RMC-TR-78-04A



# ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

1977 RADIOLOGICAL REPORT
JANUARY 1 TO DECEMBER 31, 1977



Prepared For

PUBLIC SERVICE ELECTRIC AND GAS COMPANY

By

RADIATION MANAGEMENT CORPORATION

APRIL 1978

RMC-TR-78-04A

# 1977 RADIOLOGICAL REPORT

## ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

January 1 to December 31, 1977

Prepared for

Public Service Electric and Gas Company

by

Radiation Management Corporation

April 1978

* This report is the completed version of the original report issued on an interim basis in March 1978. All analytical data for the 1977 program are included in this report.

TABLE OF CONTENTS

## LIST OF FIGURES

SUMMARY

During the period January 1 to December 31, 1977, Radiation Management Corporation participated in the Operational Radiological Environmental Monitoring Program conducted by Public Service Electric and Gas Company at Artificial Island, New Jersey. Salem Nuclear Generating Station (SNGS) Unit #1 became critical on December 11, 1976, thereby initiating the operational phase of the Radiological Environmental Monitoring Program (REMP). This program was designed to identify and quantify concentrations of radioactivity in various environmental media and to quantify ambient radiation levels in the environs of Artificial Island. During the operational phase, the program will monitor the operations of SNGS Unit #1, fulfill the requirements of the SNGS Environmental Technical Specifications, and provide background data for SNGS Unit #2 and Hope Creek Generating Station. This report presents the results of thermoluminescent dosimetry and radiochemical analyses of environmental samples collected during 1977.

A total of 3592 analyses were performed on 1475 environmental samples during the period covered by this report. Samples from the aquatic environment included surface water, edible and prey fish, hardshell crabs, benthos, and sediment. Air particulates, air iodine, and precipitation samples were taken from the atmospheric environment. Samples from the terrestrial environment include well water, potable water, milk, fruits, vegetables, beef, fodder crops, game, and soil. Thermoluminescent dosimeters were used to measure ambient radiation levels.

A wide variety of radionuclides, both naturally occurring and man-made, were found in the above samples. These nuclides were detected at levels similar to those found during the peroperational phase of this program. In general no significant differences were observed between indicator and control stations. Some media showed the after effects of the Peoples Republic of China's nuclear test of September 17, 1977. It is concluded that the radiological characteristics of the environment around Artificial Island were not affected by SNGS Unit #1 during 1977.

## INTRODUCTION

Radiation Management Corporation (RMC) has participated in the Artificial Island Radiological Environmental Monitoring Program (REMP) since January 1973. RMC has previously reported results from the preoperational phase of the REMP for 1973(1), 1974(2), and 1975(3). On December 11, 1976, SNGS Unit #1 became critical, thereby initiating the operational phase of the REMP. RMC has also reported results from the initial operating period between December 11 and December 31, 1976 (5). This report summarizes the operational period between January 1 and December 31, 1977. Interpretation of the data and conclusions are also presented.

Artificial Island will eventually be the site of four nuclear power reactors. Two of the reactors will be part of the Salem Nuclear Generating Station. Unit #1 is a 1090 MWe pressurized water reactor (PWR), and is presently operational. Unit #2, now under construction, will consist of an 1115 MWe PWR and is scheduled for operation in 1979. The remaining two units will be part of the Hope Creek Generating Station.

Artificial Island is actually a man-made peninsula in the Delaware River, created by the deposition of dredging spoils. It is located in Lower Alloways Township, Salem County, New Jersey. The environment around Artificial Island is characterized mainly by the Delaware River and Bay, extensive tidal marshes, and grass lands. These land types make up approximately 85% of the land area within five miles of the site. Most of the remaining land is used for agricultural production. (6)

More specific information on the demography, hydrology, meteorology, and land use characteristics of the local area may be found in the Environmental Report (6), Environmental Statement (7), and the Final Safety Analyses Report (Units 1 and 2) for SNGS (8).

## THE PROGRAM

In the operational phase of the REMP, the program was conducted in accordance with section 3.2 of the SNGS Environmental Technical Specifications. Radioanalytical data were collected for comparison with results from the preoperational phase. Differences between these periods were examined statistically to determine whether any station effects exist. These observations were based on the magnitude and fluctuations of radioactivity levels determined in the preoperational phase.

### Objectives

The objectives of the operational radiological environmental program are:

1. To fulfill the obligations of the Radiological Surveillance-Environmental sections of the Environmental Technical Specifications for SNGS.

2. To determine whether any significant increase occurs in the concentration of radionuclides in critical pathways.

3. To determine if SNGS has caused an increase in the radioactive inventory of long lived radionuclides.

4. To detect any change in ambient gamma radiation levels.

5. To verify that SNGS operations have no detrimental effects on the health and safety of the public or on the environment.

This report as required by section 5.6 of the Salem ETS summarizes the findings of the 1977 REMP. Results of the four year preoperational program have been summarized in reference 4 for purposes of comparison with subsequent operational reports.

### Sample Collection

In order to meet the stated objectives, an appropriate operational REMP was developed by RMC in cooperation with Public Service Electric and Gas Company. The operational REMP includes samples from the aquatic, atmospheric, and terrestrial environments, as well as TLDs to measure ambient radiation. Samples of various media were selected to obtain data for the evaluation of the radiation dose to man and other organisms. Sample types were based on: (1) established critical pathways for the transfer of radionuclides through the environment to man, and (2) experience gained during the preoperational phase. Sampling locations were determined from site meteorology, Delaware estuarian hydrology, local demography, and land uses.

Sampling locations were divided into two classes--indicator and control. Indicator stations are those which are expected to manifest station effects, if any exist; control samples are collected at locations which are believed

to be unaffected by station operations. Fluctuations in the levels of radionuclides and direct radiation at indicator stations are evaluated with respect to analogous fluctuations at control stations, which are unrelated to station operation. Indicator and background station data are also evaluated relative to preoperational data. The REMP for the Artificial Island site includes additional samples and analyses not specifically required by the Salem ETS. The summary tables in this report include these additional samples and analyses.

All samples from the aquatic environment were collected by Ichthyological Associates and shipped to RMC for analysis. Surface water samples were collected in new polyethylene bottles. Sample containers were rinsed twice with the sample medium prior to collection. Edible and prey fish were taken by net, sealed in a bag or jar and shipped frozen. Blue hardshell crabs were taken with wire crab traps, sealed in plastic jars and shipped fresh. Benthos and sediment were taken with a bottom grab sampler.

The atmospheric environment was examined by analyzing air particulate filters, iodine charcoal cartridges, and precipitation. Air particulates were collected on Hollingsworth and Vose H-70-018 filters with low-volume air samplers (1 cfm). Iodine was collected from air by adsorption on TEDA charcoal cartridges connected in series behind the air particulate filters. Air sample volumes were measured with calibrated dry-gas meters corrected to standard temperature and pressure. Precipitation was collected on a 95-square-inch rain gauge. Samples were collected monthly and transferred to new polyethylene bottles. The rain gauge was rinsed at collection with distilled water to include residual particulates in the precipitation samples. Results of subsequent analyses were corrected for the increase in volume. Tritium results were also corrected for the tritium content of the distilled water.

The terrestrial environment was examined by analyzing samples of well water, potable water, milk, beef, food products, fodder crops, bovine thyroid, and soil. Monthly well and potable water samples were taken in new two-gallon polyethylene bottles. Separate raw and treated potable water samples were composited daily by personnel of the Salem Water Company. The Salem Water Company draws its water from Laurel Lake and adjacent wells, which are not expected to be influenced by SNGS liquid discharge. Milk samples were taken in new polyethylene bottles and shipped fresh. Food products, fodder crops, game, bovine thyroid, and soil samples were taken and sealed in plastic bags or jars. Perishable samples were frozen at the time of sampling without any prevervatives.

Ambient radiation levels in the environs were measured with energy-compensated $CaSO_4$(Tm) thermoluminescent dosimeters (TLDs). Packets containing four TLDs each were placed on and around the Artificial Island site at various distances and were exposed on a monthly and quarterly basis.

Appendix A describes and summarizes, in the format of table 5.6-1 of the Salem ETS, the entire operational program as performed in 1977. Appendix B describes the RMC coding system, which specifies sample type and relative locations at a glance. Also in appendix B, Table B-1 gives the pertinent information on individual sampling locations, while maps B-1 and B-2 show the sampling locations.

## Data Interpretation

Radiation Management Corporation has an extensive quality assurance program designed to maximize confidence in the analytical procedures used. The analytical methods and quality control procedures utilized in this program are described in an RMC publication (9). Approximately 20% of the total analytical effort is spent on quality control, including process quality control, instrument quality control, inter-laboratory cross-check analyses, and comprehensive data review. The analytical data generated during the program also are routinely evaluated by the RMC project leader who is the liaison with Public Service Electric and Gas Company personnel. Several factors are important in the interpretation of the data. These factors are discussed here to avoid repetition in sections that follow.

Grab Sampling is a useful and acceptable procedure for taking environmental samples of a medium in which the concentration of radionuclides is expected to vary slowly with time or where intermittent sampling is deemed sufficient to establish the radiological characteristics of the medium. This method, however, is only representative of the sampled medium for that specific location and instant of time. As a result, variation in the radionuclide concentrations of the samples will normally occur. Since these variations will tend to counterbalance one another, the extraction of averages based upon repetitive grab samples is valid.

It is characteristic of environmental monitoring data that many results occur at or below the minimum detectable level (MDL), as defined in reference 9. For reporting and calculation of averages, any result occurring at or below the minimum detectable level is considered to be at that level. Averages obtained using this method are therefore biased high.

Within the data tables (appendix C) an approximate 95% ($\pm 2$ sigma) confidence interval is supplied for those data points above the minimum detectable level. These intervals represent the range of values into which 95% of repeated analyses of the same sample would fall.

Results for each type of sample were grouped according to the analysis performed. Means and standard deviations of these results were calculated when applicable. The calculated standard deviations of grouped data found in appendix C represent sample and not analytical variability. When a group of data was composed of mainly (>50%) MDL values, averages were not calculated.

## RESULTS AND DISCUSSION

The analytical results of the 1977 REMP samples are typically divided into four categories: Aquatic, Atmospheric, Terrestrial, and Direct Radiation. The individual samples and analyses within each category display the unique radiological characteristics of that type of environment. The analytical results for the 1977 REMP samples are summarized in appendix A. The data for individual samples are presented in appendix C.

A census of milk-producing animals was conducted twice during 1977 as part of the REMP. These censuses indicated no new dairy operations within 5 miles of SNGS. They also indicated some slight fluctuations in the number of cows on individual farms and that one farm ceased dairy operations.

### Aquatic Environment

The aquatic environs of Artificial Island comprise a portion of the Delaware River-Bay estuary. Usage by man and the physical characteristics of this system have been described by Thomann (10). Ichthyological Associates is making continual ecological studies (11) of the estuary in the vicinity of Artificial Island. This information has been used in evaluating the aquatic portions of the REMP. The radiological characteristics of the aquatic environs of Artificial Island were studied by analyzing samples of surface water, edible fish, blue crabs, prey fish, benthos and sediment.

#### Surface Water

Monthly surface water samples were taken at five locations in the Delaware estuary. One is downstream from the outfall area, one is in the outfall area, and another is directly west of the outfall area at the mouth of the Appoquinimink River. Two other stations are located upstream--one station is in the river and the other is in the Chesapeake and Delaware Canal. The station located at the mouth of the Appoquinimink River serves as the operational control. Surface water samples were analyzed for tritium, alpha emitters, beta emitters, strontium-89 and-90, and gamma emitters.

Analysis of surface water for H-3 yielded an average concentration of 177 pCi/l and ranged from <80 to 460 pCi/l. These levels are similar to those measured in the preoperational program as shown in figure 1.

Gross alpha concentrations were generally below MDL, which ranged from 1.5 to 33 pCi/l. Only 2 of the 55 samples analyzed showed detectable gross alpha activity. Those results (2 and 14 pCi/l) were within the same range as the MDLs. Alpha activity may be expected in suspended solids from naturally occurring radionuclides especially during periods of high surface runoff.

Gross beta concentrations ranged from 4.3 to 140 pCi/l and averaged 43 pCi/l. Nearly all of the beta activity was contributed by K-40 (<7 to 170 pCi/l), a natural component of salt and brackish waters, as illustrated in figure 2, comparing gross beta and K-40 concentrations in the Delaware River. Due to the flow rate variations and the tidal nature of the estuarine enviornment, large variations in the gross beta concentration were observed throughout the year. Much of this variation can be attributed to the tidal stage at the time of sampling.

# Average Concentrations of Tritium in Delaware Estuary Waters in the Vicinity of Artificial Island

## 1973 through 1977

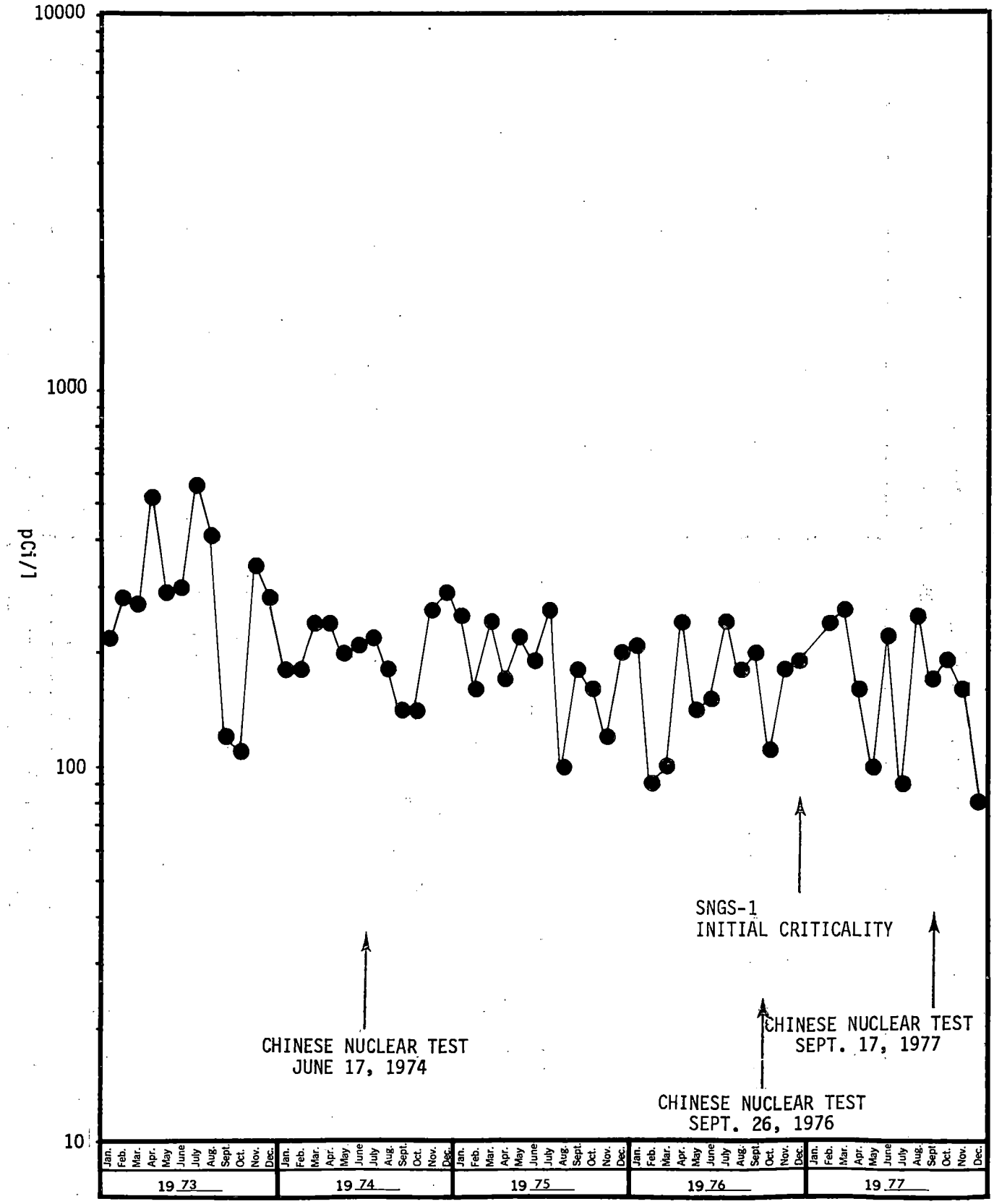
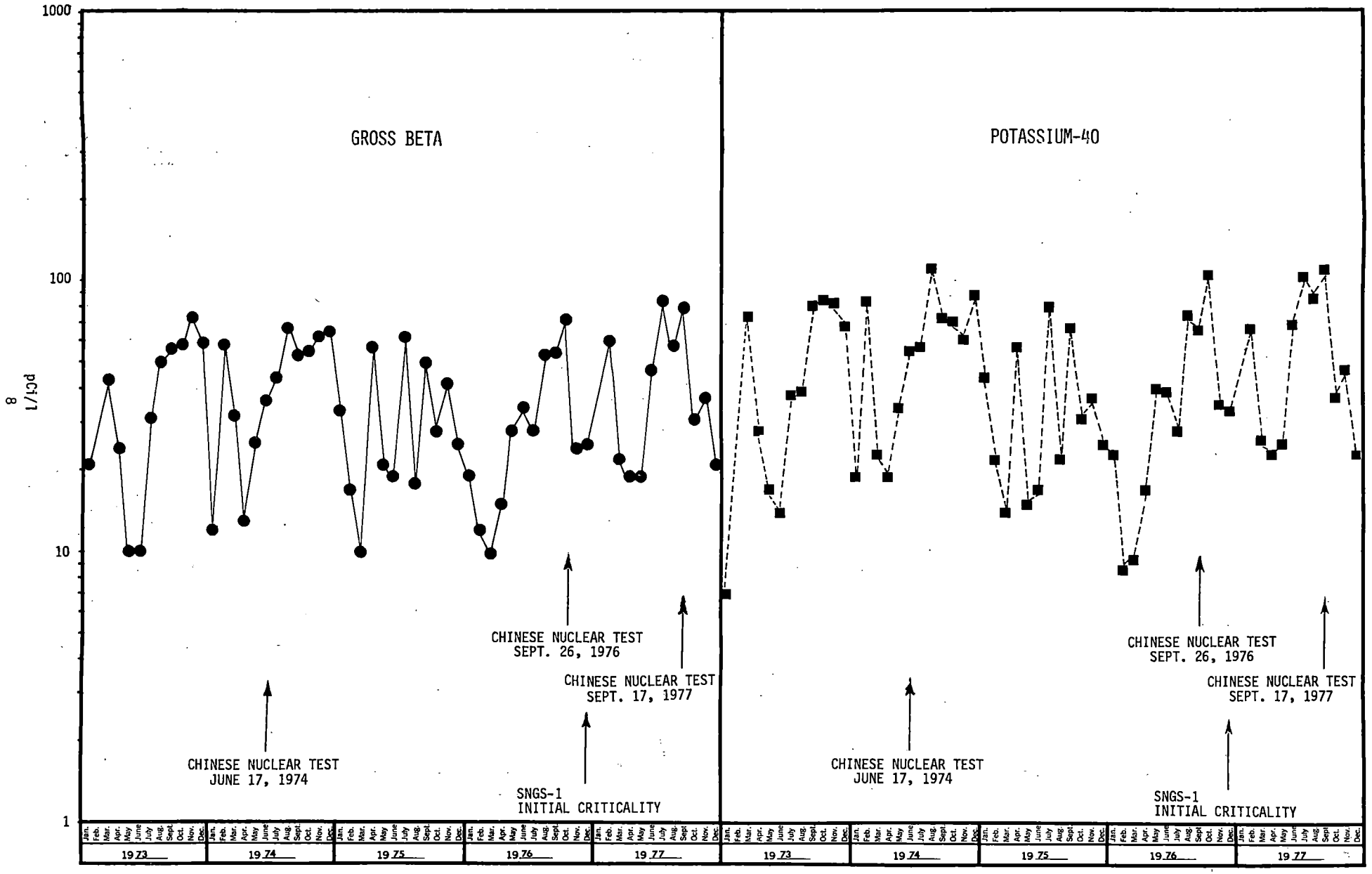


FIGURE 2

AVERAGE CONCENTRATIONS OF BETA EMITTERS AND POTASSIUM-40 IN DELAWARE ESTUARY WATERS IN THE VICINITY OF ARTIFICIAL ISLAND

1973 THROUGH 1977



Gamma spectrometric analysis of surface water samples showed detectable concentrations of K-40 in 49 of 55 samples. The average K-40 concentration was 36 pCi/l and ranged from <7 to 170 pCi/l. Two additional gamma-emitting nuclides, Cs-134 and Cs-137, with concentrations of 0.8 pCi/l and 1.2 pCi/l respectively, were observed in the February sample from control location 16F1.

Cesium-137, which has randomly occurred throughout the preoperational period, is associated with fallout from past nuclear weapons testing and can be expected to occur periodically in the future.

The Cs-134 result of 0.8±0.6 pCi/l is comparable to the minimum detectable level of 0.5 pCi/l for the other samples. In addition, the sample was taken 6.9 miles upstream of the site; and since the SNGS did not release any cesium during February 1977 it can be concluded that the observed Cs-134 was not plant related. (12)

Levels of Sr-89 were below MDL (0.6 to 1.6 pCi/l) in all samples. Levels of detectable Sr-90 ranged from 0.3 to 0.7 pCi/l in 6 of the 20 samples. The MDLs values ranged from 0.4 to 0.9 pCi/l. The maximum level of Sr-90 detected in the preoperational program was 1.6 pCi/l.

