

SWRHL-12r

FINAL REPORT OF OFF-SITE SURVEILLANCE
FOR

OPERATION NIBLICK

July 1, 1963-June 30, 1964

by the
Southwestern Radiological Health Laboratory
U. S. Public Health Service
Department of Health, Education, and Welfare
Las Vegas, Nevada

April 1, 1966

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

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ABSTRACT

Under a Memorandum of Understanding with the U. S. Atomic Energy Commission, the U. S. Public Health Service conducted a program of environmental surveillance for Operation Niblick, a series of nuclear experiments carried out at the AEC's Nevada Test Site during the period July 1, 1963, through June 30, 1964. This report contains the results of this surveillance.

Of the twenty-six announced events of Operation Niblick, including four Plowshare events, two released radioactivity to the environment immediately after detonation which was subsequently detected on the ground in the off-site areas. These events were Eagle, conducted on December 12, 1963 and Pike, conducted on March 13, 1964.

The Eagle Event release was not detected by ground monitors but low concentrations of fresh fission products (maximum, 20 pCi/m³ ¹³³I) were detected on charcoal cartridge air filters at four air sampling stations located south of the Nevada Test Site. No fresh fission products were found in milk or water samples collected in downwind areas.

The Pike Event resulted in a release of radioactive effluent that was detected by various sampling techniques as far south as Yuma, Arizona. Maximum measurements by portable ground monitoring instruments in the off-site areas were relatively low (maximum, 5.9 mR/hr net gamma). Areas in the cloud path experienced low, but detectable, residual contamination on vegetation and in some milk samples.

Maximum external and internal exposures to the off-site population as a result of any one, or combination of, Operation Niblick events were below the safety criteria as established by the Atomic Energy Commission.

FOREWORD

This report covers the activities of the Southwestern Radiological Health Laboratory. These activities are conducted in accordance with a Memorandum of Understanding with the U. S. Atomic Energy Commission. In part, this memorandum authorizes the U. S. Public Health Service to investigate, assess, record, and report the radiological situation in the public areas surrounding the Nevada Test Site, and to inform and protect the public should an unacceptable radiological situation develop.

This report is the final report for Operation Niblick and supersedes all previous reports issued by the Public Health Service for this series. All future requests for data from Operation Niblick will be referenced to this report. It is neither possible nor desirable to include in this report every item of data obtained. However, summaries of all data pertaining to exposures or contamination of people or of property in the off-site areas have been included.

TABLE OF CONTENTS

ABSTRACT	i
FOREWORD	ii
TABLE OF CONTENTS	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
Chapter 1 INTRODUCTION	1
A. MEDICAL AND VETERINARIAN SERVICES	2
B. PUBLIC RELATIONS	2
Chapter 2 OPERATIONAL PROCEDURES	3
A. EXTERNAL MEASUREMENTS	3
1. Ground Monitoring	3
2. Dose Rate Recorders	3
3. Aerial Cloud Tracking	5
4. Film Badges	5
B. ENVIRONMENTAL MEASUREMENTS	5
1. Air Samples	5
2. Milk and Water Samples	7
C. SAFETY CRITERIA	8
D. FIELD PROCEDURES	9
Chapter 3 RESULTS	11
A. SUMMARY OF TWO EVENTS	11
1. Eagle	11
a. Aerial and Ground Monitoring	11
b. Air Sampling	11
c. Additional Environmental Sampling	15
2. Pike	15
a. Ground Monitoring	15

b. Aerial Cloud Tracking	16
c. Air	26
d. Water	26
e. Milk	26
f. Film Badges	26
g. Dose Rate Recorders	26
B. SUMMARY OF OPERATION NIBLICK	32
1. Air Sampling	32
2. Film Badges	32
3. Milk Sampling	32
4. Water Sampling	37
5. Vegetation Sampling	37
Chapter 4 DISCUSSION AND CONCLUSIONS	38
A. EXTERNAL EXPOSURES	38
B. AIR SAMPLING	38
C. MILK SAMPLING	38
D. WATER SAMPLING	39
E. CONCLUSION	39
APPENDIX	
DISTRIBUTION	

LIST OF TABLES

Table 1. Announced underground events of Operation Niblick.	12
Table 2. Air sampling data, Eagle Event, 12/12/63.	13
Table 3. Ground monitoring summary for the Pike Event, March 13 and 14, 1964.	17
Table 4. Results of ground station air samples collected following the Pike Event, March 13, 1964.	29
Table 5. Monthly gross beta activity averages from all per- manent air sampling stations in operation during Operation Niblick - activity in pCi/m ³ .	33
Table 6. Summary of monthly film badge placements.	34
Table 7. Milk samples collected during Operation Niblick showing the presence of fresh fission products (not including two Las Vegas farms).	36

LIST OF FIGURES

Figure 1.	Environmental sampling points as of June 30, 1964, Operation Niblick.	4
Figure 2.	Off-site instrument locations and roads monitored, Eagle Event.	14
Figure 3.	Roads monitored March 13, 1964, for the Pike Event.	22
Figure 4.	Roads monitored March 14, 1964, for the Pike Event.	23
Figure 5.	Sampling locations other than in Nevada for the Pike Event.	27
Figure 6.	Sampling locations in Nevada for the Pike Event.	28
Figure 7.	Gamma dose rate vs. time at three locations following the Pike Event, 3/13/64.	31
Figure 8.	Routine film badge placement locations.	35

Chapter 1

INTRODUCTION

Operation Niblick was a series of underground nuclear tests conducted from July 1, 1963 through June 30, 1964, by the U. S. Atomic Energy Commission (AEC) at their Nevada Test Site. As for past operations, the U. S. Public Health Service (PHS) carried out a program of radiological surveillance of the public areas off-site for the Operational Safety Division of the AEC's Nevada Operations Office. This surveillance is conducted under a memorandum of understanding between the U. S. Atomic Energy Commission and the U. S. Public Health Service.

The Off-Site Radiological Safety Program of the Southwestern Radiological Health Laboratory (SWRHL) conducts its present program of radiological monitoring and environmental sampling in the off-site area surrounding the restricted area enclosed by the Nevada Test Site, and the Nellis Air Force Range. This overall complex of the Nevada Test Site (NTS) and the Nellis Air Force Range (NAFR) includes the Nuclear Rocket Development Station (NRDS) and the Tonopah Test Range (TTR) and for simplicity will be called the test range complex throughout this report.

In order to carry out the assigned program of off-site surveillance, the PHS organized, equipped, and trained aerial monitoring teams, mobile ground monitors, and provided for periodic sampling of air, milk, water, vegetation, film badge placement and evaluation of other environmental factors. A system of permanent, continuous air sampling stations was maintained at locations surrounding the test range complex, and provisions were made to supplement this network with additional samplers if the need arose. During the latter part of the

Niblick series, additional sampling points were established for regularly scheduled milk and water sample collection to augment the special samples that were being collected.

A. MEDICAL AND VETERINARIAN SERVICES

A PHS Medical Officer was available on short notice in the event any cases of a medical nature arose as a result of the test series. No such cases were brought to the attention of the PHS and the services of a Medical Officer were not required.

An Army Veterinarian assigned to the NVOO, AEC, was available to the Public Health Service Off-Site Radiological Safety Program. Veterinarian services were also provided by a PHS Veterinarian. Liaison was maintained with livestock producers in the area and the program of wildlife and cattle investigation was continued.

B. PUBLIC RELATIONS

An important part of off-site radiological safety activities is that of public relations. In their everyday contacts with residents of the off-site area, PHS personnel express their desire to speak to local groups to explain the programs at the Nevada Test Site and the role of the Public Health Service in them.

Talks and films covering elementary atomic physics and radiation effects are given to school groups, while civic groups are offered talks and films on atomic testing and the safeguards exercised to protect the public.

A number of off-site residents took part in the environmental sampling program. All routine sampling stations except Las Vegas were operated by local citizens and many more people wore film badge dosimeters. This cooperation saved greatly on manpower requirements, and gave the individuals in a community a feeling of participation in the PHS activities.

Chapter 2

OPERATIONAL PROCEDURES

A. EXTERNAL MEASUREMENTS

1. Ground Monitoring

Each monitor was equipped with the following monitoring instruments: an Eberline E-500B, a Precision Model 111 Standard "Scintillator", a Beckman MX-5, and a Tracerlab AN/PDR T1B. The Eberline E-500B has a range of 0 to 200 milliroentgens per hour (mR/hr) beta-gamma over four linear scales with an external halogen filled GM tube detector and a 0 to 2000 mR/hr gamma only range from an internal Anton 302 tube detector. The Precision Model 111 "Scintillator" is used primarily for low level detection and provides for a range of 0 to 5 gamma mR/hr in six scales. The Beckman MX-5 instrument has a range of 0 to 20 mR/hr in three scales. It is equipped with an external Geiger tube with a slide-open beta shield. The Tracerlab AN/PDR T1B has a range of 0.05 to 50,000 mR/hr gamma in five scales. This instrument employs an air ionization chamber detector. These instruments are accurate to ±20% when readings are taken to two significant figures.

2. Dose Rate Recorders

Eberline RM-11 dose rate recorders were placed at several stations around the test range complex. (See Figure 1, page 4). These recorders utilize a Geiger tube detector to document radiation levels at specific locations. The instrument operates on 110V AC and has a 0.01 to 100 mR/hr range. Gamma dose rate is recorded on a 30-hour or 8-day strip chart. The instrument is accurate to ±20%.

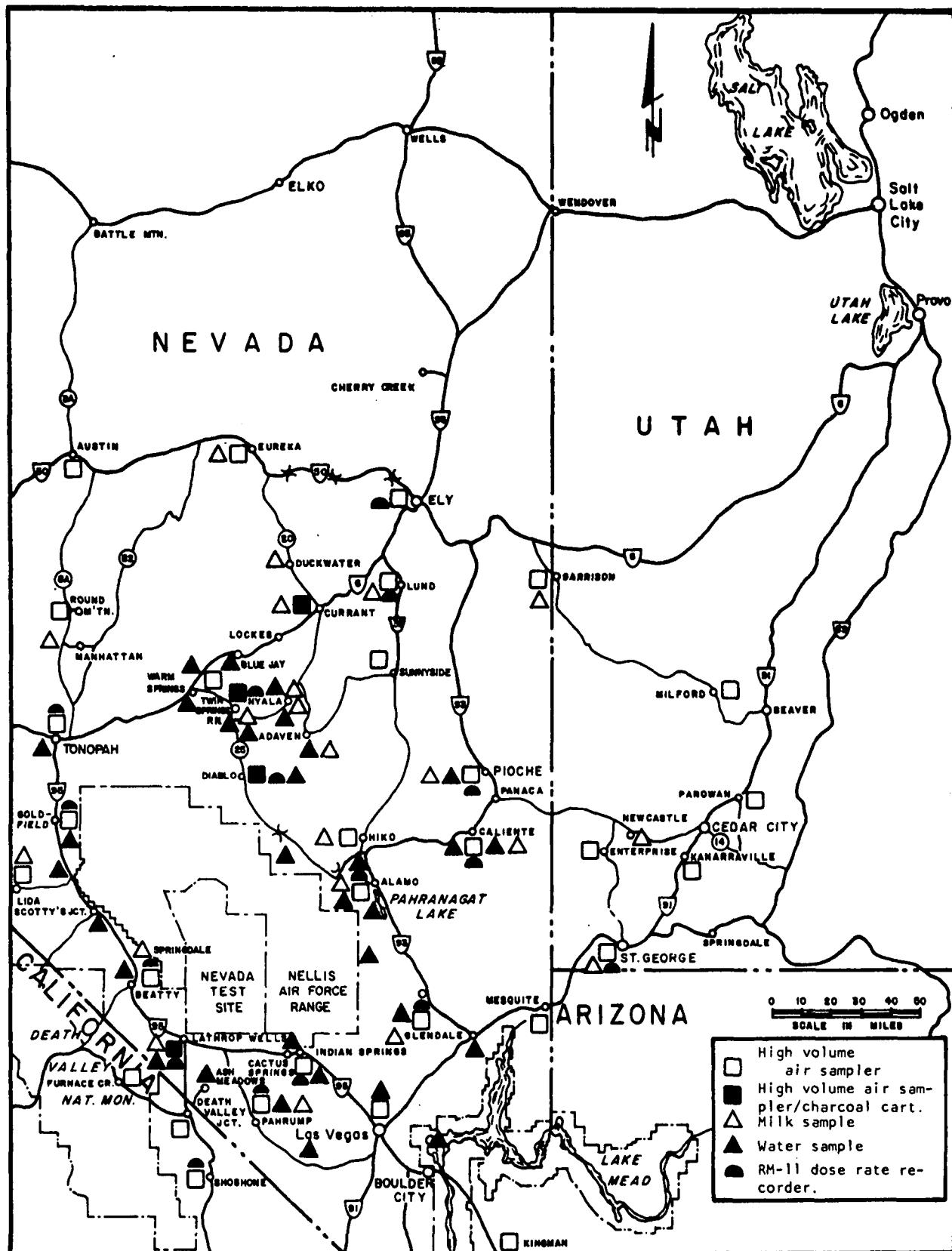


Figure 1. Environmental sampling points as of June 30, 1964, Operation Niblick.

3. Aerial Cloud Tracking

A PHS aerial monitoring team was available for each event in the Niblick series. In the event of a release of radioactive material, this team, equipped with instruments identical to those used by ground monitors, tracked the effluent. Normally an Air Force U3-A aircraft and a PHS Aero-Commander were used in this tracking mission.

Aerial cloud tracking is used as a tool to track and detect relative radiation intensities and to indicate cloud position, speed and direction. The information thus obtained is utilized to position ground monitors to insure comprehensive ground coverage and subsequently better surveillance.

4. Film Badges

Approximately two hundred residents in the off-site area wore film badge dosimeters throughout the series. The film badges were changed each month and were processed by the Radiological Sciences Department, Reynolds Electrical and Engineering Co., Inc. Approximately sixty-five single badge and five badge stations were also used to provide more complete coverage.

B. ENVIRONMENTAL MEASUREMENTS

1. Air Samples

During this series the PHS used General Metal Works high volume air samplers which utilize glass fiber prefilters and MSA charcoal cartridges. The locations of these samplers are shown in Figure 1, page 4. Twenty-four to thirty-four stations were operated routinely and several additional stations were established as required. All air sample prefilters were returned to Las Vegas to be counted for gross beta activity with a thin window, large area gas flow

proportional probe connected to a high speed scaler. The system has an efficiency of approximately 30% for 1.5 Mev betas. The background for this system is 575 ± 20 counts per minute.

Air samples were counted for gross beta activity as soon as possible after collection, and activity levels were computed at the time of count for the purpose of screening samples and delineating the effluent trajectory. These samples were then stored for five days to allow natural activity to decay. They were recounted at this time and again seven days later. Activity levels were then recomputed to end of collection from these two later counts. Air samples showing levels of activity significantly above natural background were recounted frequently to obtain a decay curve. The curve obtained was then analyzed for the best fit to the general equation $y=ax^b$. Based on an analysis of these decay curves, a decay factor was determined. This factor was then used to extrapolate activity to end of collection.

All charcoal cartridges were gamma scanned by placing each cartridge directly on a 4"x 4" NaI(Tl) crystal coupled to a 400-channel pulse height analyzer set to examine energies from 0 to 2 Mev. The activity on the cartridge should represent gaseous fission products only, especially the radioiodines. Detection efficiency for this geometry is 18% at 0.53 Mev (^{133}I). The minimum detectable activity for each iodine isotope is 200 picocuries total on the cartridge. Error estimates are such that values less than 1 picocurie per cubic meter of air collected (pCi/m^3) are generally not reported. Since it was not possible to define duration of effluent passage at all locations, the reported values given as pCi/m^3 assume an average concentration over each entire sampling period.

2. Milk and Water Samples

After any release of radioactivity from the test range complex, milk samples are collected from dairies (processing plants), producing dairy farms, and farms producing milk for their own consumption. Each sample was counted for 50 minutes. All liquid samples are analyzed for gamma-emitting isotopes in 3.5 liter inverted well aluminum beakers which are placed on top of a 4"x 4" NaI(Tl) crystal coupled to a 400-channel pulse height analyzer. The detection efficiency for the 0.364 Mev photopeak of ^{131}I is 5.3%. A matrix technique is employed in computation to compensate for the interference due to the presence of other isotopes. The input to this matrix is variable, allowing for the simultaneous determination of any eight nuclides for which detection efficiencies and interference factors have been obtained. Actual computation is performed by an IBM 1620 computer. No attempt was made to recount samples giving low positive values. The lower limit of detection for gamma emitters in milk samples was taken to be 20 picocuries per liter (pCi/l) at the time of count, and all results below that value are reported as <20 pCi/l or not detectable (ND). The error associated with reported values is ± 20 pCi/l or 10%, whichever is greater. All reported values are extrapolated to collection time.

Water samples are analyzed for gross beta activity by slow evaporation of an aliquot in a 2" diameter stainless steel planchet and counting beta activity with a low-background counter. Sr-90 - Y-90 in equilibrium is used as a counting standard. Due to the temperatures encountered in evaporation and fixing the residue to the planchet, volatile radionuclides, such as iodine and cesium, and dissolved gases will be missing from the sample at time of count.

This leads to gross beta results which would be low compared to the total radionuclide content of the sample. Nevertheless, the gross beta results are useful as a screening technique for samples containing unusually high amounts of radioactivity or for observing trends at a specific sampling location, and an observed increase in gross activity indicates a need for further analysis of the sample.

After gamma analysis of milk samples was completed, certain samples were analyzed for strontium-89 and 90. After addition of strontium carrier, milk proteins are removed by trichloroacetic acid precipitation. Following several purification steps, the purified strontium is stored for at least one week to allow for ingrowth of yttrium-90. Strontium and yttrium are separated by nitric acid precipitation and both fractions are counted in a low-background beta counter. The strontium-89 activity is the calculated difference between the total strontium activity and the strontium-90 (as yttrium-90 activity).

C. SAFETY CRITERIA

Throughout Operation Niblick, the criteria used for determining the radiological hazard to the off-site population were those established by the Atomic Energy Commission.

"For planning weapons tests the criterion shall be 3.9 Roentgens per year whole body exposure including any exposure from non-weapons test activities (but excluding background and medical x-rays). The criterion of 3.9 Roentgens is in the definite context used in the past, i.e., every reasonable effort should be made to keep the radiation exposures as low as possible, but for planning purposes, if unanticipated yet credible circumstances could result in estimated doses in excess of 3.9 Roentgens per year, then the detonation should be postponed until more favorable conditions prevail. Also, to avoid any given

community receiving unusually high exposures over a period of years, the guide shall be not more than 10 Roentgens in any consecutive 10 year period."

"The Guides for radioactivity in air, water, milk and food-stuffs were not to exceed one-tenth the values listed in AEC Manual Chapter 0524, Standards for Radiation Protection. These concentrations may be averaged over twelve consecutive months."*

The external exposure was estimated from doses recorded by film badges worn by off-site residents, or from records of dose rate readings taken in populated areas by PHS radiation monitors and by dose rate recorders. The external exposure excluded background and medical exposures.

The concentrations of radioactivity in air and water, milk and food-stuffs were averaged over a period of one year. The concentrations in these media were determined from analysis of samples collected from the off-site area. Data obtained during the series of tests which constituted Operation Niblick showed that the guides were not exceeded.

D. FIELD PROCEDURES

The working field unit of the PHS was the monitoring team composed of one or two people equipped with various survey instruments, sampling apparatus, tools and supplies. Using dose rate meters or survey instruments, the teams monitored roads, areas, and locations within the cloud trajectory. They set up additional air sampling stations and dose rate recorders, augmented routinely operating stations with charcoal cartridge collectors and collected other environmental samples when required. They also noted the presence of people or farm animals in areas not usually inhabited, observed the condition of back

*(Quoted from a memorandum of Dr. Nathan H. Woodruff to James E. Reeves dated August 1, 1962.)

roads and trails which might be needed for cloud tracking or surveillance routes, and checked infrequently traveled areas for radio reception and transmission.

During Operation Niblick, the PHS used aerial monitoring teams to augment its surveillance program. Before detonation of a nuclear device, the cloud tracking aircraft flew in a standby pattern within sight of ground zero. After detonation, if no visible venting occurred, low altitude passes were made downwind of ground zero to determine if gaseous radioactive material could be detected. After collapse of the cavity, if no radiation had been detected by the aerial team and ground telemetry indicated no release of radioactive material, the aerial monitoring mission was terminated. When a release did occur, the aircraft made a series of passes at several altitudes beginning downwind of ground zero and moving gradually outward. In this way the team estimated the width and depth of the cloud and determined its direction and speed of travel. Measurements of radiation intensity were made to determine the distribution and magnitude of radioactive material within the cloud, and to define concentration gradients if possible. These cloud tracking missions were terminated when the cloud had dispersed or the activity it contained had dropped to levels too low for measurement, or when flying conditions necessitated termination of the flight.

