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SWRHL-50r

NIMBUS-B/SNAP-19 LAUNCH

MAY 18, 1968

OFF-SITE RADIOLOGICAL SURVEILLANCE

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by
Environmental Surveillance
Southwestern Radiological Health Laboratory
Department of Health, Education, and Welfare
Public Health Service
National Center for Radiological Health

December 1968

This surveillance performed under a Memorandum of
Understanding (No. SF 54 373)
for the
U. S. ATOMIC ENERGY COMMISSION

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DTIE, USAEC
Oak Ridge, Tennessee

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I. INTRODUCTION

The Southwestern Radiological Health Laboratory (SWRHL) of the National Center for Radiological Health (NCRH), Public Health Service (PHS) provided off-site monitoring for the launch of the Nimbus-B/SNAP-19. This report presents the results of that surveillance in partial satisfaction of general NCRH responsibilities for radiation surveillance and in specific response to Atomic Energy Commission Nevada Operations Office (AEC/NVOO) as requested by letter of April 23, 1968 from AEC/NVOO to the Director, SWRHL.

The vehicle was launched from location SLC-2 East (Figure 1), Vandenberg Air Force Base at 0121 hours PDT, May 18, 1968. Shortly after launching, the vehicle was destroyed because of an undesirable flight path. The best estimates placed the impact area of the generator package about 5 miles north of San Miguel Island in the Santa Barbara Channel (Figure 1).

Following the abort SWRHL monitors moved immediately into locations along the beach from Gaviota to Long Beach, including three islands off the coast. They began monitoring for possible contamination and to collect environmental samples for analysis.

SNAP-19 SURVEILLANCE AREA
FIGURE 1

II. SAMPLE COLLECTION AND ANALYSIS

Samples collected included air, vegetation, soil, milk, and water (fresh and sea). Sampling locations for pre-launch activities were set up to coincide with previous work done in the area¹. Post-launch sampling locations were chosen on the basis of meteorological and radar impact information.

Samples collected after the aborted launch were returned by SWRHL aircraft and analyzed immediately for gross alpha concentrations in order to provide guidance for further surveillance operations.

The samples were treated as described in the SWRHL, "Operations Plan for the Off-Site Surveillance for the Launch of SNAP-19," which is attached to this report.

During the pre-launch and immediate post-launch phase (May 16 to June 18, 1968) of the SNAP-19 launch surveillance, a total of 178 samples were collected and analyzed.

¹Radiation Surveillance in Santa Barbara County, California, July 1, 1963 - January 1, 1965; the EDP of SWRHL, Department HEW, PHS, Las Vegas, Nevada, March 15, 1965.

III. DESCRIPTION AND INTERPRETATION OF DATA

The data are presented in Tables 1-4 as follows:

Table 1 - Ground Monitoring

Table 2 - Vegetation, Soil, and Water

Table 3 - Air Sampling

Table 4 - Milk

The ground monitoring summary includes average instrument readings before the launch in the Lompoc area and after the launch along the main coast from Gaviota to 110 miles southeast of Gaviota, and on the Channel Islands. The alpha activity on the ground (cpm/55 cm²) is listed under the PAC-IS column. The gamma activity (cpm), as measured with a Plutonium Gamma Probe, is listed under the PG-1 column and the gamma exposure rate (mR/hr) is listed in the E-500B column. These values are comparable to those reported in earlier studies². All levels measured were as expected for natural radioactivity.

The gross alpha summary includes results on soil, water, and vegetation with results expressed as activity (pCi) per gram or liter. The error associated with each value is based on counting statistics (95% C.L.) and does not include those errors which may be associated with variation in sample moisture content and natural soil activity due to various types of soil. These data are about as expected for natural radioactivity³.

²Ibid

³Radiation Hygiene Handbook, Hanson Blatz, McGraw-Hill Book Co., Page 4-7.

The air sample gross alpha activity summary is presented in Table 3. In all cases, the alpha activity was less than 4 counts per minute total (12 day count, volume $\geq 600 \text{ ft}^3$), the minimum detectable activity. Beta and gamma analyses were done on all air filters. No evidence of radioactivity from this operation was found.