Aquatic Organisms

Biological samples from various levels of the human food chain were taken from the same stations as surface water samples. These included edible fish, blue crabs, prey fish, and benthic organisms.

Edible fish samples (American Shad, alewife, etc.) were collected at three locations and analyzed for gamma emitters and tritium. Fish bones were analyzed for Sr-89 and Sr-90.

Gamma spectrometry of these samples showed only K-40 at detectable levels. This nuclide was detected in all fish flesh samples at an average concentration of 3800 pCi/kg-wet, which is typical for this naturally occurring nuclide.

Tritium analyses were performed on both aqueous and organic fractions of the flesh portions of these samples. The average concentration of tritium was 131 pCi/l for the aqueous fraction and 214 pCi/l for the organic fraction. The observed results are essentially the same as those found in surface water for the same period, indicating no biological accumulation of tritium.

All the bone samples analyzed for Sr-89 were below minimum detectable level (1.7 to 8.8 pCi/g-dry), with one exception. The June sample from station 11A1 had a detectable level of 0.1 pCi/g-dry, which is below the MDL of all the other samples. One of the four samples analyzed for Sr-90 had a detectable concentration of 0.09 pCi/g-dry. This concentration is below the MDL range (0.4 to 1.6 pCi/g-dry) of the other analyses and is similar to the other values.

Blue hardshell crabs were taken at two locations with the edible portions being analyzed for gamma emitters, tritium and Sr-89 and-90. The shells were also analyzed for Sr-89 and-90.

Gamma spectrometry of the edible portions showed K-40 concentrations in all samples ranging between 2200 and 3300 pCi/kg-wet, with the average being 2800 pCi/kg-wet. One sample taken at control station 12C1 had a trace amount of Cs-137 (18 pCi/kg-wet).

Tritium analyses performed on the edible portions showed an average concentration of 206 pCi/l. No significant differences in H-3 levels were observed between samples, reflecting an equilibrium between the blue crabs and their estuarine environment.

Radiostrontium analyses on the flesh portions of the samples indicated no detectable concentrations of Sr-89, with the MDL ranging between 0.03 and 0.04 pCi/g-wet. Detectable concentrations of Sr-90 (0.006 pCi/g-wet) were observed in the August sample collected at both locations. This activity was similar to the Sr-90 MDL of the June samples, which were 0.007 and 0.008 pCi/g-wet.

The blue crab shell samples analyzed for Sr-89 showed detectable concentrations of 0.18 and 0.30 pCi/g-dry at station 11A1 during June and August. Detectable Sr-89 activity of 0.4 pCi/g-dry was also observed at control location 12C1 in the August sample. The June sample at the control location 12C1 was less than 0.1 pCi/g-dry. Therefore, the concentrations of Sr-89 observed at the indicator station (0.18 and 0.3 pCi/g-dry) are similar to those observed at the control location (<0.1 and 0.4 pCi/g-dry). All the shell samples contained Sr-90 concentrations ranging between 0.15 and 0.32 pCi/g-dry. Because strontium concentrations in skeletal structures, the shells of the crabs are expected to contain higher levels of radiostrontium than the flesh. Observable radiostrontium activity at both locations indicate that the probable source for the Sr-89 and-90 can be attributed to world-wide fallout from nuclear weapons testing.

Small fish species (prey fish) which serve as a primary food source for larger edible species were sampled. Total samples (flesh and bones) were analyzed for gamma emitters, and Sr-89 and Sr-90. Detectable concentrations of K-40 were found in all samples, averaging 2900 pCi/kg-wet, similar to the 2800 pCi/kg average for edible fish. Concentrations of Sr-89 were below the MDL (0.01 to 0.20 pCi/g-wet) in all but one sample. The detectable Sr-89 concentration was 0.13 pCi/g-wet, which is within the range of the MDL values of the other samples. Strontium-90 was detected in one of six samples. The detectable level in this sample (0.004 pCi/g-wet) also fell within the MDL range (0.004 to 0.04 pCi/g-wet) of the other samples.

Benthic organisms were collected at four locations and analyzed for Sr-89 and-90. Since only small samples were available, analytical results vary considerably. Strontium-89 was detected in one of six samples. The detectable activity was 20 pCi/g-dry, which was between the MDL range (0.7 to 2370 pCi/g-dry) of the other samples. Two of six samples showed detectable Sr-90 concentrations of 0.1 pCi/g-dry and 0.3 pCi/g-dry. These detectable activities are below the MDL range (0.8 to 309 pCi/g-dry) of the other four samples. The MDL for radiostrontium as required by the Environmental Technical Specifications for benthic organisms cannot be met in any of the samples due to the impracticality of obtaining a large sample size of benthic organisms.

Sediment

Sediment was collected semiannually at four locations and analyzed for gamma emitters and Sr-90.

Results of gamma spectrometry showed detectable levels of a variety of naturally occurring radionuclides as well as man-made radionuclides. The various fallout nuclides were observed intermittently at control stations as well as at indicator stations. With the exception of Cs-137, which ranged between 0.04 and 0.25 pCi/g-dry, no other fallout nuclide was detected in more than 20% of the samples. Manganese-54, with a detectable concentration of 0.02 pCi/g-dry at control location 12C1, was the only nuclide observed in 1977 that was not detected during the preoperational period.

No Sr-90 was observed in any of the eight samples analyzed, with the MDL ranging between 0.03 and 0.06 pCi/g-dry.

All results observed in the aquatic samples analyzed in 1977 showed no apparent differences from results observed during the preoperational period.

## Atmospheric Environment

The atmospheric environment in the vicinity of Artificial Island was examined by analyzing samples of air particulates, air iodine, and precipitation. Air particulates were collected at eight stations, while air iodine cartridges were collected at seven locations. Precipitation was also collected at one of these locations - the Salem Substation.

### Air Particulates

Weekly air particulate samples were analyzed for alpha and beta emitters. Quarterly composites of the weekly samples from each station were analyzed for Sr-89, Sr-90 and gamma emitters. Due to a temporary laboratory problem Sr-89 and-90 and gamma emitter analyses for the fourth quarter include only December samples. The results of these analyses and subsequent gamma emitter analyses of the October and November samples are included in this report. Results of Sr-89 and-90 analyses for the October and November samples are available and are included in this report.

Of the 102 weekly air particulate samples (2 stations) analyzed for alpha emitters, 85 showed detectable concentrations. The range of alpha activity was from <0.0002 to 0.0026 pCi/$m^3$ and averaged 0.0012 pCi/$m^3$ .

Weekly gross beta analyses showed concentrations ranging from 0.023 to 0.540 pCi/$m^3$ , with the average for the 8 sampling stations being 0.144 pCi/$m^3$ . In addition to normal seasonal fluctuations, increased activity was noted in early October and was directly attributed to fallout from the September 17 atmospheric nuclear weapons test. Figures 3 and 4 show the relation between gross beta and precipitation for the preoperational versus the operational periods, showing both seasonal and weapons-testing fluctuations.

FIGURE 3

AVERAGE CONCENTRATIONS OF BETA EMITTERS IN PRECIPITATION AND IN AIR PARTICULATES IN THE VICINITY OF ARTIFICIAL ISLAND
1973 THROUGH 1976

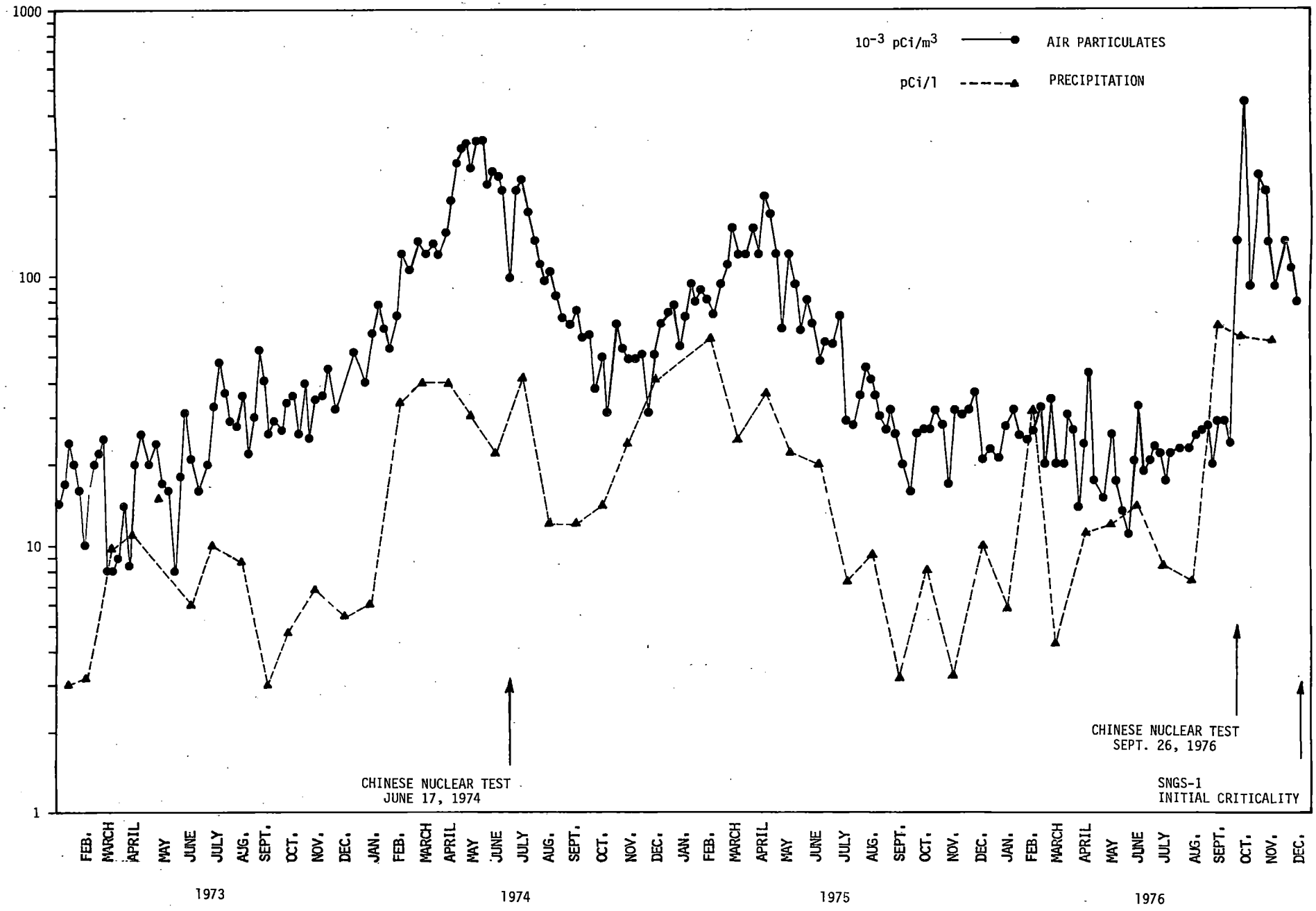
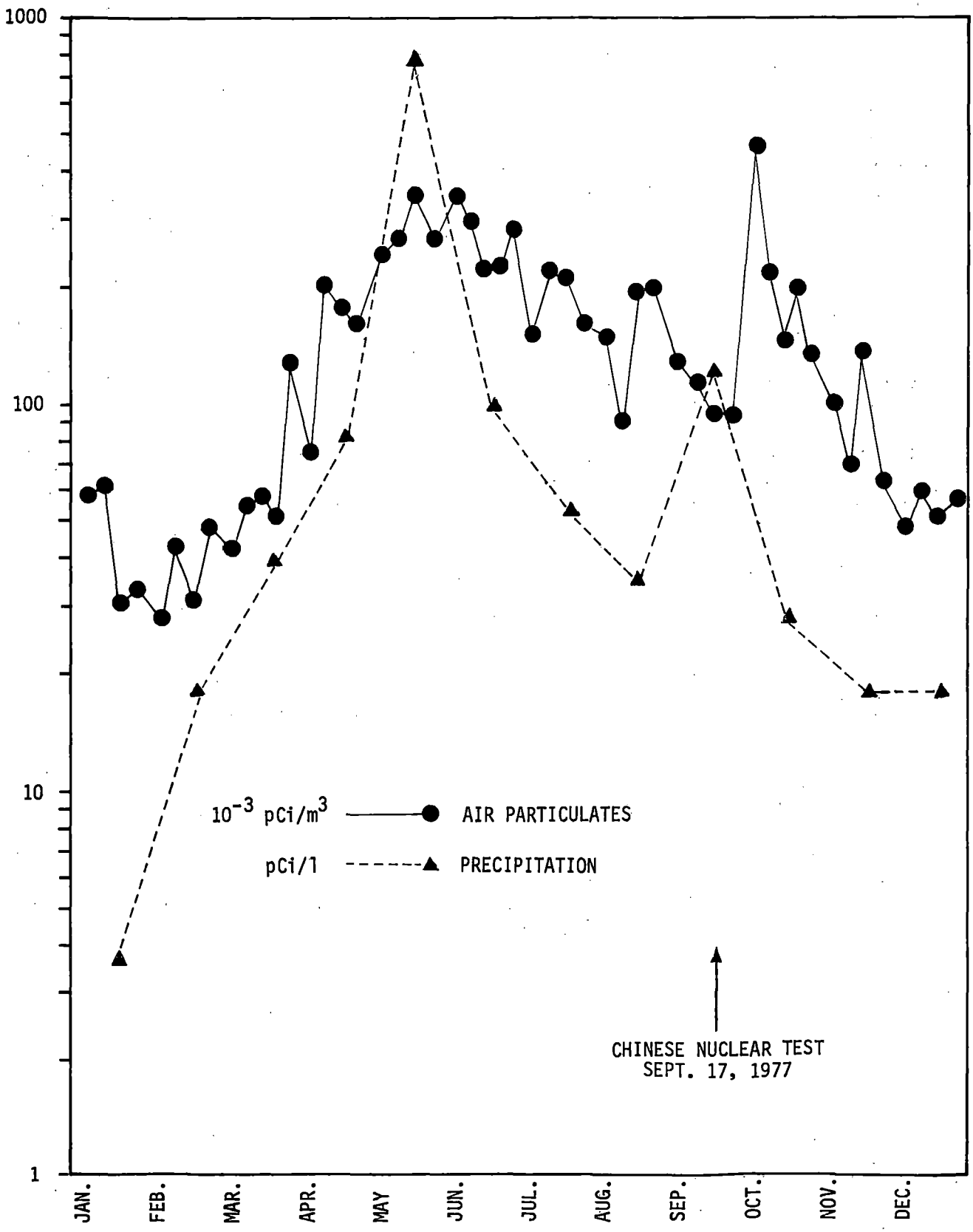


FIGURE 4

AVERAGE CONCENTRATIONS OF BETA EMITTERS IN PRECIPITATION AND IN AIR PARTICULATES IN THE VICINITY OF ARTIFICIAL ISLAND

1977



Results of gamma spectrometry showed detectable levels of several radionuclides, both naturally occurring and man-made (Be-7, K-40, Mn-54, Cr-51, Co-58, Co-60, ZrNb-95, Ru-103, Ru-106, Sb-125, I-131, Cs-137, BaLa-140, Ce-141, and Ce-144).

All gamma-emitting nuclide concentrations observed were below or similar to those concentrations noted during the preoperational period, with the exception of Co-58 and I-131. Cobalt-58 was observed in the third quarter composite sample from station 5D1 with a decay corrected concentration of 0.00034±0.00026 $pCi/m^3$. The high associated error indicates that the value detected is close to the minimum detectable level. This concentration is probably not plant related since no other detectable amounts of Co-58 were observed during the third quarter. In addition Co-58 was detected in the October-November composite samples at locations 5S1 and 16E1. The concentrations at these locations were 0.00047 and 0.00052 $pCi/m^3$, respectively. The Co-58 observed is most probably attributed to the world wide fallout resulting from the atmospheric nuclear weapons test of September 17, 1977. Iodine-131 was observed in a December composite sample at station 10D1 with a concentration of 0.014±0.010 $pCi/m^3$. Since no gaseous I-131 was observed during the period and SNGS did not release any detectable I-131 during 1977 (12,13) it can be concluded that this incident was not plant related. Gamma analyses were performed on three additional weekly air particulate samples from stations 2S1, 1F1 and 2F2 for the week of September 19 through September 27. These samples were analyzed for gamma emitters in accordance with the SNGS technical specifications because the beta activity in these samples exceeded the control location activity by a factor of four. It was determined that the reason for the difference was a low sample volume at the control location. Results of these analyses are found in table 36.

All the gamma emitters observed in these weekly samples were similar in concentration to those observed in the quarterly composites except for two nuclides. Iodine-131 of undetermined origin was observed in the filter collected at station 2S1 at a decay-corrected concentration of 0.047±0.027 $pCi/m^3$. The above-mentioned I-131 was detected in a particulate form, and, in addition, no gaseous I-131 was observed during this period from 2S1. Therefore, it is probably that this incident was not plant related. The other gamma-emitting nuclide BaLa-140, was observed in all of the special analyses.

The radiostrontium analyses performed on the quarterly composites showed detectable levels of Sr-89 ranging between 0.0013 and 0.013 $pCi/m^3$, with the average being 0.0055 $pCi/m^3$ while Sr-90 ranged between <0.0003 and 0.0026 $pCi/m^3$ with the average being 0.0011 $pCi/m^3$. The activities noted are the result of the recent atmospheric nuclear weapons testing since the fall of 1976 and are not related to the operation of SNGS since the effluent release records of SNGS indicate that less than $5x10^{-4}$ µCi of radiostrontium was released during the later part of 1977. (13)

The results of all air particulate analyses did not differ, except where noted above, from preoperational results, nor were any significant differences between indicator and control stations observed.

Air Iodine

Iodine cartridges were connected in series behind each of the air particulate filters for adsorption of gaseous iodine. The adsorption media used in these cartridges was "TEDA" impregnated charcoal. Eighteen of 339 cartridges

analyzed had detectable concentrations of I-131 ranging between 0.0038 and 0.031 pCi/$m^3$. The majority of the detectable I-131 was observed in January at both control and indicator stations. The I-131 observed can therefore be attributed to the world-wide fallout from the nuclear wepaons testing in the fall of 1976. One additional week of detectable I-131 activity was noted in October. This again was observed following the September 1977 nuclear weapons testing. No additional I-131 activity was observed throughout the reporting period.

Precipitation

Although not specifically required by the Salem ETS, precipitation was sampled continuously and collected monthly at the Salem substation sampling location. Concentrations of H-3 in these samples ranged from <80 to 195 pCi/l. The concentrations of alpha emitters were below MDL (1.5 pCi/l) in seven of the twelve samples. The other five samples had alpha concentrations ranging between 0.7 and 12 pCi/l. Beta-emitter concentrations ranged from <3.7 to 776 pCi/l and averaged 107 pCi/l. The highest activity of both the alpha and beta (12 and 776 pCi/l, respectively) was found in the May sample and had elevated results due to the extremely low sample volume.

Quarterly composites of precipitation were analyzed for radiostrontium and gamma emitters. The gamma emitters detected were naturally occurring Be-7 and K-40 while the man-made nuclides observed were ZrNb-95, Ru-103, Cs-137, BaLa-140, Ce-141 and Ce-144. Most of the nuclides were detected in the third quarter sample, which included samples that were affected by the September atmospheric nuclear weapons test. The Sr-89 levels ranged between <4.5 and 7.8 pCi/l, while those for Sr-90 ranged from <0.5 to 2.4 pCi/l. These levels indicate fluctuations resulting from atmospheric nuclear weapons testing in 1976 and 1977.

Terrestrial Environment

The terrestrial environment in the vicinity of Artificial Island was examined by analyzing samples of well water, raw and treated potable water, milk, fruits, vegetables, beef, fodder crops, game, beef thyroid tissue, and soil.

Well Water

Monthly well water samples were taken from an on-site (indicator) well and two off-site (control) wells. All well water samples were analyzed for H-3, alpha and beta activity, and K-40 (atomic absorption). Quarterly composites were analyzed for gamma emitters, and Sr-89 and Sr-90.

Detectable concentrations of H-3 were observed in eleven of 36 samples ranging between the MDL (80 pCi/l) and 402 pCi/l. Alpha-emitter concentrations were below the MDL (1.5 to 2.7 pCi/l) in all but one sample, and that sample had a detectable concentration of 1.5 pCi/l. The concentrations of beta emitters averaged 7.6 pCi/l and ranged from <3.0 to 13 pCi/l. The potassium-40 activity as determined by atomic absorption averaged 6.4 pCi/l. This indicates that the beta activity observed in these samples is primarily the result of naturally occurring K-40, a beta emitter.

The only nuclide detected by gamma spectrometry was K-40 (10 to 16 pCi/l) in three of twelve samples. Strontium-89 was detected in the second quarter sample from locations 4S1 and 5D1 with a concentration at or lower than the MDLs of the other 10 samples, which ranged between 0.5 pCi/l and 1.1 pCi/l. One detectable Sr-90 activity was observed with a concentration of 0.6 pCi/l. This again is within the range of MDLs for Sr-90 (0.3 pCi/l to 0.7 pCi/l).

Potable Water

Both raw and treated water samples were taken at the Salem Water Company, the only drinking water processing plant in the vicinity of Artificial Island. The raw water source for this plant is Laurel Lake (a tributary of the Delaware River) and several adjacent wells. Potable water samples were analyzed monthly for H-3, alpha and beta activity, and K-40 (atomic absorption); Sr-89 and-90, and gamma emitters were analyzed on a quarterly basis.

