

IS-1523

Health and Safety (UC-41)  
TID-4500, September 1, 1966

UNITED STATES ATOMIC ENERGY COMMISSION

Research and Development Report



SURVEY OF ENVIRONMENTAL  
RADIOACTIVITY

by

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January, 1967

Ames Laboratory

at

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Contract W-7405 eng-82

The following average levels of radioactivity were recorded for 1966:

Sample Media	Individual Samples	Beta Activity	Alpha Activity
Air	274	0.15 $\mu\mu\text{c}/\text{M}^3$	0.0025 $\mu\mu\text{c}/\text{M}^3$
Soil	25	15.01 $\mu\mu\text{c}/\text{g}$	0.68 $\mu\mu\text{c}/\text{g}$
Vegetation	13	34.00 $\mu\mu\text{c}/\text{g}$	0.13 $\mu\mu\text{c}/\text{g}$
River Water	305	16.03 $\mu\mu\text{c}/\text{l}$	1.02 $\mu\mu\text{c}/\text{l}$
ALRR Outfall (Site No. 2-DD-D)	247	12.25 $\mu\mu\text{c}/\text{l}$	0.061 $\mu\mu\text{c}/\text{l}$
Bottom Sediment	52	13.75 $\mu\mu\text{c}/\text{g}$	0.85 $\mu\mu\text{c}/\text{g}$
Precipitation	38	217.15 $\mu\mu\text{c}/\text{l}$	9.21 $\mu\mu\text{c}/\text{l}$
Well Water	36	6.93 $\mu\mu\text{c}/\text{l}$	1.14 $\mu\mu\text{c}/\text{l}$
Pond Water	33	16.30 $\mu\mu\text{c}/\text{l}$	0.86 $\mu\mu\text{c}/\text{l}$

## II. SAMPLE INFORMATION

### A. Air Samples

Daily air samples are taken at a location on top of the Ames Laboratory Research Building. Samples are collected on Whatman #41 filter paper with a Gast pump at the flow rate of 3.75 cfm. The filter samples are held for seven days to allow short-lived activities to decay. The samples are then placed directly in a Sharp Low Beta-Matic three-inch system and counted for gross alpha and beta activity.

#### Beta Activity Range ( $\mu\mu\text{c}/\text{M}^3$ )

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Average	3.40	3.86	1.26	0.30	0.15
High	22.40	13.50	5.95	1.50	2.34
Low	0.50	0.21	0.05	0.01	0.01

#### Alpha Activity Range ( $\mu\mu\text{c}/\text{M}^3$ )

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Average	0.05	0.11	0.0139	0.0068	0.0025
High	0.40	0.73	0.1135	0.0760	0.030
Low	0.01	0.10	0.0004	0.00012	0.001

### B. Soil Samples

Soil samples are collected once each year. Circles surrounding the ALRR site were divided into quadrants on the basis of wind frequencies. The annuli were chosen on the basis of simplicity for defining sampling area. One sample was taken in each sector of each annulus (see maps #1 and #2). Reference samples were collected at Fort Dodge, Iowa. The number-letter designations on the data sheets are our Codes for sample locations. One-quart samples are collected from the 0-2 inches of top soil. The samples are dried thoroughly in a 100°C drying oven, mixed thoroughly, with large stones and roots being removed. A 3-4 gram counting sample is made from the dried soil, placed in a 3-inch aluminum planchet, and counted directly in the Sharp System for gross alpha and beta activity.

#### Beta Activity Range ( $\mu\mu\text{c/g}$ )

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Average	7.57	9.45	19.97	14.45	15.01
High	9.40	14.00	32.00	20.50	35.30
Low	5.20	7.80	13.00	3.26	11.00

#### Alpha Activity Range ( $\mu\mu\text{c/g}$ )

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Average	0.26	0.56	0.94	0.86	0.68
High	0.60	1.08	1.31	1.20	1.20
Low	0.11	0.19	0.53	0.56	0.22

### C. Vegetation

Vegetation samples are collected once each year. Samples are obtained from the same location as soil samples. Date of collection is correlated to maximum growth period which is July to August for this

area. Samples are not collected directly after precipitation of any kind to minimize surface contamination. The type of vegetation is confined to grasses and none of the root system is included in the sample.

Samples are dried, ground to a fine powder, and made into 3-4 gram counting samples on 3-inch aluminum planchets. Samples are counted for gross alpha and beta activity in the Sharp System.

Beta Activity Range ( $\mu\mu\text{c/g}$ )

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Average	117.30	87.50	73.26	32.49	34.00
High	181.00	186.00	125.00	43.00	90.00
Low	10.80	10.50	51.00	26.00	20.00

Alpha Activity Range ( $\mu\mu\text{c/g}$ )

	<u>1962</u>	<u>1963</u>	<u>1964</u>	<u>1965</u>	<u>1966</u>
Average	1.62	0.96	1.27	0.38	0.13
High	4.00	4.10	3.24	1.06	0.77
Low	0.11	0.15	0.35	0.07	0.27

D. River Water Samples

River water samples are collected weekly and analyzed for gross alpha and beta activity. One liter samples are filtered and counted separately as soluble and insoluble fractions. Samples are obtained from each river or creek in the flow route of the ALRR drainage system. In addition, two samples are obtained from streams outside the ALRR flow route. These constitute control samples and are numbers nine and ten in the data. Samples are obtained at each site until the creeks go dry in late summer and until the rivers are frozen solid in winter. If water is flowing under ice, a sample is obtained by chopping

Air Samples ( $\mu\mu\text{c}/\text{M}^3$ )

1966

<u>Date</u>	<u>Beta Conc.</u>	<u>Alpha Conc.</u>
January (25)	0.10	0.003
February (22)	0.09	0.002
March (27)	0.12	0.002
April (24)	0.10	0.003
May (24)	0.19	0.002
June (25)	0.30	0.003
July (22)	0.20	0.003
August (25)	0.09	0.001
September (20)	0.07	0.003
October (20)	0.05	0.002
November (22)	0.38	0.004
December (18)	0.12	0.003
Average	0.15	0.0025
Individual High	2.34	0.030
Individual Low	0.01	0.001

