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S. Department of Energy
k Ridge Field Office
O. Box 2001
k Ridge, TN 37831-8723

ttention: David G. Adler, Site Manager
Former Sites Restoration Division

ubject: Report on Results of Environmental Sampling Conducted at SLAPS During 1991

ear Mr. Adler:

nclosed is a report summarizing the results of environmental ampling and analysis conducted at SLAPS during 1991. The report ndicates that there were no significant changes in conditions from hose reported in previous years -- and no significant long term rends are apparent.

There are two items of note:

1) Data from certain wells appear to be suspect because of the condition of wells from which the samples were taken. Bechtel is currently completing a program in St. Louis to repair wells that have become damaged or that have deteriorated over time, as well as to clean and/or redevelop wells as necessary. It is expected that the quality of future water samples will be more certain to accurately reflect groundwater conditions at the site.

2) TETLD data indicate that the area on the northern side of the site, adjacent to McDonnell Boulevard, continues to exhibit significant gamma exposure. Bechtel has recently placed additional TETLDs in this area so as to better understand and evaluate the extent of the gamma source, as well as to consider possible alternatives to reduce potential public exposure from this source term.

Should you have any questions regarding the material in this report, please let me know.

his material was prepared under my direction or supervision in ccordance with a system designed to ensure that the information ubmitted was properly gathered and evaluated. To the best of my nowledge and belief it is true, accurate, and complete.

Sincerely,

Gerald L. Palau
Project Manager - FUSRAP

GLP:

Enclosure: As stated

Concurrence: R.G. Robbins @ RGR E.T. Newberry: ETN

ACTION REQUIRED:	[ ] YES	[X] NO	DUE DATE
RESPONSE TO CHRON NO.			

Enclosure
Environmental Surveillance Report for the
St. Louis Airport Site
Covering Calendar Year 1991

Environmental sampling of the U.S. Department of Energy's DOE) St. Louis Airport Site (SLAPS) and surrounding area began n 1984. SLAPS is part of the Formerly Utilized Sites Remedial ction Program (FUSRAP). The environmental sampling activities t SLAPS during 1991 included sampling networks for radon oncentrations in air; external gamma radiation exposure; and otal uranium, radium-226, and thorium-230 concentrations in surface water, sediment, and groundwater. Additionally, several onradiological parameters were measured in groundwater; these indicator parameters included total organic carbon (TOC), total organic halides (TOX), specific conductance, and pH.

Sampling analysis results have been compared with applicable Environmental Protection Agency (EPA) standards; federal, state, and local applicable or relevant and appropriate requirements (ARARs); and/or DOE derived concentration guidelines (DCGs). Environmental standards, ARARs, and DCGs are established to protect public health and the environment.

Some data results from sampling in 1991 appeared to be anomalous, particularly during fourth quarter sampling. The wells that showed an increase in contaminant concentration are known to be damaged and/or require cleaning. In addition, the increase of contaminant concentrations in the damaged wells during fourth quarter could be explained by two storm events that occurred in October of 1991. The first event occurred on October 4 when 1.17 inches of rain fell in 60 minutes and the second on October 23 when 1.01 inches of rain fell in 30 minutes. The event on October 23 occurred less than a week prior to sampling and it is believed that resulting runoff may have transported contamination into wells with damaged seals or screens. Surface water and sediment sampling results may have also been affected by these storm events. Movement of sediments in Coldwater Creek could transport known contamination to new locations causing contaminant concentrations in sediment to vary, and suspended

[redacted]oad movement could cause elevated surface water concentrat
A detailed delineation of these anomalous data values can b
in data tables where footnotes are provided for further
explanation (Note: Anomalous values and values attributable
this storm event are not used in calculating the annual ave
for that location).

ENVIRONMENTAL SAMPLING RESULTS

During 1991, annual average radon concentrations (Tabl
for each monitoring station (Figure 1) ranged from 0.5 to 1
pCi/L (0.02 to 0.05 Bq/L), well below the DOE guideline of
pCi/L at the boundary. The annual average external gamma
radiation exposure level (Table 2) at SLAPS was 316 mR/yr a
background at the property line; the high average was due
primarily to the high exposure level at station 2 (average
of 2152 mR/yr above background). If the value for station
dropped from the calculation for the average along the prop
[redacted]ine, the average would be 54 mR/yr above background. Two
monitoring stations have been added along the fenceline at
on either side of location 2 due to high levels of external
radiation in its vicinity. A station was also added in the
southwest corner of the site in an area of known contaminat
Results from these new stations will be reported in the
environmental surveillance report for 1992.

Annual average radionuclide concentrations in surface
(Table 3) ranged from 0.2 to 0.7 pCi/L (0.007 to 0.026 Bq/L
to 1.2 pCi/L (0.01 to 0.04 Bq/L), and 4 to 6 pCi/L (0.15 t
Bq/L) for radium-226, thorium-230, and total uranium,
respectively. These concentrations are well below the DOE
of 100, 300, and 600 pCi/L for radium-226, thorium-230, an
uranium, respectively. Sampling locations for surface wat
sediment are shown in Figures 1 and 2.