Chapter 3

RESULTS

Table 1 lists the twenty-six announced underground events conducted during Operation Niblick. Two of these events released radioactivity which was detected on the ground off-site. The results of surveillance for these events are summarized below.

A. SUMMARY OF TWO EVENTS

1. Eagle

The Eagle Event was an underground detonation conducted at 0800 hours PST on December 12, 1963, by the Lawrence Radiation Laboratory.

Some venting occurred immediately after detonation and continued for a few minutes until the cavity collapsed. The released material moved southeast at about twelve knots.

a. Aerial and Ground Monitoring

Four ground monitors, operating between Lathrop Wells and Indian Springs, detected no radiation intensities above background.

An aerial survey at 5000' MSL from Ground Zero to Ash Meadows at 1015 hours showed no radiation intensities above background.

b. Air Sampling

Table 2 contains the results of all air sample filters showing fresh fission products and Figure 2 shows off-site instrument locations.

Table 1. Announced underground events of Operation Niblick.

<u>NAME OF EVENT</u>	<u>DATE OF EVENT</u>
Pekan	8/12/63
Satsop	8/15/63
Kohocton	8/23/63
Ahtanum	9/13/63
Bilby	9/13/63
Grunion	10/11/63
Tornillo*	10/11/63
Clearwater	10/16/63
Anchovy	11/14/63
Mustang	11/15/63
Greys	11/22/63
Sardine	12/04/63
Eagle	12/12/63
Fore	1/16/64
Oconto	1/23/64
Klickitat*	2/20/64
Pike	3/13/64
Hook	4/14/64
Sturgeon	4/15/64
Turf	4/24/64
Pipefish	4/29/64
Backswing	5/14/64
Minnow	5/15/64
Ace*	6/11/64
Fade	6/25/64
Dub*	6/30/64

*Plowshare event

Table 2. Air sampling data, Eagle Event, 12/12/63.

Location (Azimuth & Distance)	Air Volume (m ³)	On Time	Off Time	Col- lector	Gross β Count (pCi/m ³)	Gamma Pulse Height Analysis (pCi/m ³)			
						131 I	132 I	133 I	135 I
Ash Meadows (200°, 45 mi.)	238	12/12-1040	12/12-1440	F	10	ND	ND	D	D
				C	--	ND	ND	5	2
Death Valley Junction, Calif. (203°, 60 mi.)	1125	12/12-1505	12/13-1000	F	4	--	--	--	--
				C	--	ND	ND	D	ND
	266	12/12-0930	12/12-1550	F	24	ND	D	20	6
	*		*	C	--	*Cartridge ran through next period			
13	46.9	12/12-1558	12/12-1705	F	8	--	--	--	--
	312.9	12/12-0930		C	--	ND	D	15	4
	781.2	12/12-1705	12/13-1105	F	4	--	--	--	--
				C	--	ND	ND	2	ND
Indian Springs (157°, 41 mi.)	419	12/12-0900	12/12-1730	F	3	--	--	--	--
				C	--	ND	ND	D	ND
Lathrop Wells (216°, 40 mi.)	817	12/12-1730	12/13-1115	F	9	ND	ND	2	ND
				C	--	ND	ND	1	ND
	233	12/12-0850	12/12-1530	F	14	ND	ND	D	D
				C	--	ND	ND	10	3
	670	12/12-1530	12/13-1040	F	8	ND	ND	D	ND
				C	--	ND	ND	2	ND

NOTES: Azimuth and distance are from Ground Zero. Gross beta air filter results at all other locations were essentially background on 12/12 through 12/16.

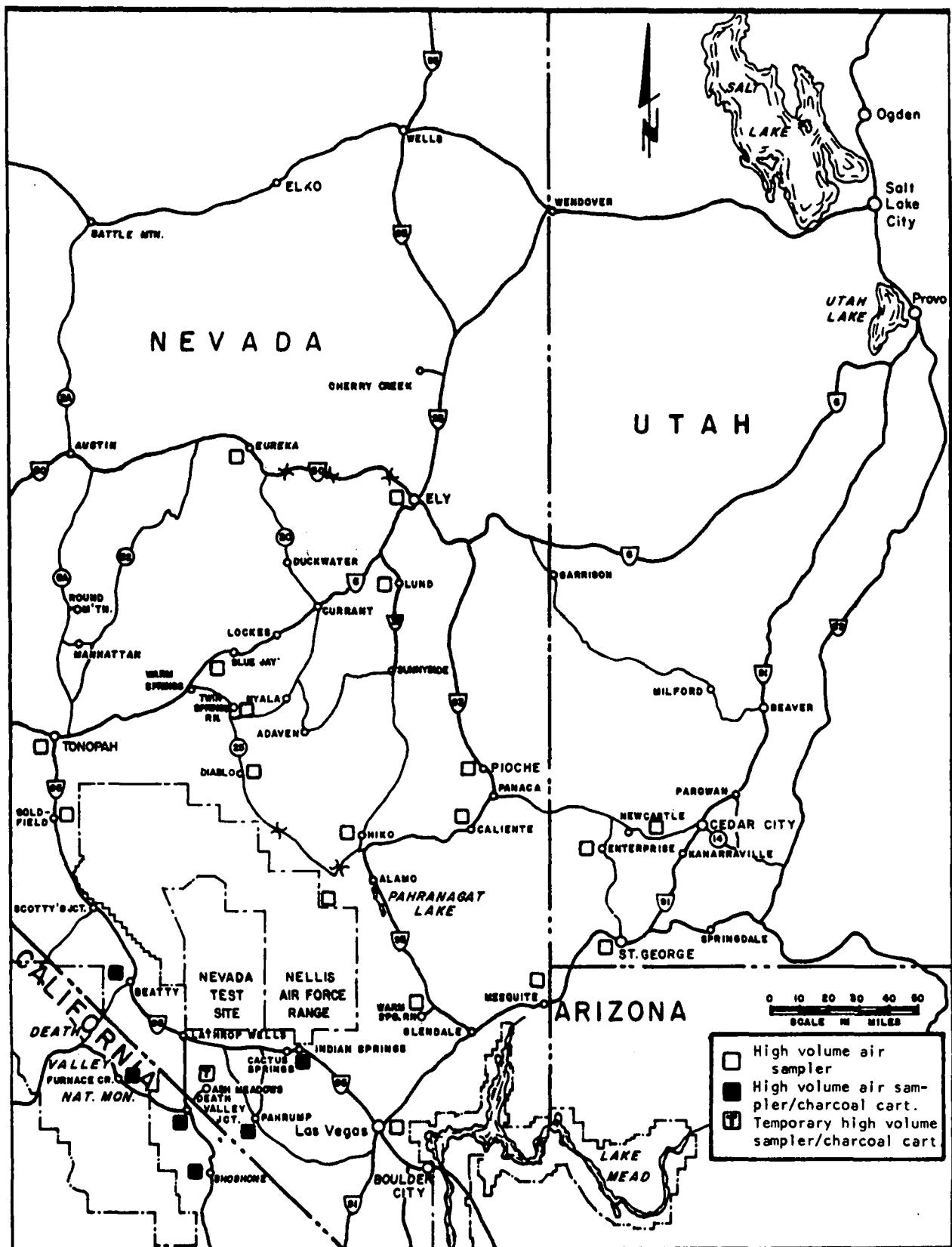
ND = Not detected.

D = Detected in trace amounts, not sufficient to quantitate.

-- = Not analyzed.

C = Charcoal cartridge.

F = Glass fiber filter.



c. Additional Environmental Sampling

Sixteen milk samples from eleven locations were analyzed for specific gamma emitting isotopes. No fresh fission products were detected. The results of all milk samples collected during the operation are listed in the Appendix.

No water samples were collected for analyses in relation to this event.

2. Pike

The Pike Event was an underground detonation conducted by the Los Alamos Scientific Laboratory at 0802 hours PST on March 13, 1964. Visible venting of gaseous and particulate material occurred immediately and continued for a few minutes until the cavity collapsed.

a. Ground Monitoring

Thirteen ground monitors recorded over five hundred and fifty individual dose rate measurements on the day of the event. The maximum net gamma dose rate observed was 5.9 mR/hr at Cactus Springs and the maximum net beta plus gamma observed was 40 mR/hr one mile east of Cactus Springs. The beta plus gamma measurement was taken at ground level.

By the time the cloud had reached Las Vegas (about 1230 hours PST), a dose rate of 0.28 mR/hr net gamma was observed.

On March 14, additional roads were monitored and most roads monitored on March 13 were re-monitored. Residual contamination was found from a few miles southwest of Las Vegas to Mercury. Dose rate measurements of 0.01 to 0.07 mR/hr net gamma and 0.01 and 0.8 mR/hr net beta plus gamma were

observed. By March 15 residual contamination levels had dropped to background in most areas.

A synopsis of ground monitoring results will be found in Table 3 and the location of roads monitored and re-monitored are shown in Figures 3 and 4 (pages 22 and 23).

b. Aerial Cloud Tracking

Aerial cloud tracking dose rate readings from portable monitoring instruments are not corrected for aircraft attenuation, air attenuation, geometry, aircraft and instrument contamination, and the inherent inaccuracies of taking instrument readings in a high speed aircraft while in a cloud for a very short time. Therefore, these measurements are only relative in that they represent the changes in dose rate in flying from uncontaminated areas (background) into and across the effluent. The data cannot be used to extrapolate ground contamination or airborne radioactivity at ground level.

The U3-A aircraft crew first detected the radioactive cloud from the Pike Event off-site at H+50 minutes. At this time the leading edge of the cloud was located about seven miles northwest of Indian Springs and the cloud was moving on a course that would take it over the Indian Springs-Cactus Springs area. At H+67 minutes a dose rate reading of 110 mR/hr was obtained at 7000 feet MSL five miles northwest of Indian Springs on a flight perpendicular to the direction of movement of the cloud. This was the maximum reading obtained during the off-site cloud tracking mission. From H+85 minutes to H+123 minutes several passes were made in the Indian Springs-Cactus Springs area as the cloud movement down the Las Vegas Valley was documented. The highest

Table 3. Ground monitoring summary for the Pike Event, March 13 and 14, 1964.

LOCATION	Time (PST)	Net Gamma (mR/hr)	Net Beta plus Gamma (mR/hr)
----------	---------------	-------------------------	-----------------------------------

MARCH 13

MERCURY TO LAS VEGAS

On Hwy. 95, 3.7 mi. W. of Cactus Spgs.	1048	3.5	7.5
On Hwy. 95, 2.9 mi. W. of Cactus Spgs.	1059	4.0	8.5
Cactus Springs, Nevada	0919	0.1	
	0930	2.4	
	0940	4.1	
	1000	3.7	
	1030	4.4	
	1052	5.9	
	1210	3.3	
	1305	1.9	
	1400	1.6	
	1530	0.8	
On Hwy. 95, 1 mi. E. of Cactus Spgs.	1015	2.9	11 g/c*
	1020	2.4	12 g/c
	1025	2.9	13 g/c
	1030	2.9	17 g/c
	1035	2.9	18 g/c
	1040	4.4	35 g/c
	1050	3.9	40 g/c
	1100	3.4	35 g/c
	1110	2.9	18 g/c
	1120	2.9	15 g/c
	1130	2.9	18 g/c
	1140	2.9	14 g/c
	1150	1.9	12 g/c
	1200	2.3	12 g/c
	1215	1.9	
	1230	1.9	11 g/c
	1245	1.4	12 g/c

Table 3. Ground monitoring summary for the Pike Event, March 13 and 14, 1964. (Continued)

LOCATION	Time (PST)	Net Gamma (mR/hr)	Net Beta plus Gamma (mR/hr)
MARCH 13			
Indian Springs, Nevada	0930	0.2	
	0951	1.9	
	1005	0.4	0.6 g/c
	1010	0.7	
	1048	1.5	
	1230	0.35	1.8 g/c
	1445	ND	1.0 g/c
On Hwy. 95, 10 mi. SE of Indian Spgs.	1350	0.09	0.07 g/c
On Hwy. 95, at Lee Canyon Turnoff	1402	0.04	0.13 g/c
Cold Spring Ranger Station	1315	0.10	
On Hwy. 95, 24 mi. NW of Las Vegas	1447	0.04	0.09 g/c
On Hwy. 95, 7 mi. NW of Las Vegas	1527	0.03	0.13 g/c
Las Vegas, at Jct. of Rancho & Bonanza	1555	0.02	0.1 g/c
MERCURY TO LAS VEGAS VIA ASH MEADOWS, PAHRUMP, ARDEN AND HENDERSON			
On Hwy. 85, from Mercury to 12 mi. E. of Mtn. Spgs. Summit (50 readings)	0834-1335	ND	
On Hwy. 85, 12 mi. W. of Arden Turnoff	1344	0.02	
On Hwy. 85, 3.5 mi. E. of Arden Turnoff	1416	0.18	
On Hwy. 41, at its Jct. with Hwy. 91, 14 mi. S. of Las Vegas	1517	0.10	
On Hwy. 41, 10 mi. NE of its Jct. with Hwy. 91, 3 mi. SW of Henderson	1537	0.08	
On Hwy. 41, at its Jct. with Hwy. 95 at Henderson	1549	0.05	
Las Vegas at Jct. of Tropicana Rd. and Las Vegas Blvd.	1612	0.08	

Table 3. Ground monitoring summary for the Pike Event, March 13 and 14, 1964. (Continued)

LOCATION	Time (PST)	Net Gamma (mR/hr)	Net Beta plus Gamma (mR/hr)
MARCH 13			
LAS VEGAS, NEVADA			
104 E. Charleston Blvd.	1310	0.10	
	1505	0.12	
1113 Ramona Circle	1235	0.12	
At the Jct. of Smoke Ranch Rd. and Hwy. 95	1253	0.22	
On Lone Mtn. Rd., 2 mi. W. of Hwy. 95 (North Las Vegas)	1321	0.22	
On Lone Mtn. Rd., 6.9 mi. W. of Hwy. 95 (North Las Vegas)	1341	0.28	
At the Jct. of Sahara and Decatur Blvd.	1224	0.07	
At the Jct. of Vegas Drive and Parkchester	1244	0.02	
On W. Sahara, 2.1 mi. E. of Jct. of W. Charleston and W. Sahara	1345	0.10	
Craig Rd. toward Nellis AFB (North Las Vegas)	1310	0.08	
LAS VEGAS TO BOULDER CITY			
Las Vegas at Jct. of Highland and Sahara	1600	0.07	
On Hwy. 95, 10.4 mi. SE of Jct. of Sahara and Boulder Hwy. (East Las Vegas)	1707	0.03	
On Hwy. 93, 2.4 mi. W. of Boulder City	1733	0.03	
Boulder City	1810	ND	

Table 3. Ground monitoring summary for the Pike Event, March 13 and 14, 1964. (Continued)

LOCATION	Time (PST)	Net Gamma (mR/hr)	Net Beta plus Gamma (mR/hr)
MARCH 14			
LAS VEGAS TO JEAN, HENDERSON, BOULDER BEACH AND RETURN TO LAS VEGAS			
On Hwy. 91, from Las Vegas to 23 mi. SW of Las Vegas	0857- 0955	0.01	0.05- 0.07 g/c
On Hwy. 41, from Jct. of Hwys. 41 and 91 to Henderson	1101- 1203	0.01- 0.02	0.04- 0.11 g/c
On Hwy. 41, from Jct. of Hwys. 95, 93 and 41 to Boulder Beach	1237- 1335	ND	ND g/c
Las Vegas, on Tropicana Rd., 2 mi. W. of Hwy. 95 to Tropicana and Paradise Roads	1430- 1450	ND	0.02- 0.07 g/c
On Hwy. 85, from Las Vegas to 3.5 mi. W. of Jct. of 85 and 91 (At Arden)	0900- 0938	ND- 0.02	ND- 0.03 g/c
On Hwy. 95, from Las Vegas to 9.7 mi. S. of Jct. of 93 and 95 toward Search- light (Railroad Pass)	0915- 1257	ND- 0.03	0.03- 0.10 g/c
KINGMAN, ARIZONA TO PHOENIX, ARIZONA			
Kingman to Phoenix (readings approx. every ten miles)	1210- 1757	ND	ND g/c
LAS VEGAS TO OVERTON			
Las Vegas to Overton via Hwy. 91 (all beta/gamma readings above bkg. were taken in the area adjacent to Nellis AFB)	0906- 1515	ND	ND- 0.04 g/c
MT. CHARLESTON AREA			
On Charleston Canyon Rd. from its Jct. . with Hwy. 95 to 9.6 mi. W. of Jct.	0900- 0958	ND- 0.02	ND- 0.2 g/c

Table 3. Ground monitoring summary for the Pike Event, March 13 and 14, 1964. (Continued)

LOCATION	Time (PST)	Net Gamma (mR/hr)	Net Beta plus Gamma (mR/hr)
MARCH 14			
Desert Game Range	1112- 1133	ND- 0.02	ND- 0.04 g/c
On Lee Canyon Rd. from its Jct. with Hwy. 95 to 12 mi. SW of Jct.	1313- 1424	ND- 0.03	0.02- 0.15
CACTUS-INDIAN SPRINGS AREA			
Las Vegas to Cactus Springs	0751- 1310	ND- 0.07	0.01- 0.8 g/c
Indian Springs to Mercury	0940- 1220	0.01- 0.07	0.01- 0.2 g/c

*All readings taken at 3 feet above the ground except those noted as g/c (ground contact).

ND=Not detectable.

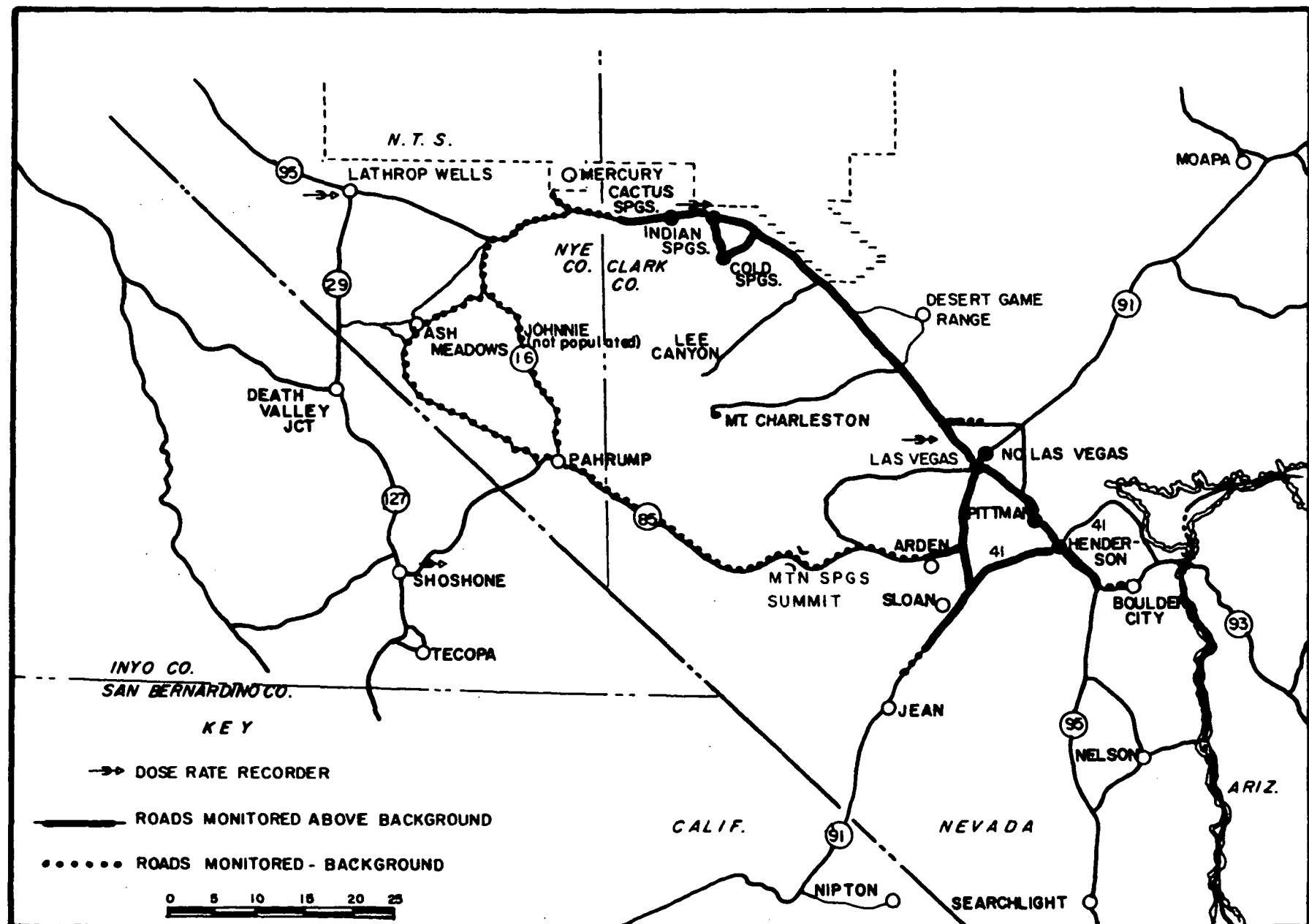


Figure 3. Roads monitored March 13, 1964, for the Pike event.