Detection Limit -  $0.0066 \mu\mu\text{c}/\text{M}^3 \beta$

$0.0026 \mu\mu\text{c}/\text{M}^3 \alpha$

## SOIL SAMPLES

 $\mu\mu\text{c/g}$ 

Location	Date	Beta Conc.	Alpha Conc.
1S-SE1	8-10-66	18.30	0.41
2S-SW1	"	13.40	0.54
3S-NW1	"	13.30	0.39
4S-NE1	"	11.50	0.45
5S-SE2	"	14.30	0.22
6S-SW2	"	14.40	0.84
7S-NW2	"	12.80	0.39
8S-NE2	"	13.30	0.86
9SV-SE3	"	15.20	0.55
10SV-SW3	"	14.00	1.08
11SV-NW3	"	11.00	0.23
12SV-NE3	"	15.80	0.72
13SV-SE4	"	35.30	1.16
14S-SW4	"	15.50	0.87
15SV-NW4	"	13.00	0.54
16S-NE4	"	14.30	0.37
17SV-NE5	"	12.70	0.88
18S-SW5	"	12.00	0.57
19SV-NW5	"	14.60	0.75
20S-NE5	"	12.20	0.77
21SV-SE6	"	11.10	0.72
22SV-SW6	"	16.00	1.02
23S-NW6	"	16.70	0.76
24SV-NE6	"	16.10	0.78
Ft. Dodge	"	18.50	1.20
Average		15.01	0.68
High		35.30	1.20
Low		11.00	0.22

Detection Limit 0.25  $\mu\mu\text{c/g}$   $\beta$

0.10  $\mu\mu\text{c/g}$   $\alpha$

## VEGETATION SAMPLES

 $\mu\text{c/g}$ 

Location	Date	Beta Conc.	Alpha Conc.
3SV-NW1	8-10-66	33.00	Not Detectable
9SV-SE3	"	33.00	Not Detectable
10SV-SW3	"	31.00	Not Detectable
11SV-NW3	"	24.00	Not Detectable
12SV-NE3	"	27.00	Not Detectable
13SV-SE4	"	33.00	0.27
15SV-NW4	"	20.00	Not Detectable
17SV-NE5	"	90.00	Not Detectable
19SV-NW5	"	28.00	0.77
21SV-SE6	"	23.00	0.30
22SV-SW6	"	21.00	0.41
24SV-	"	33.00	Not Detectable
Ft. Dodge	"	46.00	Not Detectable
Average		34.00	0.13
High		90.00	0.77
Low		20.00	0.27
Detection Limit	2.07 $\mu\text{c/g}$ $\beta$		
	0.78 $\mu\text{c/g}$ $\alpha$		

River Water Samples ( $\mu\mu\text{c}/\text{l}$ )

January 1966

<u>Location</u>	Beta Activity		Alpha Activity	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	No Samples	-----		
3-On-U	No Samples	-----		
4-On-D	No Samples	-----		
5-Sq-U	No Samples	-----		
6-Sq-D	No Samples	-----		
7-Sk-U	No Samples	-----		
9-CC	No Samples	-----		
10-DM	No Samples	-----		
11-Sk-S	15.11	0.96	0.24	0.33
Average	15.11	0.96	0.24	0.33
High	15.11	0.96	0.24	0.33
Low	15.11	0.96	0.24	0.33
Detection Limit - 1.00 $\mu\mu\text{c}/\text{l} \beta$		0.39 $\mu\mu\text{c}/\text{l} \alpha$		



River Water Samples ( $\mu\mu\text{c}/\text{l}$ )

February 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	No Samples	-----		
3-On-U	5.20	Not Detectable	0.34	Not Detectable
4-On-D	No Samples	-----		
5-Sq-U	2.90	Not Detectable	0.45	Not Detectable
6-Sq-D	5.90	Not Detectable	0.68	0.23
7-Sk-U	6.10	Not Detectable	1.20	Not Detectable
9-CC	2.70	Not Detectable	0.45	Not Detectable
10-DM	12.85	0.54	1.95	0.12
11-Sk-S	16.10	0.25	0.30	0.23
Average	7.39	0.11	0.77	0.08
High	16.10	0.54	1.95	0.23
Low	2.70	0.25	0.30	0.12

Detection Limit:  $1.00 \mu\mu\text{c}/\text{l} \beta$        $0.39 \mu\mu\text{c}/\text{l} \alpha$

River Water Samples ( $\mu\mu\text{c}/\text{l}$ )

March 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	6.25	Not Detectable	Not Detectable	0.12
3-On-U	5.96	0.24	0.59	0.09
4-On-D	5.00	Not Detectable	0.45	Not Detectable
5-Sq-U	5.38	0.64	0.54	Not Detectable
6-Sq-D	4.34	0.33	0.18	0.23
7-Sk-U	6.46	0.18	0.45	0.09
9-CC	3.90	0.15	0.58	0.17
10-DM	11.68	0.24	1.13	0.05
11-Sk-S	15.00	0.86	0.41	0.36
Average	7.11	0.29	0.48	0.12
High	15.00	0.86	1.13	0.36
Low	3.90	0.18	0.18	0.05

Detection Limit -  $1.00 \mu\mu\text{c}/\beta$   $0.39 \mu\mu\text{c}/\alpha$

River Water Samples ( $\mu\mu\text{c}/1$ )

April 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	6.47	1.47	0.44	0.30
3-On-U	5.83	1.04	1.08	0.06
4-On-D	7.20	1.80	0.67	0.34
5-Sq-U	5.28	2.00	0.68	0.11
6-Sq-D	8.48	1.14	0.80	0.28
7-Sk-U	51.93	0.90	1.03	0.17
9-CC	5.10	0.23	0.73	0.06
10-DM	7.20	2.03	0.83	0.06
11-Sk-S	17.07	1.57	0.15	0.38
Average	12.73	1.35	0.71	0.20
High	51.93	2.03	1.08	0.36
Low	5.10	0.23	0.15	0.06

Detection Limit -  $1.00 \mu\mu\text{c}/1 \beta$        $0.39 \mu\mu\text{c}/1 \alpha$

River Water Samples ( $\mu\mu\text{c}/\text{l}$ )