Annual average concentrations of radium-226, thorium-
[redacted]and total uranium in sediment (Table 4) ranged from 0.9 to
pCi/g (0.03 to 0.04 Bq/g), 1.3 to 9.7 pCi/g (0.05 to 0.36
and 1.9 to 5.3 pCi/g (0.07 to 0.20 Bq/L), respectively.

Average annual concentrations in groundwater (Table 5

ranged from 0.2 to 1.6 pCi/L (0.007 to 0.06 Bq/L), 0.5 to 28 pCi/L (0.019 to 1.04 Bq/L), and 4 to 6616 pCi/L (0.15 to 245 Bq/L) for radium-226, thorium-230, and total uranium, respectively. Twenty nine radionuclide concentrations in groundwater fell outside the expected range. Of these 29 values, 10 were total uranium concentrations, 8 were radium-226 concentrations, and 11 were thorium-230 concentrations (Note, there were 21 annual average concentrations for each radiological analyte in groundwater). Of the 10 total uranium annual averages that fell outside the expected range, 2 deviated from the expected range by less than 25%, 5 from 25% to less than 50%, 2 from 50% to less than 75%, and 1 was 76%. Of the 8 radium-226 annual averages that fell outside the range, 2 deviated from the expected range by less than 25%, 2 from 25% to less than 50%, and 4 from 50% to less than 75%. Of the 11 thorium-230 annual averages that fell outside the range, 1 deviated from the expected range by less than 25%, 3 from 25% to less than 50%, 6 from 50% to less than 75%, and 1 was 76%. These deviations from the expected range are absolute deviations, of them, 2 values were less than and 27 values were greater than the expected range. The annual average concentrations for total uranium do not include values from first quarter samples due to an error in analyzing the samples. The average concentrations of uranium in groundwater were below the DOE DCG of 600 pCi/L in all wells except A, B, D, M10-25S, and M11-9 (see Figure 3 for location of wells). These wells are installed either through or adjacent to buried radioactive materials. However, because SLAPS is fenced, the public does not have access to these capped and locked wells; in addition, there is no known consumption of groundwater in the vicinity of the site.

Groundwater samples were also collected and analyzed for the following indicator parameters: Specific conductance, pH, TOC, and TOX (Tables 6 and 7). Annual average specific conductance ranged from 711 to 7130 µmhos/cm, and annual average pH values ranged from 6.5 to 7.5. The results showed TOC annual average concentrations ranging from 1.1 to 22.1 mg/L and TOX concentrations ranging from 20 to 119 µg/L. Analytical results

indicator parameters show that groundwater at SLAPS is generally of poor quality, as is typical of industrial/urban areas.

To verify that the site is in compliance with the DOE radiation protection standard and to assess the potential effect of the site on public health, the potential radiation dose was calculated for a hypothetical maximally exposed individual and the population within an 80 km (50mi) radius of the site (Table 8). Based on a conservative scenario, this hypothetical individual would receive an annual exposure, excluding background, of approximately 5.2 mrem/yr (0.052 mSv/yr). The population within an 80-km (50-mi) radius of SLAPS would receive a collective dose of 0.79 person-rem/yr (0.0079 person-Sv/yr) from materials present onsite. This collective population dose is extremely small compared with the collective population dose due to natural background gamma radiation of 1.6×10^5 person-rem/yr (1.6×10^3 person-Sv/yr) for the population within 80 km -mi) of SLAPS.

Site activities in 1991 were limited to maintenance. SLAPS was in compliance with all applicable regulations during 1991 and has remained in compliance since 1984.

CONCLUSIONS

Environmental sampling data for 1991 was compared to results of the previous 5 years data. An expected range was calculated by subtracting and adding 2 standard deviations from the data set of the previous 5 years to the average of the data set. Radon concentrations and external gamma radiation levels at SLAPS displayed no significant trends when compared to the environmental sampling results of the 5 previous years. Twenty six radionuclide concentrations in sediment and surface water fell outside the expected range, however, there are no apparent trends of increasing or decreasing contaminant levels. It is ieved that these data anomalies are caused by the migration of wn contamination in Coldwater Creek. Twenty nine radionuclide concentrations in groundwater fell outside the expected range. Of these 29 values, 16 deviated by less than 1 pCi/l from the

expected range, 8 deviated from the expected range by more than 1 to 10 pCi/l, and only 5 deviated from the expected range by more than 10 pCi/l. The wells that showed an increase in contaminant concentration are known to be damaged and/or require cleaning. A program has been implemented to begin repairing and cleaning wells at SLAPS. As data results are acquired after this repairing and cleaning activity, further investigations into possible trends at these wells will continue and will be reported in the environmental surveillance report for 1992.