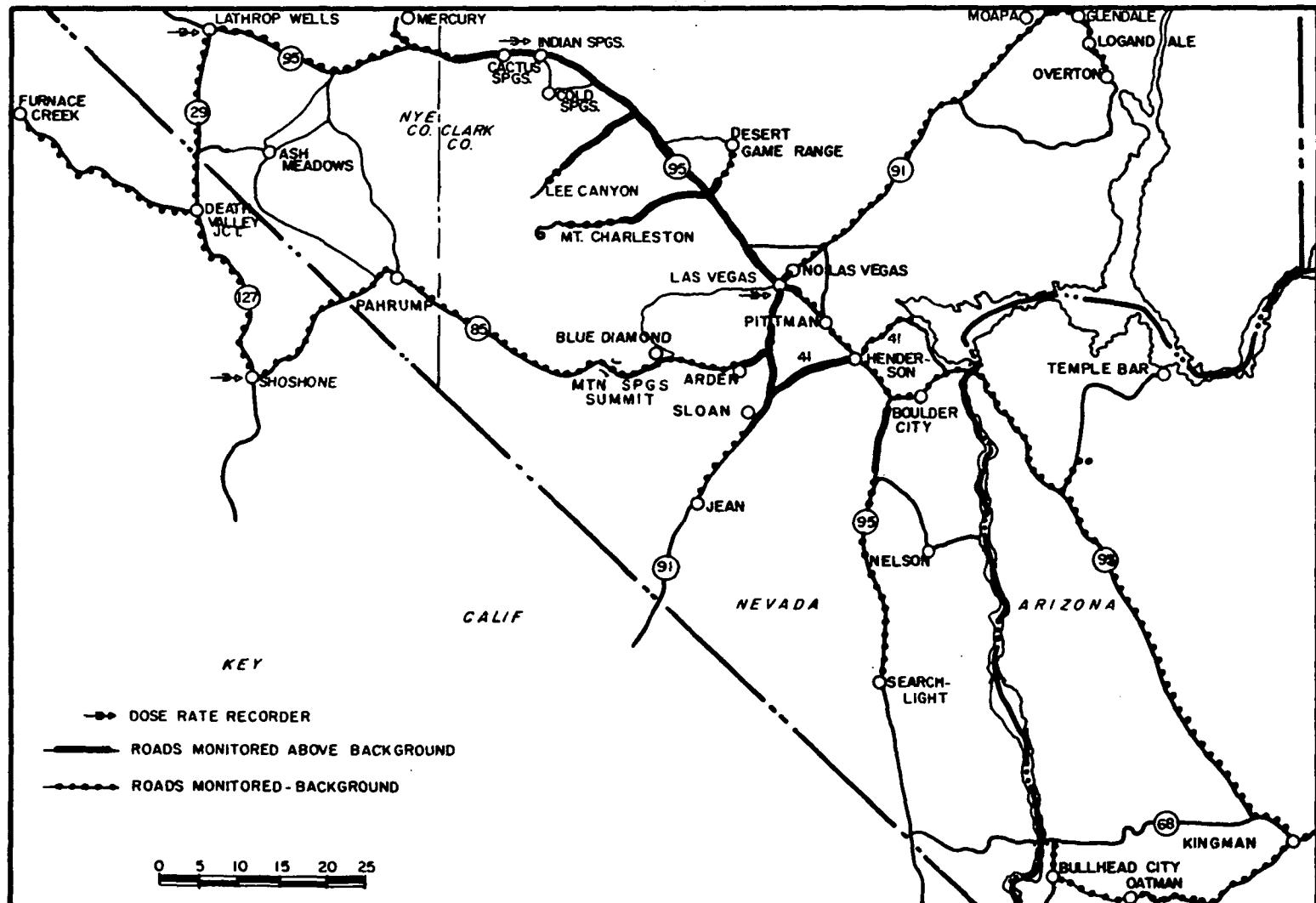


Figure 4. Roads monitored March 14, 1964, for the Pike Event.

reading obtained during this period was 6 mR/hr at H+92 minutes, one-half mile west of Cactus Springs at an altitude of 3300 feet MSL. The leading edge of the cloud was seven miles south of Indian Springs at H+115 minutes where, at an altitude of 5000 feet MSL, the reading was 1.5 mR/hr. The western edge of the cloud extended to approximately eight miles west of Cactus Springs.

At H+139 minutes the U3-A mission was terminated because of aircraft and instrument contamination and the plane landed at Indian Springs Air Force Base. At 1130 PST, the same crew took off from Indian Springs Air Force Base in a U6-A aircraft with uncontaminated instruments. A zig-zag pattern was flown between Highway 95 and the Charleston Range toward Las Vegas. Readings from Indian Springs to the Lee Canyon Road ranged between 0.6 mR/hr and 1.0 mR/hr. A pass 800 feet above the terrain from the Lee Canyon Road toward Angel's Peak showed levels of activity in the 0.8 to 1.0 mR/hr range.

By the time the cloud had reached the Charleston Park turn-off, readings from 0.6 to 0.4 mR/hr were obtained. Readings taken on the west side of the Charleston Range indicated that the cloud was confined to the Las Vegas Valley. Upon entering the Las Vegas Valley at Red Rock Canyon at 1230 hours, readings increased to 0.6 mR/hr. This mission was terminated at Las Vegas at 1330 hours.

At 1430 hours an Aero-Commander took off from Thunderbird Field in Las Vegas carrying a Precision Model 111 "Scintillator" for cloud detection. All readings were taken at 5000 feet MSL. The first leg of the flight from Thunderbird

Field to Blue Diamond was flown from 1430 to 1440 hours with readings dropping from 0.016 mR/hr at Las Vegas to 0.008 mR/hr over Blue Diamond and Red Rock Canyon. Values of 0.016 mR/hr to 0.02 mR/hr were again encountered about four miles west of Las Vegas at 1450 hours and these values persisted to Sloan at 1455 hours. Normal background existed from Sloan to Jean and to Highway 95 enroute to Boulder City. From Highway 95 to Boulder City and from Boulder City fifteen miles toward Searchlight, values of 0.016 to 0.025 mR/hr were observed. The southernmost edge appeared to be fifteen miles south of Boulder City airport at 1515 hours. Background readings were observed from that point to Searchlight over to Lake Mohave and up to willow Beach (1535 hours). Levels slightly above background were encountered halfway between Willow Beach and Boulder City at 1540 hours, and from Boulder City to Eldorado Canyon at 1550 hours. Just south of the Eldorado Canyon Road, background was observed. On the return flight from Eldorado Canyon, readings dropped to background at 1600 hours over Railroad Pass and background persisted over Las Vegas to Thunderbird Field.

In summary, the western edge of the cloud appeared to be three to four miles west of Las Vegas at 1440 hours and the southwestern edge over Sloan at 1455 hours. At 1550 hours the southern edge had reached Eldorado Canyon, but the eastern edge had not passed the Colorado River by 1535 hours. This delineation was drawn from readings barely discernible above background and represent the greatest sensitivity which could be attained with the instrumentation employed.

c. Air

Only air samples taken at populated locations with gross beta concentrations above normal background fluctuations, and/or with fresh fission products on the charcoal cartridges are listed in this report. Air sampler locations are shown in Figures 5 and 6 (pages 27 and 28). Results are shown in Table 4, (page 29).

d. Water

No contamination of water supplies used for human consumption was detected as a result of the Pike Event. Water sampling locations are shown in Figures 5 and 6.

e. Milk

In addition to the routine milk sampling program carried out by the Off-site Surveillance Section, four hundred and fifty milk samples were collected after the Pike Event. All the milk samples that were collected and analyzed as a result of the Pike release are reported in Tables 1 and 2 of the Appendix. Milk sampling locations are shown in Figures 5 and 6.

No milk supplies from the commercial dairies sampled showed detectable amounts of fresh fission products.

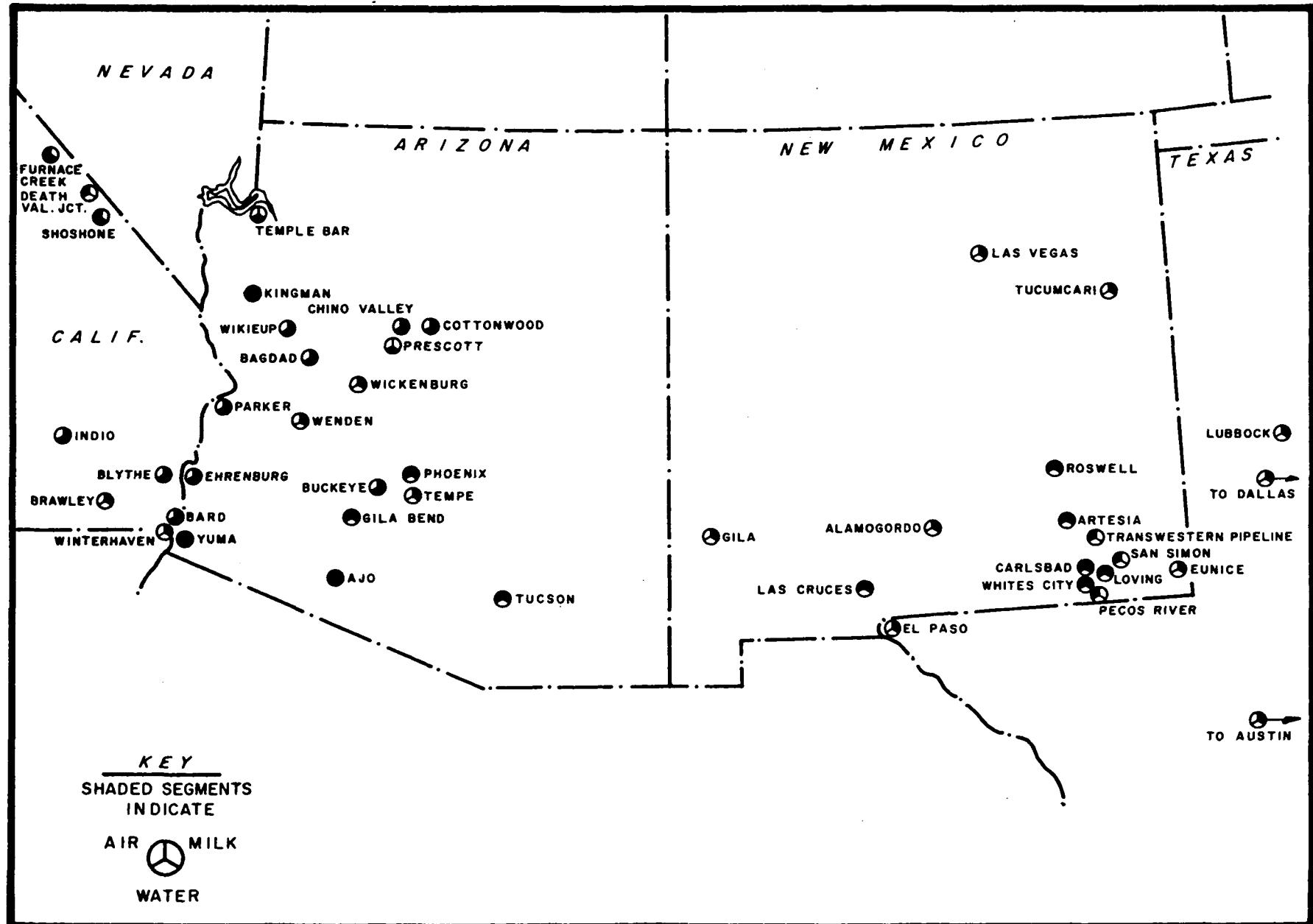
f. Film Badges

Film badges collected following the Pike Event showed no exposures which could be attributed to the release. The lower limit of these badges is 20 mR.

g. Dose Rate Recorders

Graphical representation of recorder charts from the two stations in the cloud path is shown in Figure 7 (page 31).

Figure 5. Sampling locations other than in Nevada for the Pike event.



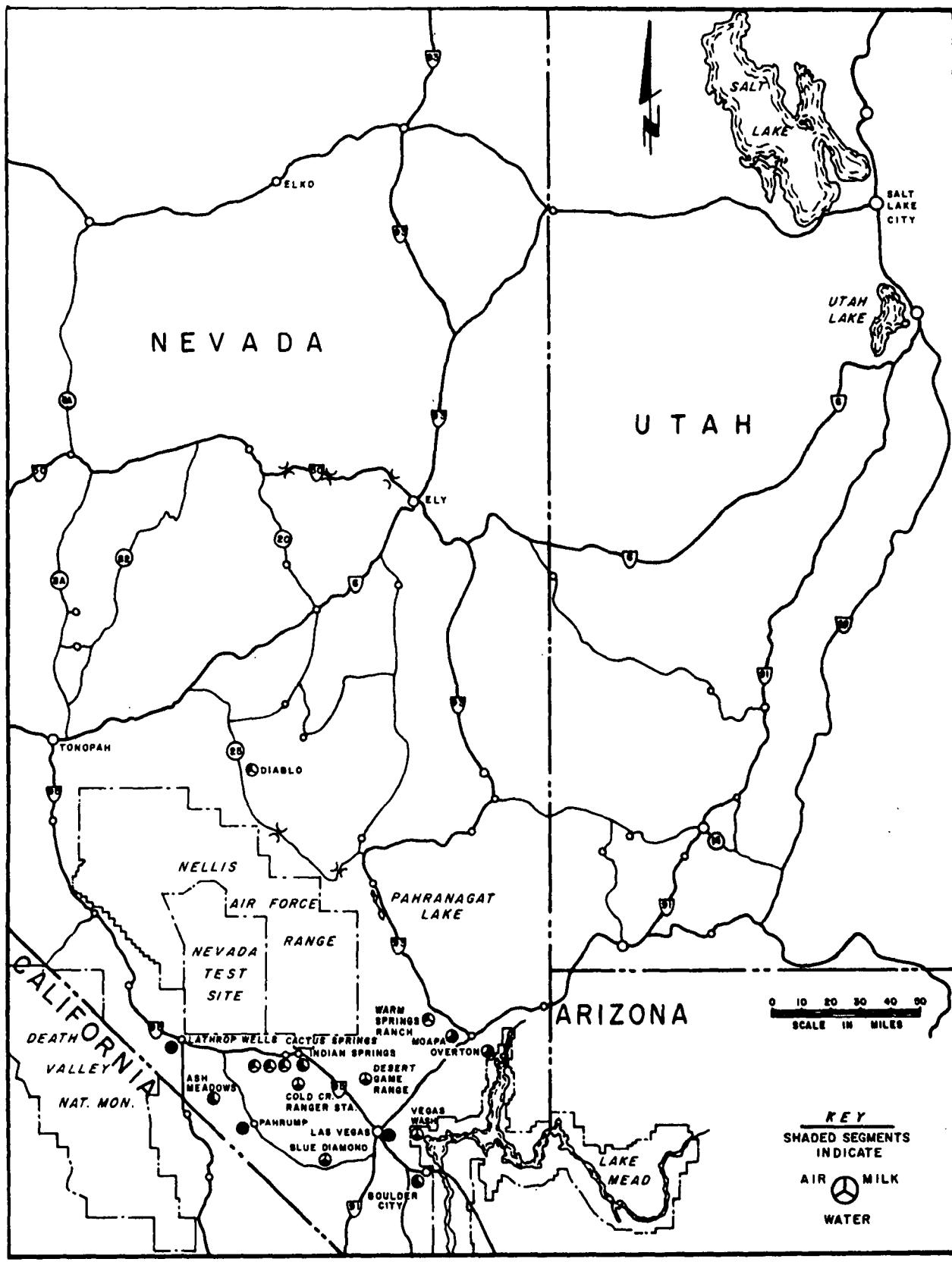


Figure 6. Sampling locations in Nevada for the Pike Event.

Table 4. Results of ground station air samples collected following the Pike Event, March 13, 1964.

I. LOCATION DATA		II. COLLECTION DATA						COLLECTOR	III. RADIOASSAY DATA (extrapolated to end of collection period)							
STATION NAME (Azimuth and Distance)	AIR VOLUME (m ³)	SAMPLING PERIOD							GROSS BETA COUNT (filter)	GAMMA PULSE HEIGHT ANALYSIS (cartridge)						
		BEGIN			END				DATE-TIME First Count	ACTIVITY (pCi/m ³)	DATE-TIME First Count	131 I	132 I	133 I	135 I	132 Te
		Mo.	Day	Time	Mo.	Day	Time									
ARIZONA																
Kingman	941	3	14	1340	3	15	1415	FC	15-2035	3.0	15-2035	ND	ND	TR	ND	ND
	1009	3	15	1415	3	16	1430	FC	17-1100	2.2	17-1100	TR	TR	TR	ND	ND
CALIFORNIA																
Death Valley Jct.	1602	3	13	0935	3	14	0700	FC	14-2230	1.9	14-2230	ND	ND	TR	ND	ND
	598	3	14	0700	3	14	1535	FC	15-1330	3.2		NOT	ANALYZED			
	937	3	14	1541	3	15	1344	FC	15-1644	16	15-1935	ND	ND	ND	ND	ND
	1002	3	15	1352	3	16	1205	FC	16-1530	120	16-1705	ND	TR	TR	ND	TR
Shoshone	880	3	14	1400	3	15	1200	FC	15-1627	9.2	15-1600	ND	ND	TR	ND	ND
	1020	3	15	1200	3	16	1200	F	16-1527	34		NO	CARTRIDGE			
NEVADA																
Ash Meadows	622	3	13	1000	3	14	1000	FC	14-2218	28	14-2200	ND	ND	TR	ND	ND
	542	3	14	1830	3	15	1408	FC	15-1643	24	15-1950	ND	ND	ND	ND	ND
Cactus Springs	91	3	13	0840	3	13	1120	FC	13-1512	50,000*	13-1625	ND	ND	700	510	ND
	79	3	13	1128	3	13	1503	FC	13-1706	9000	13-1910	ND	ND	98	96	ND
	805	3	13	1505	3	14	1141	FC	15-1655	23	15-1900	TR	ND	4.5	TR	ND
	787	3	15	1430	3	16	1200	FC	16-1534	44	16-1620	ND	ND	TR	ND	ND
	978	3	16	1202	3	17	1105	FC	18-0912	9.3	18-0900	ND	ND	ND	ND	ND
On Hwy. 95, 5 mi. W. of Cactus Springs	49	3	13	0910	3	13	1010	FC	13-1515	76,000**	13-2040	ND	ND	470	380	ND
	85	3	13	1210	3	13	1522	FC	13-1704	1400	13-1830	ND	ND	9.7	6.2	ND
	912	3	14	1531	3	14	1326	FC	14-1830	30	14-1820	ND	ND	2.4	ND	ND
	955	3	15	1340	3	15	1040	FC	15-1629	18	15-1850	TR	ND	TR	ND	ND
Indian Springs	77	3	13	0852	3	13	1102	FC	13-1521	35,000	13-1620	ND	ND	190	160	ND
	99	3	13	1106	3	13	1530	FC	13-1635	15,000	13-1645	ND	ND	123	92	ND
	798	3	13	1530	3	14	1154	FC	14-1830	42	14-1840	ND	ND	2.9	ND	ND
	860	3	14	1200	3	15	1100	FC	15-1709	28	15-2010	TR	ND	TR	ND	ND
	122	3	15	1100	3	15	1407	FC	15-1710	320						
	889	3	15	1415	3	16	1034	FC	16-1600	11	16-1640	ND	TR	TR	ND	TR
	910	3	16	1038	3	17	1130	FC	18-0910	4.8	18-0825	ND	ND	ND	ND	ND
	871	3	17	1138	3	18	1022	FC	19-0904	5.3	18-2000	TR	ND	ND	ND	ND

Cartridge left in through next period

Table 4. Results of ground station air samples collected following the Pike Event, March 13, 1964(continued).