May 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	23.74	5.12	0.31	0.32
3-On-U	29.72	128.11	1.46	1.91
4-On-D	3.53	0.57	0.43	0.15
5-Sq-U	47.60	6.12	1.61	0.95
6-Sq-D	59.16	16.52	1.74	1.03
7-Sk-U	10.08	6.15	0.98	0.77
9-CC	67.82	220.57	1.97	2.19
10-DM	18.32	29.72	1.23	0.83
11-SK-S	15.80	0.60	0.15	0.49
Average	30.64	45.94	1.10	0.96
High	67.82	220.57	1.97	2.19
Low	3.53	0.57	0.15	0.15

Detection Limit -  $1.00 \mu\mu\text{c}/\text{l} \beta$      $0.39 \mu\mu\text{c}/\text{l} \alpha$

River Water Samples ( $\mu\mu\text{c/l}$ )

June 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	6.37	5.70	0.75	0.82
3-On-U	9.90	2.63	0.57	0.51
4-On-D	6.33	1.53	1.20	0.53
5-Sq-U	9.50	2.09	1.08	0.45
6-Sq-D	9.93	1.01	1.25	0.40
7-Sk-U	10.30	2.18	1.18	0.28
9-CC	10.60	1.55	1.21	0.40
10-DM	9.63	4.35	1.70	0.58
11-Sk-S	12.58	0.60	0.50	0.74
Average	9.46	2.40	1.05	0.52
High	12.58	5.70	1.70	0.82
Low	6.37	0.60	0.57	0.28

Detection Limit -  $1.00 \mu\mu\text{c/l } \beta$  $0.39 \mu\mu\text{c/l } \alpha$

River Water Samples ( $\mu\mu\text{c}/\text{l}$ )

July 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	4.35	3.05	0.09	0.97
3-On-U	4.00	1.44	0.78	0.27
4-On-D	3.10	1.26	0.55	0.61
5-Sq-U	5.90	1.35	0.55	0.23
6-Sq-D	3.56	1.14	0.50	0.46
7-Sk-U	4.48	1.49	0.56	0.41
9-CC	4.20	1.09	0.59	0.41
10-DM	7.68	2.73	1.10	0.78
11-Sk-S	11.63	1.24	0.29	0.27
Average	5.43	1.64	0.55	0.49
High	11.63	3.05	1.10	0.97
Low	3.10	1.09	0.09	0.23

Detection Limit -  $1.00 \mu\mu\text{c}/\text{l} \beta$        $0.39 \mu\mu\text{c}/\text{l} \alpha$

River Water Samples ( $\mu\mu\text{c}/\text{l}$ )

August 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	No Samples	-----	-----	-----
3-On-U	7.08	0.99	0.86	0.77
4-On-D	4.63	0.35	0.52	0.55
5-Sq-U	6.70	1.36	0.67	0.70
6-Sq-D	5.44	1.04	0.56	0.54
7-Sk-U	8.10	5.24	0.81	0.52
9-CC	7.56	1.81	0.52	0.44
10-DM	8.36	3.14	1.20	0.77
11-Sk-S	13.00	1.16	0.47	0.57
Average	7.60	1.88	0.70	0.61
High	13.00	5.24	1.20	0.77
Low	4.63	0.35	0.47	0.44

Detection Limit -  $1.00 \mu\mu\text{c}/\text{l}\beta$  $0.39 \mu\mu\text{c}/\text{l}\alpha$

River Water Samples ( $\mu\mu\text{c}/1$ )

September 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	No Samples	-----	-----	-----
3-On-U	7.00	0.95	0.54	Not Detectable
4-On-D	No Samples	-----	-----	-----
5-Sq-U	No Samples	-----	-----	-----
6-Sq-D	No Samples	-----	-----	-----
7-Sk-U	4.45	0.31	0.45	0.23
9-CC	6.57	0.32	0.49	0.37
10-DM	6.45	2.68	0.41	0.72
11-Sk-S	13.56	0.64	0.68	0.45
Average	7.61	0.98	0.51	0.35
High	13.56	2.68	0.68	0.72
Low	4.45	0.31	0.41	0.23
Detection Limit - 1.00 $\mu\mu\text{c}/1 \beta$		0.39 $\mu\mu\text{c}/1 \alpha$		



River Water Samples ( $\mu\mu\text{c}/1$ )

October 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	No Samples	-----		
3-On-U	No Samples	-----		
4-On-D	No Samples	-----		
5-Sq-U	No Samples	-----		
6-Sq-D	No Samples	-----		
7-Sk-U	7.80	Not Detectable	Not Detectable	0.09
9-CC	7.62	0.08	0.66	0.34
10-DM	6.42	0.46	0.43	0.47
11-Sk-S	16.52	0.30	0.32	0.38
Average	9.59	0.21	0.35	0.32
High	16.52	0.46	0.66	0.47
Low	6.42	0.08	0.32	0.09

Detection Limit -  $1.00 \mu\mu\text{c}/1 \beta$        $0.39 \mu\mu\text{c}/1 \alpha$

River Water Samples ( $\mu\mu\text{c}/1$ )

November 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	No Samples	-----	-----	-----
3-On-U	No Samples	-----	-----	-----
4-On-D	No Samples	-----	-----	-----
5-Sq-U	10.70	5.86	0.55	0.18
6-Sq-D	7.40	7.40	0.90	0.36
7-Sk-U	7.43	1.29	0.54	0.65
9-CC	9.35	0.13	0.76	0.38
10-DM	7.75	3.80	0.81	0.45
11-Sk-S	19.50	0.53	0.45	0.44
Average	10.35	3.17	0.67	0.41
High	19.50	7.40	0.90	0.65
Low	7.40	0.13	0.45	0.18
Detection Limit - 1.00 $\mu\mu\text{c}/1 \beta$			0.39 $\mu\mu\text{c}/1 \alpha$	

River Water Samples ( $\mu\mu\text{c}/\text{l}$ )