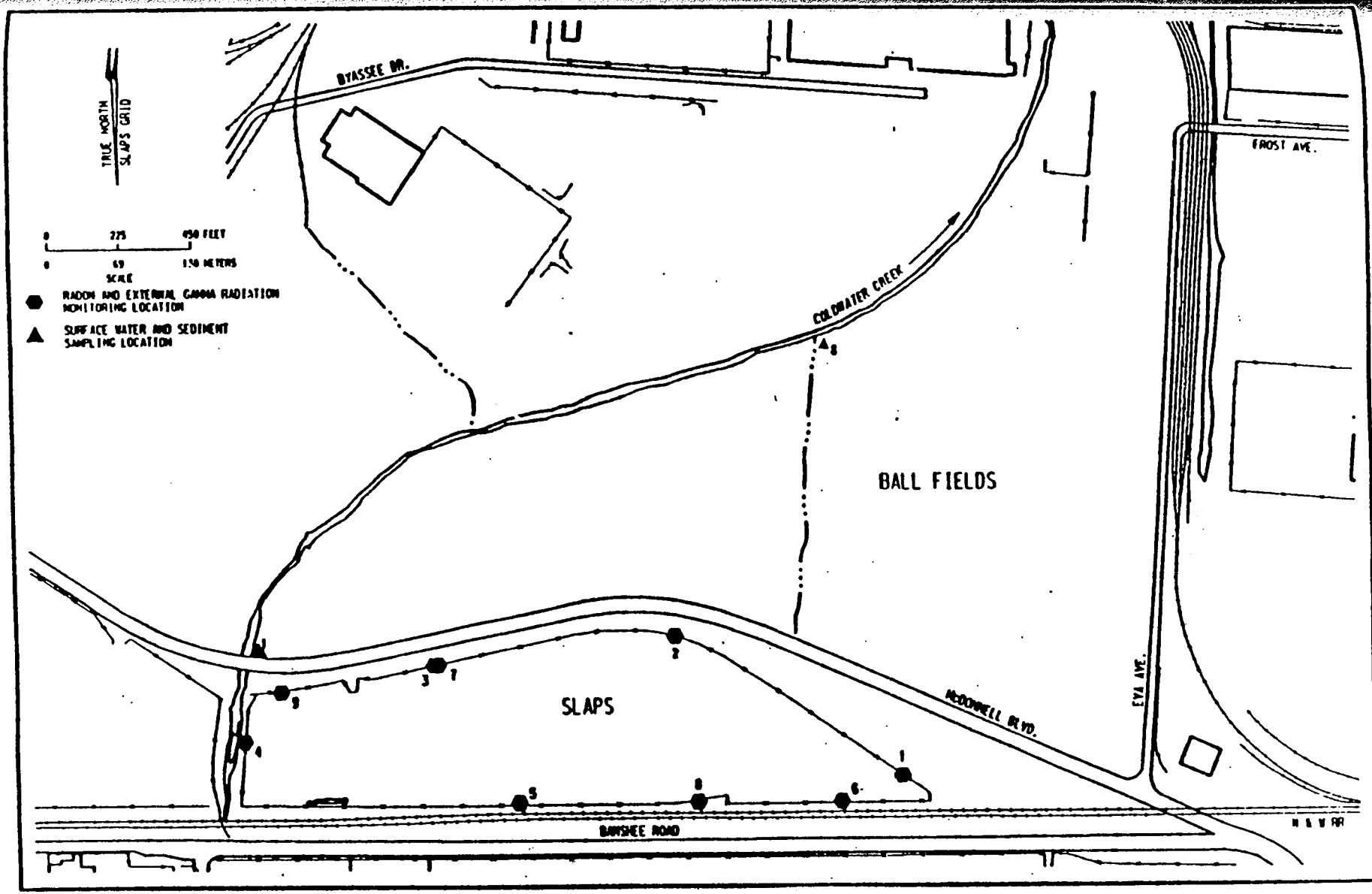

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FIGURE 1
ONSITE RADON, EXTERNAL GAMMA RADIATION, SURFACE WATER, AND SEDIMENT SAMPLING LOCATIONS AT SLAPS

Table 1

Concentrations[a,b] of Radon at SLAPS, 1991

Sampling Location[c]	Quarter 1	2	3	4	Avg
Property Line					
1	0.6	<0.4	0.6	<0.3	0.5
2	0.7	0.4	2.5	2.1	1.4
3	0.9	<0.4	0.8	0.9	0.8
4	0.5	<0.4	0.9	0.9	0.7
5	0.9	<0.4	1.6	2.0	1.2
6	0.5	<0.4	1.1	1.1	0.8
8	0.7	<0.4	1.6	1.7	1.1
9	0.5	<0.4	1.1	1.1	0.8
Quality Control					
7[d]	<0.3	0.4	1.0	0.7	0.6
Background					
16[e]	0.9	0.4	<0.3	<0.3	0.5
17[f]	<0.3	<0.4	<0.3	<0.3	0.3
18[g]	<0.3	<0.4	1.2	0.8	0.7

[a]Concentrations are given in units of pCi/L (1 pCi/L = 0.037 Bq/L).

[b]Background has not been subtracted from the values reported for property-line stations. Note: Concentrations at some stations were below values at background stations.

[c]Onsite sampling locations are shown in Figure 1.

[d]Station 7 is a quality control for station 3.

[e]Detector moved in October 1990 from 6500 Las Sombrias Lane, Florissant, Missouri, approximately 24 km (15 mi) northeast of SLAPS, to 4517 Oakland Drive, St. Louis, approximately 26 km (16 mi) southeast of SLAPS.

