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*The State Hygienic
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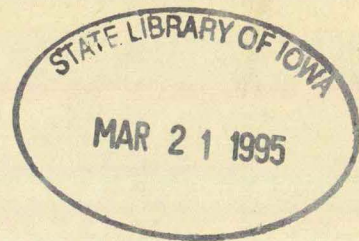


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IOWA CITY, IOWA 52240

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RADIATION MONITORING OF
IOWA SURFACE WATERS

Robert Graybeal & R L Morris

#70-16

Submitted to the State Conservation Commission
by the
State Hygienic Laboratory
28 October 1969

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DES MOINES, IOWA 50310

RADIATION MONITORING OF IOWA SURFACE WATERS

The data presented are the results of radio-chemical analyses performed on selected surface waters for the 6-month period beginning November 1, 1968 and ending April 30, 1969. Also presented are the results of radio-chemical analyses performed on precipitation samples collected in Iowa City during the same period.

Our present environmental monitoring program is adequate to determine changes in environmental levels of radioactivity resulting from fallout, however, it is totally inadequate in those areas where the potential for problems will be the greatest. These areas are the environs surrounding the nuclear power stations contemplated within the state or on its boundary waters.

This laboratory is presently neither staffed nor funded to carry out a surveillance program which would be considered adequate in those areas of primary concern.

The releases of radioactive wastes from nuclear power stations do not normally exceed maximum permissible limits prescribed in Title 10, Part 20, of the Code of Federal Regulations. These limits, however, refer to maximum levels of radioactivity that can occur in drinking water for man without resulting in any harmful effects. Operation within the limits may not always guarantee that fish and wildlife will be protected from adverse effects. Some organisms concentrate and store radioisotopes of elements not normally required but which are chemically similar to elements essential for metabolism. The radionuclides are then transferred from one organism to

another through various levels of the food chain just as are the non-radioactive elements. These transfers may result in further concentration of radionuclides and a wide dispersion from the project area, particularly by migratory fish, mammals and birds.

Consideration must be given to the importance of the fish and wildlife resources in the environs of the nuclear power station sites and every possible effort be made to protect these valuable resources from radioactive contamination.

For reasons stated above, we believe that a pre- and post-operational environmental radiological surveillance program should be undertaken to measure the effect of plant operation on fish and wildlife resources native to the nuclear power station environs.

Support of \$15,000 per annum has been promised the State Hygienic Laboratory from Iowa State Department of Health water pollution control funds and we are now engaged in a search for another radiochemist to handle this important program responsibility.

31 January 1969

Mr P S Houser
Chief, Environmental Engineering Services
Iowa State Department of Health
State Office Building
Des Moines, Iowa 50319

Attention: Dr C L Campbell and Mr R S Schliekelman

RADIOACTIVITY IN IOWA WATERS

Enclosed are the results of tritium analyses performed on selected Iowa waters for the 4th quarter of 1968.

While the tritium levels measured are below that recommended for active surveillance, 100 nCi/l, several samples can be classified as positive.

Static waters can normally be expected to contain activity levels higher than dynamic waters since radioactivity tends to concentrate in static waters. Missouri River samples are consistently positive for tritium for reasons, as yet, unknown.

R G Graybeal
Health Physicist

cc: Dr R L Morris
Dr J Gakstetter

Enclosure

nlb

STATE HYGIENIC LABORATORY, IOWA CITY, IOWA

STATEWIDE STATIC AND DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVEL, TRITIUM
 RADIATION REPORTED AS nCi/L
 DATA FOR 4th QUARTER, 1968

		<u>CITY</u>	<u>DATE COUNTED</u>	<u>³H ACTIVITY</u>	
LAKES	Okoboji	Okoboji	1-29-69	0.96 ± 0.71	
	Clear Lake	Clear Lake	1-29-69	< 0.69	
IMPOUNDED RESERVOIRS		Corning	1-29-69	< 0.69	
		Fairfield	1-29-69	1.80 ± 0.74	
		Greenfield	1-29-69	< 0.69	
RIVERS	Big Sioux	Hawarden	1-29-69	< 0.69	
	Cedar	Osage	1-29-69	< 0.69	
	Cedar	Cedar Rapids	1-29-69	< 0.69	
	Des Moines		Estherville	1-29-69	< 0.69
			Euclid Ave Bridge	1-29-69	< 0.69
			IPAL Co Bridge	1-29-69	< 0.69
			Ottumwa	1-29-69	< 0.69
	Mississippi		Lansing	1-29-69	< 0.69
			Dubuque	1-29-69	< 0.69
			Davenport	1-29-69	< 0.69
	Missouri		Sioux City	1-29-69	1.26 ± 0.71
			Council Bluffs	1-29-69	1.55 ± 0.73
	Raccoon	Des Moines	1-29-69	< 0.69	
	Skunk	Ames	1-29-69	< 0.69	
	PRECIPITATION	Collected			
10-9-68		Iowa City	11-11-68	< 0.67	
Collected					
12-31-68	Iowa City	1-29-69	< 0.69		

