furthest downstream extent of continuous surface water (SW-04).

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REFERENCE: MERRITT & DAVIS, CALIFORNIA 7.5 QUAD. MAPS, 1981 34

- EXPLANATION**
- S-01 SEDIMENT SAMPLING LOCATIONS
 - SW-01 SURFACE WATER SAMPLING LOCATIONS

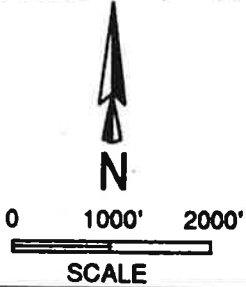


FIGURE 1
SITE MAP WITH LOCATION OF
SEDIMENT AND SURFACE WATER
SAMPLING POINTS
UCD LEHR
UNIVERSITY OF CALIFORNIA
DAVIS, CALIFORNIA
 Dames & Moore

Surface water samples were collected by the same methods used in SWAT and Department of Energy (DOE) Phase II surface water sampling. These methods are described in detail in the SWAT Proposal (Workplan) dated May 1990 and in the final/approved DOE Phase II Workplan dated August 31, 1990.

Water samples were submitted to CEP Laboratories, Inc. of Santa Fe, New Mexico for the following chemical and radiological analyses:

- Halogenated volatile organic compounds (EPA 8010);
- Aromatic semi-volatile organic compounds (EPA 8020);
- Organochlorine pesticides (EPA 8080);
- CAM metals by ICP;
- Mercury, selenium, and arsenic by AA;
- Hexavalent chromium;
- Nitrate as nitrogen;
- Sulfate;
- Chloride;
- Ca, Mg, K, Na;
- Bicarbonate alkalinity (as CaCO_3);
- Chemical oxygen demand;
- Total dissolved solids;
- Electrical conductivity;
- pH;
- Gamma spectralanalysis;
- Strontium - 90;
- Tritium;
- Carbon - 14; and
- Gross alpha and beta.

A blind duplicate water sample was collected from the effluent discharge for QA/QC purposes.

Sediment Sampling

Creek bed sediment samples were collected from four locations shown on Figure 1 and described below:

- Upstream just beyond the furthest extent of continuous surface water in the dry creek bed (S-01);
- Where the effluent stream discharges into the creek bed (S-02);
- Downstream of the effluent stream discharge (S-03); and
- Further downstream beyond the downstream extent of continuous creek water in the dry creek bed (S-04).

Samples were collected from three depths at each location. A surface sample was collected followed by two-foot and five-foot depth samples. The two-foot and five-foot depth samples were composited prior to analysis.

At each location the surface sediment sample was collected by using a clean trowel to fill an 8 ounce glass sample jar. The two-foot and five-foot depth samples were collected by driving a length of four-inch diameter schedule 40 pvc pipe into the sediment to a depth of one to two feet. The purpose of the casing was to temporarily seal off an area of bottom sediment from surface water. Water in the casing was then bailed out and a hand auger was used to "drill" to the required sampling depth and collect a disturbed soil sample.

Samples collected from two-foot and five-foot depths were composited by placing equal amounts of sediment from each depth in a clean plastic mixing bowl then thoroughly mixing the sediments.

All sampling equipment was thoroughly cleaned and rinsed with de-ionized water between sampling locations.

Blind duplicate samples for QA/QC were formed by splitting of composite samples into two equal portions and giving one of the splits a fictitious designation (sample I.D.).

Sediment samples were also sent to CEP Laboratories and analyzed for the following parameters:

- Organochlorine pesticides (EPA 8080);
- CAM Metals by ICP;
- Mercury, selenium, and arsenic by AA;
- Hexavalent chromium;
- Nitrate as nitrogen;
- Gamma spectralanalysis;
- Strontium-90;
- Tritium;
- Carbon-14; and
- Gross alpha and beta.

Results of Water Samples

The results of chemical and radiological analysis of the surface water samples are presented in Tables 1 through 6. A list of the tables is presented below:

Table 1	Metals
Table 2	Cations, Anions, and General Mineral Analyses
Table 3	Aromatic Volatile Organics
Table 4	Halogenated Volatile Organics
Table 5	Chlorinated Pesticides and PCBs
Table 6	Radiologic Analyses

Chemical and radiological detections in the surface water samples were compared with the Maximum Contaminant Levels (MCLs) listed in Title 22, and the National Primary Drinking Water Regulations. All detections reported for the samples were below the MCLs.