I. LOCATION DATA STATION NAME (Azimuth and Distance)	II. COLLECTION DATA						COLLECTOR	III. RADIOASSAY DATA (extrapolated to end of collection period)										
	AIR VOLUME (m ³)	SAMPLING PERIOD			GROSS BETA COUNT (filter)			GAMMA PULSE HEIGHT ANALYSIS (cartridge)										
		BEGIN		END	Mo.	Day	Time	Mo.	Day	Time	DATE-TIME First Count	ACTIVITY (pCi/m ³)	DATE-TIME First Count	ACTIVITY	1 ³¹ I	1 ³² I	1 ³³ I	1 ³⁵ I
NEVADA (cont)																		
Las Vegas	155	3	13	1140	3	13	1445	FC	13-1457	14,000	13-1620	ND	ND	60	100	ND		
	210	3	13	1450	3	13	1845	FC	13-2221	680	13-2100	ND	ND	10	ND	ND		
	263	3	13	1850	3	13	2348	FC	13-2350	59	13-2355	ND	ND	0.8	ND	ND		
	421	3	13	2355	3	14	0827	FC	14-0857	32	14-0857	ND	ND	1.4	ND	ND		
	254	3	14	0830	3	14	1355	FC	14-1403	24	14-1410	ND	ND	1	ND	ND		
	1109	3	14	1400	3	15	1023	FC	15-1331	13	15-1145	ND	ND	0.4	ND	ND		
	350	3	15	1028	3	15	1720	FC	15-1735	35	15-2025	ND	ND	TR	ND	ND		
	983	3	15	1725	3	16	1513	FC	16-1601	14	16-1735	ND	ND	ND	ND	ND		
Lathrop Wells	946	3	13	0850	3	14	0705	FC	16-1044	7.2	16-1045	ND	ND	TR	ND	ND		
	1293	3	14	0710	3	15	1300	FC	15-1643	15	15-2000	ND	ND	TR	ND	ND		
		3	15	1302	3	16	0600	FC										
	2364	3	16	0605	3	17	0615	F	23-1459***	8.1								
Nye Co. Line & Hwy.95 (12 mi.W.of Cactus Springs)	162	3	13	0852	3	13	1228	FC	13-1516	10,000	13-1605	ND	ND	75	160	ND		
	53	3	13	1245	3	13	1503	FC	13-1705	460	13-1830	ND	ND	5	10	ND		
Pahrump	902	3	13	1600	3	14	1151	FC	14-2216	94	14-2200	ND	ND	1.4	ND	ND		
	1201	3	14	1156	3	15	1310	FC	15-1628	14	15-1920	ND	ND	TR	ND	ND		

* The glass fiber filter showed the following concentrations (pCi/m³) 1³¹I, 1000; 1³³I, 35,000.

** Sampler failed after approximately one hour's operation. Results calculated on this basis.

*** Sample delayed in transit.

ND=Not detected

TR=(Trace)= < 1 pCi/m³

F = Filter

C = Cartridge

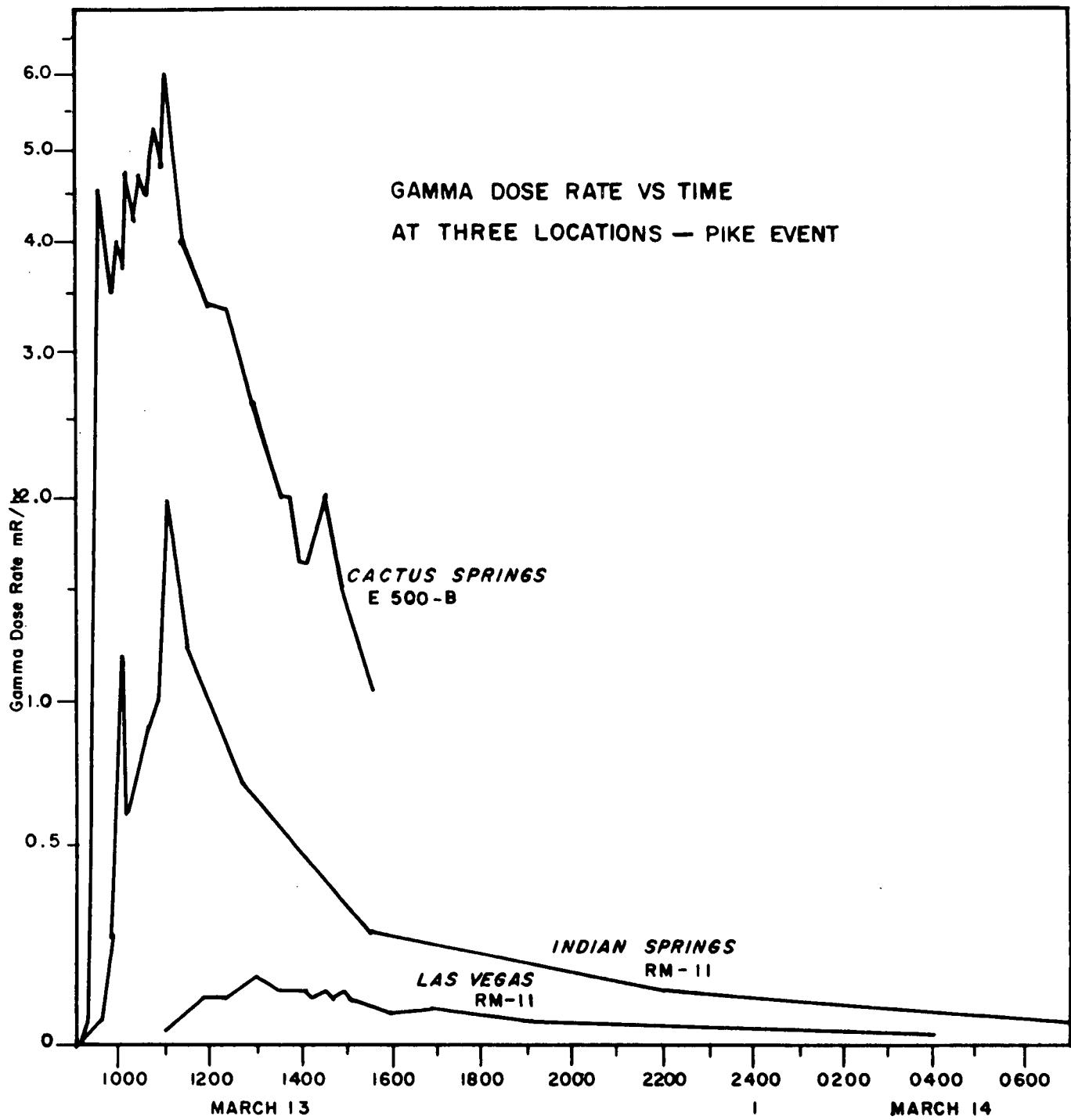


Figure 7. Gamma dose rate vs. time at three locations following the Pike Event, 3/13/64.

B. SUMMARY OF OPERATION NIBLICK

1. Air Sampling

Table 5 (page 33) shows the monthly averages of all permanent air sampling stations in operation during this series. When more than one sample was taken at a station during a 24 hour period, the results were averaged over the entire 24 hour period. The higher monthly average at Diablo during May was the result of reactor test operations at the Nuclear Rocket Development Station. The blank spaces in the table indicate that the sampling station was not yet established.

2. Film Badges

Table 6 (page 34) contains a summary of film badge placement. Analysis of film badge results indicates that no film badge exposures above the 20 mR detection limit occurred as a result of any one, or combination of, events during this test series. Film badge locations are shown in Figure 8 (page 35).

3. Milk Sampling

Table 7 (page 36) lists all milk samples analyzed during the series which contained fresh fission products, with the exception of those samples taken as a part of a special study by the SWRHL Bioenvironmental Research Program following the Pike Event. The results of all the raw milk samples collected as a part of this study are listed in Table 2 of the Appendix. For a discussion of these results consult "Dairy Farm Radioiodine Study following the Pike Event" by Delbert S. Barth and Joel G. Veater, published as SWRHL-14r and as AEC TID-21764.

The only milk samples with positive results were collected following the Pike Event. The samples collected in Arizona and California with detectable concentrations of iodine isotopes, were

Table 5. Monthly gross beta activity averages from all permanent air sampling stations in operation during Operation Niblick - activity in pCi/m³.

LOCATION	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Alamo, Nevada	5.35	2.11	2.43	1.97	1.39	1.56	1.54	1.91	2.12	2.65	3.11	2.39
Beatty, Nevada	9.72	2.45	2.83	1.93	1.67	1.52	1.26	1.75	1.79	1.56	2.27	1.15
Caliente, Nevada	5.64	1.61	3.09	2.42	1.99	2.02	1.85	2.55	2.84	3.43	3.53	2.92
Currant, Nevada	7.20	2.82	2.87	1.81	1.38	1.36	1.63	2.42	2.18	2.23	3.71	3.40
Death Valley Jct., California	7.93	3.76	2.65	2.14	2.08	1.72	1.40	2.15	3.18	2.39	2.78	2.26
Diablo, Nevada	7.07	2.11	2.69	2.45	2.21	1.21	1.18	1.58	1.60	1.99	24.74	1.64
Ely, Nevada	5.62	4.06	2.90	2.13	1.19	2.37	1.46	1.70	2.50	2.28	3.72	2.12
Enterprise, Utah	1.57	1.55	2.21	1.39	1.52	1.55	2.18	2.29	2.76	3.29	2.29	
Twin Spgs., Nevada	5.37	1.85	1.72	1.35	1.45	1.38	.90	1.34	1.43	1.60	2.52	1.87
Furnace Creek, California	9.27	3.67	5.93	1.89	1.65	1.38	1.25	2.46	2.20	2.91	3.33	2.78
Goldfield, Nevada	8.58	2.86	2.27	2.19	1.55	1.59	1.55	2.01	2.18	2.69	3.21	2.20
Hiko, Nevada	4.45	1.72	1.88	1.54	1.65	2.29	1.66	2.19	2.50	4.31	2.75	1.97
Indian Spgs., Nev.	5.73	2.72	2.60	1.84	1.13	1.60	1.54	2.37	2220	2.64	6.57	2.10
Las Vegas, Nevada	6.43	1.98	2.59	1.28	2.09	1.86	1.74	2.10	63.0	4.36	3.62	2.91
Lathrop Wells, Nevada	7.01	4.15	2.91	2.02	1.18	2.42	1.77	2.41	2.93	2.35	3.33	3.71
Lund, Nevada	5.31	1.46	2.07	1.59	.97	1.35	1.74	2.17	2.46	2.48	3.25	2.15
Mesquite, Nevada	5.51	1.54	2.35	2.04	1.39	1.37	1.23	*	2.25	2.20	2.79	1.73
Pahrump, Nevada	5.10	2.02	1.83	1.84	1.37	1.58	1.41	2.33	4.75	2.23	2.23	1.83
Pioche, Nevada	5.71	2.08	2.80	2.16	1.44	1.80	1.53	2.89	2.61	2.69	3.82	2.14
Shoshone, Calif.						1.66	1.28	1.92	2.54	2.50	2.29	1.63
St. George, Utah	5.11	1.41	1.71	1.34	1.14	1.11	1.28	1.76	2.43	1.49	3.34	2.44
Tonopah, Nevada	9.74	3.44	2.67	1.77	1.40	1.29	1.52	2.23	2.19	2.97	3.33	1.91
Warm Spgs. Ranch, Nevada	6.45	1.83	3.42	2.93	2.02	1.36	1.24	1.69	2.18	3.01	2.79	1.79
Eureka, Nevada	7.40	2.77	2.25	1.60	1.06	1.45	1.08	2.06	1.98	2.44	3.09	2.35
Blue Jay, Nevada	6.93	2.08	2.34	1.56	1.60	1.76	1.93	2.05	2.19	2.50	3.42	2.16
Garrison, Utah	6.40	2.07	2.25	1.68	1.24	1.13	1.05	1.62	2.22	2.49	3.16	2.18

Table 5. Monthly gross beta activity averages from all permanent air sampling stations in operation during Operation Niblick - activity in pCi/m³. (Continued)

LOCATION	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Parowan, Utah						1.43	1.35	1.82	1.65	1.69	2.25	1.53
Kanarraville, Utah						1.98	1.38	1.74	1.72	2.18	2.82	2.53
Sunnyside, Nevada							1.67	1.76	2.28	1.64	2.90	1.79
Lida, Nevada							1.66	2.50	2.06	2.65	3.18	1.73
Round Mtn., Nevada							2.01	2.39	2.87	2.50	3.08	2.45
Milford, Utah								2.13	1.73	2.26	2.45	2.01
Kingman, Arizona									2.38	2.81	2.69	1.94
Austin, Nevada										2.36	2.84	2.17

*Sampler not operating

34

Table 6. Summary of monthly film badge placements.

Average No. of Individuals Badged	Average No. of Single Badge Stations	Average No. of Five Badge Stations
140	13	56

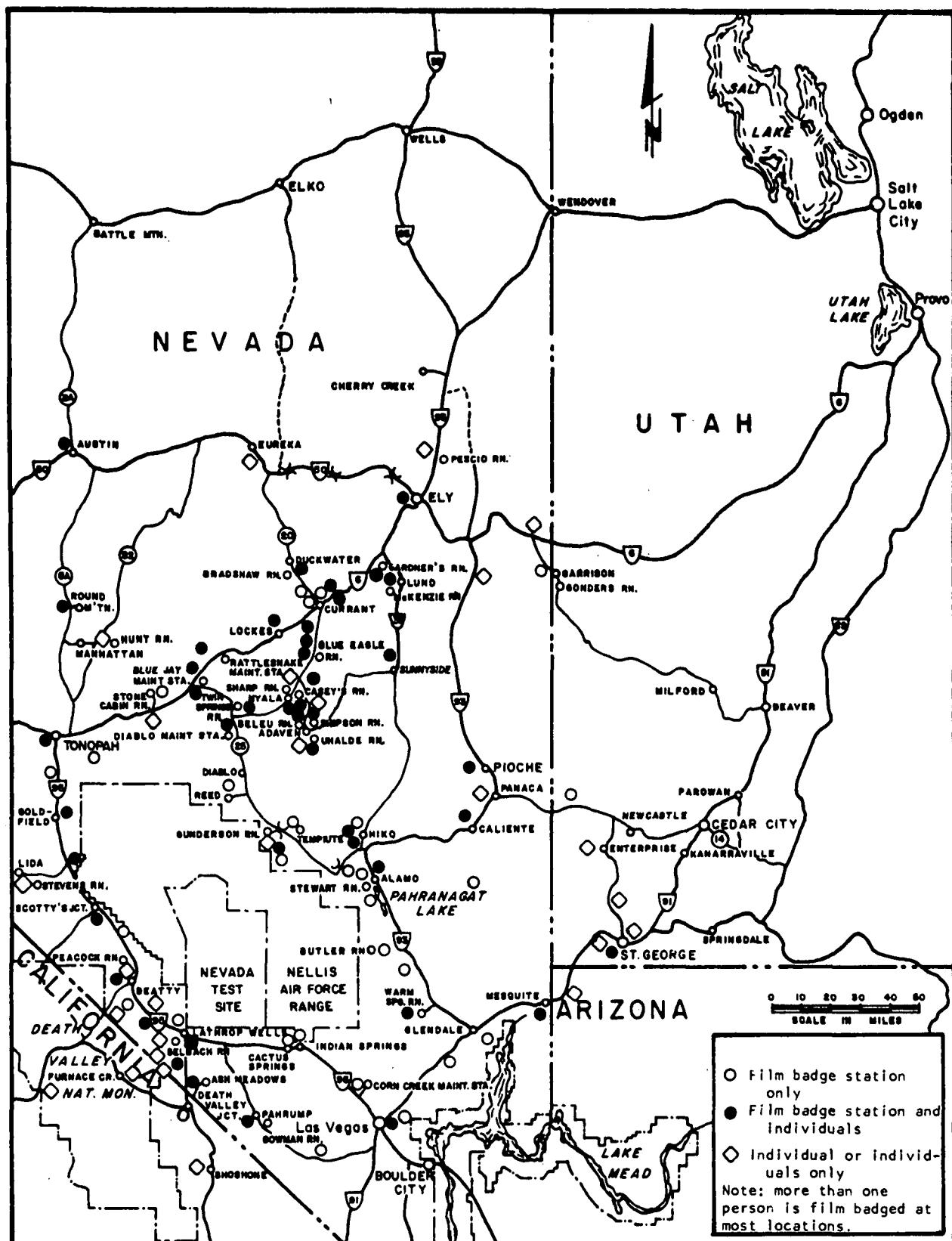


Figure 8. Routine film badge placement locations.

Table 7. Milk samples collected during Operation Niblick showing the presence of fresh fission products (not including two Las Vegas farms).

COLLECTION DATA			RADIOCHEMICAL DATA						
LOCATION	DATE COLLECTED	DATE ANALYZED	ACTIVITY (pCi/l) at time of collection					CONCENTRATION (ppm)	
			¹³¹ I	¹³³ I	¹³⁷ Cs	⁸⁹ Sr	⁹⁰ Sr		
Yuma, Arizona	3/26/64	3/30/64	30	ND	10				
Yuma, Arizona	3/17/64	3/17/64	30	ND	10				
Yuma, Arizona	3/18/64	3/18/64	50	ND	15	5	4	1.17	
Yuma, Arizona	3/21/64	3/25/64	80	ND	20	ND	2	1.18	
Yuma, Arizona	3/22/64	3/24/64	60	ND	15	ND	4	1.15	
Yuma, Arizona	3/24/64	3/25/64	40	ND	ND	ND	2	1.18	
Yuma, Arizona	3/25/64	3/26/64	40	ND	ND	ND	2	1.18	
Yuma, Arizona	3/28/64	4/01/64	30	ND	ND				
Bard, California	3/26/64	3/30/64	50	ND	20				
Blythe, California	3/21/64	3/25/64	30	ND	ND	ND	3	1.42	
Blythe, California	3/22/64	3/24/64	20	ND	ND	ND	2	1.58	
Winterhaven, California	3/23/64	3/24/64	20	ND	25	ND	3	1.16	
Winterhaven, California	3/25/64	3/26/64	40	ND	20	ND	2	1.14	
Winterhaven, California	3/26/64	3/30/64	50	ND	20				
Winterhaven, California	3/27/64	3/30/64	20	ND	25	ND	4	1.20	
Winterhaven, California	3/28/64	4/01/64	80	ND	35	ND	4	1.20	

ND = Not detected

from farms. No commercial dairy samples showed detectable amounts of fresh fission products. Complete tabulations of all milk samples collected and analyzed during Operation Niblick are shown in the Appendix to this report.

4. Water Sampling

Water samples from surface and sub-surface supplies were collected and analyzed during the operation. No contamination of water used for human consumption occurred as a result of any one or combination of events of Operation Niblick.

5. Vegetation Sampling

Vegetation samples were collected only after the two previously mentioned events. The results from vegetation sampling are used to determine the presence of fresh fission products in order to delineate cloud passage and to indicate possible areas for more intensive sampling of other elements of the environment. Since vegetation sample results include so many parameters, they are not used to assess exposure to people or animals in the off-site area.

Chapter 4

DISCUSSION AND CONCLUSIONS

A. EXTERNAL EXPOSURES

The only event of the Operation Niblick series that produced off-site radiation levels that were detectable on portable instruments was Pike. Using the formula $5 \times \text{dose rate} \times \text{hours since detonation}$, the infinite dose rate can be calculated for a given location. This calculation is made using the peak net gamma measurement on the day of the event. The calculated infinite dose rate for Cactus Springs would be 85 mR, at Indian Springs 25 mR, and 9 mR at Las Vegas. These values may be compared with the 150-200 mR annual exposure from natural background radiation.

B. AIR SAMPLING

Radioiodine concentrations in air as determined by air sampling operations, represented only a small percentage of the allowable exposure for populations as defined by the AEC.

C. MILK SAMPLING

The only radioiodine concentrations detected in milk supplies occurred after the Pike Event. All Las Vegas commercial dairies were sampled daily and no radioiodine was detected. Other than those samples taken for a special study in Las Vegas, Nevada, concentrations of ^{131}I were found only at Yuma, Arizona and at Bard, Blythe, and Winterhaven, California. The concentrations found at these locations were well below the maximum permissible levels established by the AEC.

D. WATER SAMPLING

Water samples from potable and nonpotable supplies were sampled in the downwind areas. No contamination of water used for human consumption was detected.

E. CONCLUSION

Operation Niblick resulted in the addition of relatively minor amounts of radioisotopes into the off-site area. These amounts were well below presently accepted maximum permissible exposures as defined by the AEC Manual, Chapter 0524.

APPENDIX

Table 1.	Results of milk samples collected following the Pike Event (activity extrapolated to time of collection).	A - 1
Table 2.	Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection).	A - 21
Table 3.	Results of routine milk sampling - July 1963 through June 1964.	A - 33

Note 1. The numbers and letters in the ID columns in Tables 1 and 2 are identification codes assigned by SWRHL.

Note 2. In Table 2, the abbreviation G CH indicates that the cow was being fed freshly cut green feed (green chop). The abbreviation D FD indicates that the cow was on dry feed. The milk samples in Table 2 were collected for a special investigation by the Bioenvironmental Research Program (see page 32).

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection).