21 May 1969

Mr P J Houser
Chief, Environmental Engineering Services
Iowa State Department of Health
State Office Building
Des Moines, Iowa 50319

Attention: Dr C L Campbell and Mr R S Schliekelman

RADIOACTIVITY IN IOWA WATERS

Enclosed are the results of tritium analyses performed on selected Iowa waters for the 1st quarter of 1969.

The tritium level in all the samples was below our minimum detectable activity of 1.02 nCi/l. This is below the level of tritium activity recommended for active surveillance which is 100 nCi/l. The amount of tritium activity in Iowa waters is consistent with that found in other states by the USPHS.

R G Graybeal
Health Physicist

cc R L Morris PhD
J Gakstatter PhD

Enclosure

nlb

STATE HYGIENIC LABORATORY, IOWA CITY, IOWA

STATEWIDE STATIC AND DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVEL, TRITIUM
 RADIATION REPORTED AS nC/L
 DATA FOR 1st QUARTER, 1969

		CITY	DATES COLLECTED COMPOSITE SAMPLE	DATE COUNTED	³ H ACTIVITY
LAKES	Okoboji	Okoboji	1-6, 2-3, 3-3	5-19-69	< 1.02
	Clear Lake	Clear Lake	1-3, 1-29, 2-26	5-19-69	< 1.02
UNBOUNDED RESERVOIRS		Corning	1-6, 1-29, 2-27	5-19-69	< 1.02
		Fairfield	1-6, 2-3, 3-3	5-19-69	< 1.02
		Greenfield	1-2, 1-23, 2-26	5-19-69	< 1.02
RIVERS	Big Sioux	Hawarden	1-6, 2-3, 3-10	5-19-69	< 1.02
	Cedar	Osage	1-2, 1-31, 2-28	5-19-69	< 1.02
	Cedar	Cedar Rapids	1-7, 2-19, 3-6	5-19-69	< 1.02
	Des Moines	Estherville	1-2, 2-7, 3-3	5-19-69	< 1.02
		Euclid Ave Bridge	1-2, 2-19, 3-13	5-19-69	< 1.02
		IPAL Co Bridge	1-7, 2-19, 3-13	5-19-69	< 1.02
	Mississippi	Ottumwa	1-6, 2-3, 3-3	5-19-69	< 1.02
		Lansing	1-3, 1-30, 2-26	5-19-69	< 1.02
		Dubuque	1-13, 2-3, 3-4	5-19-69	< 1.02
	Missouri	Davenport	1-6, 2-3, 2-28	5-19-69	< 1.02
		Sioux City	1-6, 1-30, 2-26	5-19-69	< 1.02
		Council Bluffs	1-2, 1-29, 3-11	5-19-69	< 1.02
	Raccoon	Des Moines	1-7, 2-19, 3-13	5-19-69	< 1.02
	Skunk	Ames	1-9, 1-30, 3-6	5-19-69	< 1.02
	PRECIPITATION		Iowa City	2-28-69	5-19-69
		Iowa City	3-20-69	5-19-69	< 1.02
		Iowa City	3-24-69	5-19-69	< 1.02

IOWA CITY PRECIPITATION
GROSS RADIATION
DATA FOR OCTOBER, NOVEMBER, DECEMBER 1968

IC LAB NO.	DATE SAMPLED	DATE COUNTED	AMOUNT OF PRECIPITATION	WATER RECEIVED	BETA-GAMMA ACTIVITY	
	1968	1968	mm	L	pCi /L	pCi /m ²
13852	Oct 9	Oct 17	11.28	4.80	76	860
13870	22	31	42.3	18.00	26	1100
13882	Nov 8, 11	Nov 15	17.6	7.50	267	4700
13892	15	21	12.6	Not stated	43	540
13893	18	Dec 4	6.0	Not stated	35	210
13904	Nov 29 - Dec 2	9	4.0	Not stated	53	210
13934	Dec 26	Jan 14	35.2	15.00	102	4000
	Highest reading				267	4700
	Lowest reading				26	210
	Average (of 7)				86	1600