Results of Sediment Samples

Results of the chemical and radiological analyses of sediment samples collected from the Putah Creek stream bed and the UCD Wastewater Treatment Plant outfall are presented in Tables 7 through 9, as outlined below:

Table 7	Metals
Table 8	Chlorinated Pesticides and PCBs
Table 9	Radiologic Analyses

Chemical and radiological detections reported from sediment sample analyses were compared with Total Threshold Limit Concentrations (TTLC) listed in Title 22 of the California Code of Regulations. The TTLCs are concentrations above which a material is considered hazardous for disposal purposes. All detections reported from Putah Creek sediment sample analyses were below the listed TTLCs.

Detection Limits

The presence or absence of organochlorine pesticides in soils and water were evaluated by EPA Method 8080. A secondary product of this test method is the analysis of PCBs. The detection limits for PCBs by Method 8080 are above MCLs for water listed in Title 23 of the California Code of Regulations. For this analysis, we are not concerned that detection limits exceed the MCLs for PCBs. This is because the intent of our use of Method 8080 was to evaluate the presence of pesticides, not PCBs, in water and sediment. No PCBs were detected in soil or water.

Mr. Steve Eckberg
December 21, 1990
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As stated in our proposal, this report makes no attempt at evaluating the potential impact that effluent discharges to the creek may have had on surface water or the underlying soil. The data is intended to be used as baseline or background data for low flow periods. The data will be available for inclusion in any larger scale characterizations of the creek.

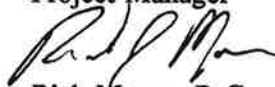
If you have any questions regarding this report please call us at (916) 364-8698.

Sincerely,

DAMES & MOORE



Jim Brake
Project Manager



Rick Moren, R.G.
Geologist

JB:RM:sdm

TABLE 1
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
METALS

SAMPLE DATE QA	MCL	SW-01 08/08/90	SW-02 08/08/90	SW-02 08/08/90 DUPLICATE SAMPLE	SW-03 08/08/90	SW-04 08/08/90
ANTIMONY	-	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
ARSENIC	0.0500	0.0100	< 0.0100	0.0100	< 0.0100	< 0.0100
BARIUM	1.0000	0.1100	0.0600	0.0400	0.0400	0.0700
BERYLLIUM	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
CADMIUM	0.0100	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
CHROMIUM	0.0500	0.0200	0.0100	0.0100	< 0.0100	< 0.0100
CHROMIUM HEXAVALENT	0.0500	0.0200	0.0200	0.0100	0.0100	0.0300
COBALT	-	0.0100	0.0100	0.0100	0.0200	0.0100
COPPER	1.3000 *	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
LEAD	0.0500	< 0.0010	0.0010	0.0010	< 0.0010	< 0.0010
MERCURY	0.0020	< 0.0004	< 0.0004	< 0.0004	< 0.0004	< 0.0004
MOLYBDENUM	-	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
NICKEL	-	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
SELENIUM	0.0100	< 0.0100	< 0.0100	0.0200	< 0.0100	< 0.0100
SILVER	0.0500	< 0.0500	< 0.0500	< 0.0100	< 0.0100	< 0.0100
THALLIUM	-	0.2000	0.2000	0.1000	0.1000	< 0.1000
VANADIUM	-	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
ZINC	-	< 0.0100	0.0300	0.0300	0.0300	0.0200

All units reported as mg/L (ppm)

- < = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.
- * = Proposed EPA value.