[f]Located at McDonnell Blvd., approximately 0.8 km (0.5 mi) east of SLAPS.

[g]Located at the St. Charles County, Missouri, airport, approximately 32 km (20 mi) northwest of SLAPS.

Table 2

Average External Gamma Radiation Levels[a,b]

at SLAPS, 1991

Sampling Location[c]	Quarter 1	2	3	4	Avg
Property Line					
1	40	36	30	30	34
2	1916	2122	2021	2548	2152
3	76	91	80	76	81
4	37	35	25	28	31
5	25	58	24	32	35
6	35	43	36	32	37
8	37	41	48	43	42
9	102	135	128	96	115
Quality Control					
7[d]	93	94	85	89	90
Background					
16[e]	59	59	66	73	64
17[f]	64	69	70	68	68
18[g]	52	49	54	62	54

[a]Levels are given in units of mR/yr. Dosimeters evaluated each quarter have been in place for 1 year.

[b]Measured background has been subtracted from the readings taken at the property-line stations.

[c]Onsite sampling locations are shown in Figure 1.

[d]Station 7 is a quality control for station 3.

[e]Station moved in October 1990 from 6500 Las Sombrias Lane, Florissant, Missouri, approximately 24 km (15 mi) northeast of SLAPS, to 4517 Oakland Drive, St. Louis, approximately 26 km (16 mi) southeast of SLAPS.

[f]Located at McDonnell Blvd., approximately 0.8 km (0.5 mi) east of SLAPS.

[g]Located at the St. Charles County, Missouri, airport, approximately 32 km (20 mi) northwest of SLAPS.

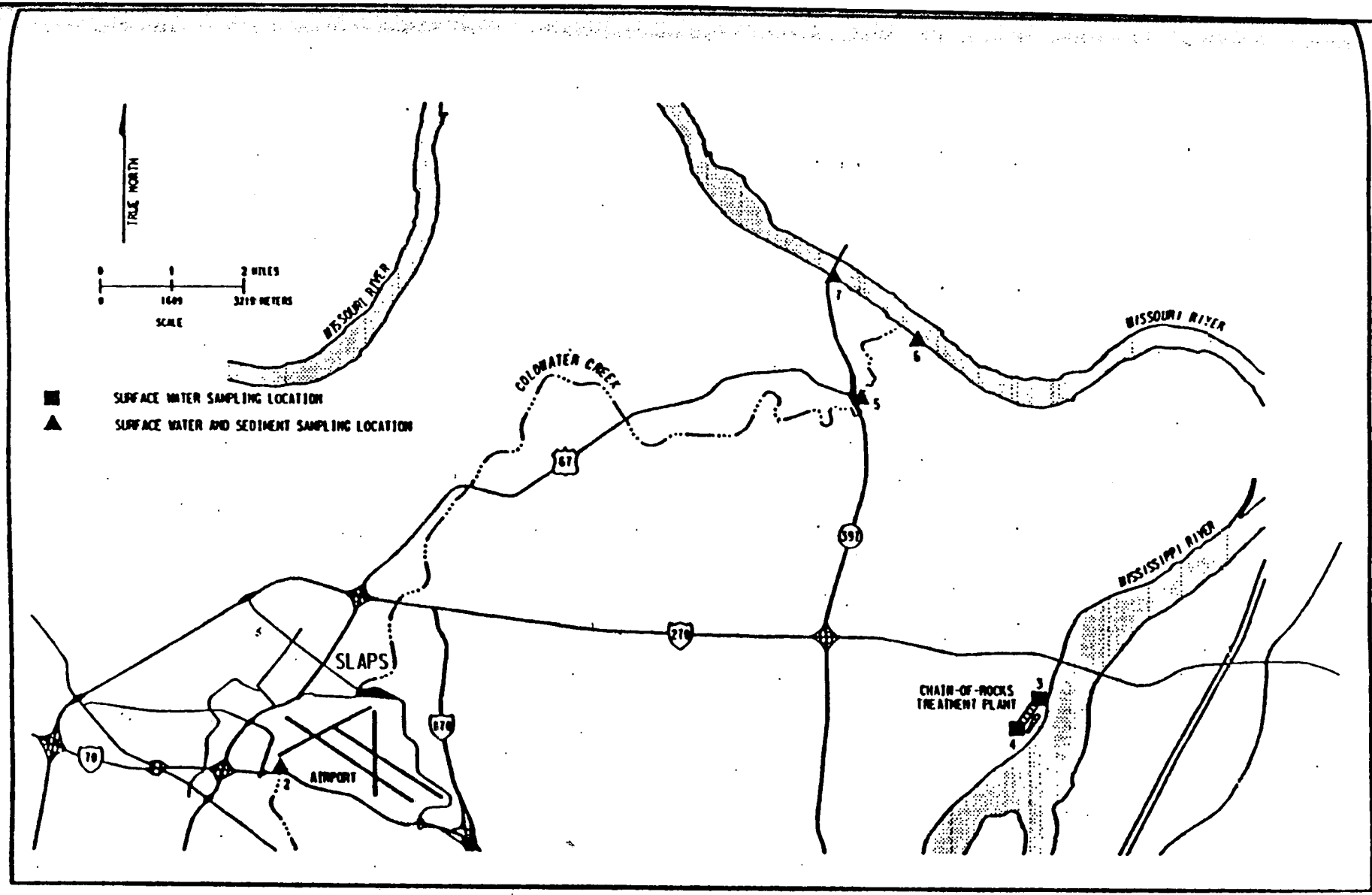

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FIGURE 2

OFFSITE SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS IN SLAPS AREA

Table 3

Concentrations[a] of Total Uranium, Radium-226, and Thorium-230 in Surface Water in the Vicinity of SLAPS, 1991