Arnolds Abele
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Technician
3 Feb 69 bj

STATE HYGIENIC LABORATORY, DES MOINES
 IOWA CITY PRECIPITATION
 GROSS RADIATION

DATA FOR FIRST SIX MONTHS, 1969

IC LAB NO	DATE SAMPLED 1969	DATE COUNTED 1969	AMOUNT OF PRECIPITATION mm	WATER RECEIVED L	BETA-GAMMA ACTIVITY pCi/L	ACTIVITY pCi/m ²
13968	2/28	3/7	6.3	2.7	195	1200
13984	3/21-24	4/9	16.2	6.9	67	1100
13989	Not stated	4/9	9.6	4.05	62	600
13995	4/4	4/17	42.0	Not stated	32	2500
14003	4/11-12	4/22	8.5	3.6	21	460
14004	4/14-16	4/22	18.8	8.0	28	1400
14007	4/17	4/29	14.1	6.0	12	870
14014	Not stated	5/6	20.5	8.71	16	1300
14024	5/8	5/15	45.8	19.5	49	2800
14026	5/12	5/15	9.9	4.2	32	1700
14030	5/13	5/22	8.5	3.6	78	660
14035	5/22	6/3	24.7	10.5	20	500
14042	6/2	6/5	4.2	Not stated	420	1800
14048	6/9	6/17	71.9	30.6	75	5400
14055	6/13	6/19	7.0	3.0	193	1400
14059	6/23	6/30	14.1	6.0	222	3100
14065	6/26	7/9	22.6	9.6	73	1600
14067	6/27	7/8	32.4	13.8	75	2400
14068	6/30	7/10	47.9	20.4	78	3700

IOWA CITY PRECIPITATION FOR FIRST SIX MONTHS, 1969

BETA-GAMMA ACTIVITY

pCi/L pCi/m²

Highest reading

420

5400

Lowest reading

12

460

Average (of 19)

92

1800

Amount of Water Collected 425

Arnolds Abele

Arnolds Abele
Technician
23 Jul 69 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE STATIC SURFACE WATER REPORT-BACKGROUND RADIATION LEVELS
 SELECTED IOWA LAKES AND IMPOUNDED RESERVOIRS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR NOVEMBER 1968

LAKES & RESERVOIRS	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS

LAKES

Okoboji	Okoboji	Nov 4	Nov 7	0.5	0.5	Nil	49	42	7
Clear Lake	Clear Lake	Oct 30	1	2.5	2.1	0.4	42	36	6
	Average (of 2)			1.5	1.3	0.2	46	39	7

IMPOUNDED RESERVOIRS

	Corning	Nov 2	Nov 5	2.0	0.4	1.6	38	26	12
	Fairfield	4	6	0.5	0.5	Nil	31	22	9
	Greenfield	4	6	1.3	1.0	0.3	22	21	1
	Average (of 3)			1.2	0.6	0.6	30	23	7

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 Technician
 19 Nov 68 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE STATIC SURFACE WATER REPORT - BACKGROUND RADIATION LEVELS
 SELECTED IOWA LAKES AND IMPOUNDED RESERVOIRS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR DECEMBER 1968

LAKES & RESERVOIRS	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
<u>LAKES</u>		<u>1968</u>	<u>1968</u>						
Okoboji	Okoboji	Dec 2	Dec 5	3.0	2.9	0.1	26	24	2
Clear Lake	Clear Lake	Nov 27	3	1.6	1.4	0.2	20	17	3
	Average (of 2)			2.3	2.1	0.2	23	20	3
<u>IMPOUNDED RESERVOIRS</u>									
	Corning	Nov 26	Dec 3	5.5	5.4	0.1	10	9	1
	Fairfield	Dec 2	9	1.8	1.0	0.8	16	13	3
	Greenfield	Nov 27	3	1.2	1.1	0.1	9	7	2
	Average (of 3)			2.8	2.5	0.3	12	10	2

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 31 Dec 68 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE STATIC SURFACE WATER REPORT - BACKGROUND RADIATION LEVELS
 SELECTED IOWA LAKES AND IMPOUNDED RESERVOIRS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR JANUARY 1969

