

ENVIRONMENTAL RADIATION SURVEILLANCE REPORT

FOR THE PERIOD 10/5/81 - 8/20/82

RADIATION PROTECTION OFFICE
NORTH CAROLINA STATE UNIVERSITY AT RALEIGH

1. INTRODUCTION

Environmental radioactivity levels in the vicinity of the North Carolina State University campus have been observed to remain at low levels during the current reporting interval. The available data for this period is greatly reduced in comparison to the previous reporting period due to numerous technical problems with the laboratory instrumentation.

2. AIR MONITORING

All the data in this report related to air monitoring is given only in terms of gross beta activity as determined from Millipore air filters (Table 2.1). Due to recurrent difficulties with instrumentation, no gamma spectral data is available.

3. Monthly analyses of pasteurized cow's milk from the University Creamery have consistently exhibited levels of Sr-90 that are well within the maximum permissible concentrations (Table 3.1). The available data on I-131 activity is limited to one sample counted in October 1982. The I-131 activity in this sample was found to be below its detection limit of 2.0 picoCurie liter⁻¹.

4. SURFACE H₂O

The available data on surface water activity is limited to the months of April, May, and June. The indication from this data is a very low level of gross alpha and beta activity (Table 4.1).

5. SOIL

Soil samples were collected at four campus locations and counted for the Radiation Protection Office by the Radiation Protection Section of the Division of Human Resources. The results indicate no significant levels of radioactivity (Tables 5.1 and 5.2).

6. VEGETATION

Soybeans were collected from the University Farm and a grass sample was taken for analysis. These samples were counted by the Radiation Protection Section of the Division of Human Resources. The results indicate no significant concentrations of radionuclides (Tables 6.1 and 6.2).

TABLE 2.1 LOCATION OF AIR MONITOR STATIONS

<u>SITE</u>	<u>DIRECTION</u> ¹	<u>DISTANCE</u> ² (meters)	<u>ELEVATION</u> ³ (meters)
Broughton	Southwest	125	- 17
David Clark Labs	West	500	- 18
Library	Northwest	192	+ 11
Riddick	Southwest	99	- 14
Withers	Northeast	82	- 6

¹Direction - Direction from PULSTAR Reactor Stack

²Distance - Distance from PULSTAR Reactor Stack

³Elevation - Elevation relative to the top of the PULSTAR Reactor Stack

TABLE 2.2 AERIALY TRANSPORTED GROSS BETA ACTIVITY ($\text{fCi m}^{-3} \pm 1 \sigma$)