MCL = Maximum Contaminant Levels, units reported as mg/L

TABLE 2
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
CATIONS, ANIONS, AND GENERAL ANALYSES

SAMPLE		SW-01	SW-02	SW-02	SW-03	SW-04
DATE		08/08/90	08/08/90	08/08/90	08/08/90	08/08/90
DEPTH						
QA	MCL			DUPLICATE SAMPLE		
ALKALINITY	-	270.00	196.00	190.00	182.00	178.00
CALCIUM	-	25.10	19.00	22.10	20.40	18.00
CHLORIDE	-	75.10	106.90	113.00	104.00	118.00
COD	-	149.76	115.20	119.00	92.20	468.00
EC-L	-	983.90	962.60	973.00	941.00	963.00
MAGNESIUM	-	45.90	23.40	23.40	23.90	25.70
NITRATE	10000.00	< 0.10	3.00	1.00	3.00	0.80
POTASSIUM	-	6.90	9.60	9.30	9.30	8.90
SODIUM	-	159.80	166.00	163.30	165.00	168.00
SULFATE	-	180.00	76.00	77.00	82.00	100.00
TDS	-	702.00	612.00	622.00	644.00	634.00
pH-L	-	9.01	8.11	8.10	8.03	8.67

All units reported as mg/L (ppm)

EC-L = Lab electrical conductivity in umhos/cm.

ALKALINITY is bicarbonate alkalinity.

MCL = Maximum Contaminant Levels, units reported as mg/L.

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.

- = Parameter not analyzed.

TABLE 3
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
AROMATIC VOLATILE ORGANICS
EPA METHOD 8020

SAMPLE DATE QA	MCL (ug/L)	SW-01 08/08/90	SW-02 08/08/90	SW-02 08/08/90 DUPLICATE SAMPLE	SW-03 08/08/90	SW-04 08/08/90
1,2-DICHLOROBENZENE	600.00 *	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,3-DICHLOROBENZENE	-	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40
1,4-DICHLOROBENZENE	5.00	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30
BENZENE	1.00	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
CHLOROBENZENE	30.00	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
ETHYLBENZENE	680.00	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
TOLUENE	2000.00 *	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
XYLENES	1750.00	0.42	< 0.20	< 0.20	0.28	0.58

All units reported as ug/L (ppb)

- < = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.
- * = Proposed EPA value.

MCL = Maximum Contaminant Levels, units reported as ug/L.

TABLE 4
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 HALOGENATED VOLATILE ORGANICS
 METHOD 8010

SAMPLE		SW-01	SW-02	SW-02	SW-03	SW-04 *
DATE		08/08/90	08/08/90	08/08/90	08/08/90	08/08/90
QA	MCL (ug/L)			DUPLICATE SAMPLE		
		-	-	-	-	0.00
1,1,1,2-TETRACHLOROETHANE	-	< 0.10	< 0.10	< 0.10	< 0.10	-
1,1,1-TRICHLOROETHANE	200.00	< 0.03	< 0.03	< 0.03	< 0.03	-
1,1,2,2-TETRACHLOROETHANE	1.00	< 0.03	< 0.03	< 0.03	< 0.03	-
1,1,2-TRICHLOROETHANE	32.00	< 0.02	< 0.02	< 0.02	< 0.02	-
1,1-DICHLOROETHANE	-	< 0.07	< 0.07	< 0.07	< 0.07	-
1,1-DICHLOROETHYLENE	6.00	< 0.13	< 0.13	< 0.13	< 0.13	-
1,2-DICHLOROETHYLENE	-	< 0.03	< 0.03	< 0.03	< 0.03	-
1,2-DICHLOROPROPANE	-	< 0.04	< 0.04	< 0.04	< 0.04	-
1-CHLOROHEXANE	-	< 1.00	< 1.00	< 1.00	< 1.00	-
2-CHLOROETHYLVINYL ETHER	-	< 0.13	< 0.13	< 0.13	< 0.13	-
BENZYL CHLORIDE	-	< 1.00	< 1.00	< 1.00	< 1.00	-
BIS(2-CHLOROETHOXY)METHANE	-	< 1.00	< 1.00	< 1.00	< 1.00	-
BIS(2-CHLOROISOPROPYL)ETHER	-	< 0.50	< 0.50	< 0.50	< 0.50	-
BROMOBENZENE	-	< 0.50	< 0.50	< 0.50	< 0.50	-
BROMODICHLOROMETHANE	100.00	< 0.10	0.25	0.51	0.54	-
BROMOFORM	100.00	< 0.20	< 0.20	< 0.20	< 0.20	-

All units reported as ug/L (ppb)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.

- = Parameter not analyzed.