LAKES & RESERVOIRS	CITY	DATE	DATE	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
		SAMPLED	COUNTED	TS	DS	SS	TS	DS	SS
		<u>1969</u>	<u>1969</u>						
<u>LAKES</u>									
Okoboji	Okoboji	Jan 6	Jan 13	0.7	0.7	Nil	22	20	2
Clear Lake	Clear Lake	3	10	0.8	0.8	Nil	21	20	1
	Average (of 2)			0.8	0.8	Nil	22	20	2
<u>IMPOUNDED RESERVOIRS</u>									
	Corning	Jan 6	Jan 10	0.3	0.3	Nil	12	8	4
	Fairfield	6	15	1.0	0.9	0.1	22	18	4
	Greenfield	2	8	1.9	1.9	Nil	15	12	3
	Average (of 3)			1.1	1.0	0.1	16	12	4

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 23 Jan 69 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE STATIC SURFACE WATER REPORT - BACKGROUND RADIATION LEVELS
 SELECTED IOWA LAKES AND IMPOUNDED RESERVOIRS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR FEBRUARY 1969

LAKES & RESERVOIRS	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
<u>LAKES</u>		<u>1969</u>	<u>1969</u>						
Okoboji	Okoboji	Feb 3	Feb 10	1.7	1.7	Nil	23	20	3
Clear Lake	Clear Lake	Jan 29	4	0.3	0.3	Nil	26	21	5
	Average (of 2)			1	1	Nil	25	21	4
<u>IMPOUNDED RESERVOIRS</u>									
	Corning	Jan 29	Feb 4	1.9	1.5	0.4	15	12	3
	Fairfield	Feb 5	12	0.4	0.1	0.3	18	14	4
	Greenfield	Jan 29	6	1.9	1.2	0.7	19	16	3
	Average (of 3)			1.4	0.9	0.5	17	14	3

Arnolds Abele
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 28 Feb 69 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE STATIC SURFACE WATER REPORT - BACKGROUND RADIATION LEVELS
 SELECTED IOWA LAKES AND IMPOUNDED RESERVOIRS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR MARCH 1969

LAKES & RESERVOIRS	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
<u>LAKES</u>		1969	1969						
Okoboji	Okoboji	Mar 3	Mar 7	3.7	3.2	0.5	25	23	2
Clear Lake	Clear Lake	Feb 26	Feb 28	1.4	1.4	Nil	25	20	5
	Average (of 2)			2.5	2.3	0.2	25	22	3
<u>IMPOUNDED RESERVOIRS</u>									
	Corning	Feb 27	Mar 7	1.4	0.4	1.0	25	19	6
	Fairfield	Mar 5	12	1.2	0.5	0.7	18	11	7
	Greenfield	Feb 26	Feb 28	1.6	1.6	Nil	21	16	5
	Average (of 3)			1.4	0.8	0.6	21	15	6

Arnolds Abele
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 21 Mar 69 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE STATIC SURFACE WATER REPORT - BACKGROUND RADIATION LEVELS
 SELECTED IOWA LAKES AND IMPOUNDED RESERVOIRS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR APRIL 1969

LAKES & RESERVOIRS	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
<u>LAKES</u>		1969	1969						
Okoboji	Okoboji	Apr 1	Apr 16	0.9	0.9	Nil	27	24	3
Clear Lake	Clear Lake	Mar 26	7	0.9	0.5	0.4	21	20	1
	Average (of 2)			0.9	0.7	0.2	24	22	2
<u>IMPOUNDED RESERVOIRS</u>									
	Corning	Mar 26	Apr 8	0.5	0.2	0.3	47	34	13
	Fairfield	Apr 1	16	0.8	0.4	0.4	19	16	3
	Greenfield	Mar 25	7	2.4	0.9	1.5	45	37	8
	Average (of 3)			1.2	0.5	0.7	37	29	8

Arnolds Abele
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 Technician
 22 Apr 69 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 RADIATION BACKGROUND SURVEY OF IOWA CITY
 GROSS RADIATION REPORTED AS pCi/L
 IOWA RIVER RAW & U OF I TAP
 DATA FOR NOVEMBER 1968

IC LAB NO	DATE SAMPLED	DATE COUNTED	GROSS ALPHA ACTIVITY				GROSS BETA-GAMMA ACTIVITY				
			TS	DS	SS	TAP	TS	DS	SS	TAP	
	1968										
13873	Nov 2-4	Nov 14	3.3	2.8	0.5	-	11	11	Nil	-	
13884	5-8	15	6.4	5.3	1.1	-	22	19	3	-	
13885	9-11	15	1.5	1.5	Nil	-	22	16	6	-	
13886	4-8	15	-	-	-	0.3	-	-	-	12	
13889	11-15	26	-	-	-	2.0	-	-	-	17	
13890	12-15	26	3.6	3.5	0.1	-	19	15	4	-	
13891	16-18	26	1.0	1.0	Nil	-	20	16	4	-	
13897	19-22	Dec 4	1.8	1.5	0.3	-	26	22	4	-	
13898	23-25	4	4.0	3.7	0.3	-	28	22	6	-	
13899	18-22	4	-	-	-	0.8	-	-	-	17	
13901	25-29	9	-	-	-	Nil	-	-	-	11	
13902	26-27	9	3.9	3.7	0.2	-	23	19	4	-	
	Iowa River Raw Average (of 8)		3.2	2.9	0.3		21	17	4		
	U of I Tap Average (of 4)					0.8				14	