SWRHL operates an air surveillance network consisting of 110 air sampling stations in 20 states west of the Mississippi River. From May 18 to May 31, all filters from these stations were carefully examined for gross alpha activity. No evidence of an increase in gross alpha activity was found.

Three milk samples were collected and analyzed for gamma activity. These results are reported in Table 4 and show normal background levels.

IV. RECOVERY OPERATION

The generators were located on October 4, 1968. They were positively identified through underwater color photographs along with debris from the launch vehicle.

The recovery of the generators and debris was completed on the afternoon of October 9, 1968, by use of a two-man submarine and "hard hat" divers. The generators had no visible damage except for the loss of a small portion of the graphite coating on one of them.

The generators were placed in a steel drum containing fresh water. The drum was sealed and loaded on a truck for transshipment to Mound Laboratories.

V. SAMPLE COLLECTION AND ANALYSIS

During the recovery operations two fish samples were obtained for analysis. Salt water samples from the recovery box and fresh water samples from the steel drum were also obtained. Fresh water from the mainland was obtained to verify non-contamination during the entire operation (launch, abort, and recovery).

Gross alpha and specific plutonium-238 analyses were performed on the samples. Gross analysis was performed as described in the Operations Plan. Specific analysis included solvent extraction and electrodeposition. The electroplated samples were counted with a solid state alpha detector and a multi-channel analyzer.

The results from the recovery operations are presented in Table 5 and show no increase in background.

VI. SUMMARY

The SWRHL monitored the off-site area during and after the unsuccessful launch of the Nimbus-B/SNAP-19 satellite. A variety of environmental samples was collected from the mainland, sea, and channel islands and was compared to previous data from the area. During the recovery operations, additional samples were taken. No increase in environmental radioactivity levels was observed from this operation.

Table 1. Ground monitoring summary

Location	Date	PAC-1S*	PG-1	E-500B **
		α (cpm/55cm ²)	γ (cpm)	(Open Probe) (mR/hr)
Pre-Launch				
Santa Maria	5-16-68	3	2100	---- ***
Surf	5-17-68	3	850	0.01
Miguelito Park	5-17-68	4	1000	----
Lompoc	5-17-68	4	3500	0.01
Paradise Store	5-17-68	3	2000	----
Vandenberg Village	5-18-68	4	2000	----
Post-Launch				
Gaviota Beach	5-18-68	3	----	----
Gaviota Beach Turn-off, Highway 1	5-18-68	5	----	----
10 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	1	----	----
20 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	3	----	----
30 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	2	----	----
40 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	2	----	----
50 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	0	----	----
60 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	3	----	----
70 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	2	----	----
80 mi SE Gaviota Beach Turnoff, Highway 1	5-18-68	4	----	----
90 mi SE Gaviota Beach Turnoff, Highway 1 (Zuma Beach)	5-18-68	2	----	----

Table 1. Ground monitoring summary (continued)

				E-500B**
		PAC-1S*	PG-1	(Open Probe)
Location	Date	α (cpm/55cm ²)	γ (cpm)	(mR/hr)
Post-Launch (continued)				
100 mi SE Gaviota Beach Turnoff, Highway 1 (Topanga)	5-18-68	2	----	----
110 mi SE Gaviota Beach Turnoff, Highway 1 (Malibu)	5-18-68	2	----	----
Santa Cruz Island	5-18-68	Instrument Failure	3500	----
Santa Rosa Island	5-18-68	0	1500	----
San Miguel Island	5-18-68	2	1000	0.015
Gaviota Beach	5-19-68	4	----	----

*The average of five readings within one square meter.

**The reading is with a Geiger-Mueller probe with the shield open.
The closed shield probe was calibrated with ¹³⁷Cs. The unit
mR/hr indicates a meter deflection and not exposure rate.

***Not taken

Table 2. Gross alpha summary.