Sampling Location[b]	Quarter 1	2	3	4	Avg
			Total Uranium[c]		
1	SL[f]	SL[f]	<5	3	4
2[d]	<5	<5	<5	1	4
3	<5	7	6	4	6
4	<5	6	<5	3	5
5	<5	7	<5	1	5
6	<5	7	<5	4	5
7	5	7	<5	5	5
8	SL[f]	5	<5	3	4
			Radium-226		
1	0.1	<0.6	0.1	1.1	0.4
2[d]	0.1	0.2	0.2	0.3	0.2
3	<0.1	1.0	0.2	0.6	0.5
4	<0.1	0.2	0.1	<0.2	0.2
5	0.1	<0.1	0.2	1.5	0.5
6	0.4	1.1	0.4	0.8	0.7
7	0.2	1.6	0.3	0.5	0.6
8	0.3	0.2	0.3	<0.2	0.3
			Thorium-230		
1	<0.1	<0.1	<1.1	<0.2	0.4
2[d]	<0.1	<0.1	<1.1	<0.1	0.4
3	<0.1	2.5	1.2	<0.1	1.0
4	0.1	<0.1	<1.1	<0.2	0.4
5	0.1	<0.1	<1.1	0.3	0.4
6	<0.3	0.7	1.6	0.3	0.7
7	2.8	1.4	<0.3	0.1	1.2
8	<0.1	<0.1	<1.1	<0.3	0.4

[a]Concentrations are given in units of E-9 μCi/ml. Background values have not been subtracted. Note: 1E-9 μCi/ml is equivalent to 0.037 Bq/L.

[b]Sampling locations are shown in Figures 1 and 2.

[c]Total uranium concentrations were determined by using the fluorometric method during the first three quarters and by the kinetic phosphorescence analysis during the fourth quarter.

Table 3

(continued)

[d]Location 2 serves as an upstream (background) sampling station.

[e]No sample data available.

[f]The data for this quarter was not used in calculating the yearly average because the data appeared to be anomalous as previous and/or subsequent data were consistent with historical concentrations; indicated by SL in the table, or the concentrations at these locations may have been effected by the storm event prior to sampling; indicated by FQ in the table.

Table 4

Concentrations[a] of Total Uranium, Radium-226, and Thorium-230 in Sediment in the Vicinity of SLAPS, 1991

Sampling Location[b]	Quarter 1	2	3	4	Avg
Total Uranium[c]					
1	7.3	7.4	2.1	4.5	5.3
2[d]	2.0	1.6	2.4	1.8	1.9
5	1.0	7.1	1.8	1.9	2.9
6	1.0	1.3	2.8	4.2	2.3
7	1.5	1.6	2.0	2.4	1.9
Radium-226					
1	1.2	1.4	0.8	0.9	1.1
2[d]	1.2	0.9	1.2	1.2	1.1
5	0.7	1.2	1.0	0.9	1.0
6	1.2	1.2	0.7	0.7	0.9
7	0.5	1.2	1.1	1.3	1.0
Thorium-230					
1	21.0	15.4	0.8	1.6	9.7
2[d]	0.9	0.8	0.8	2.8	1.3
5	0.7	8.7	1.0	2.3	3.2
6	0.5	0.7	1.4	2.7	1.3
7	0.7	0.8	1.2	4.0	1.7

[a]Concentrations are given in units of pCi/g.
Note: 1 pCi/g is equivalent to 0.037 Bq/g.
Background values have not been subtracted.
[b]Sampling locations are shown in Figures 1 and 2.
[c]Total uranium concentrations were determined by summing the concentrations of uranium-234, uranium-235, and uranium-238.
[d]Location 2 serves as an upstream (background) sampling station; all other locations are downstream.