Arnolds Abele
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 Technician
 18 Dec 68 bj

RADIATION BACKGROUND SURVEY OF IOWA CITY
GROSS RADIATION REPORTED AS pCi/L
IOWA RIVER RAW & U OF I TAP
DATA FOR DECEMBER, 1968

IC LAB NO	DATE SAMPLED 1968	DATE COUNTED 1968	GROSS ALPHA ACTIVITY				GROSS BETA-GAMMA ACTIVITY			
			TS	DS	SS	TAP	TS	DS	SS	TAP
13903	Nov 30-Dec 2	Dec 9	3.3	3.1	0.2	-	14	8	6	-
*										
13916	Dec 10 - 13	19	4.4	4.3	0.1	-	11	8	3	-
13917	14 - 16	19	5.0	5.0	Nil	-	14	11	3	-
13918	9 - 13	19	-	-	-	1.5	-	-	-	9
13921	17 - 20	31	20	12	7.6	-	22	15	7	-
13922	21 - 23	31	7.1	7.1	Nil	-	12	8	4	-
13923	16 - 20	Jan 2 1969	-	-	-	Nil	-	-	-	6
13925	24 - 27	3	10	8.1	2.0	-	14	8	6	-
13926	28 - 30	3	4.5	4.0	0.5	-	11	9	2	-
13927	23 - 27	3	-	-	-	0.5	-	-	-	4
	Iowa River Raw	Average (of 7)	7.7	6.2	1.5		14	10	4	
	U of I Tap	Average (of 3)				0.7				6

*For the week Dec 3 - 9, 1968, samples did not arrive in Des Moines Branch Laboratory.

Arnolds Abele
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Technician
13 Jan 69 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 RADIATION BACKGROUND SURVEY OF IOWA CITY
 GROSS RADIATION REPORTED AS pCi/L
 IOWA RIVER RAW & U OF I TAP
 DATA FOR JANUARY 1969

IC LAB NO	DATE SAMPLED	DATE COUNTED	GROSS ALPHA ACTIVITY				GROSS BETA-GAMMA ACTIVITY				
			TS	DS	SS	TAP	TS	DS	SS	TAP	
	1968	1969									
13931	Dec 31 (68) - Jan 3	Jan 14	4.4	4.4	Nil	-	11	7	4	-	
13932	Jan 4 - 6	14	2.4	2.4	Nil	-	8	7	1	-	
13933	Dec 30 - Jan 3	14	-	-	-	Nil	-	-	-	7	
13935	Jan 7 - 10	16	4.6	4.5	0.1	-	13	10	3	-	
13936	11 - 13	16	2.8	2.8	Nil	-	10	7	3	-	
13937	6 - 10	16	-	-	-	Nil	-	-	-	6	
13940	14 - 17	23	2.3	1.8	0.5	-	14	11	3	-	
13941	18 - 20	23	3.9	3.8	0.1	-	14	12	2	-	
13942	13 - 17	23	-	-	-	2.2	-	-	-	5	
13945	21 - 24	30	4.5	4.1	0.4	-	16	12	4	-	
13946	25 - 27	30	3.7	2.7	1.0	-	22	15	7	-	
13947	20 - 24	30	-	-	-	1.4	-	-	-	12	
13949	28 - 31	Feb 7	2.6	1.8	0.8	-	20	16	4	-	
13951	27 - 31	7	-	-	-	0.5	-	-	-	13	
	Iowa River Raw Average (of 9)		3.4	3.1	0.3		14	11	3		
	U of I Lab Tap Average (of 5)					0.8				9	

Arnolds Abele
 Arnolds Abele
 Technician
 28 Feb 69 bj

STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 RADIATION BACKGROUND SURVEY OF IOWA CITY
 GROSS RADIATION REPORTED AS pCi/L
 IOWA RIVER RAW & U OF I LAB TAP
 DATA FOR FEBRUARY 1969