December 1966

<u>Location</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
1-DD-U	No Samples	-----	-----	-----
3-On-U	No Samples	-----	-----	-----
4-On-D	No Samples	-----	-----	-----
5-Sq-U	4.57	0.76	0.36	0.06
6-Sq-D	No Samples	-----	-----	-----
7-Sk-U	8.03	0.89	0.54	0.43
9-CC	5.53	2.04	0.24	Not Detectable
10-DM	7.53	1.53	0.55	0.06
11-Sk-S	21.00	0.18	0.77	0.37
Average	9.33	1.08	0.49	0.18
High	21.00	2.04	0.77	0.43
Low	4.57	0.18	0.24	0.06

Detection Limit -  $1.00 \mu\mu\text{c}/\text{l} \beta$        $0.39 \mu\mu\text{c}/\text{l} \alpha$

River Water Samples ( $\mu\text{uc}/1$ )

## 1966 Yearly Averages of Months

	Beta Activity		Alpha Activity	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
Average	11.03	5.00	0.64	0.38
High	30.64	45.94	1.10	0.96
Low	5.43	0.11	0.24	0.08

Detection Limit -  $1.00 \mu\text{uc}/1 \beta$

$0.39 \mu\text{uc}/1 \alpha$

## ALRR Outfall Samples (Site No. 2-DD-D)

1966

(uuc/1)

<u>Date</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
January	8.31	0.62	0.21	0.25
February	6.97	0.35	0.14	0.06
March	8.25	0.64	0.12	0.18
April	15.62	0.93	0.18	0.14
May	20.07	1.18	0.28	0.22
June	19.25	3.19	1.15	0.48
July	5.27	0.61	0.38	0.21
August	9.33	1.06	0.28	0.35
September	8.66	0.59	0.42	0.29
October	9.82	0.50	0.27	0.17
November	12.26	1.03	0.49	0.34
December	11.51	0.88	0.30	0.39
Average	11.28	0.97	0.35	0.26
High	20.07	3.19	1.15	0.48
Low	5.27	0.35	0.12	0.06

Bottom Sediment Samples ( $\mu\text{c/g}$ )

<u>Location</u>	<u>Date</u>	<u>Beta Concentration</u>	<u>Alpha Concentration</u>
1-DD-U	3-11-66	17.70	0.64
	6-27-66	9.60	0.74
	9-27-66	10.10	0.31
	11-23-66	10.30	0.34
	Average	11.93	0.51
2-DD-D	3-11-66	9.10	0.16
	6-27-66	12.00	0.33
	9-27-66	9.16	Not Detectable
	11-23-66	18.60	1.43
	Average	12.22	0.48
3-On-U	3-11-66	14.50	0.67
	6-27-66	8.60	0.38
	9-27-66	10.40	0.74
	11-23-66	10.10	0.09
	Average	10.90	0.47
4-On-D	3-11-66	8.00	0.23
	6-27-66	6.80	0.52
	9-27-66	7.20	0.06
	11-23-66	5.50	0.26
	Average	6.88	0.27
5-Sq-U	3-11-66	11.00	0.67
	6-27-66	19.00	1.00
	9-27-66	7.60	0.35
	11-23-66	14.90	1.38
	Average		
6-Sq-D	3-11-66	9.80	0.24
	6-27-66	8.20	0.72
	9-27-66	13.70	0.60
	11-23-66	12.20	0.65
	Average	10.98	0.55

Bottom Sediment Samples ( $\mu\mu\text{c/g}$ )

<u>Location</u>	<u>Date</u>	<u>Beta Concentration</u>	<u>Alpha Concentration</u>
7-Sk-U	3-11-66	11.20	0.91
	6-27-66	14.00	1.80
	9-27-66	7.90	0.28
	11-23-66	8.60	0.25
	Average	10.43	0.81
9-CC	3-11-66	9.10	0.34
	6-27-66	5.50	0.57
	9-27-66	10.00	0.17
	11-23-66	11.40	0.46
	Average	9.00	0.39
10-DM	3-11-66	13.60	Not Detectable
	6-27-66	15.00	2.10
	9-27-66	14.00	0.38
	11-23-66	13.80	1.22
	Average	14.10	0.93
11-Sk-S	3-11-66	11.00	0.73
	6-27-66	12.00	Not Detectable
	9-27-66	19.80	2.74
	11-23-66	15.00	2.10
	Average	14.45	1.39
Todd Pond	3-11-66	31.70	1.67
	6-27-66	24.00	1.60
	9-27-66	21.80	2.07
	11-23-66	26.20	2.66
	Average	25.93	2.00
Izaak Walton League Pond	3-11-66	17.80	0.71
	6-27-66	15.00	0.74
	9-27-66	12.20	0.37
	11-23-66	31.00	2.24
	Average	19.00	1.02

Bottom Sediment Samples ( $\mu\mu\text{c/g}$ )

<u>Location</u>	<u>Date</u>	<u>Beta Concentration</u>	<u>Alpha Concentration</u>
Kelley Pond	3-11-66	18.30	1.84
	6-27-66	19.00	1.30
	9-27-66	16.20	0.81
	11-23-66	25.80	1.41
	Average	19.83	1.34
Average for 52 Samples (1966)		13.75	0.85
High		31.70	2.74
Low		5.50	0.06
Detection Limit - $0.25 \mu\mu\text{c/g } \beta$			
$0.10 \mu\mu\text{c/g } \alpha$			



Precipitation Samples ( $\mu\mu\text{c}/1$ )

## Beta Activity

## Alpha Activity

<u>Date</u>	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
January	14.40	10.30	1.20	1.50
February	32.00	48.00	1.80	2.70
March	25.00	38.00	0.46	4.00
April	62.83	28.80	0.54	1.00
May	786.67	406.50	11.73	7.70
June	360.29	128.24	6.57	3.90
July	44.67	16.01	2.98	1.55
August	18.88	7.73	1.37	1.53
September	16.50	14.20	0.96	0.88
October	4.65	0.95	2.73	0.36
November	364.67	150.00	10.00	39.27
December	22.50	18.50	3.95	1.85
Average	144.88	72.27	3.69	5.52
Individual High	1,550.00	1,690.00	30.00	25.00
Individual Low	2.40	0.34	0.15	0.70
Detection Limit - $1.00 \mu\mu\text{c}/1 \beta$				
0.39 $\mu\mu\text{c}/1 \alpha$				

Well Water Samples ( $\mu\mu\text{c}/1$ )