LOCATION	ID	DATE	DATE	I	PC/L	CS 137
		COLL	COUNT	131	133	
AJO ARIZ	F	03 17	03 19	ND	ND	30
AJO ARIZ	F	03 18	03 18	ND	ND	25
AJO ARIZ	F	03 18	03 21	ND	ND	25
AJO ARIZ	F	03 19	03 21	ND	ND	25
BUCKEYE ARIZ	F	03 16	03 17	ND	ND	20
BUCKEYE ARIZ	F	03 17	03 19	ND	ND	25
BUCKEYE ARIZ	F	03 18	03 21	ND	ND	30
BAGDAD ARIZ	F	03 17	03 19	ND	ND	30
BAGDAD ARIZ	F	03 18	03 21	ND	ND	25
BAGDAD ARIZ	F	03 19	03 21	ND	ND	25
BAGDAD ARIZ	F	03 20	03 21	ND	ND	15
BAGDAD ARIZ	F	03 21	03 21	ND	ND	15
CHINO VLLY ARIZ	F	03 14	03 16	ND	ND	95
CHINO VLLY ARIZ	F	03 15	03 18	ND	ND	40
CHINO VLLY ARIZ	F	03 15	03 18	ND	ND	40
CHINO VLLY ARIZ	F	03 16	03 18	ND	ND	40
CHINO VLLY ARIZ	F	03 16	03 18	ND	ND	40
CHINO VLLY ARIZ	F	03 17	03 17	ND	ND	50
CHINO VLLY ARIZ	F	03 17	03 18	ND	ND	50
CHINO VLLY ARIZ	F	03 18	03 19	ND	ND	50
CHINO VLLY ARIZ	F	03 19	03 19	ND	ND	40
CHINO VLLY ARIZ	F	03 19	03 23	ND	ND	40
CHINO VLLY ARIZ	F	03 20	03 23	ND	ND	40
COTTONWOOD ARIZ	F	03 17	03 18	ND	ND	20
COTTONWOOD ARIZ	F	03 18	03 19	ND	ND	20
COTTONWOOD ARIZ	F	03 19	03 21	ND	ND	15
EHRENBERG ARIZ	F	03 15	03 16	ND	ND	55
EHRENBERG ARIZ	F	03 16	03 16	ND	ND	15
EHRENBERG ARIZ	F	03 17	03 18	ND	ND	35
EHRENBERG ARIZ	F	03 18	03 19	ND	ND	10

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	I 131	PC/L		CS 137
					I 133	CS 137	
EHRENBERG ARIZ	F	03 19	03 20	ND	ND	30	
EHRENBERG ARIZ	F	03 20	03 22	ND	ND	20	
KINGMAN ARIZ	D	03 14	03 15	ND	ND	30	
KINGMAN ARIZ	D	03 15	03 15	ND	ND	35	
KINGMAN ARIZ	D	03 16	03 17	ND	ND	25	
KINGMAN ARIZ	D	03 17	03 18	ND	ND	30	
KINGMAN ARIZ	D	03 18	03 19	ND	ND	25	
KINGMAN ARIZ	D	03 19	03 20	ND	ND	20	
KINGMAN ARIZ	D	03 20	03 25	ND	ND	20	
KINGMAN ARIZ	D	03 21	03 23	ND	ND	35	
PARKER ARIZ	F	03 16	03 16	ND	ND	65	
PARKER ARIZ	F	03 17	03 18	ND	ND	55	
PARKER ARIZ	F	03 18	03 19	ND	ND	50	
PARKER ARIZ	F	03 19	03 20	ND	ND	40	
PARKER ARIZ	F	03 20	03 21	ND	ND	50	
PARKER ARIZ	F	03 21	03 25	ND	ND	45	
PARKER ARIZ	F	03 22	03 23	ND	ND	55	
PHOENIX ARIZ	D01	03 14	03 14	ND	ND	25	
PHOENIX ARIZ	D01	03 15	03 17	ND	ND	20	
PHOENIX ARIZ	D01	03 16	03 17	ND	ND	20	
PHOENIX ARIZ	D01	03 17	03 17	ND	ND	20	
PHOENIX ARIZ	D01	03 18	03 18	ND	ND	20	
PHOENIX ARIZ	D01	03 19	03 21	ND	ND	40	
PHOENIX ARIZ	D01	03 20	03 21	ND	ND	25	
PHOENIX ARIZ	D01	03 26	03 31	ND	ND	20	
PHOENIX ARIZ	F02	03 17	03 17	ND	ND	30	
PHOENIX ARIZ	F02	03 18	03 19	ND	ND	25	
PHOENIX ARIZ	F02	03 19	03 20	ND	ND	70	

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	I 131	PC/L		CS 137
					I 133	137	
PHOENIX ARIZ	F03	03 14	03 14	ND	ND	25	
PHOENIX ARIZ	F03	03 16	03 17	ND	ND	20	
PHOENIX ARIZ	F03	03 17	03 19	ND	ND	20	
PHOENIX ARIZ	F03	03 18	03 21	ND	ND	15	
TEMPE ARIZ	D02	03 14	03 14	ND	ND	30	
TEMPE ARIZ	D02	03 15	03 17	ND	ND	20	
TEMPE ARIZ	D02	03 16	03 17	ND	ND	20	
TEMPE ARIZ	D02	03 17	03 17	ND	ND	30	
TEMPE ARIZ	D02	03 18	03 19	ND	ND	50	
TEMPE ARIZ	D02	03 19	03 21	ND	ND	40	
TEMPE ARIZ	D02	03 20	03 21	ND	ND	30	
TEMPE ARIZ	D02	03 26	03 30	ND	ND	25	
TEMPE ARIZ	D03	03 14	03 14	ND	ND	40	
TEMPE ARIZ	D03	03 15	03 17	ND	ND	20	
TEMPE ARIZ	D03	03 16	03 17	ND	ND	20	
TEMPE ARIZ	D03	03 17	03 17	ND	ND	20	
TEMPE ARIZ	D03	03 18	03 19	ND	ND	40	
TEMPE ARIZ	D03	03 19	03 21	ND	ND	35	
TEMPE ARIZ	F01	03 14	03 14	ND	ND	20	
TEMPE ARIZ	F01	03 16	03 17	ND	ND	25	
TEMPE ARIZ	F01	03 17	03 17	ND	ND	30	
TEMPE ARIZ	F01	03 18	03 19	ND	ND	90	
TEMPE ARIZ	F01	03 19	03 21	ND	ND	70	
TUCSON ARIZ	D	03 17	03 17	ND	ND	20	
TUCSON ARIZ	D	03 18	03 19	ND	ND	20	
TUCSON ARIZ	D	03 18	03 19	ND	ND	80	
TUCSON ARIZ	D	03 18	03 19	ND	ND	35	
TUCSON ARIZ	D	03 19	03 21	ND	ND	40	
TUCSON ARIZ	D	03 19	03 21	ND	ND	40	
TUCSON ARIZ	D	03 20	03 21	ND	ND	ND	
TUCSON ARIZ	D	03 26	03 31	ND	ND	ND	

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	PC/L		
				I 131	I 133	CS 137
WENDEN ARIZ	F	03 18	03 19	ND	ND	30
WICKENBURG ARIZ	F	03 19	03 20	ND	ND	30
WIKIEUP ARIZ	F	03 17	03 19	ND	ND	20
WIKIEUP ARIZ	F	03 20	03 21	ND	ND	15
WIKIEUP ARIZ	F	03 21	03 21	ND	ND	15
YUMA ARIZ	F01	03 16	03 17	ND	ND	15
YUMA ARIZ	F01	03 18	03 18	ND	ND	20
YUMA ARIZ	F01	03 19	03 19	ND	ND	30
YUMA ARIZ	F01	03 21	03 25	ND	ND	ND
YUMA ARIZ	F01	03 22	03 24	ND	ND	15
YUMA ARIZ	F01	03 23	03 24	ND	ND	20
YUMA ARIZ	F01	03 24	03 25	ND	ND	ND
YUMA ARIZ	F01	03 25	03 26	ND	ND	ND
YUMA ARIZ	F01	03 26	03 30	30	ND	10
YUMA ARIZ	F01	03 27	03 30	ND	ND	5
YUMA ARIZ	F01	03 30	04 02	ND	ND	15
YUMA ARIZ	F01	04 02	04 03	ND	ND	10
YUMA ARIZ	F02	03 17	03 17	30	ND	10
YUMA ARIZ	F02	03 18	03 18	50	ND	15
YUMA ARIZ	F02	03 19	03 19	ND	ND	20
YUMA ARIZ	F02	03 21	03 25	80	ND	20
YUMA ARIZ	F02	03 22	03 24	60	ND	15
YUMA ARIZ	F02	03 23	03 25	ND	ND	ND
YUMA ARIZ	F02	03 24	03 25	40	ND	ND
YUMA ARIZ	F02	03 25	03 26	40	ND	ND
YUMA ARIZ	F02	03 27	03 30	ND	ND	10
YUMA ARIZ	F02	03 28	04 01	30	ND	ND
YUMA ARIZ	F02	04 01	04 03	ND	ND	5

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	PC/L		
				I 131	I 133	CS 137
BARD CAL	F	03 19	03 20	ND	ND	40
BARD CAL	F	03 19	03 20	ND	ND	20
BARD CAL	F	03 20	03 25	ND	ND	10
BARD CAL	F	03 21	03 25	ND	ND	25
BARD CAL	F	03 22	03 24	ND	ND	15
BARD CAL	F	03 23	03 24	ND	ND	10
BARD CAL	F	03 24	03 25	ND	ND	15
BARD CAL	F	03 25	03 26	ND	ND	5
BARD CAL	F	03 26	03 30	50	ND	20
BARD CALIF	F	03 28	04 01	ND	ND	20
BLYTHE CAL	F01	03 16	03 16	ND	ND	ND
BLYTHE CAL	F01	03 17	03 18	ND	ND	25
BLYTHE CAL	F01	03 18	03 19	ND	ND	35
BLYTHE CAL	F01	03 19	03 20	ND	ND	20
BLYTHE CAL	F01	03 20	03 21	ND	ND	20
BLYTHE CAL	F01	03 21	03 25	30	ND	ND
BLYTHE CAL	F01	03 22	03 24	20	ND	ND
BLYTHE CAL	F01	03 24	03 25	ND	ND	ND
BLYTHE CAL	F02	03 26	03 30	ND	ND	15
BRAWLY CAL	D	03 18	03 19	ND	ND	15
INDIO CAL	F	03 19	03 20	ND	ND	20
WINTERHAVEN CAL	F	03 21	03 25	ND	ND	15
WINTERHAVEN CAL	F	03 22	03 24	ND	ND	20
WINTERHAVEN CAL	F	03 23	03 24	20	ND	25
WINTERHAVEN CAL	F	03 24	03 25	ND	ND	20
WINTERHAVEN CAL	F	03 25	03 26	40	ND	20
WINTERHAVEN CAL	F	03 26	03 30	50	ND	20
WINTERHAVEN CAL	F	03 27	03 30	20	ND	25
WINTERHAVEN CAL	F	03 28	04 01	80	ND	35

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	D03	03 16	03 16	ND	ND	105
LAS VEGAS NEV	D03	03 17	03 17	ND	ND	130
LAS VEGAS NEV	D03	03 17	03 17	ND	ND	90
LAS VEGAS NEV	D03	03 18	03 19	ND	ND	135
LAS VEGAS NEV	D03	03 18	03 19	ND	ND	75
LAS VEGAS NEV	D03	03 19	03 19	ND	ND	130
LAS VEGAS NEV	D03	03 20	03 21	ND	ND	100
LAS VEGAS NEV	D03	03 21	03 21	ND	ND	150
LAS VEGAS NEV	D03	03 22	03 23	ND	ND	110
LAS VEGAS NEV	D03	03 23	03 24	ND	ND	115
LAS VEGAS NEV	D03	03 24	03 25	ND	ND	125
LAS VEGAS NEV	D03	03 25	03 26	ND	ND	125
LAS VEGAS NEV	D03	03 26	03 30	ND	ND	105
LAS VEGAS NEV	D04	03 16	03 16	ND	ND	80
LAS VEGAS NEV	D04	03 17	03 17	ND	ND	50
LAS VEGAS NEV	D04	03 17	03 17	ND	ND	30
LAS VEGAS NEV	D04	03 18	03 19	ND	ND	95
LAS VEGAS NEV	D04	03 19	03 19	ND	ND	80
LAS VEGAS NEV	D04	03 20	03 21	ND	ND	70
LAS VEGAS NEV	D04	03 21	03 21	ND	ND	85
LAS VEGAS NEV	D04	03 22	03 23	ND	ND	100
LAS VEGAS NEV	D04	03 23	03 24	ND	ND	85
LAS VEGAS NEV	D04	03 24	03 25	ND	ND	85
LAS VEGAS NEV	D04	03 25	03 26	ND	ND	75
LAS VEGAS NEV	D04	03 26	03 30	ND	ND	80
LAS VEGAS NEV	D04	03 27	03 31	ND	ND	65
LAS VEGAS NEV	D05	03 17	03 17	ND	ND	65
LAS VEGAS NEV	D06	03 17	03 17	ND	ND	65

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	D07	03 16	03 16	ND	ND	90
LAS VEGAS NEV	D07	03 18	03 19	ND	ND	105
LAS VEGAS NEV	D07	03 16	03 16	ND	ND	95
LAS VEGAS NEV	D07	03 17	03 17	ND	ND	90
LAS VEGAS NEV	D07	03 19	03 19	ND	ND	90
LAS VEGAS NEV	D07	03 20	03 21	ND	ND	80
LAS VEGAS NEV	D07	03 21	03 21	ND	ND	80
LAS VEGAS NEV	D07	03 23	03 24	ND	ND	80
LAS VEGAS NEV	D07	03 25	03 26	ND	ND	75
LAS VEGAS NEV	D07	03 26	03 30	ND	ND	75
LAS VEGAS NEV	D07	03 27	03 31	ND	ND	75
LAS VEGAS NEV	D08	03 17	03 17	ND	ND	130

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Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE	DATE	I	I	PC/L
		COLL	COUNT	131	133	CS 137
LATHROP WLS NEV	F	03 18	03 19	ND	ND	55
MOAPA NEV	F	03 14	03 15	ND	ND	120
MOAPA NEV	F	03 15	03 15	ND	ND	125
MOAPA NEV	F	03 15	03 16	ND	ND	125
MOAPA NEV	F	03 16	03 16	ND	ND	110
MOAPA NEV	F	03 16	03 17	ND	ND	65
MOAPA NEV	F	03 17	03 17	ND	ND	65
MOAPA NEV	F	03 18	03 18	ND	ND	135
MOAPA NEV	F	03 18	03 18	ND	ND	135
MOAPA NEV	F	03 19	03 19	ND	ND	130
MOAPA NEV	F	03 20	03 21	ND	ND	125
OVERTON NEV	F	03 15	03 15	ND	ND	85
OVERTON NEV	F	03 15	03 16	ND	ND	95
OVERTON NEV	F	03 16	03 16	ND	ND	85
OVERTON NEV	F	03 16	03 17	ND	ND	60
OVERTON NEV	F	03 17	03 17	ND	ND	60
OVERTON NEV	F	03 17	03 18	ND	ND	105
OVERTON NEV	F	03 18	03 18	ND	ND	105
OVERTON NEV	F	03 19	03 19	ND	ND	95
PAHRUMP NEV	F	03 14	03 15	ND	ND	30
PAHRUMP NEV	F	03 14	03 15	ND	ND	40
PAHRUMP NEV	F	03 15	03 15	ND	ND	35
PAHRUMP NEV	F	03 15	03 17	ND	ND	30
PAHRUMP NEV	F	03 16	03 18	ND	ND	35
PAHRUMP NEV	F	03 16	03 17	ND	ND	30
PAHRUMP NEV	F	03 17	03 18	ND	ND	35

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	PC/L		
				I 131	I 133	CS 137
ALAMOGORDO N M	D	03 16	03 18	ND	ND	80
ALAMOGORDO N M	D	03 18	03 18	ND	ND	40
ALAMOGORDO N M	D	03 19	03 20	ND	ND	40
ALAMOGORDO N M	D	03 20	03 21	ND	ND	70
ARTESIA N M	D	03 16	03 17	ND	ND	40
ARTESIA N M	D	03 18	03 19	ND	ND	65
ARTESIA N M	D	03 19	03 20	ND	ND	50
ARTESIA N M	D	03 20	03 21	ND	ND	40
CARLSBAD N M	D	03 13	03 16	ND	ND	45
CARLSBAD N M	D	03 16	03 17	ND	ND	45
CARLSBAD N M	D	03 17	03 18	ND	ND	40
CARLSBAD N M	D	03 17	03 18	ND	ND	45
CARLSBAD N M	D	03 18	03 19	ND	ND	50
CARLSBAD N M	D	03 19	03 19	ND	ND	60
CARLSBAD N M	D	03 19	03 20	ND	ND	60
CARLSBAD N M	D	03 20	03 21	ND	ND	45
CARLSBAD N M	D	03 24	03 30	ND	ND	30
EUNICE N M	D	03 17	03 18	ND	ND	105
EUNICE N M	D	03 19	03 21	ND	ND	40
GILA N M	D	03 16	03 17	ND	ND	20
GILA N M	D	03 18	03 19	ND	ND	55
GILA N M	D	03 19	03 22	ND	ND	55
LAS CRUCES N M	D	03 17	03 18	ND	ND	45
LAS CRUCES N M	D	03 18	03 20	ND	ND	40
LAS CRUCES N M	D	03 20	03 21	ND	ND	40
LAS VEGAS N M	D	03 18	03 19	ND	ND	125
LOVING N M	D	03 13	04 08	ND	ND	145
ROSWELL N M	D	03 16	03 18	ND	ND	70

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE	DATE	I 131	PC/L	CS 137
		COLL	COUNT		I 133	
ROSWELL N M	D	03 17	03 18	ND	ND	70
ROSWELL N M	D	03 18	03 20	ND	ND	65
ROSWELL N M	D	03 19	03 20	ND	ND	60
ROSWELL N M	D	03 20	03 24	ND	ND	75
TUCUMCARI N M	D	03 15	03 19	ND	ND	65
WHITES CITY N M D	D	03 13	03 16	ND	ND	95
WHITES CITY N M D	D	03 16	03 17	ND	ND	65
WHITES CITY N M D	D	03 17	03 18	ND	ND	70
WHITES CITY N M D	D	03 18	03 19	ND	ND	65
WHITES CITY N M D	D	03 19	03 21	ND	ND	80
WHITES CITY N M D	D	03 20	03 21	ND	ND	75

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE	DATE	I	PC/L	CS
		COLL	COUNT	131	133	
AUSTIN TEX	D01	03 14	03 17	ND	ND	50
AUSTIN TEX	D01	03 18	03 21	ND	ND	70
AUSTIN TEX	D01	03 19	03 24	ND	ND	50
AUSTIN TEX	F02	03 17	03 18	ND	ND	50
AUSTIN TEX	F02	03 20	03 21	ND	ND	55
DALLAS TEX	D01	03 17	03 18	ND	ND	75
DALLAS TEX	D01	03 18	03 19	ND	ND	130
DALLAS TEX	D01	03 19	03 24	ND	ND	90
DALLAS TEX	D01	03 20	03 24	ND	ND	80
DALLAS TEX	D01	03 26	03 27	ND	ND	110
DALLAS TEX	D01	03 27	03 31	ND	ND	60
DALLAS TEX	D01	03 30	03 31	ND	ND	80
DALLAS TEX	D01	03 31	04 02	ND	ND	60
DALLAS TEX	D01	04 03	04 07	ND	ND	65
DALLAS TEX	F02	03 16	03 18	ND	ND	90
EL PASO TEX	D	03 18	03 19	ND	ND	30
EL PASO TEX	D	03 19	03 20	ND	ND	40
EL PASO TEX	D	03 20	03 22	ND	ND	45
EL PASO TEX	D	03 21	03 23	ND	ND	35
EL PASO TEX	D	03 22	03 24	ND	ND	25
LUBBOCK TEX		03 16	03 18	ND	ND	40
LUBBOCK TEX	D01	03 20	03 24	ND	ND	70
LUBBOCK TEX	D01	03 22	03 30	ND	ND	85
LUBBOCK TEX	D02	03 21	03 24	ND	ND	30

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
AJO ARIZ	F	03 17	03 19	1.57	ND	5
AJO ARIZ	F	03 19	03 21	1.66	ND	1
BUCKEYE ARIZ	F	03 16	03 17	1.52	ND	4
BUCKEYE ARIZ	F	03 18	03 21	2.15	5	6
BAGDAD ARIZ	F	03 19	03 21	1.10	ND	3
BAGDAD ARIZ	F	03 21	03 21	1.09	ND	3
CHINO VLLY ARIZ	F	03 14	03 16	1.22	ND	7
CHINO VLLY ARIZ	F	03 17	03 17	1.22	ND	8
CHINO VLLY ARIZ	F	03 19	03 23	1.34	5	7
CHINO VLLY ARIZ	F	03 20	03 23	1.34	5	7
COTTONWOOD ARIZ	F	03 17	03 18	1.15	ND	1
COTTONWOOD ARIZ	F	03 19	03 21	.88	ND	ND
EHRENBURG ARIZ	F	03 15	03 16	1.46	ND	3
EHRENBURG ARIZ	F	03 16	03 16	1.46	ND	3
EHRENBURG ARIZ	F	03 18	03 19	1.20	ND	2
KINGMAN ARIZ	D	03 14	03 15	1.28	ND	2
KINGMAN ARIZ	D	03 16	03 17	1.14	ND	4
KINGMAN ARIZ	D	03 17	03 18	1.22	5	4
KINGMAN ARIZ	D	03 18	03 19	1.23	ND	3
KINGMAN ARIZ	D	03 19	03 20	1.23	5	2
KINGMAN ARIZ	D	03 20	03 25	1.25	ND	3
KINGMAN ARIZ	D	03 21	03 23	1.22	ND	4
PARKER ARIZ	F	03 16	03 16	1.20	ND	6
PARKER ARIZ	F	03 18	03 19	1.17	ND	4
PARKER ARIZ	F	03 19	03 20	1.17	ND	5
PARKER ARIZ	F	03 21	03 25	1.34	ND	5
PARKER ARIZ	F	03 22	03 23	1.34	5	5