* Please Note: Due to laboratory error, sample SW-04 was not analyzed by Method 8010.

MCL = Maximum Contaminant Levels, units reported as ug/L.

TABLE 4 (cont.)
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
HALOGENATED VOLATILE ORGANICS
METHOD 8010

SAMPLE DATE QA	MCL (ug/L)	SW-01 08/08/90	SW-02 08/08/90	SW-02 08/08/90 DUPLICATE SAMPLE	SW-03 08/08/90	SW-04 * 08/08/90
BROMOMETHANE	-	< 1.00	< 1.00	< 1.00	< 1.00	-
CARBON TETRACHLORIDE	0.50	< 0.12	< 0.12	< 0.12	< 0.12	-
CHLOROACETALDEHYDE	-	< 1.00	< 1.00	< 1.00	< 1.00	-
CHLOROETHANE	-	< 0.52	< 0.52	< 0.52	< 0.52	-
CHLOROFORM	100.00	< 0.05	0.48	2.40	2.00	-
CHLOROMETHANE	-	< 0.08	< 0.08	< 0.08	< 0.08	-
CHLOROMETHYLMETHYL ETHER	-	< 1.00	< 1.00	< 1.00	< 1.00	-
CHLOROTOLUENE	-	< 0.25	< 0.25	< 0.25	< 0.25	-
DIBROMOCHLOROMETHANE	100.00	< 0.09	< 0.09	0.16	0.15	-
DIBROMOMETHANE	-	< 0.50	< 0.50	< 0.50	< 0.50	-
DICHLORODIFLUOROMETHANE	-	< 1.00	< 1.00	< 1.00	1.00	-
METHYLENE CHLORIDE	-	< 0.25	0.99	1.00	< 0.96	-
TETRACHLOROETHYLENE	5.00	< 0.03	< 0.03	< 0.03	< 0.03	-
TRANS-1,2-DICHLOROETHYLENE	-	2.70	< 0.10	< 0.10	< 0.10	-
TRANS-1,3-DICHLOROPROPYLENE	-	< 0.34	< 0.34	< 0.34	< 0.34	-
TRICHLOROETHYLENE	5.00	< 0.12	< 0.12	< 0.12	< 0.12	-
TRICHLOROFLUOROMETHANE	-	< 0.20	< 0.20	< 0.20	< 0.20	-

All units reported as ug/L (ppb)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.

- = Parameter not analyzed.

* Please Note: Due to laboratory error, sample SW-04 was not analyzed by Method 8010.

MCL = Maximum Contaminant Levels, units reported as ug/L.

TABLE 4 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 HALOGENATED VOLATILE ORGANICS
 METHOD 8010

SAMPLE		SW-01	SW-02	SW-02	SW-03	SW-04 *
DATE		08/08/90	08/08/90	08/08/90	08/08/90	08/08/90
QA	MCL (ug/L)			DUPLICATE SAMPLE		
TRICHLOROPROPANE	-	< 0.20	< 0.20	< 0.20	< 0.20	-
VINYL CHLORIDE	0.50	< 0.18	< 0.18	< 0.18	< 0.18	-

All units reported as ug/L (ppb)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.

- = Parameter not analyzed.

* Please Note: Due to laboratory error, sample SW-04 was not analyzed by Method 8010.

MCL = Maximum Contaminant Levels, units reported as ug/L.

TABLE 5
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 CHLORINATED PESTICIDES AND PCBs
 EPA METHOD 8080

SAMPLE		SW-01	SW-02	SW-02	SW-03	SW-04
DATE		08/08/90	08/08/90	08/08/90	08/08/90	08/08/90
QA	MCL			DUPLICATE SAMPLE		
ALDRIN	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
ALPHA-BHC	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
BETA-BHC	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
DELTA-BHC	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
DIELDRIN	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
ENDOSULFAN I	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
ENDOSULFAN II	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
ENDOSULFAN SULFATE	-	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
ENDRIN	0.20	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
ENDRIN ALDEHYDE	-	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
GAMMA-BHC	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
HEPTACHLOR	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
HEPTACHLOR EPOXIDE	0.20 *	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
METHOXYCHLOR	100.00	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00
P,P'-DDD	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
P,P'-DDE	-	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
P,P'-DDT	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

All units reported as ug/L (ppb)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.