The concentration of H-3 averaged 143 pCi/l for all analyses, with no significant differences between the raw and treated samples. Detectable alpha activity was observed in 17 of 24 samples ranging between 0.4 pCi/l and 1.8 pCi/l in all samples. Beta and K-40 concentrations were lower than in the saline surface water, as is usual for fresh water, with K-40 generally contributing less than 50% of the beta activity. The average gross beta concentrations were 4.5 pCi/l (raw) and 5.1 pCi/l (treated). The average K-40 results were 1.4 pCi/l (raw) and 1.7 pCi/l (treated).

Eight quarterly composites were analyzed for Sr-89 and-90, and gamma emitters. Two detectable concentrations of Sr-89 were noted, which were between the MDL range (0.9 pCi/l to 1.9 pCi/l) of the other samples. Strontium-90 was observed in seven of the eight samples with the concentrations ranging between 0.5 pCi/l and 1.0 pCi/l. No gamma emitters were detected in any of these samples. Water treatment had no significant effect on any of the analytical parameters measured. No annual trends in the radiological characteristics of potable water were observed.

Milk

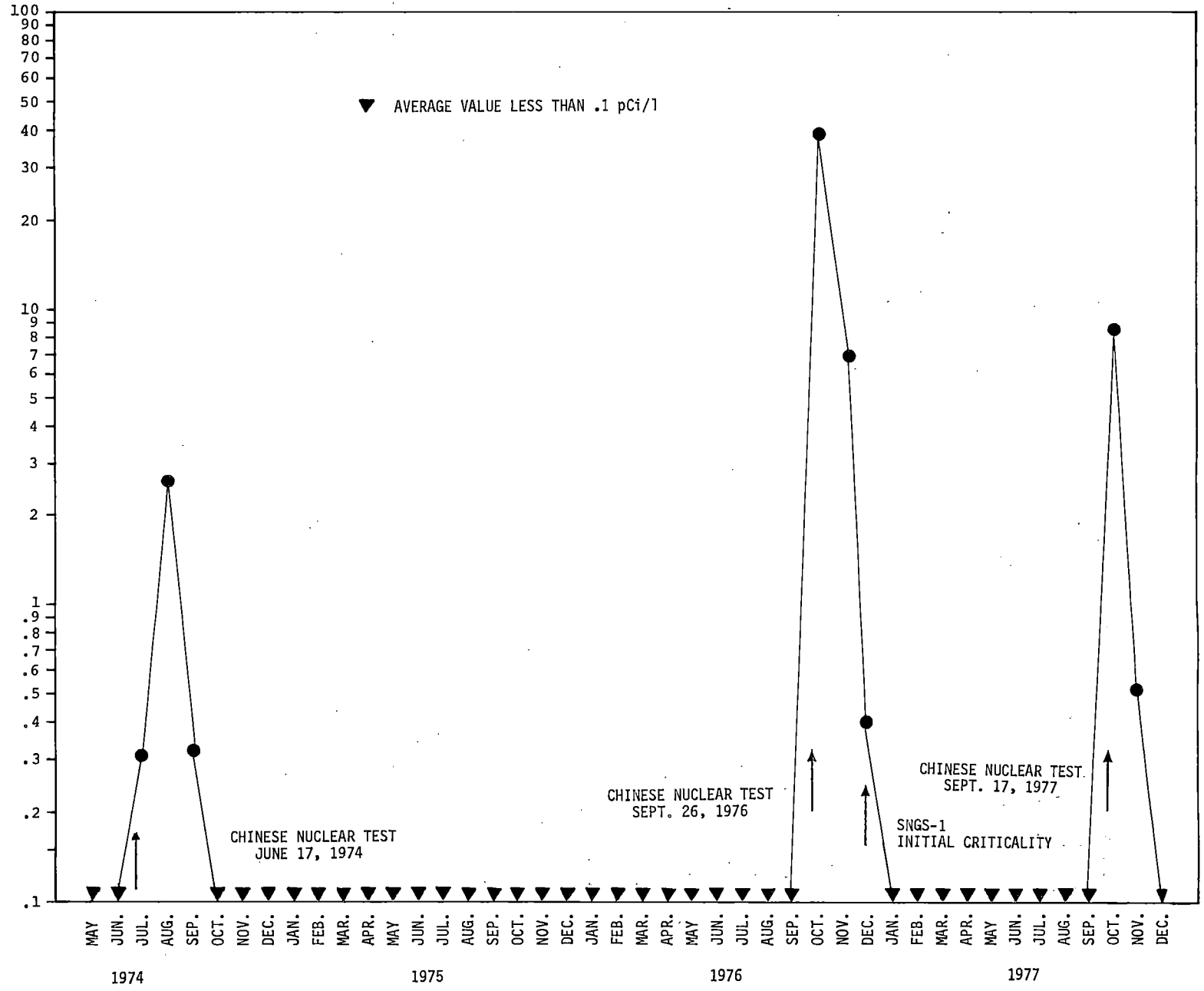
Milk samples were taken twice a month from five local farms during 1977 and analyzed for I-131; gamma emitters, Sr-89, and Sr-90 were analyzed monthly. Following the nuclear weapons test of September 17, additional milk samples were collected in order to meet the ETS requirements concerning collection during time of elevated I-131 concentrations.

Detectable concentrations of I-131 were observed in 30 of 37 samples collected from all stations between the last week of September through the first collection in December. The I-131 observed ranged between 0.29 and 25.00 pCi/l and was attributed to the world-wide fallout from the September 1977 nuclear weapons test. Figure 5 shows the average I-131 concentrations in milk samples resulting from three atmospheric nuclear weapons tests by the Peoples Republic of China between June 1974 and September 1977. No other I-131 was observed in any of the samples.

FIGURE 5

AVERAGE CONCENTRATIONS OF IODINE-131 IN MILK IN THE VICINITY OF ARTIFICIAL ISLAND

MAY 1974 THROUGH DECEMBER 1977



Two incidents concerning I-131 in milk samples were reported in 1977. In all cases, the I-131 concentrations at the various indicator locations were a factor of ten greater than was the concentration at the control location. The first incident occurred with the October 17 and 18 sample collected at station 2F1. The second occurred with the November 6 and 7 samples collected at stations 2F1 and 15F1. It was concluded that the cause of reportable I-131 was world-wide nuclear fallout from the September 17 nuclear weapons test since SNGS did not release detectable I-131 during this reporting period (12,13).

Gamma spectrometry showed detectable concentrations of K-40 in all samples and of Cs-137 in all but five of the sixty samples analyzed. The annual average concentrations were 1400 pCi/l for K-40 and 2.8 pCi/l for Cs-137. These levels were not significantly different between stations. Iodine-131 was the only other gamma-emitting nuclide detected during 1977. Observable levels were detected in the October samples following the September nuclear weapons test and ranged from 14 to 45 pCi/l.

Strontium-89 was detected in seven of the fifteen samples analyzed following the September nuclear weapons test, with results ranging between <4.4 pCi/l and 15 pCi/l. The concentration of Sr-90 exceeded the MDL in forty six of the sixty samples analyzed and averaged 2.3 pCi/l. Seven Sr-89 analyses did not meet the required sensitivity because the MDLs were decay corrected. Presently, a study is being conducted to verify the accuracy and precision of the strontium methodology.

Game

Five game samples (4 muskrat, 1 deer) were taken during this period. Flesh from all five samples was analyzed for gamma emitters while bones from the muskrats were analyzed for Sr-89 and Sr-90. Naturally occurring K-40 was detected in all five samples ranging from 0.7 to 3.7 pCi/g. In addition, Cs-137 was present in two of the five samples. Muskrat bones showed detectable Sr-89, with concentrations ranging between 0.6 and 1.2 pCi/g-dry. Detectable Sr-90 concentrations were observed in all samples ranging from 0.5 to 1.0 pCi/g-dry.

Beef

Three beef samples were collected during this reporting period. Two gamma-emitting nuclides, K-40 and Cs-137, were detected at similar concentrations to those observed during the preoperational period. All other gamma emitters were below the MDL.

Beef Thyroid

Three beef thyroids were taken during this period and analyzed for gamma emitters. One thyroid showed a detectable concentration of naturally occurring K-40. One sample showed a detectable concentration of I-131 (2.3 pCi/g); no other gamma emitters were detected in these samples. The most probable explanation is that this I-131 was concentrated from atmospheric fallout due to the series of nuclear detonations by the Peoples Republic of China in September 1977 since SNGS did not release and detectable I-131 during 1977. (12,13)

Food Products

A wide variety of other human food products was sampled and analyzed for gamma emitters, and Sr-89 and-90. These included cucumbers, asparagus, peppers, corn, tomatoes, squash, and eggplant. All samples contained K-40 at concentrations from 1.0 to 3.5 pCi/g-wet. One squash sample at control station 1G2 contained a detectable level of Cs-137, while one asparagus sample collected from station 2E1 showed a detectable amount of ZrNb-95. No other gamma emitters were detected in those food products. All analyses for Sr-89 were below the MDL (5 pCi/kg to 40 pCi/kg). Concentrations of Sr-90 were detected in the asparagus sample (4 pCi/kg), which is similar to concentrations observed during the preoperational period.

Fodder Crops

Eleven fodder crop samples were taken at 7 local farms and analyzed for gamma emitters. Gamma spectrometry of these samples showed a variety of radionuclides, both man made and naturally occurring. Of the naturally occurring gamma emitters present, only K-40 was observed in all samples, with an average of 15 pCi/g-dry. Other detected naturally occurring nuclides were Be-7 and Ra-226. The man-made nuclides Mn-54, Zr-95, Nb-95, Ru-103, Ru-106, Sb-125, Cs-137, Ce-141, and Ce-144 were also observed. With the exception of Mn-54 and Ru-103, all were observed during the preoperational period. Manganese-54 was detected in four of eleven samples at concentrations at or just barely above the MDL (0.02 pCi/g-dry), while Ru-106 was found in three of the eleven samples. All man-made radionuclides are assumed to be from the residual world-wide fallout from the 1976 nuclear weapons tests since all were detected in the preoperational air particulate samples collected following the above-mentioned tests.

Soil

Fourteen soil samples were analyzed for gamma emitters and Sr-90. Gamma spectrometry of these samples showed detectable concentrations of the naturally occurring nuclides (K-40, Ra-226, and Th-232) and the fission products Cs-137 and Ru-103. The Cs-137 concentration averaged 0.70 pCi/g with a range from 0.11 to 3.7 pCi/g. Ruthenium-103 was detected in one sample at a concentration of 0.02 pCi/g, which was just above the MDL (0.01 pCi/g). All other gamma emitters were at or below their respective MDLs. The concentrations of Sr-90 ranged from 0.06 to 0.68 pCi/g with an average of 0.16 pCi/g.

## Direct Radiation

Direct radiation measurements were made at 24 locations using $CaSO_4$ (Tm) thermoluminescent dosimeters. During 1977, 288 monthly and 96 quarterly TLD packets were collected. Each packet included four dosimeters for a total of 1536 analyses. These analyses resulted in an average dose rate of 5.09 mrads/standard month for monthly TLDs and 4.90 mrads/standard month for quarterly TLDs. All TLD results presented in this report have been normalized to a standard month (30.4 days) to eliminate the apparent differences caused by variations in exposure periods. A comparison of the direct radiation data for 1977 shows a similarity between the average monthly dose for both indicator stations (4.97 mrem/std. month) and control stations (5.64 mrem/std. month). These results compare favorably to the preoperational results as shown in figures 6 and 7, therefore, indicating no effect from SNGS operation.

FIGURE 6

AVERAGE AMBIENT RADIATION LEVELS FROM MONTHLY AND QUARTERLY TLD'S IN THE VICINITY OF ARTIFICIAL ISLAND
1973 THROUGH 1976

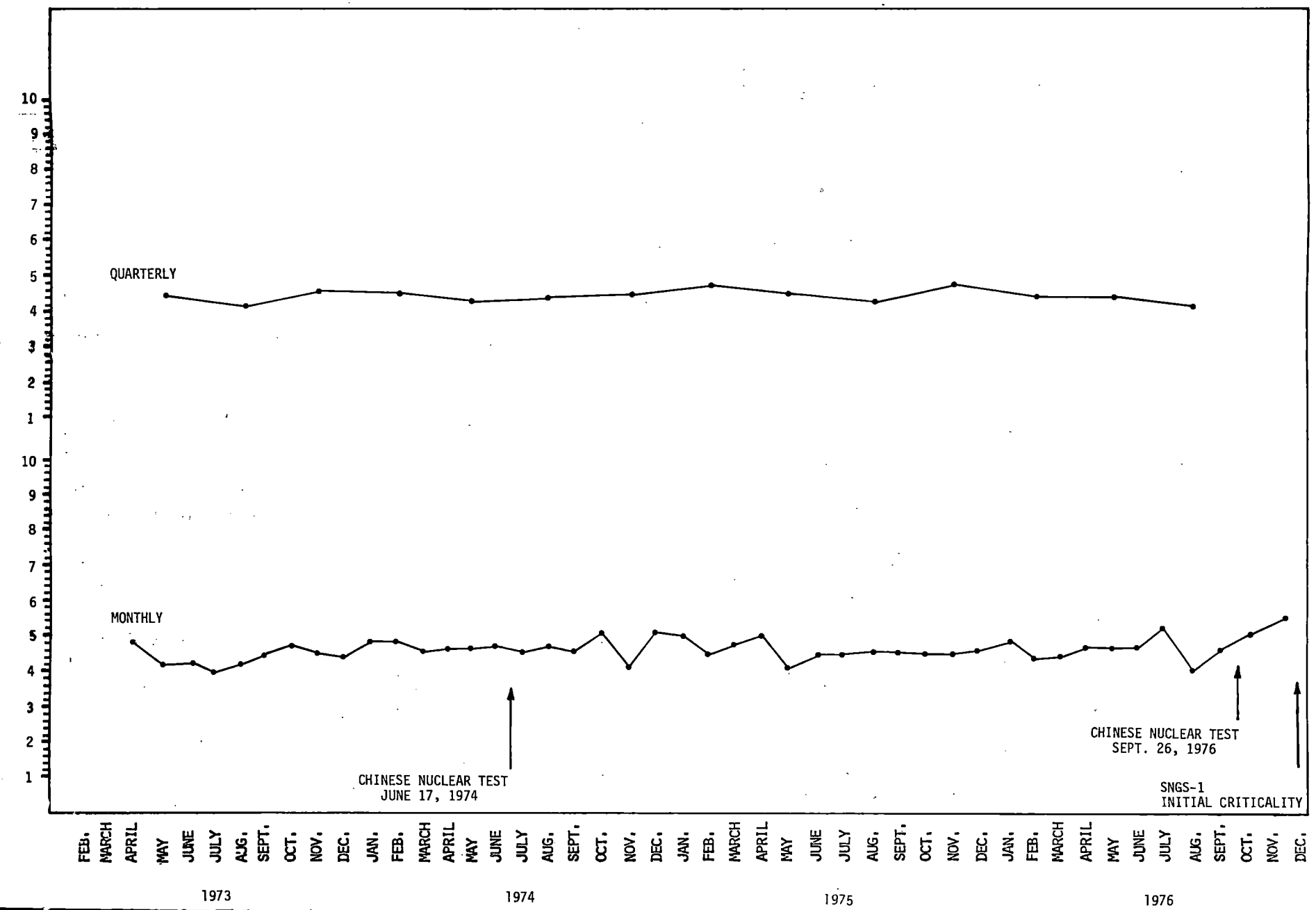
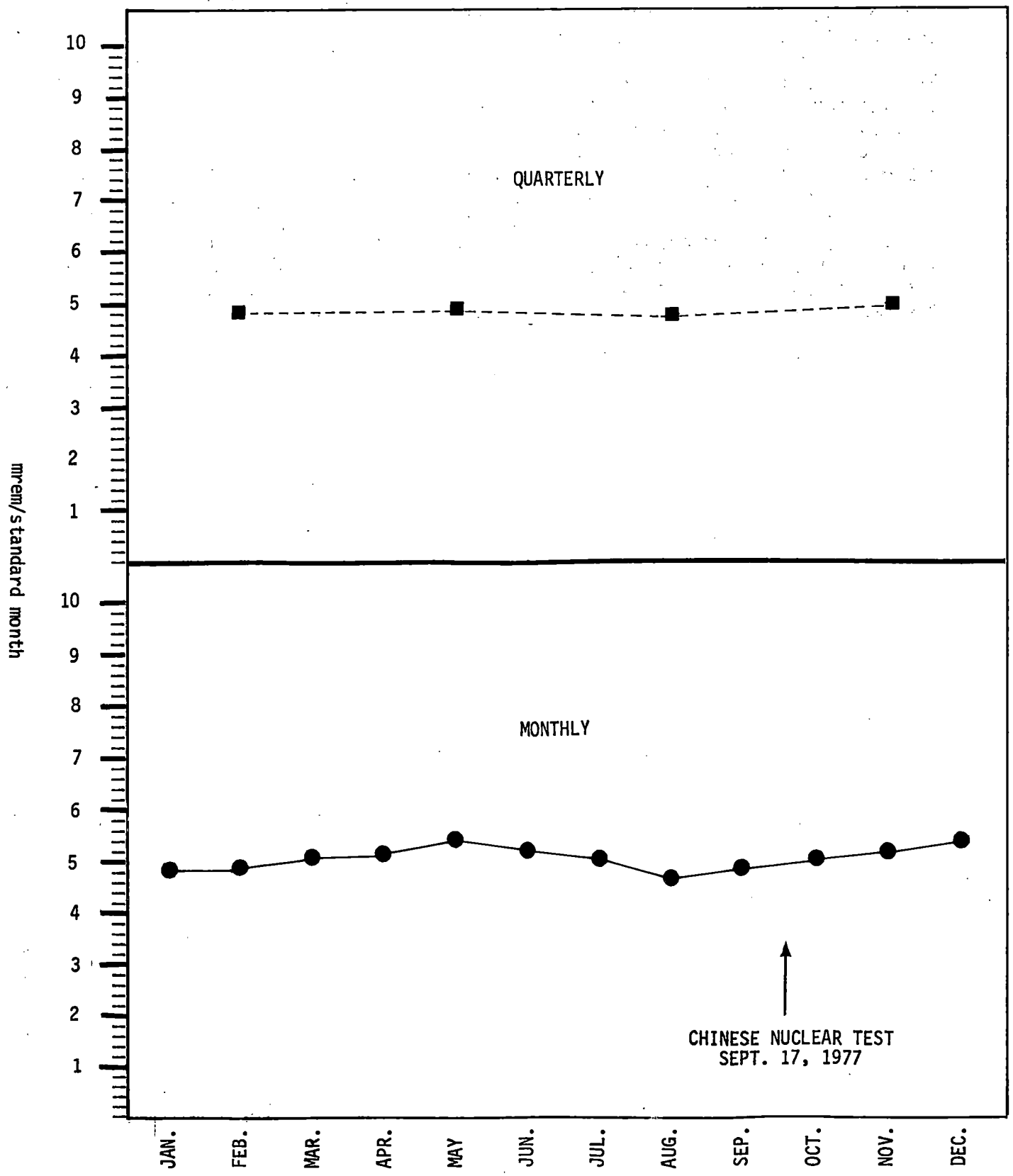


FIGURE 7

AVERAGE AMBIENT RADIATION LEVELS FROM MONTHLY AND QUARTERLY TLD'S IN THE VICINITY OF ARTIFICIAL ISLAND

1977



## CONCLUSIONS

The Radiological Environmental Monitoring Program for Salem Nuclear Generating Station at Artificial Island was conducted during 1977 in accordance with the SNGS Environmental Technical Specifications. The objectives of the program were met during this period. The data collected shows that SNGS unit #1 was operated in compliance with Environmental Technical Specifications.

From the results obtained, it can be concluded that the levels and fluctuations of radioactivity in environmental samples were as expected for an estuarine environment. In addition no increases were observed in either radionuclide concentrations in critical pathways or with respect to radionuclide build up. Ambient radiation levels were relatively low, averaging about 5.09 mrem/std. month and were similar to preoperational results. The observation of the fission product I-131 in a few samples was attributed to residual fallout from the September 1977 atmospheric weapons tests by the People's Republic of China. No other unusual radiological characteristics were observed in the environs of Artificial Island. The operation of SNGS Unit #1 had no discernable effect on the radiological characteristics of the environs of Artificial Island.

## REFERENCES


(1) Radiation Management Corporation. "Salem Nuclear Generating Station - Radiological Environmental Monitoring Program - 1973." RMC-TR-74-09, 1974.

(2) Radiation Management Corporation. "Artificial Island Radiological Environmental Monitoring Program - 1974 Annual Report." RMC-TR-75-04, 1975.

(3) Radiation Management Corporation "Artificial Island Radiological Environmental Monitoring Program - 1975 Annual Report." RMC-TR-76-04, 1976.

(4) Radiation Management Corporation. "Artificial Island Radiological Environmental Monitoring Program - Preoperational Summary - 1973 through 1976." RMC-TR-77-03, 1978.

(5) Radiation Management Corporation. "Artificial Island Radiological Environmental Monitoring Program - December 11 to December 31, 1976." RMC-TR-77-02.

(6) Public Service Electric and Gas Company. "Environmental Report, Operating License Stage - Salem Nuclear Generating Station Units 1 and 2." 1971.

(7) United States Atomic Energy Commission. "Final Environmental Statement - Salem Nuclear Generating Station, Units 1 and 2." Docket No. 50-272 and 50-311, 1973.