<u>Location</u>	<u>Date</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
		<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
City of Ames	2-07-66	2.30	Not Detectable	0.68	Not Detectable
	3-01-66	5.70	Not Detectable	1.60	1.60
	4-01-66	2.60	1.20	0.68	Not Detectable
	5-02-66	4.20	0.32	0.23	0.16
	5-31-66	3.60	Not Detectable	1.10	0.68
	6-27-66	6.30	2.30	0.90	0.68
	7-29-66	5.50	0.81	1.10	0.09
	9-06-66	4.10	1.60	0.36	Not Detectable
	10-03-66	4.20	Not Detectable	1.50	0.27
	11-07-66	5.40	0.68	1.40	0.18
	12-05-66	5.50	Not Detectable	0.72	0.90
	12-27-66	5.00	1.10	0.36	Not Detectable
	Average		4.53	0.67	0.89
High		6.30	2.30	1.60	1.60
Low		2.30	0.32	0.23	0.09

Detection Limit -  $1.00 \mu\mu\text{c}/1 \beta$

$0.39 \mu\mu\text{c}/1 \alpha$

Well Water Samples ( $\mu\mu\text{c}/1$ )

<u>Location</u>	<u>Date</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>		
		<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>	
Iowa State University	2-07-66	7.10	Not Detectable	0.45	Not Detectable	
	3-01-66	8.00	0.14	Not Detectable	Not Detectable	
	4-01-66	8.60	Not Detectable	0.90	0.45	
	5-02-66	7.00	Not Detectable	0.68	0.23	
	5-31-66	5.40	Not Detectable	1.40	0.45	
	6-27-66	10.70	2.30	2.70	0.45	
	7-29-66	5.90	1.80	1.70	0.27	
	9-06-66	6.90	0.27	1.40	Not Detectable	
	10-3-66	6.50	Not Detectable	0.81	0.27	
	11-07-66	5.80	0.41	0.90	1.30	
	12-05-66	5.10	0.27	1.30	Not Detectable	
	12-27-66	8.80	Not Detectable	1.10	0.72	
	Average		7.15	0.43	1.11	0.35
	High		10.70	2.30	2.70	1.30
Low		5.10	0.14	0.45	0.23	

Detection Limit -  $1.00 \mu\mu\text{c}/1 - \beta$   
 $0.39 \mu\mu\text{c}/1 - \alpha$

Well Water Samples ( $\mu\mu\text{c}/1$ )

<u>Location</u>	<u>Date</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
		<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
Arland Martin Acreage	2-07-66	7.20	Not Detectable	0.68	Not Detectable
	3-01-66	6.90	Not Detectable	Not Detectable	Not Detectable
	4-01-66	10.10	2.10	1.60	Not Detectable
	5-02-66	7.20	1.20	0.45	0.16
	5-31-66	8.00	Not Detectable	0.45	0.23
	6-27-66	8.60	1.50	0.90	Not Detectable
	7-29-66	7.30	Not Detectable	0.45	0.63
	9-06-66	7.00	Not Detectable	0.18	Not Detectable
	10-03-66	6.50	0.41	0.63	Not Detectable
	11-07-66	5.40	1.80	0.90	Not Detectable
	12-05-66	7.70	0.81	0.72	Not Detectable
	12-27-66	6.50	Not Detectable	0.54	Not Detectable
Average		7.37	0.65	0.63	0.09
High		10.10	2.10	1.60	0.63
Low		5.40	0.41	0.18	0.16

Detection Limits -  $1.00 \mu\mu\text{c}/1 \beta$

$0.39 \mu\mu\text{c}/1 \alpha$

	Beta Activity		Alpha Activity	
	<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
Average for 36 Samples	6.36	0.58	0.87	0.27
High for 36 Samples	10.70	2.30	2.70	1.60
Low for 36 Samples	2.30	0.14	0.18	0.09
Detection Limit - 1.00 $\mu\mu\text{c}/1 \beta$				
0.39 $\mu\mu\text{c}/1 \alpha$				

Pond Water ( $\mu\mu\text{c}/1$ )

<u>Location</u>	<u>Date</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
		<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
Geo. Todd Pond	1-26-66	7.50	1.20	Not Detectable	Not Detectable
	2-28-66	10.70	0.30	Not Detectable	Not Detectable
	3-31-66	5.10	Not Detectable	0.45	Not Detectable
	5-02-66	5.10	0.30	0.09	Not Detectable
	5-31-66	7.50	Not Detectable	1.10	Not Detectable
	6-27-66	8.00	1.70	1.10	0.68
	7-29-66	7.60	2.30	Not Detectable	0.81
	9-06-66	12.20	1.20	Not Detectable	0.72
	10-03-66	16.10	6.60	0.27	0.63
	11-07-66	Pond Dry			
	12-05-66	Pond Dry			
	12-27-66	Pond Dry			
	Average		8.87	1.51	0.33
High		16.10	6.60	1.10	0.81
Low		5.10	0.30	0.09	0.63

Detection Limits -  $1.00 \mu\mu\text{c}/1 \beta$

$0.39 \mu\mu\text{c}/1 \alpha$

Pond Water Samples ( $\mu\mu\text{c}/\text{l}$ )

<u>Location</u>	<u>Date</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>	
		<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>
Izaak Walton League Pond	1-26-66	29.30	0.45	0.45	Not Detectable
	2-28-66	14.30	1.20	Not Detectable	Not Detectable
	3-31-66	17.00	0.77	Not Detectable	0.45
	5-02-66	16.80	1.00	Not Detectable	0.16
	5-31-66	25.00	1.80	1.10	1.10
	6-27-66	28.00	2.40	1.60	0.68
	7-29-66	17.60	1.20	0.09	0.63
	9-06-66	19.20	1.50	Not Detectable	0.18
	10-03-66	19.60	Not Detectable	0.45	0.09
	11-07-66	25.60	3.60	1.80	0.18
	12-05-66	21.90	1.10	1.80	Not Detectable
	12-27-66	19.90	0.95	0.36	Not Detectable
Average		21.18	1.33	0.64	0.29
High		29.30	3.60	1.80	1.10
Low		14.30	0.45	0.09	0.09