IC LAB NO	DATE SAMPLED 1969	DATE COUNTED 1969	GROSS ALPHA ACTIVITY				GROSS BETA-GAMMA ACTIVITY			
			TS	DS	SS	TAP	TS	DS	SS	TAP
13950	Feb 1 - 3	Feb 10	2.3	0.3	2.0	-	26	17	9	-
13955	4 - 7	24	1.4	0.6	0.8	-	21	17	4	-
13956	8 - 10	24	1.0	1.0	Nil	-	20	16	4	-
13957	3 - 7	25	-	-	-	0.4	-	-	-	15
13959	11 - 14	26	0.8	Nil	0.8	-	13	9	4	-
13960	15 - 17	26	0.6	0.4	0.2	-	15	12	3	-
13961	10 - 14	26	-	-	-	0.2	-	-	-	12
13963	17 - 21	27	-	-	-	0.2	-	-	-	9
13964	18 - 21	27	2.1	1.8	0.3	-	11	9	2	-
13965	22 - 24	27	2.4	1.9	0.5	-	9	8	1	-
13969	25 - 28	Mar 10	6.4	1.4	5.0	-	25	21	4	-
13971	24 - 28	11	-	-	-	1.3	-	-	-	9
	Iowa River Raw Average (of 8)		2.1	0.9	1.2		17	13	4	
	U of I Tap Average (of 4)					0.5				11

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RADIATION BACKGROUND SURVEY OF IOWA CITY
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR MARCH 1969
 IOWA RIVER RAW & U OF I TAP

IC LAB NO.	DATE SAMPLED 1969	DATE COUNTED 1969	GROSS ALPHA ACTIVITY				GROSS BETA-GAMMA ACTIVITY			
			TS	DS	SS	TAP	TS	DS	SS	TAP
13970	Mar 1- 3	Mar 10	6.9	4.8	2.1	-	29	22	7	-
13975	4- 7	14	4.1	2.0	2.1	-	29	23	6	-
13976	8-10	14	5.5	2.8	2.7	-	21	17	4	-
13977	3- 7	14	-	-	-	Nil	-	-	-	16
13978	11-14	28	4.2	2.6	1.6	-	26	16	10	-
13979	15-17	28	4.8	0.5	4.3	-	31	23	8	-
13980	10-14	28	-	-	-	1.5	-	-	-	34
13985	17-21	Apr 9	-	-	-	1.0	-	-	-	18
13986	18-21	9	5.3	0.5	4.8	-	24	15	9	-
13987	22-24	9	5.4	0.2	5.2	-	12	10	2	-
13990	24-28	10	-	-	-	0.6	-	-	-	5
13991	25-28	10	5.0	0.4	4.6	-	10	10	Nil	-
13992	29-31	10	3.0	1.3	1.7	-	15	8	7	-
	Iowa River Raw Average (of 9)		4.9	1.7	3.2		22	16	6	
	U of I Tap Average (of 4)					0.8				18

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STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 RADIATION BACKGROUND SURVEY OF IOWA CITY
 GROSS RADIATION REPORTED AS pCi/L
 IOWA RIVER RAW & U OF I TAP
 DATA FOR APRIL 1969

IC LAB NO.	DATE SAMPLED		DATE COUNTED	GROSS ALPHA ACTIVITY				GROSS BETA-GAMMA ACTIVITY			
	TS	DS	SS	TAP	TS	DS	SS	TAP			
13996	1969 Mar 31 - Apr 4		1969 Apr 16	-	-	-	0.4	-	-	-	11
13997	Apr 1	4	17	3.7	2.4	1.3	-	20	13	7	-
13998	5	7	17	2.7	2.0	0.7	-	18	12	6	-
14002	7	11	22	-	-	-	0.8	-	-	-	9
14005	8	11	22	2.9	1.8	1.1	-	16	10	6	-
14006	12	14	22	2.5	1.6	0.9	-	15	10	5	-
14010	14	18	29	-	-	-	0.5	-	-	-	11
14011	15	18	29	2.8	2.3	0.5	-	14	9	5	-
14012	19	21	30	4.0	2.6	1.4	-	17	12	5	-
14015	21	25	May 1	-	-	-	1.1	-	-	-	8
14016	22	25	13	4.2	3.7	0.5	-	15	10	5	-
14017	26	28	13	3.1	2.1	1.0	-	14	10	4	-
14020	28	May 2	13	-	-	-	Nil	-	-	-	7
14021	29	12	13	1.5	1.3	0.2	-	12	11	1	-
Iowa River Raw Average (of 9)				3.0	2.2	0.8	-	16	11	5	-
U of I Tap Average (of 5)							0.6				9