(8) Public Service Electric and Gas Company. "Final Safety Analysis Report - Salem Nuclear Generating Station, Units 1 and 2." 1972.

(9) Radiation Management Corporation. "Radiation Management Corporation - Analysis and Quality Control Program." RMC-TM-75-3, 1975.

(10) Thomann, Robert V. "The Delaware River - A study in Water Quality Management," River Ecology and Man. Academic Press, New York, 1972.

(11) Ichthyological Associates, Victor Shular, Project Leader. "An Ecological Study of the Delaware River in the Vicinity of Artificial Island." A Series of Progress Reports since 1971.

(12) Public Service Electric and Gas Company. "Radioactive Effluent Release Report, January - June 1977." 1977.

(13) Public Service Electric and Gas Company. "Radioactive Effluent Release Report, July - December 1977." 1978.

# APPENDIX A

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATIONS MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|---|
| Surface Water (pCi/l) | Alpha | 55 | 1.5 | - (0/22) - | 12C1 2.5 mi. WSW | - (1/11) (14) | - (2/33) (2-14) | 0 |
| | Beta | 55 | 3.0 | 60 (22/22) (19-140) | 7E1 4.5 mi. SW | 69 (11/11) (35-140) | 32 (33/33) (4-77) | 0 |
| | H-3 | 55 | 80 | 189 (17/22) (65-460) | 12C1 2.5 mi. WSW | 228 (10/11) (76-431) | 196 (30/33) (76-431) | 0 |
| | Sr-89 | 20 | 5.0 | - (1/8) (1.0) | 7E1 4.5 mi. SW | - (1/4) (1.0) | - (0/12) - | 0 |
| | Sr-90 | 20 | 1.0 | - (1/8) (0.4) | 12C1 2.5 mi. WSW | 0.6 (2/4) (0.4-0.7) | - (5/12) (0.3-0.7) | 0 |
| | Gamma | 55 | | | | | | |
| | K-40 | | 7.0 | 79 (22/22) (27-170) | 7E1 4.5 mi. SW | 89 (11/11) (41-170) | 48 (27/33) (11-100) | 0 |
| | Cs-134 | | 0.5 | - (0/22) - | 16F1 6.9 mi. NNW | - (1/11) (0.8) | - (1/33) (0.8) | 0 |
| | Cs-137 | | 0.5 | - (0/22) - | 16F1 6.9 mi. NNW | - (1/11) (2.1) | - (3/33) (1.0-2.1) | 0 |
| Edible Fish (pCi/l) | H-3 (aqueous) | 6 | 80 | 118 (3/4) (112-122) | 12C1 2.5 mi. WSW | - (1/2) (270) | - (1/2) (270) | 0 |
| (pCi/l) | H-3 (organic) | 6 | 80 | 245 (3/4) (142-358) | 11A1 650 ft. SW | 297 (2/2) (235-358) | 233 (2/2) (175-290) | 0 |
| (pCi/g-dry) | Sr-89(1) | 4 | 0.5 | - (1/3) (0.10) | 11A1 650 ft. SW | - (1/2) (0.10) | - (0/1) - | 0 |
| (pCi/g-dry) | Sr-90(1) | 4 | 0.1 | - (1/3) (0.09) | 11A1 650 ft. SW | - (1/2) (0.09) | - (0/1) - | 0 |
| (pCi/g-wet) | Gamma | 6 | | | | | | |
| | K-40 | | - | 3.9 (4/4) (3.3-4.2) | 11A1 650 ft. SW | 4 (2/2) (3.8-4.2) | 3.7 (2/2) (3.1-4.3) | 0 |
| Prey Fish (pCi/g-wet) | Sr-89 | 6 | 0.05 | - (1/4) (0.13) | 7E1 4.5 mi. SW | - (1/2) (0.13) | - (0/2) - | 0 |
| | Sr-90 | 6 | 0.01 | - (0/4) - | 12C1 2.5 mi. WSW | - (1/2) (0.004) | - (1/2) (0.004) | 0 |
| | Gamma | 6 | | | | | | |
| | K-40 | | - | 2.7 (4/4) (1.9-3.1) | 12C1 2.5 mi. WSW | 2.9 (2/2) (2.5-3.3) | 2.9 (2/2) (2.5-3.3) | 0 |

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATIONS MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|---|
| Blue Crab (pCi/l) | H-3 | 4 | 80 | 279 (2/2) (226-331) | 11A1 650 ft. SW | 279 (2/2) (226-331) | 134 (2/2) (83-184) | 0 |
| (pCi/g-dry) | Sr-89(2) | 4 | 0.5 | 0.24 (2/2) (0.18-0.30) | 11A1 650 ft. SW | 0.24 (2/2) (0.18-0.30) | - (1/2) (0.40) | 0 |
| (pCi/g-dry) | Sr-90(2) | 4 | 0.1 | 0.24 (2/2) (0.15-0.33) | 12C1 2.5 mi. WSW | 0.27 (2/2) (0.21-0.32) | 0.27 (2/2) (0.21-0.32) | 0 |
| (pCi/g-wet) | Sr-89(3) | 4 | 0.5 | - (0/2) - | N/A | | - (0/2) - | 0 |
| (pCi/g-wet) | Sr-90(3) | 4 | 0.1 | - (1/2) (0.006) | 12C1 2.5 mi. WSW | - (1/2) (0.006) | - (1/2) (0.006) | 0 |
| (pCi/g-wet) | Gamma | 4 | | | | | | |
| | K-40 | | - | 2.8 (2/2) (2.2-3.3) | 11A1 650 ft. SW | 2.8 (2/2) (2.2-3.3) | 2.8 (2/2) (2.6-2.9) | 0 |
| | Cs-137 | | 0.004 | - (0/2) - | 12C1 2.5 mi. WSW | - (1/2) (0.02) | - (1/2) (0.02) | 0 |
| Benthos (pCi/g-dry) | Sr-89 | 6 | 0.5 | - (1/4) (20) | 11A1 650 ft. SW | - (1/2) (20) | - (0/2) - | 0 |
| | Sr-90 | 6 | 0.1 | 0.2 (2/4) (0.1-0.3) | 11A1 650 ft. SW | - (1/2) (0.3) | - (0.2) - | 0 |
| Sediment (pCi/g-dry) | Sr-90 | 8 | 0.1 | - (0/6) - | N/A | | - (0/2) - | 0 |
| | Gamma | 8 | | | | | | |
| | K-40 | | - | 14 (4/4) (11-17) | 16F1 6.9 mi. NW | 18 (2/2) (18) | 16 (4/4) (11-18) | 0 |
| | Mn-54 | | 0.02 | - (0/4) - | 12C1 2.5 mi. WSW | - (1/2) (0.02) | - (1/4) (0.02) | 0 |
| | Nb-95 | | 0.02 | - (2/4) (0.04-0.07) | 7E1 4.5 mi. SW | - (1/2) (0.07) | - (1/4) (0.02) | 0 |
| | Zr-95 | | 0.03 | - (0/4) - | 16F1 6.9 mi. NW | - (1/2) (0.04) | - (1/4) (0.04) | 0 |
| | Ru-103 | | 0.01 | - (1/4) (0.04) | 11A1 650 ft. SW | - (1/2) (0.04) | - (0/4) - | 0 |

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATION MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|
| Sediment (cont.) (pCi/g-dry) | Gamma | | | | | | |
| | Sb-125 | 0.04 | - (0/4) | 16F1 6.9 mi. NW | - (1/2) (0.06) | - (1/4) (0.06) | 0 |
| | Cs-137 | 0.01 | 0.14 (4/4) (0.05-0.25) | 11A1 650 ft. SW | 0.22 (2/2) (0.19-0.25) | 0.05 (3/4) (0.04-0.07) | 0 |
| | Ce-141 | 0.02 | - (0/4) | 12C1 2.5 mi. WSW | - (1/2) (0.02) | - (1/4) (0.02) | 0 |
| | Ce-144 | 0.10 | - (1/4) (0.13) | 11A1 650 ft. SW | - (1/2) (0.13) | - (0/4) | 0 |
| | Ra-226 | - | 0.74 (4/4) (0.70-0.81) | 12C1 2.5 mi. WSW | 0.88 (2/2) (0.75-1.00) | 0.71 (4/4) (0.50-0.10) | 0 |
| | Th-232 | - | 0.59 (4/4) (0.38-0.80) | 16F1 6.9 mi. NW | 0.67 (2/2) (0.54-0.80) | 0.61 (4/4) (0.42-0.80) | 0 |
| Air Particulates ($10^{-3}$ pCi/$m^3$) | Alpha 102 | 0.4 | 1.1 (40/51) (0.5-2.4) | 3H3 110 mi. NE | 1.2 (45/51) (0.5-2.6) | 1.2 (45/51) (0.5-2.6) | 0 |
| | Beta 406 | 5.0 | 143 (355/355) (27-543) | 2S1 0.3 mi. NNE | 153 (49/49) (32-456) | 144 (51/51) (23-440) | 0 |
| | Sr-89(5) 32 | 5 | 5.5 (28/28) (1.3-13) | 5S1 1.0 mi. E | 6.4 (4/4) (1.4-13) | 5.3 (4/4) (1.6-10) | 0 |
| | Sr-90(5) 32 | 1 | 1.2 (23/28) (0.3-2.6) | 5D1 3.5 mi. E | 1.4 (3/4) (1.0-1.7) | 1.2 (3/4) (1.0-1.4) | 0 |
| | Gamma(5) 32 | | | | | | |
| | K-40 | 5.0 | - (2/28) (24-130) | 2F2 8.7 mi. NNE | - (1/4) (130) | - (0/4) | 0 |
| | Be-7 | - | 76 (28/28) (43-108) | 5S1 1.0 mi. E | 88 (4/4) (69-108) | 83 (4/4) (73-93) | 0 |
| | Cr-51 | 2 | - (1/28) (21) | 16E1 4.1 mi. NNW | - (1/4) (21) | - (0/4) | 0 |
| | Mn-54 | 0.2 | - (4/28) (0.3-0.4) | 2F2 8.7 mi. NNE | - (1/4) (0.4) | - (1/4) | 0 |
| | Co-58 | 0.2 | - (3/28) (0.3-2.0) | 16E1 4.1 mi NNW | - (1/4) (1.5) | - (0/4) | 0 |
| | Co-60 | 0.3 | - (1/28) (1.2) | 1F1 5.8 mi. N | - (1/4) (1.2) | - (0/4) | 0 |
| | Zr-95 | - | 14 (28/28) (1.5-35) | 5S1 1.0 mi. E | 16 (4/4) (3-35) | 15 (4/4) (3-31) | 0 |
| | Nb-95 | - | 17 (28/28) (2.8-49) | 5S1 1.0 mi. NNE | 20 (4/4) (4.2-49) | 13 (4/4) (3.6-21) | 0 |
| | Ru-103 | - | 6.2 (28/28) (1.6-14) | 5S1 1.0 mi. E | 7.4 (4/4) (2.3-14) | 7.0 (4/4) (2.2-12) | 0 |
| | Ru-106 | - | 14 (22/28) (1.6-18) | 2F2 8.7 mi. NNE | 17 (3/4) (16-18) | 17 (3/4) (11-22) | 0 |
| | Sb-125 | 0.3 | 2.7 (19/28) (1.1-14) | 1F1 5.8 mi. N | 6.4 (3/4) (1.7-14) | 1.6(2/4) (1.4-1.8) | 0 |
| | I-131 | 0.2 | - (1/28) (14) | 10D1 3.9 mi. SSW | - (1/4) (14) | - (0/4) | 0 |

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATIONS MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|
| Air Particulates (cont.) ($10^{-3}$ pCi/$m^3$) | Gamma | | | | | | |
| | Cs-137 | 2.0 | 2.0 (28/28) (0.2-3.4) | 2F2 8.7 mi. NNE | 2.3 (4/4) (0.4-3.2) | 2.1 (4/4) (0.6-3.3) | 0 |
| | BaLa-140 | 0.4 | - (2/28) (10-11) | 5S1 1.0 mi. E | - (1/4) (11) | - (0/4) - | 0 |
| | Ce-141 | 0.3 | 5.5 (22/28) (1.3-16) | 5S1 1.0 mi. E | 6.9 (4/4) (1.7-16) | 5.5 (4/4) (1.6-13) | 0 |
| | Ce-144 | 20 | 29 (28/28) (2.0-56) | 2S1 0.3 mi. NNE | 31 (4/4) (2.1-48) | 28 (4/4) (1.3-41) | 0 |
| Air Iodine ($10^{-3}$ pCi/$m^3$) | I-131 339 | 10 | - (15/288) (3.7-35) | N/A | | - (3/51) (4.5-20) | 0 |
| Precipitation (pCi/l) | Alpha 12 | 1.5 | 4.1 (5/12) (0.7-12) | 2F2 8.7 mi. NNE | 4.1 (5/12) (0.7-12) | No Control Location | 0 |
| | Beta 12 | 3.0 | 117 (11/12) (18-776) | 2F2 8.7 mi. NNE | 117 (11/12) (18-776) | - | 0 |
| | H-3 12 | 80 | - (4/12) (97-195) | 2F2 8.7 mi. NNE | - (4/12) (97-195) | - | 0 |
| | Sr-89 4 | 5.0 | 5.4 (3/4) (1.1-7.8) | 2F2 8.7 mi. NNE | 5.4 (3/4) (1.1-7.8) | - | 0 |
| | Sr-90 4 | 1.0 | 1.9 (2/4) (1.4-2.4) | 2F2 8.7 mi. NNE | 1.9 (2/4) (1.4-2.4) | - | 0 |
| | Gamma 4 | | | | | | |
| | Be-7 | - | 19 (3/4) (10-33) | 2F2 8.7 mi. NNE | 19 (3/4) (10-33) | - | 0 |
| | K-40 | 10 | - (1/4) (58) | 2F2 8.7 mi. NNE | - (1/4) (58) | - | 0 |
| | ZrNb-95(6) | 2.0 | - (1/4) (32) | 2F2 8.7 mi. NNE | - (1/4) (32) | - | 0 |
| | Ru-103 | - | 3.9 (2/4) (2.2-5.5) | 2F2 8.7 mi. NNE | 3.9 (2/4) (2.2-5.5) | - | 0 |
| | Cs-137 | 2.0 | - (1/4) (0.8) | 2F2 8.7 mi. NNE | - (1/4) (0.8) | - | 0 |
| | BaLa-140 | 3.0 | - (1/4) (1.7) | 2F2 8.7 mi. NNE | - (1/4) (1.7) | - | 0 |
| | Ce-141 | 0.7 | - (1/4) (1.9) | 2F2 8.7 mi. NNE | - (1/4) (1.9) | - | 0 |
| | Ce-144 | 10 | - (1/4) (5.7) | 2F2 8.7 mi. NNE | - (1/4) (5.7) | - | 0 |

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATIONS MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|
| Well Water (pCi/l) | Alpha 36 | 1.5 | - (1/24) (1.5) | 5D1 3.5 mi. E | - (1/12) (1.5) | - (0/12) - | 0 |
| | Beta 36 | 3.0 | 7.7 (20/24) (2.3-13) | 4S1 Site Well | 9.9 (11/12) (7.2-13) | 9.0 (12/12) (5.3-13) | 0 |
| | H-3 36 | 80 | - (5/24) (81-334) | 3E1 4 mi. NE | - (5/12) (77-402) | - (5/12) (77-402) | 0 |
| | K-40 36 | 0.09 | 5.8 (24/24) (0.8-12) | 4S1 Site Well | 9.0 (12/12) (1.7-12) | 7.5 (12/12) (1.4-11) | 0 |
| | Sr-89 12 | 5.0 | 0.5 (2/8) (0.4-0.5) | 5D1 3.5 mi. E | - (1/4) (0.5) | - (0/4) - | 0 |
| | Sr-90 12 | 1.0 | - (0/8) - | 3E1 4 mi. NE | - (1/4) (0.6) | - (1/4) (0.6) | 0 |
| | Gamma 12 | | | | | | |
| | K-40 | 7.0 | - (2/8) (10-16) | 4S1 Site Well | - (2/4) (10-16) | - (1/4) (13) | 0 |
| Fruits and Vegetables (pCi/g-wet) | Sr-89 14 | 0.05 | - (0/5) - | N/A | | - (0/9) - | 0 |
| | Sr-90 14 | 0.01 | - (1/5) (0.004) | 2E1 4.5 mi. NNE | - (1/2) (0.004) | - (0/9) - | 0 |
| | Gamma 14 | | | | | | |
| | K-40 | - | 2.4 (5/5) (1.0-3.3) | 15E1 4.1 mi. NW | - (1/1) (3.3) | 2.6 (9/9) (1.3-3.5) | 0 |
| | ZrNb-95 | 0.001 | - (1/5) (0.004) | 2E1 4.5 mi. NNE | - (1/2) (0.004 | - (0/9) - | 0 |
| | Cs-137 | 0.002 | - (0/5) - | 1G2 Background | - (1/1) (0.004) | - (1/9) (0.004) | 0 |
| Fodder Crops (pCi/g-dry) | Gamma 10 | | | | | | |
| | Be-7 | - | 3.5 (6/10) (0.8-7.2) | 5F1 6.5 mi. E | - (1/1) (7.2) | No Control Location | 0 |
| | K-40 | - | 14.4 (10/10) (3.4-23) | 15F1 5.4 mi. NW | 20 (3/3) (19-23) | - | 0 |
| | Mn-54 | 0.02 | - (4/10) (0.01-0.03) | 2F1 5.0 mi. NNE | - (1/1) (0.3) | - | 0 |
| | Zr-95(4) | - | 0.29 (7/10) (0.08-0.52) | 5F1 6.5 mi. E | - (1/1) (0.52) | - | 0 |
| | Nb-95 | - | 0.66 (6/10) (0.17-1.10) | 5F1 6.5 mi. E | - (1/1) (1.1) | - | 0 |

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATIONS MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|
| Fodder Crops (cont.) (pCi/g-dry) | Gamma | | | | | | |
| | Ru-103 | - | - (4/10) (0.05-0.07) | 5F1 6.5 mi. E | - (1/1) (0.07) | - | 0 |
| | Ru-106 | - | - (3/10) (0.4-0.6) | 5F1 6.5 mi. E | - (1/1) (0.6) | - | 0 |
| | Sb-125 | 0.05 | - (3/10) (0.05-0.07) | 5F1 6.5 mi. E | - (1/1) (0.07) | - | 0 |
| | Cs-137 | 0.02 | 0.08 (6/10) (0.03-0.13) | 5F1 6.5 mi. E | - (1/1) (0.13) | - | 0 |
| | Ce-141 | 0.01 | - (2/10) (0.02-0.06) | 5F1 6.5 mi. E | - (1/1) (0.06) | - | 0 |
| | Ce-144 | 0.1 | 1.2 (5/10) (0.4-2.4) | 5F1 6.5 mi. E | - (1/1) (2.4) | - | 0 |
| | Ra-226 | 0.04 | - (2/6) (0.07-0.10) | 14F1 5.5 mi. WNW | - (1/1) (0.10) | - | 0 |
| Potable Water Raw-Treated (pCi/l) | Alpha 24 | 1.5 | 0.9 (17/24) (0.4-1.8) | 2F3 8 mi. NNE | 0.9 (17/24) (0.4-1.8) | No Control Location | 0 |
| | Beta 24 | 3.0 | 4.9 (23/24) (1.4-20) | 2F3 8 mi. NNE | 4.9 (23/24) (1.4-20) | - | 0 |
| | H-3 24 | 80 | 175 (16/24) (76-317) | 2F3 8 mi. NNE | 175 (16/24) (76-317) | - | 0 |
| | Sr-89 8 | 5.0 | - (2/8) (0.8-1.2) | 2F3 8 mi. NNE | - (2/8) (0.8-1.2) | - | 0 |
| | Sr-90 8 | 1.0 | 0.6 (7/8) (0.4-1.0) | 2F3 8 mi. NNE | 0.6 (7/8) (0.4-1.0) | - | 0 |
| | K-40 24 | 0.09 | 1.6 (24/24) (0.6-3.2) | 2F3 8 mi. NNE | 1.6 (24/24) (0.6-3.2) | - | 0 |
| | Gamma 8 | | None Detected | | | | |
| Milk (pCi/l) | I-131 130 | 0.05 | 5.02 (26/104) (0.07-25) | 2F1 5 mi. NNE | 7.0 (6/26) (0.3-25) | 2.33 (4/26) (0.29-5.60) | 3 |
| | Sr-89 60 | 5.0 | - (8/48) (2.1-14) | 2F1 5 mi. NNE | 9.2 (2/12) (4.3-14) | - (1/12) (15) | 0 |
| | Sr-90 60 | 1.0 | 2.7 (37/48) (0.3-8.6) | 2F1 5 mi. NNE | 3.9 (10/12) (0.4-8.6) | 3.1 (9/12) (0.6-6.2) | 0 |