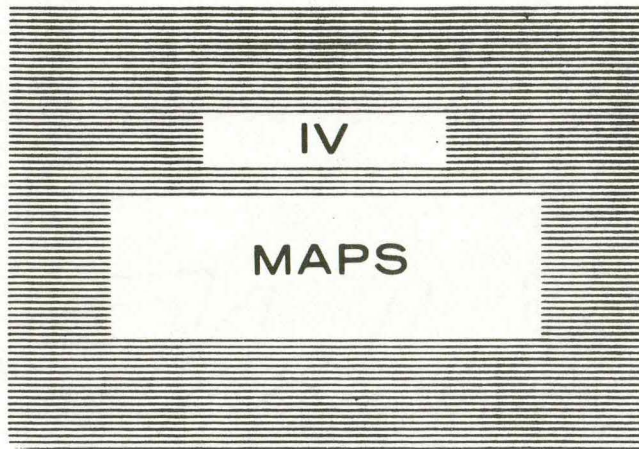
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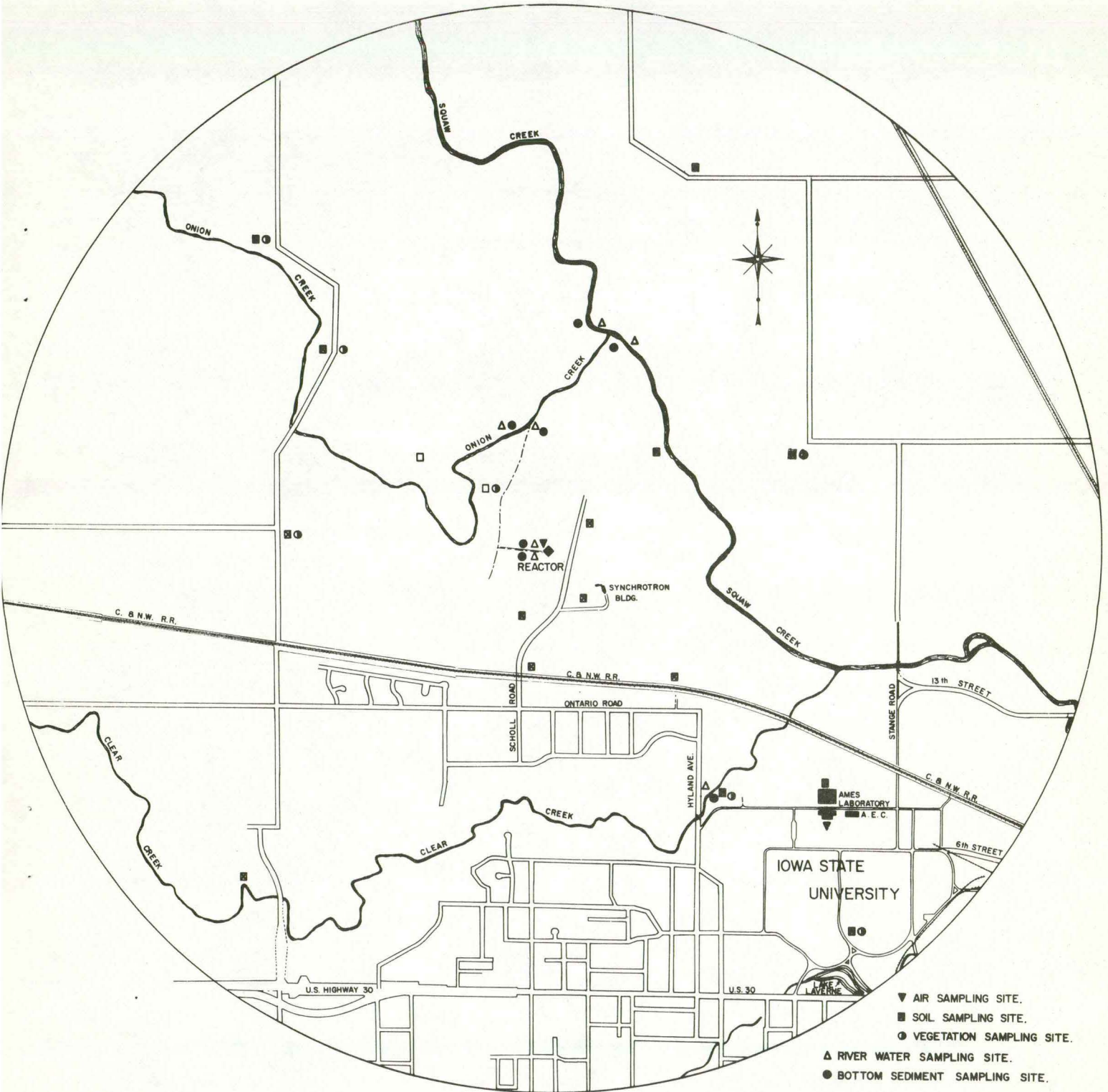
Pond Water Samples ( $\mu\mu\text{c}/1$ )

<u>Location</u>	<u>Date</u>	<u>Beta Activity</u>		<u>Alpha Activity</u>		
		<u>Soluble</u>	<u>Insoluble</u>	<u>Soluble</u>	<u>Insoluble</u>	
Kelly Pond	1-26-66	13.80	Not Detectable	0.45	Not Detectable	
	2-28-66	13.90	1.00	Not Detectable	Not Detectable	
	3-31-66	10.20	1.00	1.80	Not Detectable	
	5-02-66	12.60	1.40	0.09	Not Detectable	
	5-31-66	17.90	1.90	2.50	Not Detectable	
	6-27-66	17.00	2.70	0.90	0.23	
	7-29-66	10.70	1.80	Not Detectable	0.27	
	9-06-66	6.60	0.95	Not Detectable	Not Detectable	
	10-03-66	11.00	Not Detectable	0.27	0.27	
	11-07-66	23.50	2.80	0.36	1.40	
	12-05-66	11.20	1.10	1.30	Not Detectable	
	12-27-66	10.90	0.95	0.54	Not Detectable	
	Average		13.28	1.30	0.68	0.18
	High		23.50	2.80	2.50	1.40
Low		6.60	0.95	0.09	0.23	
Average for 33 Samples		14.93	1.37	0.57	0.26	
High for 33 Samples		29.30	6.60	2.50	1.40	
Low for 33 Samples		5.10	0.30	0.09	0.09	
Detection Limit - $1.00 \mu\mu\text{c}/1 \beta$						
$0.39 \mu\mu\text{c}/1 \alpha$						