- = Parameter not analyzed.

* = Proposed EPA value.

MCL = Maximum Contaminant Levels, units reported as ug/L.

TABLE 5 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SURFACE WATER SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 CHLORINATED PESTICIDES AND PCBs
 EPA METHOD 8080

SAMPLE		SW-01	SW-02	SW-02	SW-03	SW-04
DATE		08/08/90	08/08/90	08/08/90	08/08/90	08/08/90
QA	MCL			DUPLICATE SAMPLE		
PCB-1016	0.50	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
PCB-1221	0.50	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
PCB-1232	0.50	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
PCB-1242	0.50	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
PCB-1248	0.50	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
PCB-1254	0.50	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
PCB-1260	0.50	< 5.00	< 5.00	< 5.00	< 5.00	< 5.00
TECHNICAL CHLORDANE	-	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
TOXAPHENE	-	< 2.00	< 2.00	< 2.00	< 2.00	< 2.00

All units reported as ug/L (ppb)

- < = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.
- * = Proposed EPA value.

MCL = Maximum Contaminant Levels, units reported as ug/L.

TABLE 6
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK WATER SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
RADIONUCLIDES

SAMPLE DATE DEPTH QA	MCL	SW-01	SW-02	SW-02	SW-03	SW-04
		08/08/90	08/08/90	08/08/90	08/08/90	08/08/90
				DUPLICATE SAMPLE		
CARBON-14	3000.0	< 500.0	< 500.0	< 500.0	< 500.0	< 500.0
GROSS ALPHA	15.0	< 2.0	3.0	3.0	3.0	6.0
GROSS ALPHA (2-SIGMA RANGE)	-	-	+/- 2.0	+/- 2.0	+/- 2.0	+/- 3.0
GROSS BETA	50.0	< 3.0	17.0	18.0	19.0	23.0
GROSS BETA (2-SIGMA RANGE)	-	-	+/- 4.0	+/- 4.0	+/- 4.0	+/- 4.0
GSA	-	ND 0.0	ND 0.0	ND 0.0	ND 0.0	ND 0.0
STRONTIUM-90	8.0	< 0.5	2.8	4.1	2.2	1.4
STRONTIUM-90 (2-SIGMA RANGE)	-	-	+/- 1.0	+/- 1.1	+/- 1.1	+/- 0.7
STRONTIUM-90 (DISSOLVED)	-	-	-	0.6	-	-
STRONTIUM-90 (DISSOLVED) (2-SIGMA RANGE)	-	-	-	+/- 0.9	-	-
TRITIUM	20000.0	< 500.0	< 500.0	< 500.0	< 500.0	< 500.0

All units reported as pCi/L

QA = Samples taken as part of the quality assurance program.

ND = No detection.

TABLE 7
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
METALS

SAMPLE DATE DEPTH QA	TTLC (mg/Kg)	S-01	S-01	S-01	S-02	S-02	S-02
		08/07/90 0.0	08/07/90 0.0	08/07/90 2.0	08/08/90 0.0	08/08/90 2.0	08/08/90 2.0
		DUPLICATE SAMPLE			DUPLICATE SAMPLE		DUPLICATE SAMPLE
ANTIMONY	500.00	21.40	21.60	29.00	13.50	20.00	18.00
ARSENIC	500.00	2.60	1.70	2.00	1.50	3.80	3.10
BARIUM	10000.00	1.00	1.10	1.00	319.00	890.20	145.20
BERYLLIUM	75.00	0.70	0.60	0.60	< 0.10	0.10	0.20
CADMIUM	100.00	< 1.00	< 1.00	< 1.00	7.40	9.50	9.90
CALCIUM	-	-	-	-	2400.00	13850.00	14120.00
CHROMIUM	2500.00	< 1.00	< 1.00	< 1.00	71.70	67.40	66.60
CHROMIUM HEXAVALENT	500.00	< 0.10	< 0.10	< 0.10	0.10	0.20	0.20
COBALT	8000.00	25.80	22.50	27.20	13.30	18.10	17.10
COPPER	2500.00	25.20	30.80	25.70	24.00	33.40	33.90
LEAD	1000.00	< 1.00	< 1.00	< 1.00	16.40	22.30	22.60
MAGNESIUM	-	-	-	-	9880.00	22200.00	21500.00
MERCURY	20.00	< 0.04	0.34	0.06	0.26	0.25	0.21
MOLYBDENUM	3500.00	9.50	9.70	12.50	5.60	8.60	8.10
NICKEL	2000.00	150.00	160.00	227.00	109.00	123.00	128.00
NITRATE	-	< 1.00	< 1.00	< 1.00	1.30	2.50	3.40
POTASSIUM	-	-	-	-	755.90	819.90	773.00
SELENIUM	100.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00
SILVER	500.00	< 1.00	< 1.00	< 1.00	1.00	1.00	1.00