Location	Date Collected May 1968	Soil* (pCi/g)	Water (pCi/l)		Vegetation (pCi/g)
			Fresh	Salt	
Lompoc	17	1.1 ± 1.0			< 0.2
Gaviota State Beach Park	18	1.1 ± 0.4			< 0.2
10 mi SE Gaviota Beach Turnoff, Highway 1	18	$< 0.2 \pm 0.5$			0.7
20 mi SE Gaviota Beach Turnoff, Highway 1	18	1.1 ± 1.0			< 0.2
30 mi SE Gaviota Beach Turnoff, Highway 1	18	0.4 ± 0.6			0.7
40 mi SE Gaviota Beach Turnoff, Highway 1	18	1.1 ± 0.3			< 0.2
50 mi SE Gaviota Beach Turnoff, Highway 1	18	5.2 ± 2.4			0.2
60 mi SE Gaviota Beach Turnoff, Highway 1	18	3.8 ± 0.5			< 0.2
70 mi SE Gaviota Beach Turnoff, Highway 1	18	1.1 ± 1.1			0.5
80 mi SE Gaviota Beach Turnoff, Highway 1	18	0.4 ± 0.6			< 0.2
Port Hueneme	18	0.4 ± 0.5		3.6	< 0.2
90 mi SE Gaviota Beach Turnoff, Highway 1 (Zuma Beach)	18	0.9 ± 0.7			< 0.2
100 mi SE Gaviota Beach Turnoff, Highway 1 (Topanga Beach)	18	1.1 ± 0.9			0.2
110 mi SE Gaviota Beach Turnoff, Highway 1 (Malibu Beach)	18	1.1 ± 0.9			< 0.2
Santa Rosa Island	18	0.9 ± 0.7	< 1	< 1	< 0.2
Santa Cruz Island	18	0.7 ± 0.4	< 1		< 0.2
	18	2.9 ± 0.9			
San Miguel Island	18	Lost in analysis	< 1	< 1	< 0.2
Carlsbad Beach	19	2.0 ± 0.5		< 1	< 0.2

Table 2. Gross alpha summary. (continued)

Location	Date Collected May 1968	Soil* (pCi/g)	Water (pCi/l)		Vegetation (pCi/g)
			Fresh	Salt	
San Clemente Beach	19	2.0 ± 0.7		1.6	< 0.2
Newport Beach	19	0.9 ± 0.4			
	19	2.7 ± 1.6		< 1	< 0.2
Redondo Beach, Palos Verdes Pt.	19	1.1 ± 0.3		2.0	
Redondo Beach	19	1.1 ± 0.7		< 1	< 0.2
El Segundo Beach	19	0.4 ± 0.2		< 1	
Malibu Beach	19	0.9 ± 0.5		1.6	
Zuma Beach	19	0.4 ± 0.3		< 1	
Laguna Beach	20	0.4 ± 0.3		2.0	< 0.2
Gaviota State Beach	21	0.7 ± 0.8		< 1	
Goleta State Beach	21	0.4 ± 0.6		< 1	
Emma Wood Beach	21	0.9 ± 0.9		< 1	
San Miguel Island, Harris Pt.	21			< 1	
San Miguel Island, 1-1/4 mi inland W Harris Pt.	21	$< 0.2 \pm 0.3$		1.4	
San Miguel Island, 1-1/2 mi inland W Simonton Cove	21	$< 0.2 \pm 0.3$		< 1	
San Miguel Island, 1-1/4 mi SE Harris Pt. (Cuyler Harbor)	21	0.2 ± 0.2		< 1	
San Miguel Island, 1-1/4 mi off Prime Rock, 320° Mag.	21			< 1	
CUSS I Drill Rig**	21			< 1	
Malibu Beach	22	0.9 ± 0.9		< 1	
Newport Beach	22	0.7 ± 0.8		< 1	
San Clemente Beach	22	0.4 ± 0.6		< 1	
San Miguel	23	0.4 ± 0.6		< 1	*** < 0.2
	23	2.0 ± 1.3			< 0.2
	23	$< 0.2 \pm 0.4$			< 0.2
	23	$< 0.2 \pm 0.4$			< 0.2
	23	$< 0.2 \pm 0.4$			< 0.2
	23	0.2 ± 0.4			
	23	0.2 ± 0.4			

Table 2. Gross alpha summary. (continued)