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATIONS MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|
| Milk (cont.) (pCi/l) | Gamma 60 | | | | | | |
| | K-40 | - | 1500 (48/48) (1000-1800) | 15F1 5.4 mi. NW | 1500 (12/12) (1100-1800) | 1500 (12/12) (1100-1700) | 0 |
| | I-131 | 0.5 | - (3/48) (14/32) | 3G1 16.6 mi. NE | - (1/12) (45) | - (1/12) (45) | 0 |
| | Cs-137 | 0.6 | 2.7 (43/48) (0.9-6.4) | 2F1 5.0 mi. NNE | 3.4 (11/12) (1.8-6.2) | 3.2 (12/12) (1.7-7.3) | 0 |
| Beef (pCi/g-wet) | Gamma 3 | | | | | | |
| | K-40 | - | 2.2 (3/3) (0.6-3.4) | 3E1 4.5 mi. NE | 3.1 (2/2) (2.7-3.4) | No Control Sample | 0 |
| | Cs-137 | 0.002 | 0.02 (2/3) (0.02) | 3E1 4.5 mi. NE | 0.02 (2/3) (0.02) | Available | 0 |
| Game (pCi/g-dry) | Sr-89 4 | 0.5 | 0.8 (2/2) (0.6-0.9 | 11D1 3.5 mi. SSW | 0.9 (2/2) (0.6-1.2) | 0.9 (2/2) (0.6-1.2) | 0 |
| | Sr-90 4 | 0.1 | 0.7 (2/2) (0.5-0.8) | 11D1 3.5 mi. SSW | 0.8 (2/2) (0.5-1.0) | 0.8 (2/2) (0.5-1.0) | 0 |
| | Gamma 5 | | | | | | |
| | K-40 | - | 2.5 (3/3) (0.7-3.7) | 11D1 3.5 mi. SSW | 3.3 (2/2) (3.2-3.4) | 3.3 (2/2) (3.2-3.4) | 0 |
| | Cs-137 | 0.002 | 0.025 (2/3) (0.021-0.028) | 3E1 4.5 mi. NE | - (1/2) (0.028) | - (0/2) - | 0 |
| Beef Thyroid (pCi/g-wet) | Gamma 3 | | | | | | |
| | K-40 | 0.8 | - (1/3) (0.9) | 3E1 4.5 mi. NE | - (1/2) (0.9) | No Control Location | 0 |
| | I-131 | 0.05 | - (1/3) (2.3) | 3E1 4.5 mi. NE | - (1/2) (2.3) | - | 0 |

ARTIFICIAL ISLAND RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

SALEM NUCLEAR GENERATING STATION DOCKET NO. 50-272

SALEM COUNTY, NEW JERSEY JANUARY 1, 1977 to DECEMBER 31, 1977

| MEDIUM OR PATHWAY SAMPLED (UNIT OF MEASUREMENT) | ANALYSIS AND TOTAL NUMBER OF ANALYSES PERFORMED | LOWER LIMIT OF DETECTION (MDL) | ALL INDICATOR LOCATIONS MEAN* RANGE | LOCATION WITH HIGHEST MEAN NAME DISTANCE AND DIRECTION | MEAN RANGE | CONTROL LOCATIONS MEAN RANGE | NUMBER OF NONROUTINE REPORTED MEASUREMENTS |
|---|---|---|---|---|---|---|---|
| Soil (pCi/g-dry) | Sr-90 14 | 0.05 | 0.22 (12/12) (0.06-0.42) | 3H3 110 mi. NE | - (1/1) (0.68) | 0.43 (2/2) (0.17-0.68) | 0 |
| | Gamma 14 | | | | | | |
| | K-40 | - | 9.2 (12/12) (8.4-15) | 14F1 5.5 mi. WNW | - (1/1) (15) | 10 (2/2) (9.1-11) | 0 |
| | Ru-103 | 0.01 | - (1/12) (0.02) | 6S1 0.2 mi. ESE | - (1/1) (0.02) | - (0/2) - | 0 |
| | Cs-137 | - | 0.71 (12/12) (0.11-3.70) | 1F1 5.8 mi. N | - (1/1) (3.7) | 0.62 (2/2) (0.41-0.82) | 0 |
| | Ra-226 | - | 0.71 (12/12) (0.11-3.70) | 1F1 5.8 mi. N | - (1/1) (3.7) | 0.6 (2/2) (0.41-0.82) | 0 |
| | Th-232 | - | 0.6 (12/12) (0.4-1.0) | 14F1 5.5 mi. WNW | - (1/1) (1.0) | 0.8 (2/2) (0.77-0.80) | 0 |
| Direct Radiation (mrem/std. month) | Gamma 1152 Dose (monthly) | - | 5.00 (960/960) (3.29-7.83) | 10D1 3.9 mi. SSW | 5.90 (48/48) (5.49-7.83) | 5.64 (192/192) (4.96-6.58) | 0 |
| | Gamma 384 Dose (quarterly) | - | 4.78 (320/320) (3.55-5.67) | 2H1 36 mi. NNE | 5.59 (16/16) (5.29-5.77) | 5.60 (64/64) (5.09-5.90) | 0 |

* Mean calculated using detectable measurements only. Fraction of detectable measurements in parentheses.
(1) Strontium analyses performed on the bones only.
(2) Strontium analyses performed on the shell.
(3) Strontium analyses performed on the flesh.
(4) Includes one ZrNb-95 combined result.
(5) For purposes of averaging a weighted fourth quarter average was obtained.
(6) Includes ZrNb-95 result only.

# APPENDIX B

# APPENDIX B

## Sample Designation

RMC identifies samples by a three part code. The first two letters are the power station identification code, in this case "SA". The next one to three letters are for the media sampled.

| | |
|---|---|
| AI = Air Iodine | FPV = Food Products, Various |
| AP = Air Particulates | GM = Game |
| AQS = Sediment | ID = Immersion Dose (TLD) |
| E = Soil | M = Milk |
| ECH = Hard Shell Blue Crab | PW = Potable Water; (PWR = raw, PWT = treated) |
| ESB = Benthos | RW = Rain Water |
| ESF = Edible Fish | SW = Surface Water |
| ESP = Prey Fish | THB = Bovine Thyroid |
| ESS = Sediment | V = Fodder Crops |
| FPB = Beef | WW = Well Water |

The last four symbols are a location code based on direction and distance from the site. Of these, the first two represent each of the sixteen angular sectors of 22.5 degrees centered about the reactor site. Sector one is divided evenly by the north axis and other sectors are numbered in a clockwise direction; i.e., 2=NNE, 3=NE, 4=ENE, etc. The next digit is a letter which represents the radial distance from the plant:

| | |
|---|---|
| S = On-site location | E = 4-5 miles off-site |
| A = 0-1 miles off-site | F = 5-10 miles off-site |
| B = 1-2 miles off-site | G = 10-20 miles off-site |
| C = 2-3 miles off-site | H = >20 miles off-site |
| D = 3-4 miles off-site | |

The last number is the station numerical designation within each sector and zone; e.g., 1,2,3, . . . For example, the designation SA-WW-5D1 would indicate a sample in the SNGS program SA, consisting of well water (WW), which had been collected in the 22.5 degree sector centered on east axis (5), at a distance of 3 to 4 miles off-site (D). The number 1 indicates that this is sampling station #1 in the designated area.

Sampling Locations

All Sampling locations and specific information about the individual locations are given in table B-1. Maps B-1 and B-2 Show the locations of sampling stations with respect to the site.

TABLE B-1

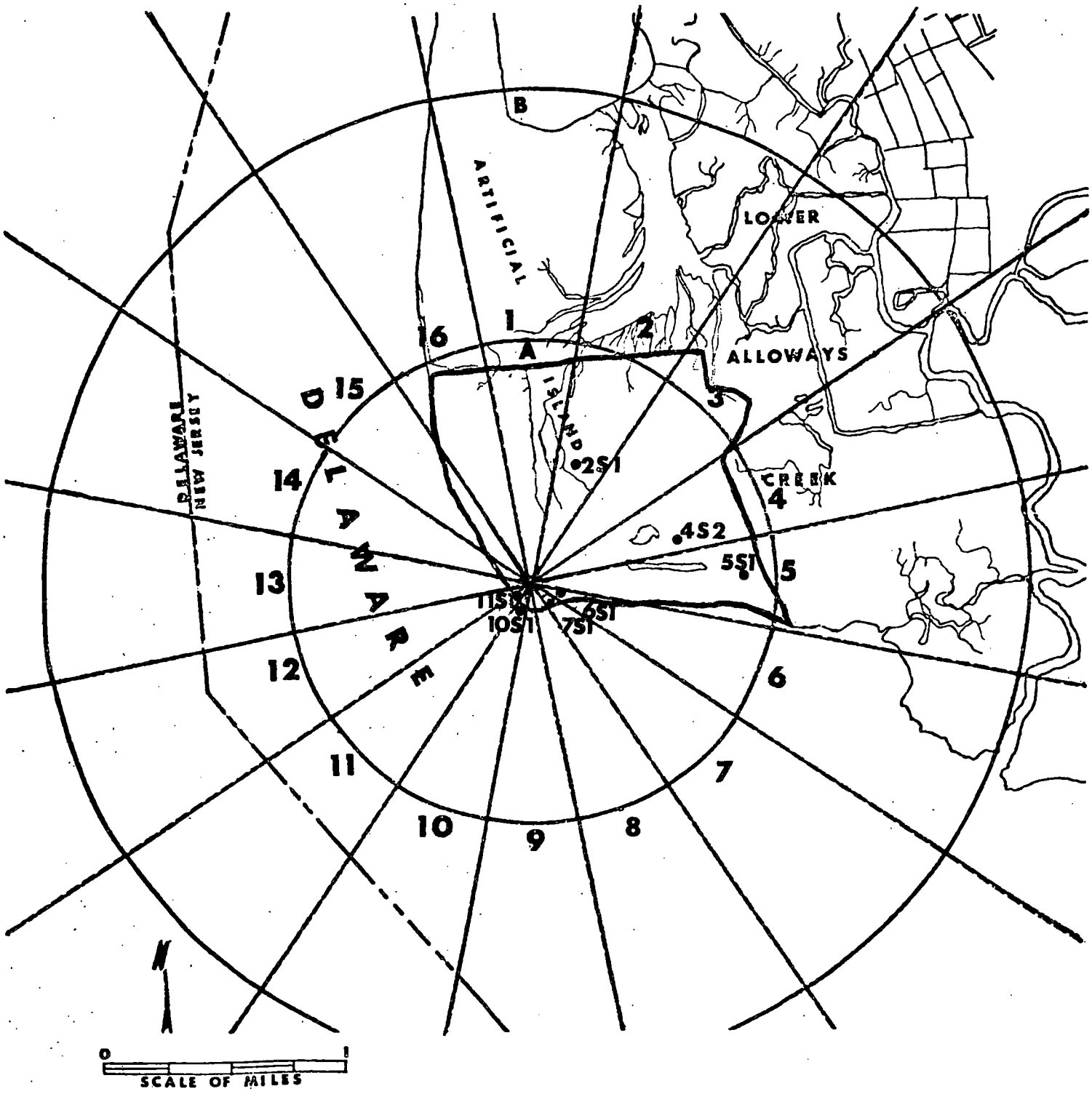
| STATION CODE | STATION LOCATION | SAMPLE TYPES |
|---|---|---|
| 2S1 | 1575 ft. NNE of vent | AP,AI,ID |
| 4S1 | Site well #5 ENE of Vent | WW |
| 5S1 | 1.0 mi. E of vent; site access road | ID,AP,AI |
| 6S1 | 0.2 mi. ESE of vent; observation platform | ID,E |
| 7S1 | 0.12 mi. SE of vent; station personnel gate | ID |
| 10S1 | 0.14 mi. SSW of vent; site shoreline | ID |
| 11S1 | 0.09 mi. SW of vent; site shoreline | ID |
| 11A1 | 0.2 mi. SW of vent; outfall area | SW,ESF,ESP, ECH,ESB,ESS |
| 1B1 | 2-3 mi. N of vent | V |
| 12C1 | 2.5 mi. WSW of vent; west bank of Delaware river | SW,ESF,ESP, ECH,ESB,ESS |
| 5D1 | 3.5 mi. E of vent; local farm | ID,V,E,WW, AP,AI |
| 10D1 | 3.9 mi. SSW of vent; Taylor's Bridge Spur | ID,AP,AI,E |
| 11D1 | 3.5 mi. SW of Vent | GM |
| 14D1 | 3.4 mi. WNW of vent; Bay View, Delaware | ID |
| 2E1 | 4.4 mi. NNE of vent; local farm | ID,FPV,E |
| 2E2 | 4.4 mi. NNE of vent; local farm | GM |
| 3E1 | 4.1 mi. NE of vent; local farm | ID,THB,WW, GM,FPB |

TABLE B-1 (CONT.)

| | | |
|---|---|---|
| 7E1 | 4.5 mi. SE of vent; 1 mi. W of Mad Horse Creek | SW,ESF,ESP, ESB,ESS |
| 13E1 | 4.2 mi. W of vent; Diehl House Lab | ID |
| 15E1 | 4.1 mi. NW of vent; local farm | FPV |
| 16E1 | 4.1 mi. NNW of vent; Port Penn | ID,AP,AI,E |
| 1F1 | 5.8 mi. N of vent; Fort Elfsborg | ID,AP,E |
| 1F2 | 7.1 mi. N of vent; midpoint of Delaware River | SW |
| 2F1 | 5.0 mi. NNE of vent; local farm | E,V,M |
| 2F2 | 8.7 mi. NNE of vent; Salem substation | ID,AP,AI, RW,E |
| 2F3 | 8.0 mi. NNE of vent; Salem Water Company | PWR,PWT |
| 5F1 | 8.0 mi. E of vent | FPV,ID,E |
| 5F2 | 7.0 mi. E of vent; local farm | M,E,V |
| 6F1 | 6.4 mi. ESE of vent; Stow Neck Road | ID |
| 7F2 | 9.1 mi. SE of vent; Bayside, New Jersey | ID |
| 11F1 | 5.2 mi. SW of vent; Taylor's Bridge, Delaware | ID |
| 13F1 | 9.8 mi. W of vent; Middletown, Delaware | ID |
| 14F1 | 5.5 mi. WNW of vent; local farm | V,M,FPB,THB,E |
| 15F1 | 5.2 mi. NW of vent; local farm | V,M,E |
| 16F1 | 6.9 mi. NNW of vent; C & D Canal | SW,ESB,ESS |
| 1G1 | 13 mi. N of vent; local farm | FPV |
| 1G2 | 12 mi. N of vent; local farm | FPV |
| 3G1 | 17 mi. NE of vent; local farm | ID,E,V,M |
| 2H1 | 34 mi. NNE of vent; RMC, Phila. | ID |
| 3H1 | 32 mi. NE of vent; National Park, N.J. | ID |
| 3H3 | 110 mi. NE of vent; Maplewood Laboratories | ID,AP,AI,E |
| 3H4 | 18 mi. NE of vent; local farm | FPV |

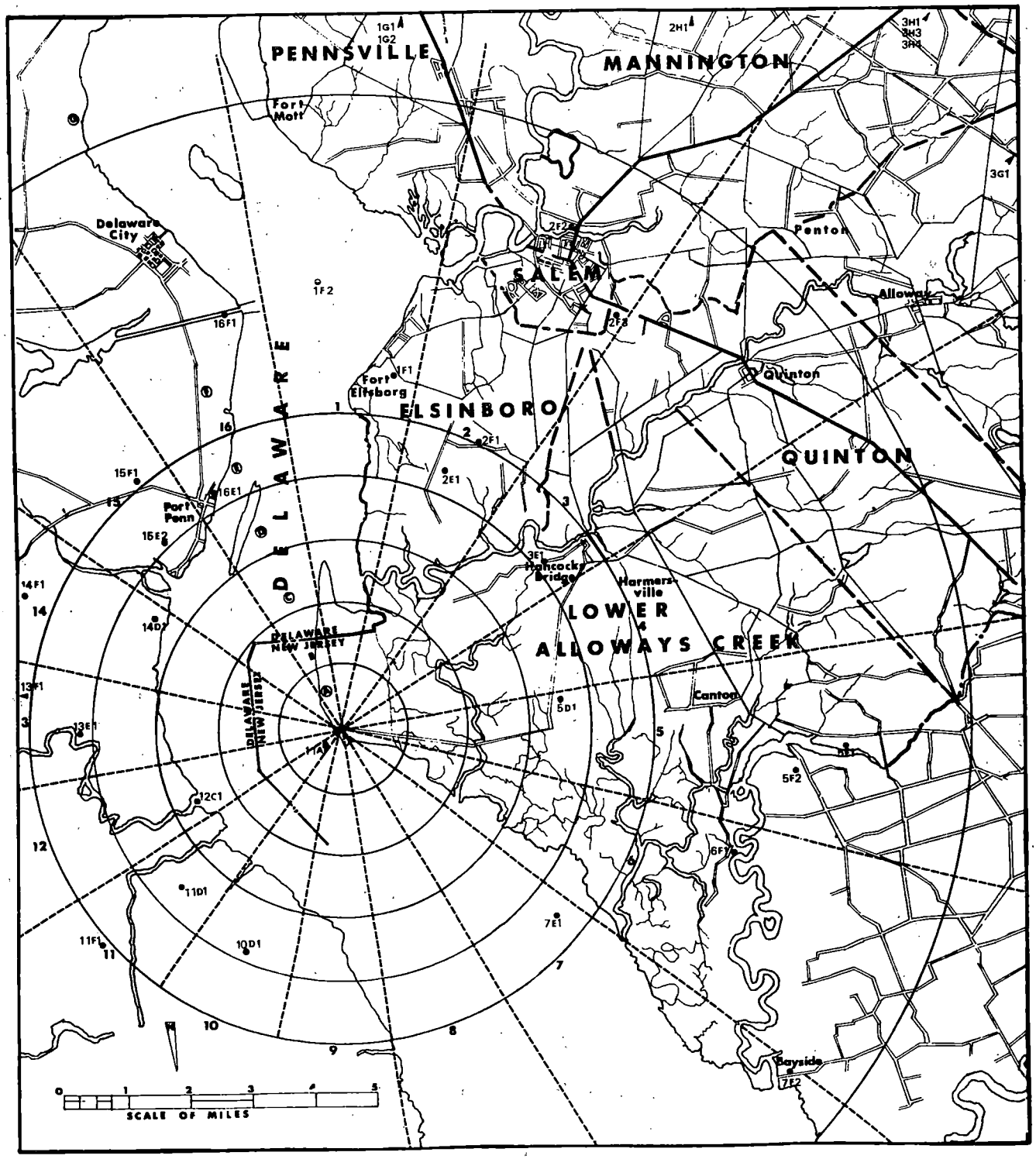
MAP B-1

ON SITE SAMPLING LOCATIONS
ARTIFICIAL ISLAND - 1977



MAP B-2

# OFF SITE SAMPLING LOCATIONS
# ARTIFICIAL ISLAND · 1977



# APPENDIX C

# DATA TABLES

Appendix C presents the analytical results of the 1977 Artificial Island Radiological Environmental Monitoring Program for the period of January 1 to December 31.

TABLE C-1

CONCENTRATIONS OF TRITIUM IN SURFACE WATER

Results in Units of pCi/l ± 2 sigma

| STATION NO. | 1-11-77 | 2-28-77 | 3-07-77 | 4-04-77 | 5-03-77 | 6-03-77 | 7-11-77 |
|---|---|---|---|---|---|---|---|
| SA-SW-11A1 | * | <80 | 140±68 | 87±65 | 124±55 | 166±73 | 90±65 |
| SA-SW-12C1 | * | 266±70 | 431±71 | 225±66 | 95±55 | 336±74 | 76±66 |
| SA-SW-7E1 | * | 292±68 | 460±71 | 65±65 | <80 | 219±73 | <80 |
| SA-SW-1F2 | * | 272±70 | 144±68 | 76±65 | 103±55 | 251±73 | 78±64 |
| SA-SW-16F1 | * | 291±68 | 132±68 | 367±67 | 118±55 | 150±73 | 142±65 |
| AVERAGE | | 240±181 | 261±337 | 164±262 | 104±35 | 224±149 | 93±56 |

| STATION NO. | 8-05-77 | 9-09-77 | 10-05-77 | 11-02-77 | 12-16-77 | ANNUAL AVERAGE |
|---|---|---|---|---|---|---|
| SA-SW-11A1 | 251±77 | 186±70(1) | 188±76 | 214±74 | <80 | 146±119 |
| SA-SW-12C1 | 400±78 | 138±71 | 184±76 | 125±73 | <80 | 214±257 |
| SA-SW-7E1 | 236±77 | 159±70 | 175±76 | 168±74 | <80 | 183±236 |
| SA-SW-1F2 | 209±77 | 177±70 | 258±72 | 117±73 | <80 | 160±153 |
| SA-SW-16F1 | 175±77 | 186±71 | 147±77 | 196±74 | <80 | 180±164 |
| AVERAGE | 254±173 | 169±41 | 190±82 | 164±85 | <80 | 177±191 |

* No sample collected because of icing conditions.

(1) Sample date was 9-13-77.

TABLE C-2

CONCENTRATIONS OF ALPHA EMITTERS IN SURFACE WATER

Results in Units of pCi/l ± 2 sigma

| STATION NO. | 1-11-77 | 2-28-77 | 3-07-77 | 4-04-77 | 5-03-77 | 6-03-77 |
|---|---|---|---|---|---|---|
| SA-SW-11A1 | * | <6.8 | <16 | <6.5 | <14 | <22 |
| SA-SW-12C1 | * | 14±13 | <8.5 | <2.5 | <7.8 | <19 |
| SA-SW-7E1 | * | <9.0 | <17 | <18 | <18 | <15 |
| SA-SW-1F2 | * | <11 | <2.3 | 2.0±1.9 | <2.3 | <7.3 |
| SA-SW-16F1 | * | <6.0 | <9.4 | <2.2 | <3.8 | <26 |

| STATION NO. | 7-11-77 | 8-05-77 | 9-09-77 | 10-05-77 | 11-02-77 | 12-16-77 |
|---|---|---|---|---|---|---|
| SA-SW-11A1 | <27 | <20 | <30(1) | <9.4 | <6.8 | <7.8 |
| SA-SW-12C1 | <19 | <20 | <24 | <7.2 | <3.2 | <6.3 |
| SA-SW-7E1 | <33 | <29 | <30 | <9.4 | <9.0 | <16 |
| SA-SW-1F2 | <19 | <16 | <20 | <3.7 | <2.3 | <4.5 |
| SA-SW-16F1 | <17 | <16 | <20 | <3.1 | <2.5 | <5.0 |

* No sample collected because of icing conditions.
(1) Sample date was 9-13-77.