All units reported as mg/Kg (ppm)

- < = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.

TTLC = Total Threshold Limit Concentration, units reported as mg/Kg

TABLE 7 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 METALS

SAMPLE DATE DEPTH QA		S-01 08/07/90 0.0	S-01 08/07/90 0.0	S-01 08/07/90 2.0	S-02 08/08/90 0.0	S-02 08/08/90 2.0	S-02 08/08/90 2.0
	TTLIC (mg/Kg)	DUPLICATE SAMPLE			DUPLICATE SAMPLE		
SODIUM	-	-	-	-	2850.00	372.00	336.00
THALLIUM	700.00	15.30	13.70	20.30	7.80	11.20	11.90
VANADIUM	2400.00	78.70	64.50	70.50	33.30	46.90	48.50
ZINC	5000.00	45.80	71.10	54.00	51.00	60.30	62.00

All units reported as mg/Kg (ppm)

- < = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.

TTLIC = Total Threshold Limit Concentration, units reported as mg/Kg

TABLE 7 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 METALS

SAMPLE DATE DEPTH QA	TTLC (mg/Kg)	S-03	S-03	S-04	S-04
		08/08/90	08/08/90	08/07/90	08/07/90
		0.0	2.0	0.0	2.0
ANTIMONY	500.00	13.70	17.40	23.50	40.20
ARSENIC	500.00	3.50	2.40	2.00	2.60
BARIUM	10000.00	118.80	142.00	1.00	1.00
BERYLLIUM	75.00	0.10	0.30	1.10	0.40
CADMIUM	100.00	7.80	9.30	< 1.00	< 1.00
CALCIUM	-	1430.00	6010.00	-	-
CHROMIUM	2500.00	42.70	57.20	< 1.00	< 1.00
CHROMIUM HEXVALENT	500.00	0.30	0.10	< 0.10	< 0.10
COBALT	8000.00	13.60	17.40	23.30	33.30
COPPER	2500.00	26.20	31.40	29.90	49.30
LEAD	1000.00	12.40	17.90	5.00	< 1.00
MAGNESIUM	-	7140.00	16800.00	-	-
MERCURY	20.00	< 0.04	< 0.04	0.30	0.09
MOLYBDENUM	3500.00	5.70	7.40	10.50	17.60
NICKEL	2000.00	77.60	124.00	165.00	173.00
NITRATE	-	< 1.00	< 1.00	< 1.00	< 1.00
POTASSIUM	-	1000.80	713.50	-	-
SELENIUM	100.00	< 1.00	< 1.00	< 1.00	< 1.00
SILVER	500.00	1.00	0.80	< 1.00	< 1.00

All units reported as mg/Kg (ppm)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
 - = Parameter not analyzed.

TTLC = Total Threshold Limit Concentration, units reported as mg/Kg

TABLE 7 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 METALS

SAMPLE		S-03	S-03	S-04	S-04
DATE		08/08/90	08/08/90	08/07/90	08/07/90
DEPTH		0.0	2.0	0.0	2.0
QA	TTLIC (mg/Kg)				
SODIUM	-	308.00	187.00	-	-
THALLIUM	700.00	7.60	10.50	15.20	26.60
VANADIUM	2400.00	37.10	45.80	66.30	91.40
ZINC	5000.00	46.20	56.40	71.60	88.70

All units reported as mg/Kg (ppm)

- < = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.