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
PHOENIX ARIZ	D01	03 20	03 21	1.16	5	2
PHOENIX ARIZ	D01	03 26	03 31	1.14	ND	5
PHOENIX ARIZ	F02	03 18	03 19	1.14	ND	12
PHOENIX ARIZ	F02	03 19	03 20	1.25	10	10
PHOENIX ARIZ	F03	03 18	03 21	1.13	ND	1
TEMPE ARIZ	D02	03 19	03 21	1.15	ND	2
TEMPE ARIZ	D02	03 26	03 30	1.14	ND	3
TEMPE ARIZ	D03	03 18	03 19	1.14	ND	5
TEMPE ARIZ	F01	03 14	03 14	1.38	ND	4
TEMPE ARIZ	F01	03 19	03 21	1.18	ND	3
TUCSON ARIZ	D	03 17	03 17	1.19	ND	2
TUCSON ARIZ	D	03 18	03 19	1.28	ND	3
TUCSON ARIZ	D	03 26	03 31	1.09	ND	5
WENDEN ARIZ	F	03 18	03 19	.	ND	4
WICKENBURG ARIZ	F	03 19	03 20	1.42	ND	4
YUMA ARIZ	F01	03 16	03 17	1.12	ND	6
YUMA ARIZ	F01	03 18	03 18	1.17	5	4
YUMA ARIZ	F01	03 19	03 19	1.42	ND	9
YUMA ARIZ	F01	03 21	03 25	1.18	ND	2
YUMA ARIZ	F01	03 22	03 24	1.15	ND	4
YUMA ARIZ	F01	03 23	03 24	1.16	ND	4
YUMA ARIZ	F01	03 24	03 25	1.18	ND	2
YUMA ARIZ	F01	03 25	03 26	1.18	ND	2
YUMA ARIZ	F01	03 27	03 30	1.38	ND	3
YUMA ARIZ	F01	03 30	04 02	1.38	ND	3
YUMA ARIZ	F01	04 02	04 03	1.14	ND	5
YUMA ARIZ	F02	03 17	03 17	1.16	ND	4
YUMA ARIZ	F02	03 18	03 18	1.14	5	3
YUMA ARIZ	F02	03 19	03 19	1.20	ND	3
YUMA ARIZ	F02	03 21	03 25	1.16	ND	4

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
YUMA ARIZ	F02	03 22	03 24	1.15	ND	4
YUMA ARIZ	F02	03 23	03 25	1.16	ND	4
YUMA ARIZ	F02	03 24	03 25	1.16	ND	4
YUMA ARIZ	F02	03 25	03 26	1.16	ND	4
YUMA ARIZ	F02	03 27	03 30	1.20	ND	4
YUMA ARIZ	F02	03 28	04 01	1.20	ND	4
YUMA ARIZ	F02	04 01	04 03	1.20	ND	4

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
BARD CAL	F	03 19	03 20	1.15	5	1
BARD CAL	F	03 19	03 20	1.16	ND	3
BARD CAL	F	03 20	03 25	1.14	ND	2
BARD CAL	F	03 21	03 25	1.14	ND	2
BARD CAL	F	03 22	03 24	1.16	ND	3
BARD CAL	F	03 23	03 24	1.15	ND	2
BARD CAL	F	03 24	03 25	1.14	ND	2
BARD CAL	F	03 25	03 26	1.14	ND	2
BARD CALIF	F	03 28	04 01	1.20	ND	4
BLYTHE CAL	F01	03 16	03 16	1.36	ND	3
BLYTHE CAL	F01	03 19	03 20	1.33	ND	3
BLYTHE CAL	F01	03 21	03 25	1.42	ND	3
BLYTHE CAL	F01	03 22	03 24	1.58	ND	2
BLYTHE CAL	F01	03 24	03 25	1.42	ND	3
BRAWLY CAL	D	03 18	03 19	1.22	5	3
INDIO CAL	F	03 19	03 20	*	ND	ND
WINTERHAVEN CAL	F	03 21	03 25	1.14	ND	2
WINTERHAVEN CAL	F	03 22	03 24	1.12	ND	2
WINTERHAVEN CAL	F	03 23	03 24	1.16	ND	3
WINTERHAVEN CAL	F	03 24	03 25	1.14	ND	2
WINTERHAVEN CAL	F	03 25	03 26	1.14	ND	2
WINTERHAVEN CAL	F	03 27	03 30	1.20	ND	4
WINTERHAVEN CAL	F	03 28	04 01	1.20	ND	4

S1-5

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
LAS VEGAS NEV	D03	03 16	03 16	1.04	ND	14
LAS VEGAS NEV	D03	03 17	03 17	1.18	5	18
LAS VEGAS NEV	D03	03 18	03 19	1.20	ND	12
LAS VEGAS NEV	D03	03 19	03 19	1.25	5	15
LAS VEGAS NEV	D03	03 21	03 21	1.10	5	14
LAS VEGAS NEV	D03	03 22	03 23	1.18	ND	15
LAS VEGAS NEV	D03	03 23	03 24	.83	5	13
LAS VEGAS NEV	D03	03 25	03 26	1.22	5	14
LAS VEGAS NEV	D03	03 26	03 30	1.11	ND	19
LAS VEGAS NEV	D04	03 16	03 16	1.12	ND	12
LAS VEGAS NEV	D04	03 17	03 17	1.17	5	11
LAS VEGAS NEV	D04	03 18	03 19	1.33	5	15
LAS VEGAS NEV	D04	03 19	03 19	1.14	ND	14
LAS VEGAS NEV	D04	03 20	03 21	1.23	5	11
LAS VEGAS NEV	D04	03 21	03 21	1.23	ND	10
LAS VEGAS NEV	D04	03 22	03 23	1.12	ND	15
LAS VEGAS NEV	D04	03 23	03 24	.86	5	10
LAS VEGAS NEV	D04	03 25	03 26	1.26	5	9
LAS VEGAS NEV	D04	03 26	03 30	1.14	ND	14
LAS VEGAS NEV	D04	03 27	03 31	1.12	ND	11
LAS VEGAS NEV	D07	03 16	03 16	1.12	ND	13
LAS VEGAS NEV	D07	03 18	03 19	1.10	5	13
LAS VEGAS NEV	D07	03 19	03 19	1.12	5	11
LAS VEGAS NEV	D07	03 20	03 21	1.20	5	8
LAS VEGAS NEV	D07	03 21	03 21	.	ND	13
LAS VEGAS NEV	D07	03 23	03 24	1.00	ND	11
LAS VEGAS NEV	D07	03 25	03 26	.90	5	9
LAS VEGAS NEV	D07	03 26	03 30	1.12	ND	13
LAS VEGAS NEV	D07	03 27	03 31	1.14	ND	12
LAS VEGAS NEV	D08	03 17	03 17	1.18	5	18

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
MOAPA NEV	F	03 15	03 16	1.15	ND	16
MOAPA NEV	F	03 16	03 16	1.15	ND	16
OVERTON NEV	F	03 15	03 15	1.25	ND	11
OVERTON NEV	F	03 16	03 16	1.20	ND	11
PAHRUMP NEV	F	03 14	03 15	1.31	ND	3
PAHRUMP NEV	F	03 15	03 17	1.20	ND	3
PAHRUMP NEV	F	03 16	03 17	1.15	ND	4

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
ALAMOGORDO N M	D	03 16	03 18	.	5	8
ALAMOGORDO N M	D	03 19	03 20	1.46	5	7
ALAMOGORDO N M	D	03 20	03 21	1.23	5	6
ARTESIA N M	D	03 16	03 17	1.09	5	4
ARTESIA N M	D	03 18	03 19	1.12	ND	4
ARTESIA N M	D	03 19	03 20	1.11	ND	4
ARTESIA N M	D	03 20	03 21	1.20	ND	16
CARLSBAD N M	D	03 13	03 16	1.18	ND	5
CARLSBAD N M	D	03 16	03 17	1.12	ND	4
CARLSBAD N M	D	03 17	03 18	1.28	5	4
CARLSBAD N M	D	03 17	03 18	1.27	ND	4
CARLSBAD N M	D	03 18	03 19	1.22	ND	6
CARLSBAD N M	D	03 19	03 20	1.17	ND	4
CARLSBAD N M	D	03 20	03 21	1.20	ND	5
EUNICE N M	D	03 17	03 18	1.44	5	35
EUNICE N M	D	03 19	03 21	1.36	5	36
GILA N M	D	03 16	03 17	1.18	ND	7
LAS CRUCES N M	D	03 17	03 18	1.28	ND	6
LAS CRUCES N M	D	03 18	03 20	1.22	ND	7
LAS CRUCES N M	D	03 20	03 21	1.23	5	4
LAS VEGAS N M	D	03 18	03 19	1.36	5	15
LOVING N M	D	03 13	04 08	1.33	ND	10
ROSWELL N M	D	03 16	03 18	1.15	5	2
ROSWELL N M	D	03 17	03 18	1.31	5	6
ROSWELL N M	D	03 18	03 20	1.10	ND	6
ROSWELL N M	D	03 19	03 20	1.21	5	7
ROSWELL N M	D	03 20	03 24	1.02	ND	5
TUCUMCARI N M	D	03 15	03 19	.	10	12

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
WHITES CITY N M D		03 13	03 16	1.15	ND	10
WHITES CITY N M D		03 16	03 17	1.14	ND	7
WHITES CITY N M D		03 17	03 18	1.20	5	5
WHITES CITY N M D		03 18	03 19	1.07	5	4
WHITES CITY N M D		03 19	03 21	1.18	ND	5
WHITES CITY N M D		03 20	03 21	1.13	ND	5

Table 1. Results of milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
AUSTIN TEX	D01	03 14	03 17	1.14	5	11
AUSTIN TEX	D01	03 18	03 21	1.18	5	11
AUSTIN TEX	F02	03 17	03 18	1.25	ND	10
AUSTIN TEX	F02	03 20	03 21	1.23	5	10
DALLAS TEX	D01	03 17	03 18	1.25	ND	13
DALLAS TEX	D01	03 18	03 19	1.28	ND	18
DALLAS TEX	D01	03 19	03 24	1.18	5	17
DALLAS TEX	D01	03 20	03 24	1.23	ND	18
DALLAS TEX	D01	03 27	03 31	1.22	ND	15
DALLAS TEX	D01	03 30	03 31	1.22	ND	15
DALLAS TEX	D01	03 31	04 02	1.22	ND	15
DALLAS TEX	D01	04 03	04 07	1.18	ND	14
EL PASO TEX	D	03 18	03 19	1.36	5	15
EL PASO TEX	D	03 19	03 20	1.06	ND	4
EL PASO TEX	D	03 21	03 23	1.06	ND	5
EL PASO TEX	D	03 22	03 24	1.10	ND	5
LUBBOCK TEX	D02	03 21	03 24	1.14	ND	13
LUBBOCK TEX	D01	03 22	03 30	1.15	ND	11

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection).

LOCATION	ID	DATE COLL.	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	F01 D FD 03	15PM	03 15	30	200	70
LAS VEGAS NEV	F01 D FD 03	16AM	03 16	70	100	70
LAS VEGAS NEV	F01 D FD 03	16PM	03 16	70	65	120
LAS VEGAS NEV	F01 D FD 03	17AM	03 17	50	30	85
LAS VEGAS NEV	F01 D FD 03	17PM	03 17	ND	ND	45
LAS VEGAS NEV	F01 D FD 03	18AM	03 18	150	40	80
LAS VEGAS NEV	F01 G CH 03	18PM	03 18	220	150	80
LAS VEGAS NEV	F01 D FD 03	18PM	03 18	80	30	70
LAS VEGAS NEV	F01 G CH 03	19AM	03 19	150	40	70
LAS VEGAS NEV	F01 D FD 03	19AM	03 19	70	ND	70
LAS VEGAS NEV	F01 D FD 03	19PM	03 19	60	ND	85
LAS VEGAS NEV	F01 G CH 03	19PM	03 19	250	50	85
LAS VEGAS NEV	F01 G CH 03	20AM	03 20	300	ND	75
LAS VEGAS NEV	F01 D FD 03	20AM	03 20	40	ND	65
LAS VEGAS NEV	F01 G CH 03	20PM	03 21	150	ND	60
LAS VEGAS NEV	F01 D FD 03	20PM	03 21	50	ND	40
LAS VEGAS NEV	F01 G CH 03	21AM	03 21	420	40	70
LAS VEGAS NEV	F01 D FD 03	21AM	03 21	50	ND	70
LAS VEGAS NEV	F01 D FD 03	21PM	03 22	50	ND	90
LAS VEGAS NEV	F01 G CH 03	21PM	03 22	330	ND	60
LAS VEGAS NEV	F01 D FD 03	22AM	03 22	ND	ND	65
LAS VEGAS NEV	F01 G CH 03	22AM	03 22	290	ND	90
LAS VEGAS NEV	F01 D FD 03	22PM	03 23	ND	ND	70
LAS VEGAS NEV	F01 G CH 03	22PM	03 23	240	ND	55
LAS VEGAS NEV	F01 D FD 03	23AM	03 23	40	ND	35
LAS VEGAS NEV	F01 G CH 03	23AM	03 23	300	ND	110
LAS VEGAS NEV	F01 G CH 03	23PM	03 24	260	ND	55
LAS VEGAS NEV	F01 D FD 03	23PM	03 24	ND	ND	70
LAS VEGAS NEV	F01 D FD 03	24AM	03 24	ND	ND	75
LAS VEGAS NEV	F01 G CH 03	24AM	03 24	260	ND	70

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	F01 D FD	03 24PM	03 25	30	ND	70
LAS VEGAS NEV	F01 G CH	03 24PM	03 25	180	ND	55
LAS VEGAS NEV	F01 D FD	03 25AM	03 25	ND	ND	85
LAS VEGAS NEV	F01 G CH	03 25AM	03 25	170	ND	60
LAS VEGAS NEV	F01 G CH	03 25PM	03 26	150	ND	40
LAS VEGAS NEV	F01 D FD	03 25PM	03 26	ND	ND	75
LAS VEGAS NEV	F01 G CH	03 26AM	03 26	120	ND	50
LAS VEGAS NEV	F01 D FD	03 26AM	03 26	30	ND	75
LAS VEGAS NEV	F01 G CH	03 26PM	03 27	110	ND	25
LAS VEGAS NEV	F01 D FD	03 26PM	03 27	ND	ND	70
LAS VEGAS NEV	F01 G CH	03 27AM	03 27	110	ND	50
LAS VEGAS NEV	F01 D FD	03 27AM	03 27	40	ND	70
LAS VEGAS NEV	F01 G CH	03 27PM	03 29	80	ND	30
LAS VEGAS NEV	F01 D FD	03 27PM	03 30	50	ND	80
LAS VEGAS NEV	F01 G CH	03 28AM	03 30	60	ND	30
LAS VEGAS NEV	F01 D FD	03 28AM	03 30	40	ND	90
LAS VEGAS NEV	F01 G CH	03 28PM	03 29	80	ND	30
LAS VEGAS NEV	F01 D FD	03 28PM	03 30	ND	ND	60
LAS VEGAS NEV	F01 G CH	03 29AM	03 29	120	ND	40
LAS VEGAS NEV	F01 D FD	03 29AM	03 30	30	ND	55
LAS VEGAS NEV	F01 D FD	03 29PM	03 30	ND	ND	60
LAS VEGAS NEV	F01 G CH	03 29PM	03 30	110	ND	35
LAS VEGAS NEV	F01 G CH	03 30AM	03 30	110	ND	35
LAS VEGAS NEV	F01 D FD	03 30AM	03 30	30	ND	45
LAS VEGAS NEV	F01 G CH	03 30PM	03 31	80	ND	30
LAS VEGAS NEV	F01 D FD	03 30PM	03 31	40	ND	55
LAS VEGAS NEV	F01 G CH	03 31AM	03 31	70	ND	40
LAS VEGAS NEV	F01 D FD	03 31AM	03 31	ND	ND	50
LAS VEGAS NEV	F01 G CH	03 31PM	04 01	30	ND	45
LAS VEGAS NEV	F01 D FD	03 31PM	04 01	30	ND	55

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	F01	G CH 04	01AM 04 01	ND	ND	75
LAS VEGAS NEV	F01	D FD 04	01AM 04 01	ND	ND	80
LAS VEGAS NEV	F01	G CH 04	01PM 04 02	ND	ND	60
LAS VEGAS NEV	F01	D FD 04	01PM 04 02	ND	ND	60
LAS VEGAS NEV	F01	G CH 04	02AM 04 02	ND	ND	45
LAS VEGAS NEV	F01	D FD 04	02AM 04 02	ND	ND	70
LAS VEGAS NEV	F01	D FD 04	02PM 04 03	ND	ND	40
LAS VEGAS NEV	F01	G CH 04	02PM 04 03	30	ND	80
LAS VEGAS NEV	F01	D FD 04	03AM 04 03	30	ND	80
LAS VEGAS NEV	F01	G CH 04	03AM 04 03	ND	ND	60
LAS VEGAS NEV	F01	G CH 04	03PM 04 06	ND	ND	25
LAS VEGAS NEV	F01	G CH 04	04AM 04 06	ND	ND	40
LAS VEGAS NEV	F01	D FD 04	04AM 04 06	ND	ND	70
LAS VEGAS NEV	F01	D FD 04	04PM 04 06	ND	ND	65
LAS VEGAS NEV	F01	G CH 04	04PM 04 06	ND	ND	55
LAS VEGAS NEV	F01	G CH 04	05AM 04 06	ND	ND	45
LAS VEGAS NEV	F01	D FD 04	05AM 04 06	ND	ND	55
LAS VEGAS NEV	F01	D FD 04	05PM 04 06	ND	ND	85
LAS VEGAS NEV	F01	D FD 04	05PM 04 07	ND	ND	60
LAS VEGAS NEV	F01	G CH 04	05PM 04 07	ND	ND	45
LAS VEGAS NEV	F01	G CH 04	06AM 04 07	ND	ND	30
LAS VEGAS NEV	F01	D FD 04	06AM 04 07	ND	ND	55
LAS VEGAS NEV	F01	G CH 04	06PM 04 08	ND	ND	50
LAS VEGAS NEV	F01	D FD 04	06PM 04 08	ND	ND	50
LAS VEGAS NEV	F01	G CH 04	07AM 04 08	ND	ND	50
LAS VEGAS NEV	F01	D FD 04	07AM 04 08	ND	ND	65
LAS VEGAS NEV	F01	D FD 04	07PM 04 09	ND	ND	70
LAS VEGAS NEV	F01	G CH 04	07PM 04 09	ND	ND	45
LAS VEGAS NEV	F01	G CH 04	08AM 04 09	ND	ND	55
LAS VEGAS NEV	F01	D FD 04	08AM 04 09	ND	ND	65

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	F01 G CH	04 08PM	04 09	ND	ND	55
LAS VEGAS NEV	F01 D FD	04 08PM	04 09	ND	ND	65
LAS VEGAS NEV	F01 G CH	04 09AM	04 09	ND	ND	60
LAS VEGAS NEV	F01 D FD	04 09AM	04 09	ND	ND	50
LAS VEGAS NEV	F01 G CH	04 09PM	04 13	ND	ND	70
LAS VEGAS NEV	F01 D FD	04 09PM	04 13	ND	ND	55
LAS VEGAS NEV	F01 G CH	04 10AM	04 13	ND	ND	55
LAS VEGAS NEV	F01 D FD	04 10AM	04 13	ND	ND	50
LAS VEGAS NEV	F01 G CH	04 13AM	04 14	ND	ND	55
LAS VEGAS NEV	F01 G CH	04 15	04 16	ND	ND	65
LAS VEGAS NEV	F01 G CH	04 17AM	04 20	ND	ND	75