Location	Date Collected May 1968	Soil* (pCi/g)	Water (pCi/l)		Vegetation (pCi/g)
			Fresh	Salt	
Santa Rosa	24	0.4 ± 0.6			< 0.2
Goleta State Beach	24	1.1 ± 2.3		< 1	
Gaviota State Beach	24	1.3 ± 1.1		< 1	
Ventura Beach	24	4.0 ± 1.9		< 1	
San Clemente Beach	24	0.7 ± 0.8		< 1	
Malibu Beach	24	1.6 ± 1.2		< 1	
Newport Beach	24	0.9 ± 0.9		< 1	
Goleta State Beach	28	0.2 ± 0.4		< 1	
Gaviota State Beach	28	0.7 ± 0.8		< 1	
Malibu Beach	29	1.3 ± 1.1		< 1	
San Clemente Beach	29	2.7 ± 1.6		< 1	
Goleta State Beach	31	1.1 ± 2.3		< 1	
San Clemente Beach	31	2.7 ± 1.6		< 1	
Malibu Beach	31	2.3 ± 1.4		< 1	
Ventura Beach	31	1.3 ± 1.1		< 1	
Newport Beach	31	2.7 ± 1.6		< 1	
Gaviota Beach	31	2.3 ± 1.4		< 1	
Carlsbad State Beach	31	0.7 ± 0.8			
	<u>June 1968</u>				
Goleta State Beach	07	0.7 ± 0.8		< 1	
Carlsbad State Beach	07	1.1 ± 2.3		< 1	
Malibu Beach	07	0.7 ± 0.8		< 1	
Newport Beach	07	0.9 ± 0.9		< 1	
Ventura Beach	07	1.3 ± 1.1		< 1	
	07	2.5 ± 1.5		< 1	
Gaviota State Beach	07	2.0 ± 1.3		< 1	
Carlsbad State Beach	17	0.2 ± 0.4		< 1	

Table 2. Gross alpha summary. (continued)

Location	Date Collected June 1968	Soil* (pCi/g)	Water (pCi/l)		Vegetation (pCi/g)
			Fresh	Salt	
San Clemente Beach	17	0.7 ± 0.8		< 1	
Redondo Beach	17	0.7 ± 0.8		< 1	
Carpenteria Beach	18	0.2 ± 0.4		< 1	
Gaviota State Beach	18	1.1 ± 2.3		< 1	
Goleta State Beach	18	0.9 ± 0.9		< 1	

*95% C. L. based on counting statistics

**Impact area

***Combination of 5 samples collected

Table 3. Air sampling summary

Location	Time On		Time Off		Alpha Activity*
Paradise Camp	5-16	1712	5-17	1645	ND
	5-17	1730	5-18	0245	ND
Santa Maria	5-16	1710	5-17	1645	ND
	5-17	1700	5-18	0245	ND
Gaviota Beach Turnoff, Highway 1	5-18	0430	5-19	1150	ND
Lompoc	5-18	1215	5-19	1525	ND
Miguelito Park	5-16	1700	5-17	1700	ND
	5-17	1705	5-18	0105	ND
	5-18	0200	5-19	1245	ND
	5-19	1300	5-20	1030	ND
Point Mugu N. A. S.	5-18	0420	5-18	0530	ND
	5-18	0545	5-18	1210	ND
	5-20	1025	5-21	0915	ND
	5-21	1100	5-22	0800	ND
	5-22	0950	5-23	1015	ND

*ND - less than 4 cpm total alpha activity on 12 day counts, volumes
 > 600 ft³.

Table 4. Milk summary

Location	Date Collected	Activity (pCi/l)			
		¹³¹ I	¹³⁷ Cs	⁸⁹ Sr	⁹⁰ Sr
Solvang	5-18-68	< 10	20	< 5	< 2
Lompoc	5-19-68	< 10	< 10	< 5	< 2
Santa Maria	5-18-68	< 10	< 10	< 5	< 2

Table 5. Recovery Operation Samples

Location	Type of Sample	Activity pCi/l or g
Recovery Box	Salt Water	< 0.1*
Shipping Barrel	Fresh Water	< 0.1*
Shipping Barrel	Fresh Water	< 1 **
Impact Area	Red Snapper Fish (Bone)	< 0.1*
Santa Barbara	Fresh Water	< 1
Lompoc	Fresh Water	2
Lompoc	Fresh Water	3

*Specific analysis (^{238}Pu) estimated minimum sensitivities
0.1 pCi/l or 0.1 pCi/g.

**Gross alpha analysis estimated minimum sensitivity 1 pCi/l.