<u>Date</u>	<u>Sampling Locations</u>				
	<u>Broughton</u>	<u>DCL</u>	<u>Library</u>	<u>Riddick</u>	<u>Withers</u>
1981-10/5-10/9	25.1±5.0	24.0±4.7	37.8±5.4	--	32.8±5.2
10/12-10/16	25.7±4.8	23.7±4.5	22.5±4.5	44.5±5.4	34.9±5.0
10/19-10/23	23.8±4.6	27.0±4.6	25.6±4.6	21.6±4.3	27.1±4.6
10/26-10/30	2.7±3.8	17.8±4.2	3.8±3.6	14.7±4.1	---
11/2-11/6	35.7±5.2	36.5±5.0	29.0±4.8	23.4±4.4	35.7±5.1
11/9-11/13	26.2±4.9	33.1±5.0	67.1±6.5	---	33.1±5.0
11/16-11/20	25.6±4.8	23.5±4.5	---	21.8±4.3	35.5±5.1
11/23-11/27	34.3±5.3	31.9±5.0	16.1±4.4	27.2±4.7	18.5±4.5
11/30-12/4	38.4±5.3	39.3±5.1	29.5±4.7	34.6±4.9	34.4±5.0
12/7-12/11	20.3±4.6	15.3±4.2	5.2±3.8	27.4±4.7	35.7±5.1
12/14-12/18	31.1±5.0	26.5±4.6	29.0±4.8	54.4±5.8	28.2±4.8
12/21-12/28	25.4±4.6	37.0±4.9	59.3±6.0	28.7±4.5	28.9±4.6
1982-1/4-1/8	26.0±4.9	23.4±4.5	21.6±4.3	33.0±5.0	27.0±4.6
1/11-1/15	25.2±4.5	36.8±4.9	27.5±5.7	28.9±4.8	23.2±4.4
1/18-1/22	39.0±5.0	29.6±4.7	27.2±4.6	34.7±5.0	21.4±4.2
1/25-1/29	25.5±4.6	32.0±5.0	32.1±5.0	34.2±5.3	35.5±5.1
2/1-2/5	20.1±4.5	31.2±4.5	28.5±4.5	28.8±4.6	27.2±4.6
2/8-2/12	33.1±4.4	21.0±4.0	38.2±4.5	25.6±4.1	24.3±4.2
2/15-2/19	34.2±4.3	35.3±4.5	38.6±4.7	24.3±4.0	22.4±4.2
2/22-2/26	23.5±4.9	29.7±4.2	32.7±4.4	21.9±4.0	35.1±4.5
3/1-3/5	31.1±4.4	39.4±4.4	43.7±5.0	40.1±4.7	39.7±4.7
3/8-3/12	33.8±4.3	26.1±4.0	33.0±4.4	45.3±4.8	41.1±4.7
3/15-3/19	30.6±4.3	50.0±5.1	27.4±4.2	23.1±4.2	23.0±4.1
3/22-3/26	45.6±4.9	32.9±4.3	31.0±4.3	27.9±4.1	21.7±3.9
4/5-4/9	30.5±4.3	29.8±4.2	32.9±4.4	40.0±4.7	22.2±4.1
4/12-4/16	20.0±4.5	32.1±5.0	34.0±5.2	28.9±4.5	27.0±4.5
4/19-4/23	39.2±5.2	34.1±5.1	45.2±5.4	43.7±5.5	34.7±4.5
4/26-4/30	47.1±5.1	22.6±4.1	26.8±4.3	37.2±4.9	29.0±4.4
5/3-5/7	28.3±4.9	27.7±4.9	22.9±4.5	40.0±5.2	32.8±4.4
5/10-5/14	39.7±5.4	23.2±4.5	43.1±5.3	51.3±5.7	39.0±4.2
5/17-5/21	28.2±4.8	27.3±4.6	31.4±5.0	40.0±5.4	41.0±5.3
5/24-5/28	37.7±5.4	35.5±5.2	23.0±4.5	40.2±5.2	45.3±5.4
5/31-6/4	31.2±5.0	36.5±5.2	34.8±5.2	48.4±5.2	43.2±5.5
6/7-6/11	34.0±4.5	39.6±4.8	38.7±4.6	46.0±5.5	36.8±5.1

TABLE 2.2 AERIALY TRANSPORTED GROSS BETA ACTIVITY ($\text{fCi m}^{-3} 1\sigma$), continued

Date	Broughton	Sampling Locations			
		DCL	Library	Riddick	Withers
6/14-6/18	37.2±5.4	36.1±4.5	21.1±3.4	29.6±4.0	42.0±4.8
6/21-6/25	46.0±5.4	41.9±4.8	26.2±4.1	26.0±4.0	39.2±4.5
6/28-7/2	33.1±4.4	28.5±4.2	31.1±4.3	29.9±4.1	32.0±4.2
7/5-7/9	40.0±4.7	39.4±4.5	30.1±4.0	29.7±4.1	35.1±4.5
7/12-7/16	30.4±4.8	50.0±5.7	30.5±4.9	23.4±3.8	22.0±4.8
7/19-7/23	40.3±4.5	37.1±4.8	38.5±4.6	36.9±4.7	40.0±4.8
7/26-7/30	40.1±5.2	41.0±4.5	37.2±5.4	39.6±4.7	37.8±5.2
8/2-8/6	41.0±4.5	39.7±5.0	50.2±5.3	40.0±4.7	40.2±5.2
8/9-8/13	31.6±4.3	40.3±5.3	30.9±3.9	40.3±4.8	41.2±4.7
8/16-8/20	35.2±4.6	32.7±4.3	32.9±4.4	38.8±4.6	39.0±4.7