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection. (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
LAS VEGAS NEV	F01 D FD 03	15PM 03 15		1.12	10	9
LAS VEGAS NEV	F01 D FD 03	16AM 03 16		1.16	5	8
LAS VEGAS NEV	F01 D FD 03	17AM 03 17		1.18	ND	10
LAS VEGAS NEV	F01 D FD 03	17PM 03 17		1.14	ND	8
LAS VEGAS NEV	F01 D FD 03	18AM 03 18		1.33	5	7
LAS VEGAS NEV	F01 G CH 03	18PM 03 18		1.31	ND	5
LAS VEGAS NEV	F01 D FD 03	18PM 03 18		1.36	ND	7
LAS VEGAS NEV	F01 G CH 03	19AM 03 19		1.46	ND	4
LAS VEGAS NEV	F01 D FD 03	19AM 03 19		1.22	ND	6
LAS VEGAS NEV	F01 D FD 03	19PM 03 19		1.41	ND	4
LAS VEGAS NEV	F01 G CH 03	19PM 03 19		1.22	5	3
LAS VEGAS NEV	F01 G CH 03	20AM 03 20		1.09	5	4
LAS VEGAS NEV	F01 D FD 03	20AM 03 20		.96	ND	5
LAS VEGAS NEV	F01 G CH 03	20PM 03 21		1.11	5	2
LAS VEGAS NEV	F01 D FD 03	20PM 03 21		1.13	ND	6
LAS VEGAS NEV	F01 G CH 03	21AM 03 21		.98	5	1
LAS VEGAS NEV	F01 D FD 03	21AM 03 21		1.00	ND	4
LAS VEGAS NEV	F01 D FD 03	21PM 03 22		1.01	5	2
LAS VEGAS NEV	F01 G CH 03	21PM 03 22		1.46	ND	6
LAS VEGAS NEV	F01 D FD 03	22AM 03 22		1.35	ND	3
LAS VEGAS NEV	F01 G CH 03	22AM 03 22		1.46	ND	6
LAS VEGAS NEV	F01 D FD 03	22PM 03 23		1.10	5	4
LAS VEGAS NEV	F01 G CH 03	22PM 03 23		1.20	ND	4
LAS VEGAS NEV	F01 D FD 03	23AM 03 23		1.01	ND	5
LAS VEGAS NEV	F01 G CH 03	23AM 03 23		1.18	ND	3
LAS VEGAS NEV	F01 G CH 03	23PM 03 24		1.04	ND	4
LAS VEGAS NEV	F01 D FD 03	23PM 03 24		.96	ND	6
LAS VEGAS NEV	F01 D FD 03	24AM 03 24		.98	ND	4

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
LAS VEGAS NEV	F01 G CH	03 24AM	03 24	1.34	ND	3
LAS VEGAS NEV	F01 D FD	03 24PM	03 25	1.18	ND	4
LAS VEGAS NEV	F01 G CH	03 24PM	03 25	.78	ND	4
LAS VEGAS NEV	F01 D FD	03 25AM	03 25	1.01	5	6
LAS VEGAS NEV	F01 G CH	03 25AM	03 25	1.09	ND	62
LAS VEGAS NEV	F01 G CH	03 25PM	03 26	1.27	ND	3
LAS VEGAS NEV	F01 D FD	03 25PM	03 26	1.12	ND	4
LAS VEGAS NEV	F01 G CH	03 26AM	03 26	1.34	ND	2
LAS VEGAS NEV	F01 D FD	03 26AM	03 26	1.25	5	6
LAS VEGAS NEV	F01 G CH	03 26PM	03 27	1.10	ND	4
LAS VEGAS NEV	F01 D FD	03 26PM	03 27	.	ND	5
LAS VEGAS NEV	F01 G CH	03 27AM	03 27	.	ND	2
LAS VEGAS NEV	F01 D FD	03 27AM	03 27	.92	10	10
LAS VEGAS NEV	F01 G CH	03 27PM	03 29	1.28	5	2
LAS VEGAS NEV	F01 D FD	03 27PM	03 30	1.47	ND	6
LAS VEGAS NEV	F01 G CH	03 28AM	03 30	1.34	ND	2
LAS VEGAS NEV	F01 G CH	03 28PM	03 29	1.28	ND	2
LAS VEGAS NEV	F01 D FD	03 28AM	03 30	1.44	5	4
LAS VEGAS NEV	F01 G CH	03 29AM	03 29	1.36	ND	3
LAS VEGAS NEV	F01 D FD	03 29AM	03 30	1.49	5	5
LAS VEGAS NEV	F01 G CH	03 30PM	03 31	1.30	5	3
LAS VEGAS NEV	F01 D FD	03 30PM	03 31	1.07	ND	4
LAS VEGAS NEV	F01 G CH	03 31AM	03 31	1.30	5	3
LAS VEGAS NEV	F01 D FD	03 31AM	03 31	1.07	ND	4
LAS VEGAS NEV	F01 G CH	04 01PM	04 02	1.22	ND	3

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
LAS VEGAS NEV	F01 D FD	04 01PM	04 02	1.05	ND	3
LAS VEGAS NEV	F01 G CH	04 02AM	04 02	1.22	ND	3
LAS VEGAS NEV	F01 D FD	04 02AM	04 02	1.05	ND	3
LAS VEGAS NEV	F01 G CH	04 03PM	04 06	1.06	ND	3
LAS VEGAS NEV	F01 D FD	04 04PM	04 06	1.14	ND	7
LAS VEGAS NEV	F01 G CH	04 04PM	04 06	1.11	ND	5
LAS VEGAS NEV	F01 G CH	04 04AM	04 06	1.11	ND	5
LAS VEGAS NEV	F01 D FD	04 05PM	04 06	1.14	ND	7
LAS VEGAS NEV	F01 G CH	04 05AM	04 06	1.06	ND	3
LAS VEGAS NEV	F01 D FD	04 05AM	04 06		SMPL	LOST
LAS VEGAS NEV	F01 G CH	04 07AM	04 08	.92	ND	6
LAS VEGAS NEV	F01 G CH	04 08PM	04 09	1.31	5	3
LAS VEGAS NEV	F01 D FD	04 08PM	04 09	1.22	ND	4
LAS VEGAS NEV	F01 G CH	04 09PM	04 13	1.26	5	5
LAS VEGAS NEV	F01 D FD	04 09PM	04 13	1.22	ND	3
LAS VEGAS NEV	F01 G CH	04 10AM	04 13	1.10	ND	5
LAS VEGAS NEV	F01 D FD	04 10AM	04 13	1.25	ND	5
LAS VEGAS NEV	F01 G CH	04 13AM	04 14	1.18	ND	5
LAS VEGAS NEV	F01 G CH	04 15	04 16	1.20	ND	6
LAS VEGAS NEV	F01 G CH	04 17AM	04 20	1.12	5	4

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	F02 D FD 03	15AM	03 15	ND	ND	45
LAS VEGAS NEV	F02 D FD 03	15AM	03 15	ND	ND	50
LAS VEGAS NEV	F02 D FD 03	15PM	03 15	ND	ND	45
LAS VEGAS NEV	F02 D FD 03	16AM	03 16	ND	ND	55
LAS VEGAS NEV	F02 D FD 03	16PM	03 17	ND	ND	35
LAS VEGAS NEV	F02 D FD 03	17AM	03 17	ND	ND	45
LAS VEGAS NEV	F02 G CH 03	17PM	03 18	ND	ND	50
LAS VEGAS NEV	F02 D FD 03	17PM	03 18	40	ND	50
LAS VEGAS NEV	F02 D FD 03	18AM	03 18	ND	ND	55
LAS VEGAS NEV	F02 G CH 03	18AM	03 18	40	ND	50
LAS VEGAS NEV	F02 G CH 03	18PM	03 18	50	ND	50
LAS VEGAS NEV	F02 G CH 03	18PM	03 18	50	10	50
LAS VEGAS NEV	F02 D FD 03	18PM	03 18	ND	ND	60
LAS VEGAS NEV	F02 G CH 03	19AM	03 19	ND	ND	60
LAS VEGAS NEV	F02 D FD 03	19AM	03 19	ND	ND	50
LAS VEGAS NEV	F02 D FD 03	19PM	03 20	40	ND	55
LAS VEGAS NEV	F02 G CH 03	19PM	03 20	40	ND	50
LAS VEGAS NEV	F02 G CH 03	20AM	03 20	60	ND	45
LAS VEGAS NEV	F02 D FD 03	20AM	03 20	40	ND	45
LAS VEGAS NEV	F02 G CH 03	20PM	03 21	70	ND	60
LAS VEGAS NEV	F02 D FD 03	20PM	03 21	ND	ND	20
LAS VEGAS NEV	F02 G CH 03	21AM	03 21	60	ND	55
LAS VEGAS NEV	F02 D FD 03	21AM	03 21	30	ND	50
LAS VEGAS NEV	F02 D FD 03	21PM	03 22	30	ND	50
LAS VEGAS NEV	F02 G CH 03	21PM	03 22	60	ND	35
LAS VEGAS NEV	F02 D FD 03	22AM	03 22	ND	ND	50
LAS VEGAS NEV	F02 G CH 03	22AM	03 22	ND	ND	35
LAS VEGAS NEV	F02 D FD 03	22PM	03 23	ND	ND	45

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	PC/L		
				I 131	I 133	CS 137
LAS VEGAS NEV	F02 G CH 03 22PM	03 23		30	ND	45
LAS VEGAS NEV	F02 D FD 03 23AM	03 23		ND	ND	35
LAS VEGAS NEV	F02 G CH 03 23AM	03 23		50	ND	45
LAS VEGAS NEV	F02 G CH 03 23PM	03 24		ND	ND	50
LAS VEGAS NEV	F02 D FD 03 23PM	03 24		ND	ND	55
LAS VEGAS NEV	F02 D FD 03 24AM	03 24		ND	ND	45
LAS VEGAS NEV	F02 G CH 03 24AM	03 24		ND	ND	40
LAS VEGAS NEV	F02 G CH 03 24PM	03 25		30	ND	45
LAS VEGAS NEV	F02 D FD 03 24PM	03 25		ND	ND	35
LAS VEGAS NEV	F02 G CH 03 25AM	03 25		30	ND	45
LAS VEGAS NEV	F02 D FD 03 25AM	03 25		ND	ND	35
LAS VEGAS NEV	F02 G CH 03 25PM	03 26		40	ND	50
LAS VEGAS NEV	F02 D FD 03 25PM	03 26		ND	ND	40
LAS VEGAS NEV	F02 G CH 03 26AM	03 26		ND	ND	45
LAS VEGAS NEV	F02 D FD 03 26AM	03 26		ND	ND	40
LAS VEGAS NEV	F02 D FD 03 26PM	03 27		ND	ND	40
LAS VEGAS NEV	F02 G CH 03 26PM	03 27		ND	ND	45
LAS VEGAS NEV	F02 D FD 03 27AM	03 27		ND	ND	35
LAS VEGAS NEV	F02 G CH 03 27AM	03 27		40	ND	50
LAS VEGAS NEV	F02 D FD 03 27PM	03 30		ND	ND	35
LAS VEGAS NEV	F02 G CH 03 27PM	03 29		50	ND	40
LAS VEGAS NEV	F02 G CH 03 28AM	03 29		ND	ND	45
LAS VEGAS NEV	F02 D FD 03 28PM	03 30		ND	ND	45
LAS VEGAS NEV	F02 G CH 03 28PM	03 29		ND	ND	45
LAS VEGAS NEV	F02 G CH 03 29AM	03 29		ND	ND	40
LAS VEGAS NEV	F02 G CH 03 29PM	03 31		ND	ND	35
LAS VEGAS NEV	F02 D FD 03 29PM	03 30		ND	ND	35
LAS VEGAS NEV	F02 G CH 03 30AM	03 31		ND	ND	40

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE	DATE	I	PC/L	CS
		COLL.	COUNT	131	133	
LAS VEGAS NEV	F02 G CH	03 30PM	03 31	30	ND	40
LAS VEGAS NEV	F02 D FD	03 30PM	03 31	ND	ND	35
LAS VEGAS NEV	F02 G CH	03 31AM	03 31	ND	ND	35
LAS VEGAS NEV	F02 D FD	03 31AM	03 31	ND	ND	35
LAS VEGAS NEV	F02 D FD	03 31PM	04 01	ND	ND	45
LAS VEGAS NEV	F02 D FD	04 01AM	04 01	ND	ND	50
LAS VEGAS NEV	F02 D FD	04 02AM	04 03	ND	ND	55
LAS VEGAS NEV	F02 G CH	04 03AM	04 03	ND	ND	35
LAS VEGAS NEV	F02 G CH	04 04AM	04 06	ND	ND	40
LAS VEGAS NEV	F02 G CH	04 05AM	04 06	ND	ND	30
LAS VEGAS NEV	F02 G CH	04 06AM	04 07	ND	ND	35
LAS VEGAS NEV	F02 G CH	04 07AM	04 08	ND	ND	50
LAS VEGAS NEV	F02 G CH	04 08AM	04 09	ND	ND	45
LAS VEGAS NEV	F02 G CH	04 09AM	04 10	ND	ND	40
LAS VEGAS NEV	F02 G CH	04 10AM	04 15	ND	ND	25
LAS VEGAS NEV	F02 G CH	04 13AM	04 14	ND	ND	45
LAS VEGAS NEV	F02 G CH	04 15AM	04 16	ND	ND	35
LAS VEGAS NEV	F02 G CH	04 17AM	04 20	ND	ND	75

Table 2. Results of raw milk samples collected following the Pike Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
LAS VEGAS NEV	F02 D FD 03	15AM	03 15	1.60	ND	7
LAS VEGAS NEV	F02 D FD 03	16AM	03 16	1.36	ND	18
LAS VEGAS NEV	F02 D FD 03	16PM	03 17	1.36	ND	11
LAS VEGAS NEV	F02 D FD 03	17AM	03 17	1.40	ND	11
LAS VEGAS NEV	F02 G CH 03	17PM	03 18	1.62	ND	6
LAS VEGAS NEV	F02 D FD 03	17PM	03 18	1.38	5	9
LAS VEGAS NEV	F02 D FD 03	18AM	03 18	1.58	ND	11
LAS VEGAS NEV	F02 G CH 03	18AM	03 18	1.62	ND	6
LAS VEGAS NEV	F02 G CH 03	18PM	03 18	1.47	ND	3
LAS VEGAS NEV	F02 D FD 03	18PM	03 18	1.60	5	6
LAS VEGAS NEV	F02 G CH 03	19AM	03 19	1.30	ND	5
LAS VEGAS NEV	F02 G CH 03	19PM	03 20	1.41	ND	3
LAS VEGAS NEV	F02 D FD 03	19AM	03 20	1.50	ND	6
LAS VEGAS NEV	F02 D FD 03	19PM	03 19	1.57	ND	6
LAS VEGAS NEV	F02 G CH 03	20AM	03 20	1.39	5	3
LAS VEGAS NEV	F02 D FD 03	20AM	03 20	1.25	ND	3
LAS VEGAS NEV	F02 G CH 03	20PM	03 21	1.54	ND	5
LAS VEGAS NEV	F02 D FD 03	20PM	03 21	1.47	ND	4
LAS VEGAS NEV	F02 G CH 03	21AM	03 21	1.56	ND	6
LAS VEGAS NEV	F02 D FD 03	21PM	03 22	1.60	ND	6
LAS VEGAS NEV	F02 G CH 03	21PM	03 22	1.46	ND	6
LAS VEGAS NEV	F02 D FD 03	22AM	03 22	1.61	ND	7
LAS VEGAS NEV	F02 G CH 03	22AM	03 22	1.53	ND	6
LAS VEGAS NEV	F02 D FD 03	22PM	03 23	1.71	5	5
LAS VEGAS NEV	F02 G CH 03	22PM	03 23	1.54	ND	6
LAS VEGAS NEV	F02 D FD 03	23AM	03 23	1.56	ND	6
LAS VEGAS NEV	F02 G CH 03	23AM	03 23	1.38	ND	5
LAS VEGAS NEV	F02 G CH 03	23PM	03 24	1.65	ND	7
LAS VEGAS NEV	F02 D FD 03	23PM	03 24	1.59	5	6

Table 2. Results of raw milk samples collected following the P-93 Event (activity extrapolated to time of collection). (continued)

LOCATION	ID	DATE COLL.	DATE COUNT	GR/L CA	PC/L SR 89	PC/L SR 90
LAS VEGAS NEV	F02	03 24AM	03 24	1.48	ND	8
LAS VEGAS NEV	F02	03 24AM	03 24	1.50	ND	5
LAS VEGAS NEV	F02	03 24PM	03 25	1.49	5	4
LAS VEGAS NEV	F02	03 24PM	03 25	1.46	ND	6
LAS VEGAS NEV	F02	03 25AM	03 25	1.47	ND	7
LAS VEGAS NEV	F02	03 25PM	03 26	1.49	5	3
LAS VEGAS NEV	F02	03 25PM	03 26	1.50	ND	15
LAS VEGAS NEV	F02	03 26AM	03 26	1.59	ND	5
LAS VEGAS NEV	F02	03 26AM	03 26	1.53	ND	5
LAS VEGAS NEV	F02	03 26PM	03 27	1.58	ND	5
LAS VEGAS NEV	F02	03 26PM	03 27	1.59	ND	11
LAS VEGAS NEV	F02	03 27AM	03 27	1.46	ND	6
LAS VEGAS NEV	F02	03 27AM	03 27	1.49	5	4
LAS VEGAS NEV	F02	03 28PM	03 29	1.54	5	5
LAS VEGAS NEV	F02	03 30AM	03 31	1.42	5	12
LAS VEGAS NEV	F02	03 30PM	03 31	1.42	5	12
LAS VEGAS NEV	F02	03 30PM	03 31	1.28	ND	7
LAS VEGAS NEV	F02	03 31AM	03 31	1.52	ND	7
LAS VEGAS NEV	F02	03 31AM	03 31	1.28	ND	7
LAS VEGAS NEV	F02	04 02AM	04 03	0	ND	7
LAS VEGAS NEV	F02	04 04AM	04 06	1.28	5	20
LAS VEGAS NEV	F02	04 05AM	04 06	1.28	5	20
LAS VEGAS NEV	F02	04 10AM	04 15	0	ND	10
LAS VEGAS NEV	F02	04 13AM	04 14	1.71	5	5
LAS VEGAS NEV	F02	04 15AM	04 16	1.35	5	5
LAS VEGAS NEV	F02	04 17AM	04 20	1.59	ND	8

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
NEVADA								
Adaven								
Simpson	7/09/63	<20	140	<10	20	12	1.38	1.4
	8/09/63	50	295	<10	45	31	1.15	1.5
	4/16/64	<20	370	<10	20	29	1.46	1.4
Alamo								
Stewart	7/08/63	<20	65	<10	25	7	.87	1.9
	8/20/63	<20	60	<10	15	6	1.14	1.7
	11/19/63	<20	40	<10	5	6	1.22	1.6
	12/10/63	<20	20	<10	<5	9	1.25	1.0
	1/27/64	<20	50	<10	<5	8	1.13	1.5
	3/03/64	<20	120	<10	5	17	1.20	1.4
	3/30/64	<20	130	<10	8	21	1.23	1.3
	4/29/64	<20	180	<10	10	19	1.22	1.7
Battle Mountain	8/21/63	<20	85	<10	5	6	1.25	1.5
Caliente								
Young	7/09/63	<20	55	<10	25	7	1.13	1.5
	8/21/63	<20	60	<10	10	3	1.15	1.6
	10/03/63	<20	50	<10	5	4	1.17	1.9
	11/20/63	<20	50	<10	5	11	1.32	1.9
	12/11/63	<20	35	<10	<5	8	1.21	1.5
	1/28/64	<20	65	<10	5	10	1.11	1.5
	3/05/64	<20	75	<10	<5	10	1.46	1.7
	3/30/64	<20	85	<10	<5	27	1.62	0.9
	4/29/64	too sour to analyze						
Currant								
Blue Eagle Ranch	7/11/63	<20	315	<10	70	24	1.30	1.1
	8/22/63	<20	130	<10	20	10	1.34	1.8

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
NEVADA (cont')								
Currant(cont')								
Blue Eagle Ranch(cont')	9/20/63	<20	115	<10	20	12	1.22	1.7
	10/15/63	<20	138	<10	10	1	1.23	1.6
	11/15/63	<20	295	<10	20	34	1.28	1.6
	11/21/63	<20	260	<10	15	28	1.42	1.7
	1/24/64	<20	375	<10	10	55	1.17	1.4
	2/19/64	<20	310	<10	5	55	1.33	1.7
	4/02/64	<20	455	<10	15	56	1.20	
Duckwater								
Halstead	8/20/63	<20	115	<10	20	15	1.12	1.8
	10/15/63	<20	305	<10			1.09	1.7
	11/14/63	<20	290	<10	20	54	1.23	1.8
	11/20/63	<20	305	<10	25	49	1.20	1.5
	1/23/64	<20	100	<10	<5	6	1.44	1.6
	1/23/64	<20	340	<10	5	44	1.29	1.3
	2/19/64	<20	365	<10	5	102	1.26	1.1
Elgin	7/10/63	<20	90	<10	105	31	.12	2.0
Eureka								
Fish Creek Ranch	7/09/63	<20	350	<10	95	31	1.26	1.5
	8/20/63	<20	390	<10	70	49	1.22	1.6
	9/18/63	<20	145	<10	20	11	1.07	1.8
	10/14/63	<20	245	<10	15	3	1.26	1.6
	11/14/63	<20	350	<10	20	35	1.20	1.6
	2/04/64	<20	150	<10	<5	26	1.29	1.1
	3/05/64	<20	305	<10	5	32	1.22	1.4
	4/01/64	<20	210	<10	<5	30	0.76	
Hiko								
Hanson	7/10/63	<20	85	<10				1.5
	8/21/63	<20	65	<10	10	5	.96	1.7