TTLIC = Total Threshold Limit Concentration, units reported as mg/Kg

TABLE 8
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
CHLORINATED PESTICIDES AND PCBs
EPA METHOD 8080

SAMPLE DATE DEPTH QA	TTLIC	S-01		S-01		S-01		S-02		S-02	
		08/07/90	08/07/90	08/07/90	08/07/90	08/08/90	08/08/90	08/08/90	08/08/90	08/08/90	08/08/90
		0.0	0.0	2.0	0.0	2.0	0.0	2.0	2.0	2.0	2.0
			DUPLICATE SAMPLE		DUPLICATE SAMPLE						DUPLICATE SAMPLE
ALDRIN	1400.0	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
ALPHA-BHC	-	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
BETA-BHC	-	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
DELTA-BHC	-	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3
DIELDRIN	8000.0	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
ENDOSULFAN I	-	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3
ENDOSULFAN II	-	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
ENDOSULFAN SULFATE	-	< 17.0	< 17.0	< 17.0	< 17.0	< 17.0	< 17.0	< 17.0	< 17.0	< 17.0	< 17.0
ENDRIN	200.0	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3
ENDRIN ALDEHYDE	-	< 6.7	< 6.7	< 6.7	< 6.7	< 6.7	< 6.7	< 6.7	< 6.7	< 6.7	< 6.7
GAMMA-BHC	-	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
HEPTACHLOR	4700.0	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
HEPTACHLOR EPOXIDE	-	< 33.0	< 33.0	< 33.0	< 33.0	< 33.0	< 33.0	< 33.0	< 33.0	< 33.0	< 33.0
METHOXYCHLOR	100000.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0
P,P'-DDD	1000.0	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3
P,P'-DDE	1000.0	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7

All units reported as ug/Kg (ppb)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.

TTLIC = Total Threshold Limit Concentration, units reported as ug/Kg

TABLE 8 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 CHLORINATED PESTICIDES AND PCBs
 EPA METHOD 8080

SAMPLE		S-01	S-01	S-01	S-02	S-02	S-02
DATE	11/11/11	08/07/90	08/07/90	08/07/90	08/08/90	08/08/90	08/08/90
DEPTH		0.0	0.0	2.0	0.0	2.0	2.0
QA	TTLIC		DUPLICATE SAMPLE				DUPLICATE SAMPLE
P,P'-DDT	1000.0	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3	< 3.3
PCB-1016	50000.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1221	50000.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1232	50000.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1242	50000.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1248	50000.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1254	50000.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1260	50000.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0	< 170.0
TECHNICAL CHLORDANE	-	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7	< 1.7
TOXAPHENE	5000.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0	< 67.0

All units reported as ug/Kg (ppb)

- < = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
- = Parameter not analyzed.

TTLIC = Total Threshold Limit Concentration, units reported as ug/Kg

TABLE 8 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 CHLORINATED PESTICIDES AND PCBs
 EPA METHOD 8080

SAMPLE	TTLc	S-03	S-03	S-04	S-04
		08/08/90	08/08/90	08/07/90	08/07/90
DATE					
DEPTH		0.0	2.0	0.0	2.0
QA					
ALDRIN	1400.0	< 1.7	< 1.7	< 1.7	< 1.7
ALPHA-BHC	-	< 1.7	< 1.7	< 1.7	< 1.7
BETA-BHC	-	< 1.7	< 1.7	< 1.7	< 1.7
DELTA-BHC	-	< 3.3	< 3.3	< 3.3	< 3.3
DIELDRIN	8000.0	< 1.7	< 1.7	< 1.7	< 1.7
ENDOSULFAN I	-	< 3.3	< 3.3	< 3.3	< 3.3
ENDOSULFAN II	-	< 1.7	< 1.7	< 1.7	< 1.7
ENDOSULFAN SULFATE	-	< 17.0	< 17.0	< 17.0	< 17.0
ENDRIN	200.0	< 3.3	< 3.3	< 3.3	< 3.3
ENDRIN ALDEHYDE	-	< 6.7	< 6.7	< 6.7	< 6.7
GAMMA-BHC	-	< 1.7	< 1.7	< 1.7	< 1.7
HEPTACHLOR	4700.0	< 1.7	< 1.7	< 1.7	< 1.7
HEPTACHLOR EPOXIDE	-	< 33.0	< 33.0	< 33.0	< 33.0
METHOXYCHLOR	100000.0	< 67.0	< 67.0	< 67.0	< 67.0
P,P'-DDD	1000.0	< 3.3	< 3.3	< 3.3	< 3.3
P,P'-DDE	1000.0	< 1.7	< 1.7	< 1.7	< 1.7

All units reported as ug/Kg (ppb)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
 - = Parameter not analyzed.