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STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVELS OF MAJOR IOWA RIVERS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR NOVEMBER 1968

RIVER	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
Big Sioux	Hawarden	Nov 4	Nov 7	4.7	3.5	1.2	49	34	15
Cedar	Osage	1	5	2.1	2.1	Nil	18	11	7
	Cedar Rapids	5	7	1.2	0.9	0.3	21	12	9
Des Moines	Estherville	Oct 31	7	7.8	7.2	0.6	41	30	11
	Des Moines (Above)	Nov 5	6	8.3	7.1	1.2	37	24	13
	Des Moines (Below)	5	6	8.0	6.4	1.6	35	22	13
	Ottumwa	4	7	7.7	7.0	0.7	42	27	15
Mississippi	Lansing	1	5	2.7	2.2	0.5	15	11	4
	Dubuque	4	6	2.9	1.9	1.0	21	13	8
	Davenport	Oct 31	5	7.2	3.6	3.6	25	12	13
Missouri	Sioux City	30	1	7.0	5.9	1.1	34	27	7
	Council Bluffs	Nov 5	5	7.7	6.4	1.3	40	30	10
Raccoon	Des Moines	5	6	6.0	5.0	1.0	21	12	9
Skunk	Ames	7	13	5.3	5.2	0.1	24	21	3
	Average (of 14)			5.6	4.6	1.0	30	20	10

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STATEWIDE DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVELS OF MAJOR IOWA RIVERS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR DECEMBER 1968

RIVER	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
		<u>1968</u>	<u>1968</u>						
Big Sioux	Hawarden	Dec 3	Dec 9	8.1	7.6	0.5	15	11	4
Cedar	Osage	Nov 27	4	1.5	1.4	0.1	7	5	2
	Cedar Rapids	Dec 3	6	2.1	1.9	0.2	8	6	2
Des Moines	Estherville	Nov 27	3	12	12	0.3	21	16	5
	Des Moines (Above)	Dec 3	5	12	12	0.2	18	14	4
	Des Moines (Below)	3	6	9	7.7	1.3	14	10	4
	Ottumwa	2	5	8.4	8.3	0.1	16	11	5
Mississippi	Lansing	Nov 27	3	2.7	2.7	Nil	9	7	2
	Dubuque	Dec 5	10	6.9	3.6	3.3	13	9	4
	Davenport	2	4	2.3	1.5	0.8	13	8	5
Missouri	Sioux City	Nov 26	3	3.5	3.1	0.4	14	12	2
	Council Bluffs	Dec 6	10	4.0	3.7	0.3	18	12	6
Raccoon	Des Moines	3	6	7.3	7.3	Nil	11	8	3
Skunk	Ames	5	10	9.5	8.7	0.8	11	7	4
	Average (of 14)			6.4	5.8	0.6	14	10	4

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STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVELS OF MAJOR IOWA RIVERS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR JANUARY 1969

RIVER	CITY	DATE	DATE	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
		SAMPLED	COUNTED	TS	DS	SS	TS	DS	SS
		1969	1969						
Big Sioux	Hawarden	Jan 6	Jan 13	8.6	8.6	Nil	14	11	3
Cedar	Osage	2	8	3.8	1.7	2.1	10	8	2
	Cedar Rapids	7	16	1.1	1.1	Nil	8	5	3
Des Moines	Estherville	2	8	8.4	8.1	0.3	24	20	4
	Des Moines (Above)	7	14	9.5	9.5	Nil	15	12	3
	Des Moines (Below)	7	15	4.7	4.7	Nil	14	11	3
	Ottumwa	6	13	6.6	6.5	0.1	14	11	3
Mississippi	Lansing	3	10	1.2	1.2	Nil	10	7	3
	Dubuque	13	17	1.1	1.1	Nil	9	8	1
	Davenport	6	10	1.4	1.4	Nil	10	9	1
Missouri	Sioux City	6	13	2.4	2.3	0.1	13	11	2
	Council Bluffs	2	8	4.2	4.2	Nil	19	16	3
Raccoon	Des Moines	7	15	10	7.9	2.5	16	8	8
Skunk	Ames	9	16	6.0	6.0	Nil	12	10	2
	Average (of 14)			5.0	4.6	0.4	13	10	3

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STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVELS OF MAJOR IOWA RIVERS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR FEBRUARY 1969