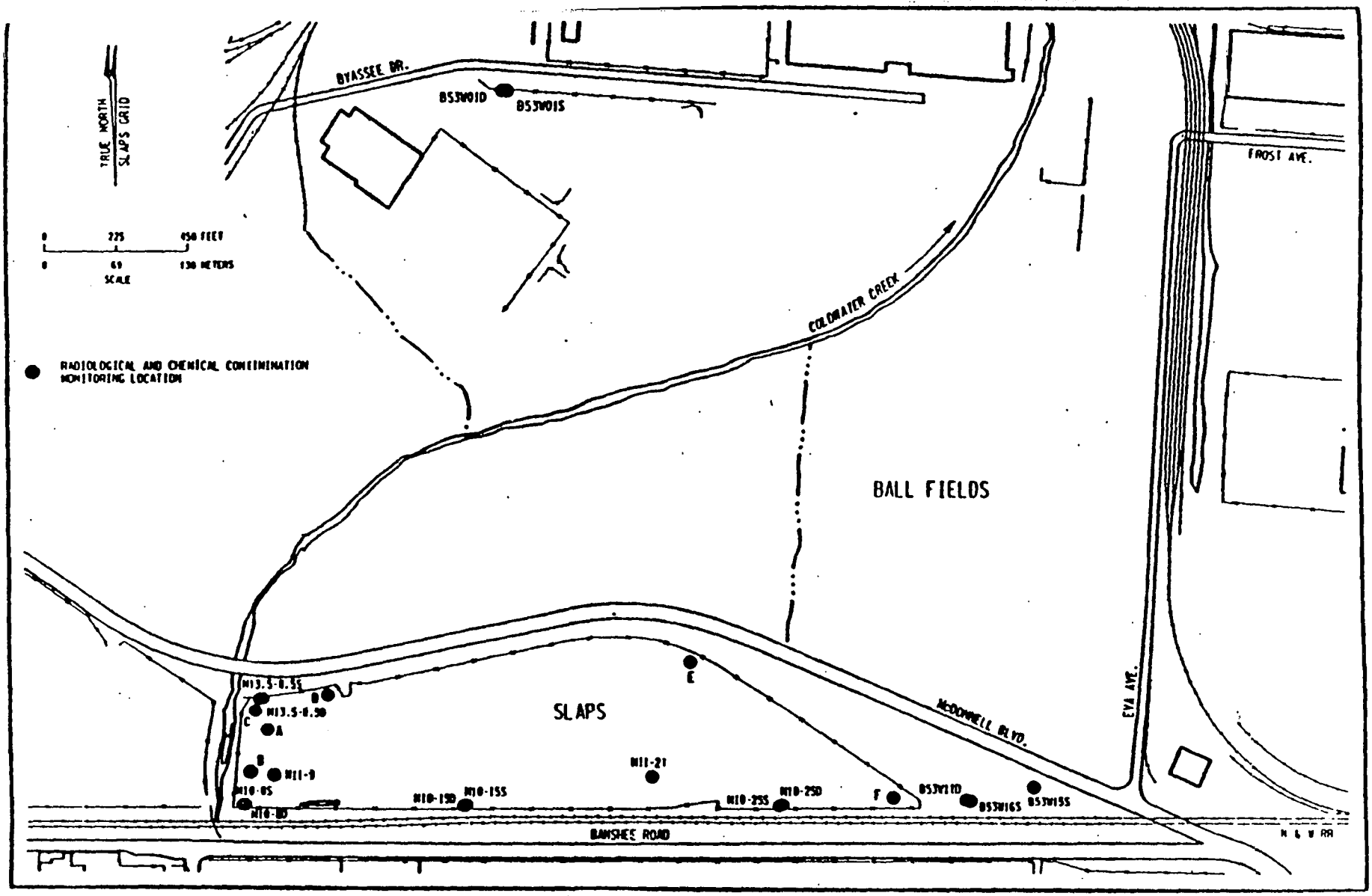

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FIGURE 3
WELLS SAMPLED FOR RADIOLOGICAL AND INDICATOR PARAMETERS IN THE SLAPS AREA IN 1991

Table 5

Concentrations[a] of Total Uranium, Radium-226, and Thorium-230 in Groundwater at SLAPS, 1991

Sampling Location[b]	Quarter 1[g]	2	3	4	Avg
Total Uranium[c]					
A		3401	4464	3450	3772
B		6717	6256	6874	6616
C		22	13	12	16
D		635	1598	412	882
E		251	210	151	204
F		376	297	539	404
M10-8D		<5	SL[h]	2	4
M10-8S		70	19	10	33
M10-15D		<5	10	2	6
M10-15S		12	SL[h]	10	11
M10-25D		<5	13	7	8
M10-25S		9	79	19	36
M11-9		6300	4819	7313	6144
M11-21		170	140	181	164
M13.5-8.5D		7	6	2	5
M13.5-8.5S		9	6	3	6
B53W11D[d]		17	8	25	17
B53W15S[d]		5	16	3	8
B53W16S[d]		7	8	2	6
Background					
B53W01D[e]		11	6	0.1	6
B53W01S[e]		8	<5	3	5
Radium-226					
A	0.2	SL[h]	0.4	FQ[h]	0.3
B	0.6	0.1	0.4	FQ[h]	0.4
C	0.3	0.2	0.3	0.3	0.3
D	0.2	0.1	0.2	0.3	0.2
E	0.3	0.4	0.8	0.5	0.5
F	0.4	0.03	0.2	0.3	0.2
M10-8D	0.5	0.6	0.8	FQ[h]	0.6
M10-8S	0.5	0.2	0.5	FQ[h]	0.4
M10-15D	1.0	0.6	1.9	1.3	1.2
M10-15S	1.6	0.6	1.2	1.5	1.2
M10-25D	1.6	2.3	0.8	FQ[h]	1.6
M10-25S	<0.1	1.3	0.9	1.1	0.8
M11-9	SL[h]	<0.07	0.5	FQ[h]	0.3
M11-21	SL[h]	1.0	0.6	0.8	2.3
M13.5-8.5D	0.7	0.4	0.6	FQ[h]	0.6