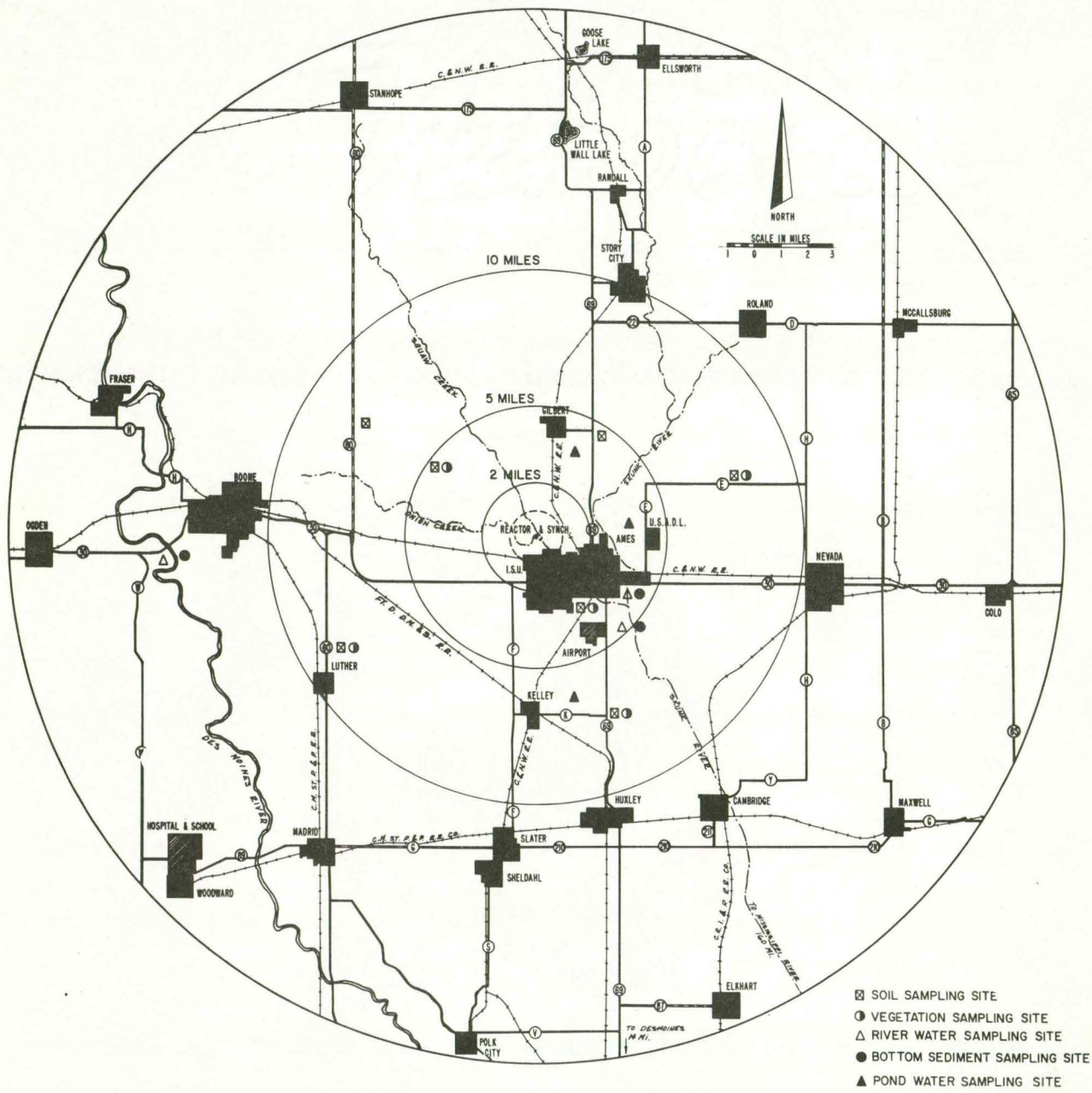


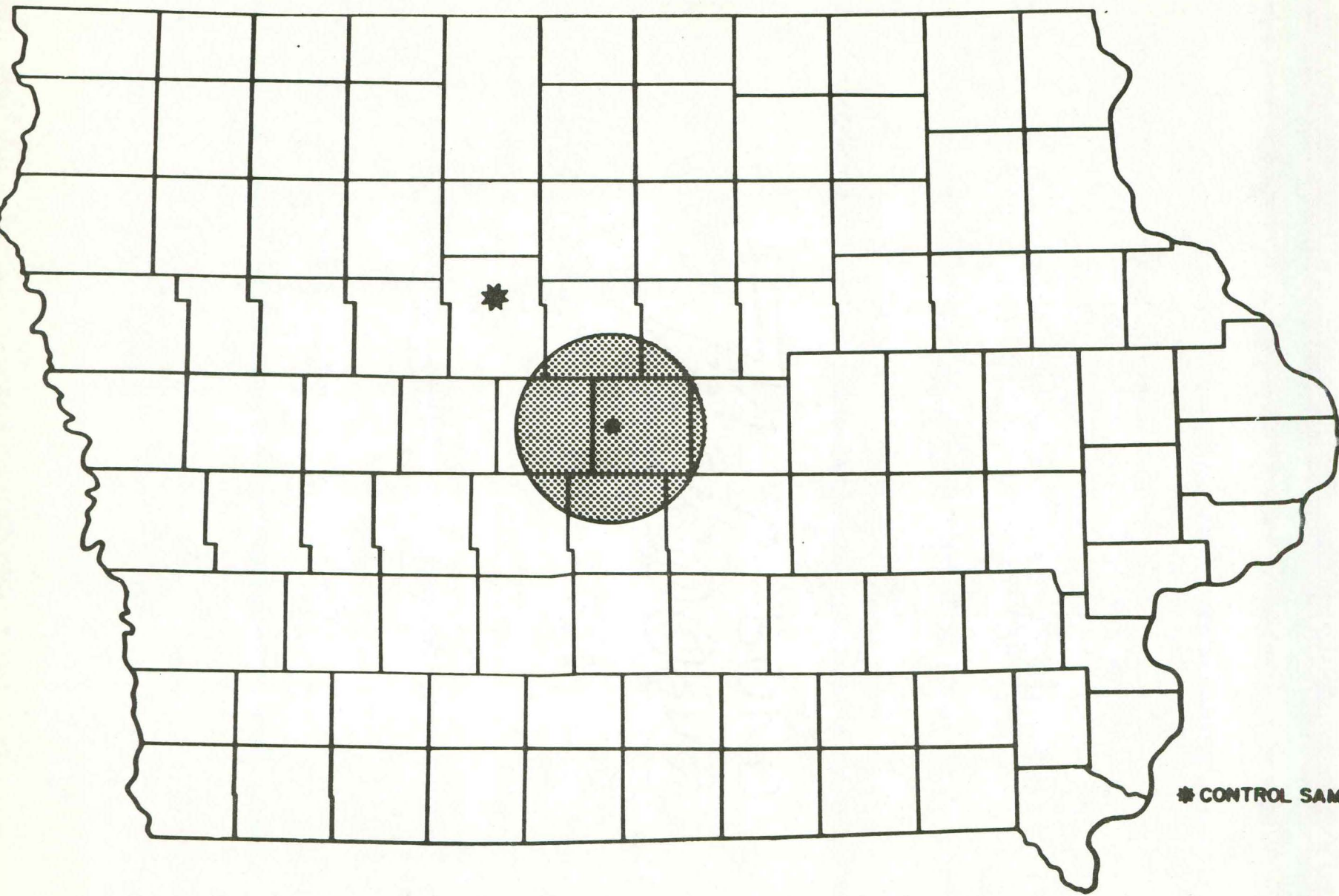


IV  
MAPS



MAP 1





\* CONTROL SAMPLES

MAP 3

†ACKNOWLEDGMENTS

We wish to express our thanks to the following individuals and organizations for their cooperation and assistance.

City of Ames - Water Department - Sewage Treatment Department