TABLE C-3

CONCENTRATIONS OF BETA EMITTERS IN SURFACE WATER

Results in Units of pCi/1 ± 2 sigma

| STATION NO. | 1-11-77 | 2-28-77 | 3-07-77 | 4-04-77 | 5-03-77 | 6-03-77 | 7-11-77 |
|---|---|---|---|---|---|---|---|
| SA-SW-11A1 | * | 70±8 | 31±5 | 19±4 | 31±5 | 50±7 | 78±9 |
| SA-SW-12C1 | * | 56±7 | 16±3 | 8.4±2.9 | 17±4 | 52±7 | 73±8 |
| SA-SW-7E1 | * | 86±9 | 38±5 | 50±7 | 35±5 | 55±6 | 140±14 |
| SA-SW-1F2 | * | 39±7 | 6.1±2.4 | 6.5±2.8 | 4.3±2.0 | 18±4 | 68±8 |
| SA-SW-16F1 | * | 49±6 | 19±4 | 9.1±3.0 | 7.4±2.2 | 61±8 | 61±7 |
| AVERAGE | | 60±37 | 22±25 | 19±36 | 19±27 | 47±34 | 84±64 |

| STATION NO. | 8-05-77 | 9-09-77 | 10-05-77 | 11-02-77 | 12-16-77 | ANNUAL AVERAGE |
|---|---|---|---|---|---|---|
| SA-SW-11A1 | 71±9 | 85±9(1) | 47±5 | 51±6 | 21±4 | 50±46 |
| SA-SW-12C1 | 55±8 | 77±8 | 32±4 | 25±4 | 16±3 | 39±49 |
| SA-SW-7E1 | 85±10 | 110±11 | 49±5 | 77±8 | 41±5 | 70±67 |
| SA-SW-1F2 | 41±6 | 56±6 | 15±3 | 16±3 | 11±3 | 26±44 |
| SA-SW-16F1 | 40±6 | 72±7 | 13±3 | 15±3 | 14±3 | 33±49 |
| AVERAGE | 58±39 | 80±40 | 31±34 | 37±54 | 21±24 | 43±59 |

* No sample collected because of icing conditions.

(1) Sample date was 9-13-77.

TABLE C-4

CONCENTRATIONS OF POTASSIUM-40* IN SURFACE WATER

Results in Units of pCi/l ± 2 sigma

| STATION NO. | RADIO-ACTIVITY | 1-11-77 | 2-28-77 | 3-07-77 | 4-04-77 | 5-03-77 | 6-03-77 | 7-11-77 |
|---|---|---|---|---|---|---|---|---|
| SA-SW-11A1 | K-40 | ** | 76±11 | 34±10 | 30±9 | 35±10 | 80±11 | 120±12 |
| SA-SW-12C1 | K-40 | ** | 73±10 | 22±9 | 13±9 | 18±9 | 78±10 | 76±11 |
| SA-SW-7E1 | K-40 | ** | 100±10 | 41±9 | 57±13 | 58±9 | 100±10 | 150±15 |
| SA-SW-1F2 | K-40 | ** | 23±9 | <7.0 | <7.0 | <7.0 | 22±10 | 84±11 |
| SA-SW-16F1(2) | K-40 | ** | 65±10 | 25±9 | <7.0 | <7.0 | 64±10 | 84±10 |
| AVERAGE | K-40 | | 67±56 | 26±26 | 23±43 | 25±43 | 69±58 | 103±63 |

| STATION NO. | RADIO-ACTIVITY | 8-05-77 | 9-09-77 | 10-05-77 | 11-02-77 | 12-16-77 | ANNUAL AVERAGE |
|---|---|---|---|---|---|---|---|
| SA-SW-11A1 | K-40 | 100±10 | 120±12(1) | 60±10 | 66±9 | 27±10 | 68±70 |
| SA-SW-12C1 | K-40 | 98±11 | 100±10 | 37±10 | 35±10 | 12±9 | 51±69 |
| SA-SW-7E1 | K-40 | 110±11 | 170±17 | 66±10 | 87±10 | 41±9 | 89±85 |
| SA-SW-1F2(3) | K-40 | 57±11 | 79±11 | 10±9 | 14±9 | <9.0 | 29±59 |
| SA-SW-16F1 | K-40 | 65±10 | 78±11 | 11±9 | 33±10 | 27±10 | 42±59 |
| AVERAGE | K-40 | 86±47 | 109±76 | 37±53 | 47±58 | 23±26 | 56±79 |

* By gamma spectrometry, all other gamma emitters <MDL; typical MDL's are given in table C-33.
** No sample collected because of icy conditions.
(1) Sample collection date was 9-13-77.
(2) Cs-134 and Cs-137 were observed in the February samples from this station with the concentrations being 0.8±0.6 pCi/l and 2.1±1.3 pCi/l respectively.
(3) Cs-137 was observed in the November and December samples from this station with the concentrations being 1.0±0.7 pCi/l and 1.5±0.9 pCi/l respectively.

TABLE C-5

CONCENTRATIONS OF STRONTIUM-89 AND-90 IN SURFACE WATER

Results* in Units of pCi/1 ± 2 sigma

| STATION NO. | 2-28-77**to 3-07-77 Sr-89 | Sr-90 | 4-04-77 to 6-03-77 Sr-89 | Sr-90 | 7-11-77 to 9-09-77 Sr-89 | Sr-90 | 10-05-77 to 12-16-77 Sr-89 | Sr-90 |
|---|---|---|---|---|---|---|---|---|
| SA-SW-11A1 | <1.2 | <0.6 | <1.2 | <0.7 | <1.0(1) | <0.5(1) | <0.8 | 0.4±0.3 |
| SA-SW-12C1 | <1.6 | <0.9 | <0.6 | <0.4 | <0.9 | 0.4±0.3 | <0.9 | 0.7±0.3 |
| SA-SW-7E1 | <1.5 | <0.7 | <1.1 | <0.6 | <1.0 | <0.5 | 1.0±0.7 | <0.6 |
| SA-SW-1F2 | <1.4 | <0.7 | <0.7 | 0.5±0.3 | <1.1 | 0.4±0.3 | <1.2 | <0.7 |
| SA-SW-16F1 | <1.2 | <0.6 | <0.7 | 0.3±0.3 | <0.8 | <0.4 | <1.3 | <0.7 |

* Sr-89 results decay corrected to sample stop date.
** No samples collected prior to 2-28-77 because of icing conditions.
(1) Sample dates were 7-11-77 to 9-13-77.

TABLE C-6

CONCENTRATIONS OF GAMMA EMITTERS* IN EDIBLE FISH

Results in Units of pCi/g(wet) ± 2 sigma

| STATION NO. | SAMPLING DATE | K-40 |
|---|---|---|
| SA-ESF-11A1 | 6-07-77 to 6-25-77 | 4.2±0.4 |
| | 8-09-77 to 8-31-77 | 3.8±0.4 |
| SA-ESF-12C1 | 6-07-77 to 6-25-77 | 3.1±0.3 |
| | 8-09-77 to 8-31-77 | 4.3±0.4 |
| SA-ESF-7E1 | 6-07-77 to 6-25-77 | 3.3±0.3 |
| | 8-09-77 to 8-31-77 | 4.2±0.4 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.

TABLE C-7

CONCENTRATIONS OF STRONTIUM-89 AND-90, AND TRITIUM IN EDIBLE FISH SAMPLES

| | | SAMPLE TYPE | | | |
|---|---|---|---|---|---|
| | | BONES (pCi/g(dry) ± 2 sigma) | | FLESH AQUEOUS FRACTION (pCi/l ± 2 sigma) | FLESH ORGANIC FRACTION (pCi/l ± 2 sigma) |
| STATION NO. | DATE | Sr-89* | Sr-90 | H-3 | H-3 |
| SA-ESF-11A1 | 6-07-77 to 6-25-77 | 0.10±0.08 | 0.09±0.03 | <80 | 358±67 |
| | 8-09-77 to 8-31-77 | <2.2 | <0.5 | 122±76 | 235±81 |
| SA-ESF-12C1 | 6-07-77 to 6-25-77 | + | + | 270±75 | 290±67 |
| | 8-09-77 to 8-31-77 | <1.7 | <0.4 | <80 | 175±81 |
| SA-ESF-7E1 | 6-07-77 to 6-25-77 | + | + | 119±74 | 142±66 |
| | 8-09-77 to 8-31-77 | <8.8 | <1.6 | 112±76 | <84 |

* Sr-89 results decay corrected to sample stop date.

\+ Insufficient sample size.

TABLE C-8

CONCENTRATIONS OF GAMMA EMITTERS* IN BLUE CRAB SAMPLES

Results in Units of pCi/g(wet) ± 2 sigma

| STATION NO. | DATE | SAMPLE TYPE | K-40 | Cs-137 |
|---|---|---|---|---|
| SA-ECH-11A1 | 6-28-77 | Blue Crab (Hard Shell) | 3.3±0.3 | <0.008 |
| | 8-09-77 to 8-31-77 | Blue Crab (Hard Shell) | 2.2±0.2 | <0.006 |
| SA-ECH-12C1 | 6-28-77 | Blue Crab (Hard Shell) | 2.9±0.3 | 0.02±0.01 |
| | 8-09-77 to 8-31-77 | Blue Crab (Hard Shell) | 2.6±0.3 | <0.008 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.

TABLE C-9

CONCENTRATIONS OF STRONTIUM-89 AND-90, AND TRITIUM IN BLUE CRAB SAMPLES

| STATION NO. | DATE | SAMPLE | Sr-89* (pCi/g ± 2 sigma) | Sr-90 (pCi/g ± 2 sigma) | H-3 (EDIBLE PORTION) (pCi/l ± 2 sigma) |
|---|---|---|---|---|---|
| SA-ECH-11A1 | 6-28-77 | Flesh (wet) | <0.03 | <0.008 | 226±74 |
| | | Shell (dry) | 0.18±0.09 | 0.15±0.04 | - |
| SA-ECH-11A1 | 8-09-77 to 8-31-77 | Flesh (wet) | <0.04 | 0.006±0.004 | 331±79 |
| | | Shell (dry) | 0.3±0.2 | 0.33±0.04 | - |
| SA-ECH-12C1 | 6-28-77 | Flesh (wet) | <0.03 | <0.007 | 184±73 |
| | | Shell (dry) | <0.1 | 0.21±0.04 | - |
| SA-ECH-12C1 | 8-09-77 to 8-31-77 | Flesh (wet) | <0.04 | 0.006±0.004 | 83±77 |
| | | Shell (dry) | 0.4±0.2 | 0.32±0.04 | - |

* Sr-89 results decay corrected to sample stop date.

TABLE C-10

CONCENTRATIONS OF STRONTIUM-89 AND-90, AND GAMMA EMITTERS* IN PREY FISH

Results in Units of pCi/g(wet) ± 2 sigma

| STATION NO. | DATE | Sr-89 ** | Sr-90 | K-40 |
|---|---|---|---|---|
| SA-ESP-11A1 | 6-07-77 to 6-25-77 | <0.01 | <0.004 | 3.1±0.3 |
| | 8-09-77 to 8-31-77 | <0.2 | <0.04 | 3.0±0.3 |
| SA-ESP-12C1 | 6-07-77 to 6-25-77 | <0.02 | 0.004±0.004 | 3.3±0.3 |
| | 8-09-77 to 8-31-77 | <0.1 | <0.03 | 2.5±0.3 |
| SA-ESP-7E1 | 6-07-77 to 6-25-77 | <0.02 | <0.006 | 2.7±0.3 |
| | 8-09-77 to 8-31-77 | 0.13±0.09 | <0.04 | 1.9±0.2 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.

** Sr-89 results decay corrected to sample stop date.

TABLE C-11

CONCENTRATIONS OF GAMMA EMITTERS* IN SEDIMENT**

Results in Units of pCi/g(dry) ± 2 sigma

| STATION NO. | SA-ESS-11A1 | | SA-ESS-12C1 | | SA-ESS-7E1 | | SA-ESS-16F1 | |
|---|---|---|---|---|---|---|---|---|
| DATE | 6-08-77 | 9-12-77 | 6-08-77 | 9-12-77 | 6-08-77 | 9-12-77 | 6-08-77 | 9-12-77 |
| NUCLIDE | | | | | | | | |
| K-40 | 17±2(1) | 16±2(2) | 11±1 | 18±2(3) | 13±1 | 11±1 | 18±2(4) | 18±2 |
| Nb-95 | <0.02 | 0.04±0.03 | 0.02±0.01 | <0.01 | <0.01 | 0.07±0.03 | <0.02 | <0.02 |
| Cs-137 | 0.25±0.04 | 0.19±0.03 | 0.04±0.02 | <0.01 | 0.05±0.02 | 0.07±0.03 | 0.07±0.03 | 0.04±0.03 |
| Ra-226 | 0.81±0.08 | 0.70±0.07 | 1.0±0.1 | 0.75±0.08 | 0.72±0.07 | 0.71±0.07 | 0.5±0.1 | 0.58±0.06 |
| Th-232 | 0.8±0.2 | 0.46±0.06 | 0.69±0.07 | 0.42±0.07 | 0.73±0.07 | 0.38±0.07 | 0.8±0.1 | 0.54±0.08 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.
** Sediment samples included associated benthic organisms.
(1) Ru-103 was also observed in this sample with a concentration of 0.04±0.02 pCi/g(dry).
(2) Ce-144 was also observed in this sample with a concentration of 0.13±0.05 pCi/g(dry).
(3) Mn-54 and Ce-141 were also observed in this sample with a concentration of 0.02±0.01 pCi/g(dry) for both nuclides.
(4) Zr-95 and Sr-125 were also observed in this sample with a concentration of 0.04±0.03 pCi/g(dry) and 0.06±0.05 pCi/g(dry), respectively.

TABLE C-12

CONCENTRATIONS OF STRONTIUM-89* AND-90* IN BENTHOS AND SEDIMENT

Results in Units of pCi/g (dry) ± 2 sigma

| STATION NO. | BENTHOS DATE | BENTHOS Sr-89*** | BENTHOS Sr-90 | SEDIMENT** DATE | SEDIMENT** Sr-90 |
|---|---|---|---|---|---|
| SA-ESB-11A1 | 6-07-77 to 6-25-77 | 20±11 | <4.6 | 6-08-77 | <0.05 |
| | | | | 9-12-77 | <0.04 |
| | 9-12-77 | <0.7 | 0.3±0.2 | | |
| SA-ESB-12C1 | 6-07-77 to 6-25-77 | <111 | <31 | 6-08-77 | <0.06 |
| | | | | 9-12-77 | <0.04 |
| | 9-12-77 | + | + | | |
| SA-ESB-7E1 | 6-07-77 to 6-25-77 | <2.8 | <0.8 | 6-08-77 | <0.04 |
| | | | | 9-12-77 | <0.03 |
| | 9-12-77 | <0.5 | 0.1±0.1 | | |
| SA-ESB-16F1 | 6-07-77 to 6-25-77 | <2370 | <309 | 6-08-77 | <0.05 |
| | | | | 9-12-77 | <0.04 |
| | 9-12-77 | + | + | | |

* High MDL values due to small sample size.
** Sediment samples included associated benthic organisms.
\+ Sample size too small to analyze.
*** Sr-89 results decay corrected to sample stop date.

TABLE C-13

CONCENTRATIONS OF ALPHA EMITTERS IN AIR PARTICULATES

Results in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| MONTH | STATION NO. SA-AP-16E1 | SA-AP-3H3 |
|---|---|---|
| January | 1.1±0.6 | 2.1±0.8 |
| | 1.9±0.6 | 2.1±0.6 |
| | <0.6 | 1.4±0.8 |
| | 1.3±0.7 | 0.5±0.5 |
| February | <0.2 | <0.2 |
| | <1.8 | <2.3 |
| | 1.2±0.6 | 1.4±0.6 |
| | <0.6 | 1.8±1.0 |
| March | 1.0±0.6 | 1.6±0.8 |
| | <0.3 | 2.0±0.8 |
| | 2.4±0.9 | 1.2±0.6 |
| | 1.5±0.6 | 0.5±0.4 |
| | 0.6±0.5 | 1.3±0.6 |
| April | 1.3±0.7 | 0.7±0.7 |
| | 1.4±0.9 | 0.9±0.7 |
| | <0.4 | 1.1±0.7 |
| | 1.4±0.8 | 1.1±0.7 |
| May | 1.3±0.6 | 1.2±0.6 |
| | 1.0±0.6 | <0.4 |
| | 0.8±0.5 | 1.8±0.7 |
| | 1.1±0.6 | 0.5±0.4 |
| June | 0.5±0.5 | 0.6±0.5 |
| | 0.5±0.4 | 0.6±0.4 |
| | <0.3 | 1.3±0.6 |
| | 0.8±0.5 | 0.9±0.5 |
| | 1.0±0.6 | 1.1±0.6 |

TABLE C-13 (CONT.)

CONCENTRATIONS OF ALPHA EMITTERS IN AIR PARTICULATES

Results in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| MONTH | STATION NO. SA-AP-16E1 | SA-AP-3H3 |
|---|---|---|
| July | <0.5 | 1.2±0.8 |
| | 0.8±0.5 | 0.9±0.6 |
| | 1.6±0.8 | 1.5±0.8 |
| | 0.9±0.7 | 2.1±0.9 |
| August | <0.9 | <0.9 |
| | 0.9±0.5 | 1.8±0.7 |
| | <0.6 | 0.7±0.7 |
| | 0.8±0.6 | 0.9±0.6 |
| September | 1.9±0.7 | 2.6±0.8 |
| | 0.9±0.7 | 1.4±0.8 |
| | 0.9±0.5 | 1.0±0.5 |
| | 0.6±0.4 | <0.6 |
| October | 0.9±0.6 | 1.4±0.7 |
| | 1.0±0.5 | 1.4±0.6 |
| | 1.0±0.6 | <0.3 |
| | 1.6±0.6 | 1.2±0.5 |
| | 0.9±0.6 | 1.6±0.7 |
| November | 1.2±0.6 | 1.6±0.7 |
| | 0.6±0.4 | 1.0±0.6 |
| | 0.7±0.5 | 1.1±0.6 |
| | 0.8±0.5 | 0.7±0.6 |
| December | 0.9±0.6 | 0.7±0.6 |
| | 1.2±0.6 | 0.7±0.5 |
| | <0.6 | 1.2±0.8 |
| | 1.3±0.6 | 0.9±0.6 |
| Average | 1.0±0.9 | 1.2±1.1 |

TABLE C-14

CONCENTRATIONS OF BETA EMITTERS IN AIR PARTICULATES

Results in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| MONTH | STATION NO. SA-AP-2S1 | SA-AP-5S1 | SA-AP-5D1 | SA-AP-10D1 | SA-AP-16E1 | SA-AP-1F1 | SA-AP-2F2 | SA-AP-3H3 | AVERAGE |
|---|---|---|---|---|---|---|---|---|---|
| January | 55±6 | 58±6 | 53±6 | 62±6 | 58±6 | 64±6 | 59±6 | 51±6 | 58±9 |
| | 62±7 | 63±7 | 55±6 | 64±7 | 59±7 | 57±7 | 67±7 | 62±7 | 61±8 |
| | 35±6 | 27±6 | 27±5 | 29±6 | 30±6 | 31±6 | 37±6 | 23±5 | 30±9 |
| | 33±5 | 31±5 | 53±6 | 28±5 | 31±6 | 30±5 | 25±5 | 31±6 | 33±17 |
| February | 32±6 | 30±5 | 28±5 | 29±5 | 27±5 | 28±5 | 27±5 | 26±5 | 28±4 |
| | (1) | 47±6 | 45±6 | 43±5 | 42±5 | 38±5 | 46±6 | 38±6 | 43±7 |
| | 36±4(2) | 30±5 | 27±5 | 30±5 | 29±5 | 31±5 | 35±5 | 32±5 | 31±6 |
| | (1) | 50±7 | 45±7 | 47±7 | 42±7 | 49±7 | 52±7 | 48±8 | 48±7 |
| March | 37±5(3) | 35±7 | 36±6 | 41±6 | 31±6 | 39±6 | 40±6 | 79±9 | 42±30 |
| | 55±7 | 52±7 | 55±7 | 48±6 | 50±6 | 51±7 | 57±7 | 65±8 | 54±11 |
| | 60±7 | 62±8 | 58±7 | 60±8 | 53±8 | 54±7 | 53±7 | 55±7 | 57±7 |
| | 54±7 | 52±7 | 53±6 | 53±7 | 46±7 | 50±6 | 54±7 | 46±7 | 51±7 |
| | 136±14 | 124±12 | 123±12 | 124±12 | 133±13 | 138±14 | 134±13 | 108±11 | 128±20 |
| April | 76±8 | 78±8 | 78±8 | 81±8 | 79±8 | 71±7 | 63±7 | 72±8 | 75±12 |
| | 203±20 | 194±19 | 176±18 | 210±21 | 248±25 | 204±20 | 205±21 | 183±18 | 203±43 |
| | 178±18 | 187±19 | 190±19 | 155±16 | 156±16 | 186±19 | 194±19 | 170±17 | 177±30 |
| | 177±18 | 159±16 | 150±15 | 188±19 | 175±18 | 159±16 | 158±16 | 118±12 | 161±43 |
| May | 242±24 | 260±26 | 238±24 | 236±24 | 224±22 | 248±25 | 261±26 | 218±22 | 241±31 |
| | 254±25 | 286±29 | 259±26 | 268±27 | 286±29 | 263±26 | 274±27 | 253±25 | 268±26 |
| | 356±36 | 351±35 | 348±35 | 285±29 | 350±35 | 289±29 | 330±33 | 440±44 | 344±96 |
| | 295±30 | 271±27 | 261±26 | 248±25 | 233±23 | 263±26 | 265±27 | 293±29 | 266±42 |
| June | 373±37 | 335±34 | 347±35 | 336±34 | 328±33 | 349±35 | 339±34 | 324±32 | 341±31 |
| | 329±33 | 310±31 | 301±30 | 262±26 | 270±27 | 298±30 | 303±30 | 288±29 | 295±43 |
| | 223±22 | 217±22 | 230±23 | 214±21 | 195±20 | 194±19 | 230±23 | 265±27 | 221±45 |
| | 230±23 | 245±25 | 222±22 | 222±22 | 239±24 | 230±23 | 227±23 | 195±20 | 226±30 |
| | 278±28 | 298±30 | 270±27 | 282±28 | 283±28 | 290±29 | 286±29 | 257±26 | 281±25 |

TABLE C-14 (CONT.)