TTLc = Total Threshold Limit Concentration, units reported as ug/Kg

TABLE 8 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 CHLORINATED PESTICIDES AND PCBs
 EPA METHOD 8080

SAMPLE DATE DEPTH QA	TTLIC	S-03	S-03	S-04	S-04
		08/08/90	08/08/90	08/07/90	08/07/90
		0.0	2.0	0.0	2.0
P,P'-DDT	1000.0	< 3.3	< 3.3	< 3.3	< 3.3
PCB-1016	50000.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1221	50000.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1232	50000.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1242	50000.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1248	50000.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1254	50000.0	< 170.0	< 170.0	< 170.0	< 170.0
PCB-1260	50000.0	< 170.0	< 170.0	< 170.0	< 170.0
TECHNICAL CHLORDANE	-	< 1.7	< 1.7	< 1.7	< 1.7
TOXAPHENE	5000.0	< 67.0	< 67.0	< 67.0	< 67.0

All units reported as ug/Kg (ppb)

< = Constituent below detection limit. Detection limits may vary depending on interference by other sample constituents.
 - = Parameter not analyzed.

TTLIC = Total Threshold Limit Concentration, units reported as ug/Kg

TABLE 9
SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
UNIVERSITY OF CALIFORNIA, DAVIS
RADIONUCLIDES

SAMPLE	S-01	S-01	S-01	S-02	S-02	S-02	S-03
DATE	08/07/90	08/07/90	08/07/90	08/08/90	08/08/90	08/08/90	08/08/90
DEPTH	0.0	0.0	2.0	0.0	2.0	2.0	0.0
QA		DUPLICATE SAMPLE				DUPLICATE SAMPLE	
CARBON-14	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
GROSS ALPHA	0.90	1.00	1.00	0.70	1.30	1.40	0.80
GROSS ALPHA 2-SIGMA RANGE	+/- 0.60	+/- 0.40	+/- 0.60	+/- 0.50	+/- 0.70	+/- 0.70	+/- 0.50
GROSS BETA	1.80	2.00	1.30	2.10	2.60	2.70	1.70
GROSS BETA 2-SIGMA RANGE	+/- 0.80	+/- 0.60	+/- 0.80	+/- 0.90	+/- 0.90	+/- 0.90	+/- 0.90
GSA	ND 0.00	ND 0.00	ND 0.00	ND 0.00	ND 0.00	ND 0.00	ND 0.00
STRONTIUM-90	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
TRITIUM	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

All units reported as pCi/g

QA = Samples taken as part of the quality assurance program.

ND = No detection.

TABLE 9 (cont.)
 SUMMARY OF CHEMICAL ANALYSES OF PUTAH CREEK SEDIMENT SAMPLES
 UNIVERSITY OF CALIFORNIA, DAVIS
 RADIONUCLIDES

SAMPLE	S-03	S-04	S-04
DATE	08/08/90	08/07/90	08/07/90
DEPTH	2.0	0.0	2.0
QA			
CARBON-14	< 0.50	< 0.50	< 0.50
GROSS ALPHA	1.50	0.50	1.20
GROSS ALPHA 2-SIGMA RANGE	+/- 0.60	+/- 0.40	+/- 0.90
GROSS BETA	2.90	0.80	2.30
GROSS BETA 2-SIGMA RANGE	+/- 1.00	+/- 0.50	+/- 0.80
GSA	ND 0.00	ND 0.00	ND 0.00
STRONTIUM-90	< 0.05	< 0.05	< 0.05
TRITIUM	< 0.20	< 0.20	< 0.20

All units reported as pCi/g

QA = Samples taken as part of the quality assurance program.
 ND = No detection.