City of Fort Dodge - Water Department

Iowa State University - Physical Plant

Individuals who permitted and helped us to obtain samples

Program and Report Preparation

Theodore L. Schneider - Jr. Chemist

Carl C. Grilli - Senior Technician

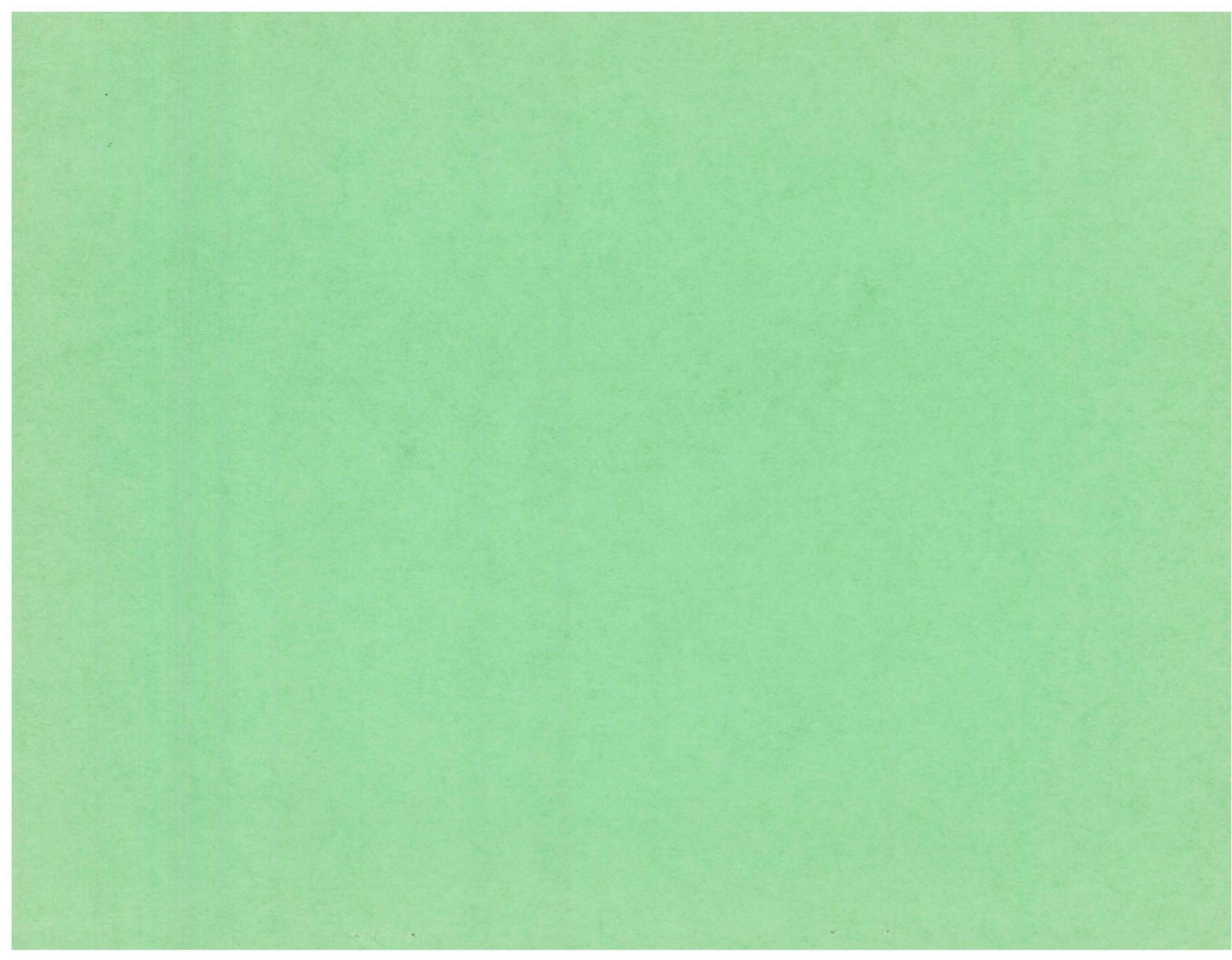
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