RIVER	CITY	DATE	DATE	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
		SAMPLED	COUNTED	TS	DS	SS	TS	DS	SS
		<u>1969</u>	<u>1969</u>						
Big Sioux	Hawarden	Feb 3	Feb 10	8.7	8.6	0.1	16	13	3
Cedar	Osage	Jan 31	6	2.3	1.4	0.9	6	4	2
	Cedar Rapids	Feb 4	11	3.2	3.2	Nil	9	6	3
Des Moines	Estherville	7	11	9.3	8.1	1.2	19	16	3
	Des Moines								
	Above	19	26	4.4	4.0	0.4	15	12	3
	Des Moines	19	27	5.1	5.1	Nil	13	10	3
	Ottumwa	3	10	3.5	3.5	Nil	12	9	3
Mississippi	Lansing	Jan 30	6	1.6	1.4	0.2	13	7	6
	Dubuque	Feb 3	11	0.9	0.9	Nil	11	8	3
	Davenport	3	10	1.2	1.2	Nil	9	7	2
Missouri	Sioux City	Jan 30	6	5.2	5.2	Nil	13	11	2
	Council Bluffs	29	5	4.4	4.3	0.1	15	13	2
Raccoon	Des Moines	Feb 19	27	6.3	6.1	0.2	14	10	4
Skunk	Ames	Jan 30	4	3.4	3.3	0.1	13	10	3
	Average (of 14)			4.2	4.0	0.2	13	10	3

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STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVELS OF MAJOR IOWA RIVERS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR MARCH 1969

RIVER	CITY	DATE SAMPLED	DATE COUNTED	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
		1969	1969						
Big Sioux	Hawarden	Mar 10	Mar 12	5.6	4.2	1.4	16	13	3
Cedar	Osage	Feb 28	Mar 7	1.2	1.1	0.1	7	6	1
	Cedar Rapids	Mar 4	10	1.5	0.2	1.3	16	10	6
Des Moines	Estherville	3	11	9.1	8.4	0.7	26	21	5
	Des Moines (Above)	13	19	7.3	7.3	Nil	16	12	4
	Des Moines (Below)	13	19	8.4	5.6	2.8	22	13	9
	Ottumwa	3	7	4.3	Nil	4.3	29	18	11
Mississippi	Lansing	Feb 26	3	0.7	0.4	0.3	9	5	4
	Dubuque	Mar 4	12	5.7	2.5	3.2	11	7	4
	Davenport	Feb 28	19	0.7	0.4	0.3	11	9	2
Missouri	Sioux City	26	3	1.5	0.7	0.8	16	13	3
	Council Bluffs	Mar 11	14	6.4	5.5	0.9	13	11	2
Raccoon	Des Moines	13	19	2.7	1.6	1.1	18	15	3
Skunk	Ames	6	12	4.6	3.5	1.1	17	13	4
	Average (of 14)			4.3	3.0	1.3	16	12	4

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STATE HYGIENIC LABORATORY, DES MOINES, IOWA
 STATEWIDE DYNAMIC SURFACE WATER REPORT
 BACKGROUND RADIATION LEVELS OF MAJOR IOWA RIVERS
 GROSS RADIATION REPORTED AS pCi/L
 DATA FOR APRIL 1969

RIVER	CITY	DATE SAMPLED 1969	DATE COUNTED 1969	ALPHA ACTIVITY			BETA-GAMMA ACTIVITY		
				TS	DS	SS	TS	DS	SS
Big Sioux	Hawarden	Mar 28	Apr 17	11	0.4	11	45	10	35
Cedar	Osage	28	14	3.5	3.0	0.5	11	7	4
	Cedar Rapids	Not stated	16	4.4	3.4	1.0	10	7	3
Des Moines	Estherville	26	8	5.7	5.5	0.2	44	36	8
	Des Moines (above)	Apr 1	11	7.1	4.4	2.7	21	8	13
	Des Moines (below)	1	11	10	4.1	6.1	25	8	17
	Ottumwa	Mar 31	14	13	2.8	9.9	64	39	25
Mississippi	Lansing	26	8	1.1	0.4	0.7	30	13	17
	Dubuque	Apr 1	15	1.0	0.4	0.6	10	7	3
	Davenport	Mar 27	11	1.9	0.4	1.5	21	8	13
Missouri	Sioux City	29	15	5.3	4.9	0.4	18	18	Nil
	Council Bluffs	25	7	5.4	3.2	2.2	50	18	32
Raccoon	Des Moines	Apr 1	11	7.5	4.3	3.2	39	8	31
Skunk	Ames	2	16	12	7.5	4.4	20	13	7
	Average (of 14)			6.4	3.2	3.2	29	14	15

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