CONCENTRATIONS OF BETA EMITTERS IN AIR PARTICULATES

Results in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| MONTH | STATION NO. SA-AP-2S1 | SA-AP-5S1 | SA-AP-5D1 | SA-AP-10D1 | SA-AP-16E1 | SA-AP-1F1 | SA-AP-2F2 | SA-AP-3H3 | AVERAGE |
|---|---|---|---|---|---|---|---|---|---|
| July | 151±15 | 148±15 | 143±14 | 130±13 | 133±13 | 155±16 | 158±16 | 181±18 | 150±32 |
| | 237±24 | 232±23 | 210±21 | 192±19 | 209±21 | 219±22 | 219±22 | 252±25 | 221±37 |
| | 218±22 | 234±23 | 198±20 | 189±19 | 180±18 | 216±22 | 222±22 | 221±22 | 210±37 |
| | 166±17 | 170±17 | 142±14 | 147±15 | 144±14 | 168±17 | 168±17 | 179±18 | 161±28 |
| August | 151±15 | 152±15 | 147±15 | 143±14 | 145±15 | 139±14 | 144±14 | 160±16 | 148±13 |
| | 92±9 | 96±10 | 80±8 | 77±8 | 95±9 | 88±9 | 89±9 | 105±11 | 90±18 |
| | 187±19 | 183±18 | 207±21 | 190±19 | 191±19 | 204±20 | 190±19 | 200±20 | 194±17 |
| | 216±22 | 212±21 | 202±20 | 191±19 | 191±19 | 197±20 | 183±18 | 182±18 | 197±25 |
| September | 158±16 | 143±14 | 123±12 | 104±10 | 120±12 | 116±12 | 140±14 | 123±12 | 128±35 |
| | 113±11 | 102±10 | 104±10 | 120±12 | 120±12 | 116±12 | 129±13 | 107±11 | 114±18 |
| | 98±10 | 100±10 | 83±8 | 97±10 | 90±9 | 93±9 | 101±10 | 90±9 | 94±12 |
| | 146±15 | 67±7 | 59±7 | 90±9 | 52±6 | 157±16 | 143±14 | 29±9 | 93±99 |
| October | 456±46 | 543±54 | 461±46 | 524±52 | 466±47 | 446±45 | 384±38 | 426±43 | 463±102 |
| | 238±24 | 189±19 | 234±23 | 233±23 | 221±22 | 189±19 | 213±21 | 237±24 | 219±41 |
| | 136±14 | 123±12 | 137±14 | 158±16 | 188±19 | 133±13 | 143±14 | 153±15 | 146±40 |
| | 231±23 | 211±21 | 200±20 | 185±19 | 168±17 | 195±20 | 216±22 | 187±19 | 199±40 |
| | 113±11 | 125±13 | 143±14 | 136±14 | 139±14 | 123±12 | 117±12 | 173±17 | 134±38 |
| November | 90±9 | 87±9 | 99±10 | 95±9 | 93±9 | 102±10 | 91±9 | 146±15 | 100±38 |
| | 76±8 | 70±7 | 69±7 | 73±7 | 67±7 | 73±7 | 72±7 | 53±7 | 69±14 |
| | 142±14 | 156±16 | 135±14 | 152±15 | 143±14 | 119±12 | 120±12 | 126±13 | 137±28 |
| | 68±7 | 59±7 | 62±7 | 61±7 | 63±7 | 63±7 | 55±7 | 72±8 | 63±10 |
| December | 49±5 | 47±5 | 48±5 | 51±6 | 51±6 | 47±5 | 42±5 | 51±6 | 48±6 |
| | 59±8 | 58±8 | 58±8 | 58±7 | 64±7 | 61±8 | 56±7 | 54±7 | 59±6 |
| | 55±6 | 48±6 | 56±6 | 45±6 | 40±6 | 43±6 | 54±6 | 63±8 | 51±16 |
| | 56±6 | 54±7 | 55±6 | 62±7 | 62±7 | 60±7 | 63±7 | 55±7 | 58±7 |
| Average | 153±204 | 146±215 | 141±198 | 140±198 | 140±197 | 142±192 | 144±189 | 144±204 | 144±198 |

(1) Unable to service air monitor due to poor weather conditions.
(2) Sample period was 2-07-77 to 2-22-77.
(3) Sample period was 2-22-77 to 3-07-77.

TABLE C-15

CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIR PARTICULATE SAMPLES

Results** in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| STATION NO. AND DATE | Be-7 | Mn-54 | Zr-95 | Nb-95 | Ru-103 | Ru-106 | Sb-125 | Cs-137 | BaLa-140 | Ce-141 | Ce-144 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SA-AP-2S1 | | | | | | | | | | | |
| 12-13-76 to 3-29-77 | 58±6 | <0.1 | 2.8±0.5 | 3.5±0.4 | 1.8±0.3 | <MDL | <0.4 | 0.3±0.2 | <0.9 | 1.8±0.4 | 2.1±1.0 |
| 3-29-77 to 6-27-77 | 98±10 | <0.2 | 32±3 | 49±5 | 13±1 | 18±5 | 1.1±0.6 | 3.1±0.6 | <2.7 | 7.4±0.8 | 48±5 |
| 6-27-77(1) to 9-27-77 | 58±10 | <0.2 | 12±2 | 15±2 | 3.5±1.4 | 14±4 | <0.8 | 2.3±0.5 | <20 | <1.4 | 45±5 |
| 9-27-77 to 11-28-77 | 97±18 | <0.4 | 14±2 | 10±1 | 11±3 | 17±4 | 2.4±1.1 | 2.6±0.5 | <173 | 13±3 | 35±4 |
| 11-28-77 to 12-27-77 | 71±11 | <0.4 | 2.7±1.3 | 3.8±0.9 | 1.3±0.8 | <MDL | <1.0 | 1.2±0.7 | <4.4 | <0.9 | 14±3 |
| SA-AP-5S1 | | | | | | | | | | | |
| 12-13-76 to 3-29-77 | 69±7 | <0.1 | 3.0±0.5 | 4.2±0.4 | 2.3±0.3 | <MDL | <0.3 | 0.4±0.2 | <0.5 | 1.7±0.3 | 2.4±1.2 |
| 3-29-77 to 6-27-77 | 108±11 | <0.2 | 35±3 | 49±5 | 14±1 | 17±3 | 1.5±0.6 | 2.8±0.4 | <2.1 | 7.9±0.9 | 51±5 |
| 6-27-77 to 9-26-77 | 80±8 | <0.2 | 14±1 | 18±2 | 3.4±0.6 | 15±3 | 1.7±0.4 | 3.3±0.5 | <6.0 | 1.8±0.6 | 37±4 |
| 9-26-77(2) to 11-28-77 | 101±20 | <0.5 | 13±3 | 11±1 | 10±4 | 12±5 | 3.0±1.9 | 3.1±0.7 | <277 | 16±9 | 30±4 |
| 11-28-77 to 12-27-77 | 76±20 | <0.9 | <3.0 | 3.1±1.2 | <1.7 | <MDL | <3.1 | 1.1±0.9 | 11±11 | <2.2 | 15±8 |

TABLE C-15 (Cont.)

CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIR PARTICULATE SAMPLES

Results** in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| STATION NO. AND DATE | Be-7 | Mn-54 | Zr-95 | Nb-95 | Ru-103 | Ru-106 | Sb-125 | Cs-137 | BaLa-140 | Ce-141 | Ce-144 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SA-AP-5D1 | | | | | | | | | | | |
| 12-13-76 to 3-29-77 | 63±6 | <0.1 | 2.3±0.4 | 3.4±0.3 | 1.7±0.3 | 1.6±1.1 | <0.3 | 0.4±0.2 | <0.7 | 1.7±0.4 | 2.3±0.9 |
| 3-29-77 to 6-27-77 | 50±6 | <0.2 | 17±2 | 24±2 | 6.0±0.8 | 11±3 | 1.1±0.8 | 2.0±0.4 | <2.3 | 4.0±0.7 | 24±2 |
| 6-27-77(3) to 9-26-77 | 69±7 | 0.3±0.2 | 14±1 | 18±2 | 3.4±0.7 | 18±3 | 2.7±0.6 | 3.2±0.1 | <6.0 | 1.7±0.7 | 41±4 |
| 9-26-77 to 11-28-77 | 26±22 | <0.3 | 16±4 | 7.3±1.0 | 4.6±3.2 | <MDL | <1.0 | <0.4 | <227 | <5.6 | 36±6 |
| 11-28-77 to 12-27-77 | 78±12 | <0.4 | 3.1±1.1 | 4.3±0.9 | <0.8 | <MDL | 1.6±1.4 | 2.5±0.8 | <5.5 | <1.6 | 18±5 |
| SA-AP-10D1 | | | | | | | | | | | |
| 12-14-76 to 3-28-77 | 58±6 | <0.1 | 1.8±0.4 | 2.9±0.4 | 1.9±0.3 | <MDL | <0.3 | 0.2±0.2 | <0.8 | 1.4±0.3 | 2.8±0.9 |
| 3-28-77 to 6-27-77 | 93±9 | <0.2 | 30±3 | 43±4 | 11±1 | 16±3 | 1.6±0.6 | 2.2±0.3 | <2.4 | 7.1±0.8 | 47±5 |
| 6-27-77 to 9-26-77 | 70±7 | 0.3±0.3 | 13±1 | 16±2 | 2.7±0.9 | 15±4 | 1.7±0.6 | 3.1±0.5 | <7.9 | <1.2 | 48±5 |
| 9-26-77 to 11-28-77 | 87±20 | <0.3 | 8.3±4.3 | 8.8±1.2 | 9.0±3.5 | 6.3±5.1 | <1.1 | 1.0±0.7 | <232 | <5.2 | 31±6 |
| 11-28-77(4) to 12-28-77 | 73±11 | <0.4 | 1.9±1.2 | 3.1±0.9 | <0.8 | <MDL | <1.0 | 1.6±0.8 | <3.7 | <0.9 | 15±4 |

TABLE C-15 (Cont.)

CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIR PARTICULATE SAMPLES

Results** in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| STATION NO. AND DATE | Be-7 | Mn-54 | Zr-95 | Nb-95 | Ru-103 | Ru-106 | Sb-125 | Cs-137 | BaLa-140 | Ce-141 | Ce-144 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SA-AP-16E1 | | | | | | | | | | | |
| 12-14-76 to 3-28-77 | 56±6 | <0.1 | 1.7±0.5 | 2.8±0.3 | 1.6±0.3 | <MDL | <0.3 | 0.5±0.2 | <0.8 | 1.3±0.5 | 2.0±1.1 |
| 3-28-77 to 6-27-77 | 85±8 | <0.2 | 27±3 | 42±4 | 101±1 | 16±3 | 1.5±0.5 | 2.7±0.4 | <1.8 | 6.7±0.8 | 36±4 |
| 6-27-77 to 9-26-77 | 78±9 | <0.3 | 15±2 | 19±2 | 3.5±0.9 | 17±3 | 2.0±0.6 | 3.4±0.5 | <6.6 | <0.9 | 51±5 |
| 9-26-77(5) to 11-28-77 | 91±16 | <0.4 | 15±2 | 9.3±0.9 | 9.0±2.8 | 16±4 | 2.2±0.9 | 2.6±0.5 | <232 | 15±4 | 33±3 |
| 11-28-77(6) to 12-28-77 | 94±26 | <1.1 | <3.0 | 4.8±1.3 | <1.7 | <MDL | <3.1 | 2.0±1.7 | <15 | <2.2 | 19±10 |
| SA-AP-1F1 | | | | | | | | | | | |
| 12-13-76 to 3-29-77 | 57±6 | <0.08 | 1.5±0.4 | 3.0±0.3 | 1.8±0.3 | 2.7±1.1 | <0.3 | 0.3±0.1 | <0.7 | 1.3±0.4 | 2.4±1.0 |
| 3-29-77 to 6-27-77 | 97±10 | <0.2 | 32±3 | 44±4 | 11±1 | 16±5 | 3.4±1.2 | 2.3±0.4 | <2.7 | 6.8±0.8 | 41±4 |
| 6-27-77 to 9-27-77 | 66±9 | 0.3±0.3 | 13±1 | 14±1 | 4.6±1.2 | 15±4(7) | 1.7±0.9 | 3.2±0.6 | <25 | <1.4 | 48±5 |
| 9-27-77 to 11-28-77 | 86±15 | <0.4 | 13±2 | 7.5±0.8 | 11±3 | 14±4 | 2.1±1.3 | 3.0±0.5 | <220 | 13±3 | 31±3 |
| 11-28-77(8) to 12-27-77 | 83±13 | <0.5 | 2.8±1.9 | 5.5±1.3 | 1.1±1.0 | <MDL | 39±37 | 2.4±1.1 | <5.4 | 18±13 | 21±5 |

TABLE C-15 (Cont.)

CONCENTRATIONS OF GAMMA EMITTERS* IN QUARTERLY COMPOSITES OF AIR PARTICULATE SAMPLES

Results** in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| STATION NO. AND DATE | Be-7 | Mn-54 | Zr-95 | Nb-95 | Ru-103 | Ru-106 | Sb-125 | Cs-137 | BaLa-140 | Ce-141 | Ce-144 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SA-AP-2F2 | | | | | | | | | | | |
| 12-13-76 to 3-29-77 | 67±7 | <0.1 | 2.4±0.9 | 4.2±0.5 | 2.1±0.4 | <MDL | <0.4 | 0.4±0.2 | <0.7 | 1.5±0.4 | 2.3±0.9 |
| 3-29-77 to 6-27-77 | 94±9 | <0.2 | 29±3 | 42±4 | 11±1 | 17±3 | 1.5±0.6 | 2.8±0.4 | <2.3 | 6.7±0.8 | 41±4 |
| 6-27-77 to 9-27-77 | 76±8 | 0.4±0.2 | 14±1 | 15±2 | 5.5±1.1 | 18±3 | 2.0±0.6 | 3.2±0.4 | <16 | 2.7±0.9 | 42±4 |
| 9-27-77 to 11-28-77 | 86±18 | <0.5 | 15±3 | 10±1 | 11±4 | 16±7 | 3.8±1.5 | 3.3±0.7 | <293 | 15±8 | 42±4 |
| 11-28-77(9) to 12-27-77 | 87±24 | <1.0 | 3.2±2.3 | 5.7±1.8 | 3.0±2.1 | <MDL | <2.0 | 1.9±1.1 | 10±9 | <2.0 | 18±8 |
| SA-AP-3H3 | | | | | | | | | | | |
| 12-13-76 to 3-28-77 | 73±7 | <0.2 | 3.0±0.7 | 3.6±0.4 | 2.2±0.4 | <MDL | <0.4 | 0.6±0.2 | <1.2 | 1.7±0.4 | 1.3±0.9 |
| 3-28-77 to 6-27-77 | 93±9 | <0.09 | 31±3 | 21±2 | 11±1 | 11±4 | 1.4±1.1 | 2.3±0.5 | <3.0 | 5.5±0.7 | 41±4 |
| 6-27-77 to 9-22-77 | 74±8 | <0.2 | 14±1 | 18±2 | 2.9±0.9 | 19±3 | 1.8±0.6 | 3.3±0.4 | <8.3 | 1.6±0.7 | 41±4 |
| 9-22-77 to 11-28-77 | 100±20 | <0.5 | 18±4 | 10±1 | 12±5 | 22±9 | <1.1 | 2.8±0.7 | <309 | 13±9 | 37±5 |
| 11-28-77 to 12-27-77 | 78±13 | <0.4 | 1.8±1.3 | 2.8±0.9 | <1.0 | <MDL | <1.0 | 1.2±0.8 | <5.5 | <1.8 | 13±6 |

* All other gamma emitters <MDL; typical MDLs are found in Table C-33.

** Results corrected for decay to sample stop date with one exception. The nuclide Nb-95 was not decayed since it does not reach equilibrium.

(1) K-40 was observed in this sample with a result of 0.024±0.006 pCi/cubic meter.

(2) Co-58 was observed in this sample with a result of 0.0013±0.0012 pCi/$m^3$.

(3) Co-58 was observed in this sample with a result of 0.0003±0.0003 pCi/cubic meter.

(4) I-131 was observed in this sample with a result of 0.014±0.010 pCi/$m^3$. The MDL for I-131 at the control station, 3H3, for this date was 0.012 pCi/$m^3$.

(5) Co-58 was observed in this sample with a result of 0.0015±0.0011 pCi/$m^3$.

(6) Cr-51 was observed in this sample with a result of 0.021±0.018 pCi/$m^3$.

(7) This result is for RuRh-106.

(8) Co-60 was observed in this sample with a result of 0.0012±0.0008 pCi/$m^3$.

(9) K-40 was observed in this sample with a result of 0.130±0.022 pCi/$m^3$.

TABLE C-16

CONCENTRATIONS OF STRONTIUM-89* AND-90 IN QUARTERLY COMPOSITES OF AIR PARTICULATE SAMPLES

Results in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| STATION NO. | JAN to MAR | | APR to JUN | | JUL to SEP | | OCT to NOV | | DEC | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sr-89 | Sr-90 | Sr-89 | Sr-90 | Sr-89 | Sr-90 | Sr-89 | Sr-90 | Sr-89 | Sr-90 |
| SA-AP-2S1 | 1.6±0.6 | <0.4 | 11±2 | 1.4±0.5 | 5.7±1.1 | 1.3±0.3 | 7.9±2.1 | 1.2±0.4 | <1.6 | 0.7±0.4 |
| SA-AP-5S1 | 1.4±0.5 | <0.3 | 13±2 | 0.9±0.6 | 4.6±1.2 | 1.4±0.3 | 8.6±2.1 | 1.0±0.4 | <2.6 | 0.7±0.6 |
| SA-AP-5D1 | 1.7±0.5 | <0.3 | 11±1 | 1.4±0.5 | 4.0±1.2 | 1.7±0.3 | 5.3±2.3 | 1.4±0.4 | <2.5 | <0.9 |
| SA-AP-10D1 | 1.3±0.6 | <0.5 | 11±1 | 0.9±0.5 | 5.3±1.3 | 1.1±0.3 | 6.5±2.1 | 1.2±0.4 | <2.4 | 0.6±0.6 |
| SA-AP-16E1 | 1.6±0.5 | <0.3 | 11±1 | 1.3±0.5 | 4.5±1.2 | 1.4±0.3 | 6.5±2.5 | 1.6±0.4 | <2.4 | <0.9 |
| SA-AP-1F1 | 1.6±0.5 | 0.3±0.2 | 7.9±2.1 | 1.1±0.7 | 3.8±1.1 | 2.0±0.3 | 5.7±2.4 | 1.3±0.4 | <2.0 | <0.8 |
| SA-AP-2F2 | 1.4±0.5 | 0.4±0.2 | 8.5±1.7 | 2.6±0.6 | 4.8±1.4 | 1.5±0.4 | 6.8±1.9 | 1.0±0.3 | <2.2 | <0.8 |
| SA-AP-3H3 | 1.6±0.5 | <0.3 | 10±2 | 1.3±0.5 | 4.4±1.5 | 1.4±0.4 | 6.3±2.6 | 1.1±0.4 | <2.7 | 0.8±0.6 |

* Sr-89 results corrected to sample stop date.