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
NEVADA (cont')								
Hiko (cont')								
Hanson (cont')	10/01/63	<20	50	<10	10	7	1.13	1.6
	11/20/63	<20	55	<10	<5	8	1.32	1.4
	12/10/63	<20	100	<10	5	9	1.26	1.5
	1/27/64	<20	60	<10	<5	7	1.16	1.5
	3/03/64	<20	45	<10	5	7	1.20	1.3
	3/30/64	<20	60	<10	<5	10	1.37	1.5
	4/29/64	<20	90	<10	5	11	1.16	1.5
Ione	10/23/63	<20	70	<10	5	17	1.32	1.4
Las Vegas								
Anderson Dairy	7/15/63	<20	110	<10	35	13	1.16	1.6
	8/15/63	<20	140	<10	25	16	1.15	1.5
	9/17/63	<20	80	<10	15	11	1.11	1.8
	10/18/63	<20	100	<10	10	1	1.09	1.8
	11/14/63	<20	115	<10	5	12	1.23	1.7
	12/16/63	<20	95	<10	5	13	1.15	1.4
	1/16/64	<20	110	<10	5	15	1.24	1.7
	2/24/64	<20	130	<10	5	19	1.14	1.6
	3/11/64	<20	115	<10	8	15	1.16	1.4
	4/17/64	<20	110	<10	10	12	1.20	1.6
	6/23/64	<20	65	<10	5	8	1.15	1.5
Arden Dairy	8/15/63	<20	40	<10	5	4	1.14	1.7
	9/17/63	<20	35	<10	<5	5	1.11	1.7
	10/18/63	<20	45	<10	35	5	1.18	1.7
	11/14/63	<20	55	<10	5	8	1.14	1.6
	12/16/63	<20	45	<10	<5	35	1.13	1.7
	1/16/64	<20	70	<10	5	13	1.22	1.6
	2/24/64	<20	70	<10	5	19	1.17	1.6
	3/11/64	<20	100	<10	5	14	1.14	1.6
	4/17/64	<20	95	<10	<5	11	1.20	1.8
	6/23/64	<20	65	<10	<5	6	1.17	1.5

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)		
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K	
NEVADA(cont')									
Las Vegas(cont')									
Bliss Dairy	7/15/63	<20	60	<10	20	5	1.14	1.5	
	8/15/63	<20	205	<10	30	21	1.14	1.5	
	9/17/63	<20	70	<10	10	10	1.10	1.7	
	10/18/63	<20	75	<10	10	1	1.13	1.7	
	11/14/63	<20	110	<10	10	15	1.14	1.7	
	12/16/63	<20	110	<10	5	9	1.14	1.5	
	1/16/64	<20	95	<10	5	13	1.24	1.7	
	3/11/64	<20	130	<10	<5	17	1.18	1.6	
	4/02/64	<20	105	<10	10	14		1.2	
	4/17/64	<20	110	<10	5	13	1.29	1.6	
	6/23/64	<20	85	<10	5	15	1.34	1.2	
Hiland Dairy	2/24/64	<20	115	<10	5	20	1.23	1.6	
	3/11/64	<20	130	<10	5	16	1.22	1.6	
	4/02/64	20	105	<10	15	14	1.00		
	4/17/64	<20	110	<10	5	11	1.16	1.7	
	6/23/64	<20	40	<10	10	8	1.25	1.1	
Hinie's Dairy	7/15/63	<20	30	<10	20	8	1.14	1.6	
	8/15/63	<20	15	<10	<5	3	1.15	1.7	
	9/17/63	<20	25	<10	<5	4	1.11	1.6	
	10/18/63	<20	40	<10	5		1.09	1.6	
	11/14/63	<20	60	<10	5	9	1.12	1.7	
	12/16/63	<20	60	<10	<5	15	1.13	1.7	
	1/16/64	<20	90	<10	8	12	1.17	1.6	
	2/24/64	<20	95	<10	5	11	1.13	1.6	
	3/11/64	<20	80	<10				1.5	
	4/02/64	<20	80	<10	<5	10	0.97	1.4	
	4/17/64	<20	90	<10	<5	14	1.16	1.5	
	6/23/64	<20	30	<10	5	5	1.08	1.2	

Table 5. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)		
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K	
NEVADA (cont')									
Las Vegas(cont')									
Meadow Gold Dairy	7/15/63	<20	145	<10	55	23	1.18	1.5	
	7/15/63	<20	75	<10	20	8	1.15	1.6	
	8/15/63	<20	160	<10	30	18	1.18	1.6	
	9/17/63	<20	160	<10	35	23	1.10	1.6	
	10/18/63	<20	115	<10	20	1	1.17	1.6	
	11/14/63	<20	120	<10	15	18	1.20	1.6	
	12/16/63	<20	105	<10	10	14	1.17	1.5	
	1/16/64	<20	105	<10	5	18	1.14	1.6	
	2/24/64	<20	115	<10	<5	12	1.23	1.5	
	3/11/64	<20	115	<10	<5	17	1.20	1.7	
	4/17/64	<20	150	<10	15	23	1.25	1.3	
	6/23/64	sample lost			5	22	1.15		
Lathrop Wells									
Selbach	12/14/63	<20	<5	<10				1.2	
	12/16/63	<20	40	<10				1.8	
	12/17/63	<20	<5	<10				1.5	
	12/19/63	<20	60	<10				1.5	
	1/10/64	<20	35	<10	<5	4	1.19	1.5	
	2/14/64	<20	25	<10	<5	15	1.20	1.4	
Lida Stevens									
	7/15/63	<20	155	<10	35	32	1.49	1.8	
	8/01/63	<20	90	<10	10	12	1.39	2.0	
	8/07/63	<20	85	<10	5	14	1.42	1.8	
	8/14/63	<20	90	<10	15	16		1.5	
	9/09/63	<20	60	<10	15	5	1.40	1.8	
	10/30/63	<20	100	<10	5	1	1.39	1.6	
	12/05/63	<20	70	<10	<5	7	1.24	1.2	
	1/18/64	<20	50	<10	<5	10	1.07	0.9	
	2/06/64				<5	9	1.66		
	3/04/64	<20	60	<10	5	17	1.63	1.0	

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
NEVADA(cont')								
Lida(cont')								
Stevens(cont')	4/01/64	<20	130	<10	25	21	1.52	
	4/30/64	<20	110	<10				1.5
	6/02/64	<20	100	<10	<5	21	1.15	1.4
	6/30/64		too sour to analyze					
Lund								
McKenzie	7/09/63	<20	190	<10	65	23	1.18	1.4
	8/07/63	<20	260	<10	45	29	1.14	1.6
	8/19/63	<20	110	<10	35	15	1.23	1.3
	8/21/63	<20	255	<10	20	26	1.07	1.6
	8/28/63	<20	240	<10	35	22	.92	1.5
	9/04/63	<20	255	<10	35	25	1.22	1.8
	9/19/63	<20	280	<10	35	25	.97	1.5
	9/26/63	<20	270	<10	30	23	.97	
	10/21/63	<20	265	<10	30	2	1.16	1.6
	10/28/63	<20	270	<10	35	24	1.11	1.7
	11/04/63	<20	245	<10	5	20	1.03	1.4
	11/08/63	<20	270	<10	15	2	1.14	1.7
	11/13/63	<20	285	<10	20	28	1.14	1.6
	11/20/63	<20	295	<10	20	33	1.19	1.5
	11/27/63	<20	295	<10	15	31	1.17	1.6
	12/04/63	<20	290	<10	20	30	1.19	1.5
	12/12/63	<20	155	<10	5	15	1.13	1.5
	12/27/63	<20	145	<10	<5	16	1.24	1.6
	1/08/64	<20	185	<10	5	23	1.15	1.5
	1/16/64	<20	170	<10	5	24	1.25	1.6
	1/24/64	<20	170	<10	5	23	1.12	1.6
	1/29/64	<20	175	<10	<5	24	1.12	1.7
	2/05/64	<20	160	<10	5	25	1.18	1.7

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)		
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K	
NEVADA (cont')									
Lund (cont')									
McKenzie	2/14/64	<20	165	<10	8	72	1.14	1.6	
	2/20/64	<20	150	<10	<5	23	1.23	1.6	
	2/27/64	<20	170	<10	10	23	1.14	1.6	
	3/05/64	<20	155	<10	5	17	1.22	1.5	
	3/12/64	<20	165	<10	5	17	1.16	1.7	
	3/19/64	<20	115	<10	10	15	1.14	1.3	
	3/26/64	<20	135	<10	5	24	1.22	1.6	
	4/03/64	<20	25	<10	<5	26	1.02		
	4/09/64	<20	180	<10	<5	24	1.16	1.4	
	4/15/64	<20	110	<10	15	13	1.18	0.9	
	4/23/64	<20	170	<10	5	25	1.15	1.4	
	4/30/64	<20	165	<10	<5	23	1.20	1.5	
	5/08/64	<20	125	<10	5	17	1.17	1.5	
	5/14/64	<20	260	<10	10	28	1.19	1.5	
	5/21/64	<20	235	<10	<5	37	1.15	1.3	
	5/29/64	<20	325	<10	5	39	1.15	1.6	
	6/04/64	<20	270	<10	5	30	1.19	1.4	
	6/10/64	<20	235	<10	10	37	1.17	1.5	
	6/18/64	<20	375	<10	5	40	1.20	1.6	
Manhattan									
Peavine Ranch	8/14/63	<20	125	<10	35	19		1.4	
	8/21/63	<20	70	<10	10	7	1.33	1.4	
	8/27/63	<20	165	<10	25	19	1.27	1.7	
	9/10/63	<20	245	<10	15	6	1.40	1.9	
	9/17/63	<20	310	<10	50	30	1.15	1.8	
	9/25/63	<20	330	<10	45	3	1.23	1.9	
	10/01/63	<20	330	<10	35	30	1.20	1.6	
	10/09/63	<20	215	<10	20	30	1.30	1.7	

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
NEVADA(cont ¹)								
Manhattan(cont ¹)								
Peavine Ranch(cont ¹)	10/14/63	<20	130	<10	15	2	1.35	1.5
	10/21/63	<20	245	<10	25	2	1.19	1.5
	10/17/63	<20	100	<10	15	23	1.25	1.9
	10/24/63	<20	255	<10	15	23	1.25	1.2
	10/28/63	<20	270	<10	25	3	1.48	1.3
	10/28/63	<20	265	<10	25	3	1.18	1.6
	10/31/63	<20	295	<10	25	32	1.31	1.7
	11/04/63	<20	310	<10				1.5
	11/11/63	<20	315	<10	30	3	1.27	1.5
	12/01/63	<20	215	<10	15	23	1.27	1.7
	1/04/64	<20	75	<10	<5	5	1.05	1.7
	2/03/64	<20	345	<10	10	31	1.26	1.3
	3/05/64	<20	95	<10	<5	6	1.25	1.5
	4/29/64	<20	45	<10				1.5
	6/03/64	<20	80	<10	10	5	1.52	1.3
Moapa								
K. Searles	7/11/63	<20	65	<10	35	14	1.00	1.4
	8/20/63	<20	60	<10	10	6	1.10	1.6
	12/09/63	<20	80	<10	5	11	1.17	1.5
	1/29/64	<20	80	<10	<5	12	1.15	1.6
	3/06/64	<20	125	<10	<5	36	1.16	1.3
	3/30/64	<20	115	<10	<5	14	1.17	1.4
	4/29/64	<20	90	<10	5	9	1.23	1.6
Nyala								
Sharp	7/09/63	<20	155	<10				1.5
Casey's Ranch	10/14/63	<20	105	<10	75		1.41	1.6
Sharp	4/01/64	<20	425	<10	<5	45	1.24	1.5

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)		
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba - La	⁸⁹ Sr	⁹⁰ Sr	Ca	K	
NEVADA(cont¹)									
Pahrump									
Bowman Ranch	7/19/63	<20	40	<10	10	5	1.25	1.6	
	7/29/63	<20	115	<10	25	8	1.26	1.3	
	8/08/63				5	5	1.25		
	8/26/63	<20	40	<10	5	2	1.46	1.3	
	9/11/63	<20	40	<10	5	7	1.30	1.5	
	9/17/63	<20	55	<10	5	5	1.22	1.5	
	9/26/63	<20	35	<10	10	3	1.41	1.5	
	10/02/63	<20	30	<10	<5	2	1.17	1.5	
	10/08/63	<20	30	<10	<5	2	1.20	1.5	
	10/18/63	<20	40	<10	<5		1.14	1.6	
	10/24/63	<20	55	<10	5	5	1.12	1.6	
	11/01/63	<20	65	<10	<5		1.18	1.9	
	11/08/63	<20	55	<10	5	5	1.17	1.8	
	11/14/63	<20	60	<10	5	5	1.14	1.8	
	11/20/63	<20	45	<10	<5	4	1.22	1.6	
	12/04/63	<20	35	<10	<5	3	1.21	1.6	
	12/14/63	<20	60	<10				1.5	
	12/14/63	<20	35	<10				1.3	
	12/16/63	<20	35	<10				1.3	
	12/17/63	<20	40	<10				1.4	
	12/17/63	<20	55	<10				1.4	
	1/07/64	<20	30	<10	<5	2	1.29	1.5	
	2/14/64	<20	50	<10		sour		1.4	
	3/31/64	<20	40	<10	<5	3	1.28		
	5/02/64	<20	50	<10	<5	8	1.26	1.6	
	5/29/64	<20	45	<10	<5	8	1.32	1.6	
Pioche									
Horlacher	7/09/63	<20	120	<10				1.5	
	8/21/63	<20	60	<10	10	6	1.07	1.6	

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
NEVADA(cont')								
Pioche(cont')								
Horlacher(cont')	10/03/63	<20	45	<10	5	7	1.04	1.6
	11/20/63				5	5	.99	
	12/11/63	<20	<5	<10	<5	5	1.42	0.9
	1/29/64	<20	50	<10	<5	9	1.86	1.7
	3/04/64	<20	50	<10	<5	4	1.39	1.4
	3/30/64	<20	30	<10	<5	5	1.35	1.2
	4/29/64		too sour to analyze					
Springdale								
Peacock	7/17/63	<20	125	<10	25	11	1.20	1.4
	8/01/63	<20	50	<10				1.7
	8/12/63	<20	90	<10	20	9	1.18	1.6
	8/15/63	<20	80	<10	15	7	1.20	1.4
	8/27/63	<20	80	<10	10	8	1.31	1.6
	9/04/63	<20	100	<10	15	7	1.26	1.4
	9/11/63	<20	80	<10	55	23	1.20	1.7
	9/18/63	<20	50	<10	5	6	1.11	1.5
	9/25/63	<20	105	<10	<5	5	1.31	1.7
	10/09/63	<20	80	<10	10	8	1.22	1.7
	10/21/63	<20	90	<10	10	1	1.29	1.3
	10/28/63	<20	115	<10	10	9	1.19	1.6
	11/01/63	<20	90	<10	5	1	1.18	1.4
	11/08/63	<20	115	<10	5	8	1.25	1.4
	11/18/63	<20	130	<10	5	7	1.33	1.3
	12/03/63	<20	90	<10	<5	9	1.33	1.4
	12/20/63	<20	100	<10	<5	7	1.19	1.4
	1/07/64	<20	100	<10	<5	7	1.25	1.5
	2/11/64	<20	95	<10	<5	4	1.24	1.4
	3/04/64	<20	115	<10	<5	11	1.35	1.3

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)		
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K	
NEVADA(cont')									
Springdale(cont')									
Peacock(cont')		4/02/64	<20	75	<10	5	5	1.38	
		5/03/64	<20	125	<10	5	10	1.32 1.5	
		5/27/64	<20	60	<10	<5	6	1.34 1.4	
Tonopah		7/16/63	<20	55	<10	20	8	1.39 1.7	
		7/31/63	<20	55	<10	10	5	1.33 1.5	
		9/03/63	<20	235	<10	40	17	1.13 1.6	
NEW MEXICO									
Eunice		9/18/63	<20	40	<10	15	12	1.15 1.6	
Lovington		9/17/63	<20	30	<10	<5	4	1.12 1.7	
Artesia		4/21/64	<20	45	<10	5	4	1.13 1.6	
Carlsbad		4/22/64	<20	50	<10	<5	6	1.18 1.5	
White City		4/22/64	<20	45	<10	<5	3	1.09 1.5	
CALIFORNIA									
Apple Valley		12/19/63	<20	130	<10			1.8	
Barstow		12/16/63	<20	50	<10			1.5	
		12/19/63	<20	35	<10			1.3	
Brawley		12/18/63						1.5	
W. Riverside, Rubidoux		12/17/63	<20	40	<10			1.5	
San Bernardino		12/18/63	<20	55	<10			1.7	
San Diego		12/17/63	<20	35	<10			1.6	
Vista		12/17/63	<20	20	<10			1.6	

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)		
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K	
UTAH									
Garrison									
Gonders	7/08/63	<20	50	<10	25	9	1.20	1.6	
	8/21/63	<20	80	<10	10	8	1.22	1.7	
	9/18/63	<20	100	<10	15	15	1.22	1.5	
	10/14/63	<20	90	<10				1.7	
	11/14/63	<20	75	<10	5	14	1.31	1.7	
	1/23/64	<20	50	<10	5	9	1.34	1.4	
	2/20/64	<20	30	<10	<5	9	1.20	1.5	
	3/31/64	<20	100	<10	5	18	1.12	1.5	
Newcastle	7/26/63	<20	137	<10	55	17	1.20	1.6	
	9/04/63	<20	20	<10	35	25	1.21	1.9	
	10/02/63	<20	120	<10	15	18	1.14	1.7	
	10/14/63	<20	70	<10				1.7	
	10/30/63	<20	70	<10	10	.9	1.21	1.7	
	12/05/63	<20	85	<10	<5	15	1.17	1.7	
	1/06/64	<20	60	<10	<5	12	1.17	1.5	
	2/08/64				<5	9	1.19		
	2/19/64	<20	55	<10	<5	13	1.19	1.5	
	2/26/64	<20	70	<10	<5	14	1.18	1.5	
St. George	7/26/63	<20	137	<10	20	15	1.15	1.7	
Cox	9/04/63	<20	150	<10	20	6	1.13	1.5	
	9/13/63	<20	35	<10	5	6	1.12	1.8	
	9/23/63	<20	35	<10	20	5	1.11	1.7	
	9/25/63	<20	45	<10	<5	10	1.08	1.7	
	10/07/63	<20	45	<10	10	5	1.06	1.6	
	10/10/63	<20	45	<10	<5	.8	1.04	1.7	
	10/18/63	<20	90	<10	5	.4	1.13	1.6	
	11/01/63	<20	135	<10	10	1.5	1.11	1.6	

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
UTAH(cont')	.							
St. George(cont')								
Cox(cont')								
	11/08/63	<20	165	<10	10	1.7	1.17	1.9
	11/15/63	<20	125	<10	5	18	1.08	1.7
	11/22/63	<20	155	<10	30	21	1.12	1.7
	12/13/63	<20	175	<10	<5	23	1.19	1.8
	12/20/63	<20	175	<10	5	22	1.17	1.7
	12/27/63	<20	150	<10	5	17	1.17	1.4
	1/03/64	<20	135	<10	<5	19	1.05	1.4
	1/10/64	<20	165	<10	<5	20	1.17	1.7
	1/17/64	<20	170	<10	5	21	1.23	1.7
	1/24/64	<20	145	<10	5	23	1.18	1.5
	1/30/64	<20	135	<10	10	22	1.17	1.6
	2/07/64				5	20	1.24	
	2/14/64	<20	150	<10	<5	22	1.32	1.4
	2/21/64	<20	140	<10	<5	22	1.21	1.5
	2/28/64	<20	150	<10	5	21	1.16	1.6
	3/06/64	<20	135	<10	<5	19	1.28	1.4
	3/13/64	<20	155	<10	<5	22	1.13	1.5
	3/20/64	<20	150	<10	5	24	1.22	1.4
	3/27/64	<20	130	<10	<5	13	1.18	1.5
	4/03/64	<20	135	<10	<5	20	1.16	
	4/10/64	<20	100	<10	<5	6	1.23	1.6
	4/17/64	<20	115	<10	5	18	1.28	1.5
	4/24/64	<20	95	<10	10	12	1.22	1.6
	5/01/64	<20	80	<10	5	13	1.22	1.5
	5/08/64	<20	80	<10	5	14	1.12	1.4
	5/15/64	<20	75	<10	<5	13	1.23	1.6
	5/22/64	<20	60	<10	<5	13	1.21	1.3
	5/29/64	<20	85	<10	5	18	1.39	1.6

Table 3. Results of routine milk sampling - July 1963 through June 1964.

Location	Date Collected	Activity (pCi/l)					Concentrations (gm/l)	
		¹³¹ I	¹³⁷ Cs	¹⁴⁰ Ba-La	⁸⁹ Sr	⁹⁰ Sr	Ca	K
UTAH (cont ¹)								
St. George(cont ¹)								
Cox(cont ¹)	6/05/64	<20	95	<10	<5	13	1.23	1.4
	6/12/64	<20	90	<10	10	13	1.17	1.4
	6/19/64	<20	70	<10	5	12	1.17	1.5

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