Table 5

(continued)

Page 2 of 3

Sampling Location[b]	Quarter 1	2	3	4	Avg
			Radium-226		
M13.5-8.5S	1.2	0.3	0.3	1.9	0.9
B53W11D[d]	0.5	0.1	1.0	FQ[h]	0.5
B53W15S[d]	0.2	1.3	0.8	FQ[h]	0.8
B53W16S[d]	0.3	0.6	0.9	0.2	0.5
Background					
B53W01D[e]	1.0	0.5	0.8	1.3	0.9
B53W01S[e]	0.9	1.3	0.3	1.2	0.9
			Thorium-230		
A	1.2	3.6	3.3	FQ[h]	2.7
B	0.7	0.3	1.7	FQ[h]	0.9
C	0.4	0.4	1.2	<0.7	0.7
D	1.7	0.4	2.5	FQ[h]	1.5
E	0.7	0.4	3.2	<0.7	1.3
F	0.9	0.7	2.5	<0.7	1.2
M10-8D	1.2	0.4	1.7	<0.7	1.0
M10-8S	0.2	0.2	1.2	<0.7	0.6
M10-15D	0.2	0.1	<1.3	1.8	0.8
M10-15S	8.0	6.0	57.5	24.9	24.1
M10-25D	1.7	1.3	<1.2	1.6	1.5
M10-25S	1.6	1.4	<1.1	0.6	1.2
M11-9	SL[h]	1.8	1.4	FQ[h]	1.6
M11-21	SL[h]	SL[h]	21.7	33.4	28
M13.5-8.5D	0.2	0.1	<0.9	0.9	0.5
M13.5-8.5S	3.1	0.8	1.4	0.9	1.6
B53W11D[d]	<0.2	SL[h]	1.4	FQ[h]	0.8
B53W15S[d]	SL[h]	SL[h]	2.1	<0.7	1.4
B53W16S[d]	0.6	0.6	<0.9	<0.7	0.7
Background					
B53W01D[e]	0.2	0.1	2.2	<0.2	0.7
B53W01S[e]	0.3	0.3	<0.9	1.0	0.6

[a]Concentrations are given in E-9 µCi/ml.
Note: 1E-9 µCi/ml is equivalent to 0.037 Bq/L.

[b]Sampling locations are shown in Figure 3.

[c]Total uranium concentrations were determined by using the fluorometric method during the first three quarters and by the kinetic phosphorescence analysis during the fourth quarter.

[d]Upgradient well.

[e]Well established for background measurements in July 1988.

[f]No sample data available.

[g]Annual average concentrations of total uranium in groundwater do not include first quarter data due to high values obtained because of laboratory analyses error.

[h]The data for this quarter was not used in calculating the yearly average because the data appeared to be anomalous as previous and/or subsequent data were consistent with historical concentrations; indicated by SL in the table, or the concentrations at these locations may have been effected by the storm event prior to sampling; indicated by FQ in the table.

Table 6
Analytical Results for Indicator Parameters in Groundwater at SLAPS, 1991

Sampling Location[a]	Quarter 1	2	3	4	Avg
Specific Conductance[b] (µmhos/cm)					
A	1374	1360	1850	1547	1533
B	6400	6000	7350	6320	6518
C	1127	1578	1860	1552	1529
D	2230	2005	2750	2260	2311
E	4200	5008	6780	6870	5715
F	697	637	790	720	711
M10-8D	834	819	996	900	887
M10-8S	880	1520	1500	1377	1319
M10-15D	960	952	1100	1052	1016
M10-15S	2620	7550	2920	2950	4010
M10-25D	1060	1042	1340	1290	1183
M10-25S	731	785	840	898	814
M11-9	7010	6630	7550	7330	7130
M11-21	1727	1710	1920	1755	1778
M13.5-8.5D	847	819	1060	918	911
M13.5-8.5S	1743	1440	1850	1708	1685
B53W11D[c]	702	675	795	729	725
B53W15S[c]	674	2590	820	849	1233
B53W16S[c]	1178	1172	1240	1233	1206
Background					
B53W01D	940	956	1110	1012	1005
B53W01S	850	880	960	929	905
pH[b] (standard units)					
A	6.8	6.6	6.6	6.5	6.6
B	6.8	6.7	6.4	6.4	6.6
C	7.0	6.8	6.7	6.7	6.8
D	6.9	6.8	6.6	6.6	6.7
E	7.1	6.7	6.7	6.6	6.8
F	7.4	7.0	7.1	6.9	7.1
M10-8D	7.5	7.4	7.3	7.2	7.4
M10-8S	7.4	6.9	6.7	6.8	7.0
M10-15D	7.4	7.1	7.0	7.0	7.1
M10-15S	7.1	7.0	6.9	5.1	6.5
M10-25D	7.1	6.8	6.8	6.7	6.8
M10-25S	7.3	7.0	6.9	6.8	7.0
M11-9	6.6	6.5	6.4	6.3	6.4
M11-21	7.1	6.9	6.8	6.9	6.9