TABLE 3.1 Sr-90 IN COW'S MILK ($\text{pCi l}^{-1} \pm 1\sigma$)

Date	Activity ($\text{pCi l}^{-1} \pm 1\sigma$)
Dec 1981	3.6 ± 0.52
1982	
Jan	3.4 ± 0.47
Feb	4.2 ± 0.53
Mar	3.4 ± 0.47
Apr	3.3 ± 0.42
May	3.3 ± 0.42
June	3.51 ± 0.52

TABLE 4.1 SURFACE H_2O

Date	Location	Gross Beta ($\text{pCi l}^{-1} \pm 1\sigma$)	Gross Alpha ($\text{pCi l}^{-1} \pm 1\sigma$)
April	ON	4.02 ± 0.43	0.18 ± 0.07
	OFF	3.01 ± 0.34	0.13 ± 0.08
May	ON	2.91 ± 0.33	0.17 ± 0.07
	OFF	2.72 ± 0.32	0.15 ± 0.07
June	ON	2.83 ± 0.32	0.19 ± 0.08
	OFF	2.74 ± 0.32	0.14 ± 0.08

TABLE 5.1 SOIL SPECIFIC ACTIVITY ($\text{pCi gram}^{-1} \pm 1\sigma$)(Gross Alpha and Beta)

Campus Location	Date	Alpha	Beta ⁻
North	3/2/82	(2.1 ± 1.2) × 10 ¹	(1.7 ± 0.7) × 10 ¹
South	3/2/82	(1.5 ± 1.8) × 10 ¹	(2.0 ± 3.3) × 10 ¹
East	3/2/82	(1.6 ± 1.0) × 10 ¹	(2.5 ± 0.7) × 10 ¹
West	3/2/82	7.6 ± 9.2	6.6 ± 12.5

TABLE 5.2 SOIL SPECIFIC ACTIVITY ($\text{pCi gram}^{-1} \pm 1\sigma$) (Gamma Emitters)

<u>North Campus - 3/2/82</u>	
<u>Nuclide</u>	<u>Activity</u>
No gamma count	---
<u>South Campus - 3/2/82</u>	
Cs-137	$(6.3 \pm 0.2) \times 10^{-1}$
K-40	7.2 ± 0.3
Ra-226	$(6.6 \pm 0.3) \times 10^{-1}$
U-235	$(7.6 \pm 5.4) \times 10^{-2}$
Th-232	$(7.1 \pm 0.5) \times 10^{-1}$
<u>East Campus - 3/2/82</u>	
Cs-137	$(3.0 \pm 0.2) \times 10^{-1}$
K-40	12.7 ± 0.4
Ra-226	$(7.7 \pm 0.3) \times 10^{-1}$
Th-232	$(9.3 \pm 0.6) \times 10^{-1}$
<u>West Campus - 3/2/82</u>	
Cs-137	$(6.7 \pm 1.3) \times 10^{-2}$
K-40	7.6 ± 0.3
Ra-226	$(5.4 \pm 0.3) \times 10^{-1}$
U-235	$(1.5 \pm 0.5) \times 10^{-1}$
Th-232	$(6.6 \pm 0.5) \times 10^{-1}$

TABLE 6.1 SOYBEANS SPECIFIC ACTIVITY ($\text{pCi gram}^{-1} \pm 1\sigma$) (Gross Alpha and Beta)
(University Farm)

<u>Gross α</u>	<u>Gross β^-</u>
< 0.6	11.6 ± 2.7

TABLE 6.2 GRASS SPECIFIC ACTIVITY ($\text{pCi gram}^{-1} \pm 1\sigma$) (Gross Alpha and Beta)
(West Campus)

<u>Gross α</u>	<u>Gross β^-</u>
$(5.6 \pm 4.7) \times 10^{-1}$	3.2 ± 1.1