Table 6

(continued)

Sampling Location[b]	Quarter 1	2	3	4	Avg
pH[b] (standard units) (cont'd)					
M13.5-8.5D	7.8	7.4	7.1	7.2	7.4
M13.5-8.5S	7.0	6.8	6.8	6.8	6.9
B53W11D[c]	8.0	7.3	7.3	7.3	7.5
B53W15S[c]	7.2	8.8	6.9	7.1	7.5
B53W16S[c]	7.0	6.7	6.9	6.8	6.8
Background					
B53W01D	7.4	7.1	7.0	7.2	7.2
B53W01S	7.2	6.8	7.2	6.9	7.0

[a]Sampling locations are shown in Figure 3.

[b]First three-quarters' results based on laboratory measurement of parameters; fourth-quarter measurements were taken in the field.

[c]Upgradient well.

Table 7

Concentrations of Total Organic Carbon and Total Organic Halides in Groundwater at SLAPS, 1991

Sampling Location[a]	Quarter 1	2	3	4	Avg
Total Organic Carbon (mg/L)					
A	66.4	10.7	4.9	6.4	22.1
B	8.1	13.6	7.3	6.8	9.0
C	3.5	4.2	16.7	4.1	7.1
D	5.3	6.0	7.7	6.5	6.4
E	3.1	3.3	2.8	2.3	2.9
F	1.5	3.2	2.6	1.6	2.2
M10-8D	5.0	5.6	6.1	4.3	5.3
M10-8S	7.0	6.2	6.4	7.5	6.8
M10-15D	6.6	7.5	7.5	11.0	8.2
M10-15S	5.1	1.9	8.9	2.1	4.5
M10-25D	2.7	4.1	3.3	2.6	3.2
M10-25S	4.6	3.8	2.8	5.6	4.2
M11-9	9.6	7.9	7.7	10.2	8.9
M11-21	4.6	6.7	3.4	2.8	4.4
M13.5-8.5D	6.2	6.4	9.3	6.2	7.0
M13.5-8.5S	7.9	6.9	6.8	6.1	6.9
B53W11D[b]	0.7	1.0	0.9	1.7	1.1
B53W15S[b]	2.1	5.9	1.9	1.3	2.8
B53W16S[b]	1.0	3.2	1.3	1.4	1.7
Background					
B53W01D	5.6	5.3	6.8	7.9	6.4
B53W01S	0.8	10.1	3.3	1.5	3.9
Total Organic Halides (µg/L)					
A	55	95	36	26	53
B	52	<20[c]	160	140	93[d]
C	<20	55	42	79	49[d]
D	130	67	20	90	77
E	88	100	98	<20	77[d]
F	23	48	29	27	32
M10-8D	<20	25	35	<20	25[d]
M10-8S	<20	22	22	<20	21[d]
M10-15D	<20	<20	<20	<20	20[d]
M10-15S	<20	64	21	<20	31[d]
M10-25D	<20	<20	<20	<20	20[d]
M10-25S	<20	150	33	<20	56[d]
M11-9	61	55	170	190	119
M11-21	93	100	96	27	79

Table 7

(continued)

Sampling Location[a]	Quarter 1	2	3	4	Avg
Total Organic Halides (µg/L) (cont'd)					
M13.5-8.5D	<20	<20	<20	<20	20[d]
M13.5-8.5S	75	85	<20	24	51[d]
B53W11D[b]	<20	<20	<20	26	22[d]
B53W15S[b]	32	38	<20	46	34[d]
B53W16S[b]	150	120	<20	130	105[d]
Background					
B53W01D	29	<20	27	27	26[d]
B53W01S	<20	25	<20	<20	21[d]

[a]Sampling locations are shown in Figure 3.

[b]Upgradient well.

[c]<20 - not found above detection limit of 20 µg/L.

[d]Annual averages are conservative, based on assuming a value of 20 µg/L when results were below detection limits.

Table 8

Summary of Calculated Doses[a] at SLAPS, 1991

Type	Dose to Hypothetical Maximally Exposed Individual (mrem/yr)[b]	Collective Dose for Population Within 80 km of Facility (person-rem/yr)[b]
Direct gamma radiation[c]	5	--[d]
Drinking water	--[d]	--[d]
Ingestion	--[d]	--[d]
Air immersion	--[d]	--[d]
Inhalation[e]	0.17	0.79
Total	5.17	0.79
Background[f]	62	1.6×10^{5}[g]
DOE guideline	100	NA[h]
Percent of guideline (excluding background)	5%	NA[h]

[a]Does not include radon.

1 mrem/yr = 0.01 mSv/yr; 1 person-rem/yr = 0.01 person-Sv/yr.

[c]Does not include contribution from background.

[d]Negligible contribution.

[e]Calculated using EPA's AIRDOS model (Version 3.0).

[f]Direct gamma exposure only.

[g]Calculated by the following: 57 mrem/yr x (2.5×10^{6} people).

[h]NA - Not applicable.