TABLE C-17

CONCENTRATIONS OF IODINE-131 IN FILTERED AIR

Results* in Units of $10^{-3}$ pCi/$m^3$

| MONTH | STATION NO. SA-AI-2S1 | SA-AI-5S1 | SA-AI-5D1** | SA-AI-10D1 | SA-AI-16E1 | SA-AI-2F2 | SA-AI-3H3 |
|---|---|---|---|---|---|---|---|
| JAN | 3.8±2.6 | <2.7 | - | <2.5 | <2.9 | <2.2 | <3.5 |
| | <3.2 | 5.2±3.4 | - | 4.1±2.7 | 5.5±3.1 | 5.1±3.0 | 11±4 |
| | <2.6 | <3.4 | - | <3.2 | <2.8 | <2.8 | <3.8 |
| | <3.0 | 3.8±2.7 | - | 6.0±3.1 | <4.0 | 6.0±2.6 | 4.5±4.0 |
| FEB | <5.9 | <5.9 | - | <5.0 | <5.5 | <5.2 | <5.9 |
| | (1) | <5.3 | - | <4.2 | <4.7 | <5.3 | <6.8 |
| | <2.8(2) | <4.4 | - | <4.7 | <4.9 | <4.6 | <5.2 |
| | (1) | <6.0 | - | <6.9 | <7.4 | <5.7 | <8.9 |
| MAR | <3.4(3) | <6.0 | - | <5.4 | <5.3 | <4.7 | <6.4 |
| | <6.0 | <6.3 | - | <4.7 | <5.4 | <7.0 | <7.4 |
| | <5.3 | <5.7 | - | <6.1 | <6.6 | <5.0 | <5.7 |
| | <4.6 | <4.4 | - | <5.1 | <4.8 | <4.2 | <5.1 |
| | <5.8 | <5.9 | - | <5.2 | <5.2 | <5.5 | <5.3 |
| APR | <5.1 | <5.3 | - | <4.9 | <5.0 | <5.6 | <6.0 |
| | <4.8 | <5.1 | - | <5.4 | <6.1 | <4.8 | <5.4 |
| | <13 | <5.1 | <5.5 | <4.6 | <4.5 | <5.4 | <6.0 |
| | <5.6 | <5.2 | <5.2 | <5.4 | <6.0 | <4.9 | <5.9 |
| MAY | <5.9 | <5.7 | <6.1 | <4.7 | <5.0 | <6.0 | <6.2 |
| | <5.5 | <5.6 | <5.5 | <6.0 | <6.4 | <5.4 | <5.7 |
| | <5.8 | <5.6 | <6.1 | <4.7 | <4.8 | <6.1 | <6.2 |
| | <4.6 | <4.3 | <4.6 | <4.9 | <4.9 | <4.5 | <5.3 |
| JUN | <6.8 | <6.7 | <7.3 | <5.5 | <5.4 | <6.7 | <7.1 |
| | <4.8 | <4.9 | <5.4 | <5.1 | <5.4 | <5.0 | <6.0 |
| | <5.9 | <5.7 | <5.6 | <5.3 | <5.4 | <5.9 | <6.5 |
| | <4.9 | <5.1 | <5.5 | <6.0 | <6.6 | <5.5 | <6.2 |
| | <4.9 | <4.5 | <4.8 | <4.4 | <4.6 | <4.8 | <5.1 |

TABLE C-17 (Cont.)

CONCENTRATIONS OF IODINE-131 IN FILTERED AIR

Results* in Units of $10^{-3}$ pCi/$m^3$

| MONTH | STATION NO. SA-AI-2S1 | SA-AI-5S1 | SA-AI-5D1 | SA-AI-10D1 | SA-AI-16E1 | SA-AI-2F2 | SA-AI-3H3 |
|---|---|---|---|---|---|---|---|
| JUL | <6.3 | <7.5 | <6.9 | <5.2 | <5.0 | <6.4 | <6.8 |
| | <6.1 | <5.4 | <5.9 | <5.6 | <5.7 | <5.7 | <7.3 |
| | <5.7 | <5.9 | <6.5 | <5.6 | <4.9 | <5.9 | <5.9 |
| | <5.5 | <6.3 | <5.6 | <6.1 | (4) | <4.8 | <6.6 |
| AUG | <6.1 | <5.8 | <6.0 | <5.4 | <4.9 | <6.6 | <5.3 |
| | <5.6 | <5.6 | <6.5 | <6.0 | <5.7 | <6.2 | <5.9 |
| | <5.9 | <6.0 | <5.6 | <4.8 | <5.2 | <5.6 | <6.0 |
| | <5.5 | <5.8 | <5.9 | <6.3 | <6.0 | <5.6 | <6.6 |
| SEP | <5.0 | <5.7 | <5.2 | <4.8 | <4.0 | <5.1 | <5.2 |
| | <5.9 | <5.8 | <6.1 | <5.8 | <5.6 | <6.6 | <6.1 |
| | <5.0 | <5.7 | <5.7 | <6.3 | <6.3 | <6.4 | <6.3 |
| | <5.2 | <5.8 | <6.0 | <6.3 | <5.7 | <5.4 | <21 |
| OCT | 21±11 | 31±8 | 28±10 | 26±10 | 35±8 | 33±11 | 20±8 |
| | 10±6 | <4.9 | <5.5 | <5.8 | <5.7 | <5.2 | <7.7 |
| | <6.1 | <6.7 | <7.2 | <7.0 | <6.9 | <6.0 | <7.5 |
| | <5.4 | <5.7 | <5.6 | <4.7 | <4.6 | <5.8 | <6.4 |
| | <5.3 | <5.7 | <5.5 | <6.1 | <6.1 | <5.4 | <6.9 |
| NOV | <5.4 | <6.1 | <7.6 | <8.3 | <7.6 | <7.4 | <5.9 |
| | <5.3 | <5.5 | <5.7 | <4.4 | <4.5 | <5.4 | <6.4 |
| | <4.8 | <4.9 | <5.6 | <6.2 | <5.9 | <4.6 | <6.4 |
| | <4.7 | <5.1 | <4.8 | <4.9 | <4.9 | <5.5 | <5.5 |
| DEC | <4.5 | <4.6 | <4.8 | <6.3 | <5.9 | <4.5 | <6.9 |
| | <5.8 | <6.4 | <6.0 | <4.4 | <4.8 | <5.9 | <6.4 |
| | <4.8 | <5.0 | <5.3 | <5.1 | <5.5 | <5.0 | <6.9 |
| | <4.4 | <4.9 | <4.6 | <4.5 | <5.0 | <5.2 | <5.7 |

* Results corrected for decay to sampling stop date.
** Station 5D1 began weekly sampling on April 18, 1977.
(1) Unable to service air monitor due to poor weather conditions.
(2) Sampling period was 2-07-77 to 2-22-77.
(3) Sampling period was 2-22-77 to 3-07-77.
(4) Cartridge was damaged in field; therefore it was not analyzed.

TABLE C-18

SAMPLING DATES FOR AIR SAMPLES

| MONTH | STATION NO. 2S1 | 5S1 | 5D1 | 10D1 | 16E1 | 1F1 | 2F2 | 3H3 |
|---|---|---|---|---|---|---|---|---|
| January | 1-03-77 to 1-11-77 | 1-03-77 to 1-11-77 | 1-03-77 to 1-11-77 | 1-04-77 to 1-12-77 | 1-04-77 to 1-12-77 | 1-03-77 to 1-11-77 | 1-03-77 to 1-11-77 | 1-03-77 to 1-11-77 |
| | 1-11-77 to 1-18-77 | 1-11-77 to 1-18-77 | 1-11-77 to 1-18-77 | 1-12-77 to 1-19-77 | 1-12-77 to 1-19-77 | 1-11-77 to 1-18-77 | 1-11-77 to 1-18-77 | 1-11-77 to 1-18-77 |
| | 1-18-77 to 1-24-77 | 1-18-77 to 1-24-77 | 1-18-77 to 1-24-77 | 1-19-77 to 1-25-77 | 1-19-77 to 1-25-77 | 1-18-77 to 1-24-77 | 1-18-77 to 1-24-77 | 1-18-77 to 1-24-77 |
| | 1-24-77 to 2-01-77 | 1-24-77 to 2-01-77 | 1-24-77 to 1-31-77 | 1-25-77 to 1-31-77 | 1-25-77 to 1-31-77 | 1-24-77 to 1-31-77 | 1-24-77 to 2-01-77 | 1-24-77 to 1-31-77 |
| February | 2-01-77 to 2-07-77 | 2-01-77 to 2-07-77 | 1-31-77 to 2-07-77 | 1-31-77 to 2-07-77 | 1-31-77 to 2-07-77 | 1-31-77 to 2-07-77 | 2-01-77 to 2-07-77 | 1-31-77 to 2-07-77 |
| | (1) | 2-07-77 to 2-14-77 | 2-07-77 to 2-14-77 | 2-07-77 to 2-15-77 | 2-07-77 to 2-15-77 | 2-07-77 to 2-14-77 | 2-07-77 to 2-14-77 | 2-07-77 to 2-14-77 |
| | 2-07-77 to 2-22-77 | 2-14-77 to 2-22-77 | 2-14-77 to 2-22-77 | 2-15-77 to 2-22-77 | 2-15-77 to 2-22-77 | 2-14-77 to 2-22-77 | 2-14-77 to 2-22-77 | 2-14-77 to 2-22-77 |
| | (1) | 2-22-77 to 3-01-77 | 2-22-77 to 2-28-77 | 2-22-77 to 2-28-77 | 2-22-77 to 2-28-77 | 2-22-77 to 2-28-77 | 2-22-77 to 3-01-77 | 2-22-77 to 2-28-77 |
| March | 2-22-77 to 3-07-77 | 3-01-77 to 3-07-77 | 2-28-77 to 3-07-77 | 2-28-77 to 3-07-77 | 2-28-77 to 3-07-77 | 2-28-77 to 3-07-77 | 3-01-77 to 3-08-77 | 2-28-77 to 3-07-77 |
| | 3-07-77 to 3-14-77 | 3-07-77 to 3-14-77 | 3-07-77 to 3-14-77 | 3-07-77 to 3-15-77 | 3-07-77 to 3-15-77 | 3-07-77 to 3-14-77 | 3-08-77 to 3-14-77 | 3-07-77 to 3-14-77 |
| | 3-14-77 to 3-21-77 | 3-14-77 to 3-21-77 | 3-14-77 to 3-21-77 | 3-15-77 to 3-21-77 | 3-15-77 to 3-21-77 | 3-14-77 to 3-21-77 | 3-14-77 to 3-21-77 | 3-14-77 to 3-21-77 |
| | 3-21-77 to 3-29-77 | 3-21-77 to 3-29-77 | 3-21-77 to 3-29-77 | 3-21-77 to 3-28-77 | 3-21-77 to 3-28-77 | 3-21-77 to 3-29-77 | 3-21-77 to 3-29-77 | 3-21-77 to 3-28-77 |
| | 3-29-77 to 4-04-77 | 3-29-77 to 4-04-77 | 3-29-77 to 4-04-77 | 3-28-77 to 4-04-77 | 3-28-77 to 4-04-77 | 3-29-77 to 4-04-77 | 3-29-77 to 4-04-77 | 3-28-77 to 4-04-77 |

TABLE C-18 (Cont.)

SAMPLING DATES FOR AIR SAMPLES

| MONTH | STATION NO. 2S1 | 5S1 | 5D1 | 10D1 | 16E1 | 1F1 | 2F2 | 3H3 |
|---|---|---|---|---|---|---|---|---|
| April | 4-04-77 to 4-11-77 | 4-04-77 to 4-11-77 | 4-04-77 to 4-11-77 | 4-04-77 to 4-12-77 | 4-04-77 to 4-12-77 | 4-04-77 to 4-11-77 | 4-04-77 to 4-11-77 | 4-04-77 to 4-11-77 |
| | 4-11-77 to 4-18-77 | 4-11-77 to 4-18-77 | 4-11-77 to 4-18-77 | 4-12-77 to 4-18-77 | 4-12-77 to 4-18-77 | 4-11-77 to 4-18-77 | 4-11-77 to 4-18-77 | 4-11-77 to 4-18-77 |
| | 4-18-77 to 4-22-77 | 4-18-77 to 4-25-77 | 4-18-77 to 4-25-77 | 4-18-77 to 4-26-77 | 4-18-77 to 4-26-77 | 4-18-77 to 4-25-77 | 4-18-77 to 4-25-77 | 4-18-77 to 4-25-77 |
| | 4-26-77 to 5-02-77 | 4-25-77 to 5-02-77 | 4-25-77 to 5-02-77 | 4-26-77 to 5-02-77 | 4-26-77 to 5-02-77 | 4-25-77 to 5-02-77 | 4-25-77 to 5-02-77 | 4-25-77 to 5-02-77 |
| May | 5-02-77 to 5-09-77 | 5-02-77 to 5-09-77 | 5-02-77 to 5-09-77 | 5-02-77 to 5-10-77 | 5-02-77 to 5-10-77 | 5-02-77 to 5-09-77 | 5-02-77 to 5-09-77 | 5-02-77 to 5-09-77 |
| | 5-09-77 to 5-16-77 | 5-09-77 to 5-16-77 | 5-09-77 to 5-16-77 | 5-10-77 to 5-16-77 | 5-10-77 to 5-16-77 | 5-09-77 to 5-16-77 | 5-09-77 to 5-16-77 | 5-09-77 to 5-16-77 |
| | 5-16-77 to 5-23-77 | 5-16-77 to 5-23-77 | 5-16-77 to 5-23-77 | 5-16-77 to 5-24-77 | 5-16-77 to 5-24-77 | 5-16-77 to 5-23-77 | 5-16-77 to 5-23-77 | 5-16-77 to 5-23-77 |
| | 5-23-77 to 5-31-77 | 5-23-77 to 5-31-77 | 5-23-77 to 5-31-77 | 5-24-77 to 5-31-77 | 5-24-77 to 5-31-77 | 5-23-77 to 5-31-77 | 5-23-77 to 5-31-77 | 5-23-77 to 5-31-77 |
| June | 5-31-77 to 6-06-77 | 5-31-77 to 6-06-77 | 5-31-77 to 6-06-77 | 5-31-77 to 6-07-77 | 5-31-77 to 6-07-77 | 5-31-77 to 6-06-77 | 5-31-77 to 6-06-77 | 5-31-77 to 6-06-77 |
| | 6-06-77 to 6-13-77 | 6-06-77 to 6-13-77 | 6-06-77 to 6-13-77 | 6-07-77 to 6-14-77 | 6-07-77 to 6-14-77 | 6-06-77 to 6-13-77 | 6-06-77 to 6-13-77 | 6-06-77 to 6-13-77 |
| | 6-13-77 to 6-20-77 | 6-13-77 to 6-20-77 | 6-13-77 to 6-20-77 | 6-14-77 to 6-21-77 | 6-14-77 to 6-21-77 | 6-13-77 to 6-20-77 | 6-13-77 to 6-20-77 | 6-13-77 to 6-20-77 |
| | 6-20-77 to 6-27-77 | 6-20-77 to 6-27-77 | 6-20-77 to 6-27-77 | 6-21-77 to 6-27-77 | 6-21-77 to 6-27-77 | 6-20-77 to 6-27-77 | 6-20-77 to 6-27-77 | 6-20-77 to 6-27-77 |
| | 6-27-77 to 7-05-77 | 6-27-77 to 7-05-77 | 6-27-77 to 7-05-77 | 6-27-77 to 7-05-77 | 6-27-77 to 7-05-77 | 6-27-77 to 7-05-77 | 6-27-77 to 7-05-77 | 6-27-77 to 7-05-77 |

TABLE C-18 (Cont.)

SAMPLING DATES FOR AIR SAMPLES

| MONTH | STATION NO. 2S1 | 5S1 | 5D1 | 10D1 | 16E1 | 1F1 | 2F2 | 3H3 |
|---|---|---|---|---|---|---|---|---|
| July | 7-05-77 to 7-11-77 | 7-05-77 to 7-11-77 | 7-05-77 to 7-11-77 | 7-05-77 to 7-12-77 | 7-05-77 to 7-12-77 | 7-05-77 to 7-11-77 | 7-05-77 to 7-11-77 | 7-05-77 to 7-11-77 |
| | 7-11-77 to 7-18-77 | 7-11-77 to 7-18-77 | 7-11-77 to 7-18-77 | 7-12-77 to 7-19-77 | 7-12-77 to 7-19-77 | 7-11-77 to 7-18-77 | 7-11-77 to 7-18-77 | 7-11-77 to 7-18-77 |
| | 7-18-77 to 7-25-77 | 7-18-77 to 7-25-77 | 7-18-77 to 7-25-77 | 7-19-77 to 7-26-77 | 7-19-77 to 7-26-77 | 7-18-77 to 7-25-77 | 7-18-77 to 7-25-77 | 7-18-77 to 7-25-77 |
| | 7-25-77 to 8-02-77 | 7-25-77 to 8-01-77 | 7-25-77 to 8-01-77 | 7-26-77 to 8-01-77 | 7-26-77 to 8-02-77 | 7-25-77 to 8-01-77 | 7-25-77 to 8-02-77 | 7-25-77 to 8-01-77 |
| August | 8-02-77 to 8-08-77 | 8-01-77 to 8-08-77 | 8-01-77 to 8-08-77 | 8-02-77 to 8-09-77 | 8-02-77 to 8-09-77 | 8-01-77 to 8-08-77 | 8-02-77 to 8-08-77 | 8-01-77 to 8-08-77 |
| | 8-08-77 to 8-15-77 | 8-08-77 to 8-15-77 | 8-08-77 to 8-15-77 | 8-09-77 to 8-16-77 | 8-09-77 to 8-16-77 | 8-08-77 to 8-15-77 | 8-08-77 to 8-15-77 | 8-08-77 to 8-15-77 |
| | 8-15-77 to 8-22-77 | 8-15-77 to 8-22-77 | 8-15-77 to 8-22-77 | 8-16-77 to 8-23-77 | 8-16-77 to 8-23-77 | 8-15-77 to 8-22-77 | 8-15-77 to 8-22-77 | 8-15-77 to 8-22-77 |
| | 8-22-77 to 8-29-77 | 8-22-77 to 8-29-77 | 8-22-77 to 8-29-77 | 8-23-77 to 8-29-77 | 8-23-77 to 8-29-77 | 8-22-77 to 8-29-77 | 8-22-77 to 8-29-77 | 8-22-77 to 8-29-77 |
| September | 8-29-77 to 9-06-77 | 8-29-77 to 9-06-77 | 8-29-77 to 9-06-77 | 8-30-77 to 9-07-77 | 8-29-77 to 9-07-77 | 8-29-77 to 9-06-77 | 8-29-77 to 9-06-77 | 8-29-77 to 9-06-77 |
| | 9-06-77 to 9-12-77 | 9-06-77 to 9-12-77 | 9-06-77 to 9-12-77 | 9-07-77 to 9-13-77 | 9-07-77 to 9-13-77 | 9-06-77 to 9-12-77 | 9-06-77 to 9-12-77 | 9-06-77 to 9-12-77 |
| | 9-12-77 to 9-19-77 | 9-12-77 to 9-19-77 | 9-12-77 to 9-19-77 | 9-13-77 to 9-19-77 | 9-13-77 to 9-19-77 | 9-12-77 to 9-19-77 | 9-12-77 to 9-19-77 | 9-12-77 to 9-19-77 |
| | 9-19-77 to 9-27-77 | 9-19-77 to 9-26-77 | 9-19-77 to 9-26-77 | 9-19-77 to 9-26-77 | 9-19-77 to 9-26-77 | 9-19-77 to 9-27-77 | 9-19-77 to 9-27-77 | 9-19-77 to 9-22-77 |

TABLE C-18 (Cont.)

SAMPLING DATES FOR AIR SAMPLES

| MONTH | STATION NO. 2S1 | 5S1 | 5D1 | 10D1 | 16E1 | 1F1 | 2F2 | 3H3 |
|---|---|---|---|---|---|---|---|---|
| October | 9-27-77 to 10-03-77 | 9-26-77 to 10-03-77 | 9-26-77 to 10-03-77 | 9-26-77 to 10-03-77 | 9-26-77 to 10-03-77 | 9-27-77 to 10-03-77 | 9-27-77 to 10-03-77 | 9-26-77 to 10-03-77 |
| | 10-03-77 to 10-11-77 | 10-03-77 to 10-11-77 | 10-03-77 to 10-11-77 | 10-03-77 to 10-11-77 | 10-03-77 to 10-11-77 | 10-03-77 to 10-11-77 | 10-03-77 to 10-11-77 | 10-03-77 to 10-11-77 |
| | 10-11-77 to 10-17-77 | 10-11-77 to 10-17-77 | 10-11-77 to 10-17-77 | 10-11-77 to 10-17-77 | 10-11-77 to 10-17-77 | 10-11-77 to 10-17-77 | 10-11-77 to 10-17-77 | 10-11-77 to 10-17-77 |
| | 10-17-77 to 10-24-77 | 10-17-77 to 10-24-77 | 10-17-77 to 10-24-77 | 10-17-77 to 10-25-77 | 10-17-77 to 10-25-77 | 10-17-77 to 10-24-77 | 10-17-77 to 10-24-77 | 10-17-77 to 10-24-77 |
| | 10-24-77 to 10-31-77 | 10-24-77 to 10-31-77 | 10-24-77 to 10-31-77 | 10-25-77 to 10-31-77 | 10-25-77 to 10-31-77 | 10-24-77 to 10-31-77 | 10-24-77 to 10-31-77 | 10-24-77 to 10-31-77 |
| November | 10-31-77 to 11-07-77 | 10-31-77 to 11-07-77 | 10-31-77 to 11-07-77 | 10-31-77 to 11-07-77 | 10-31-77 to 11-07-77 | 10-31-77 to 11-07-77 | 10-31-77 to 11-07-77 | 10-31-77 to 11-07-77 |
| | 11-07-77 to 11-14-77 | 11-07-77 to 11-14-77 | 11-07-77 to 11-14-77 | 11-07-77 to 11-15-77 | 11-07-77 to 11-15-77 | 11-07-77 to 11-14-77 | 11-07-77 to 11-14-77 | 11-07-77 to 11-14-77 |
| | 11-14-77 to 11-21-77 | 11-14-77 to 11-21-77 | 11-14-77 to 11-21-77 | 11-15-77 to 11-21-77 | 11-15-77 to 11-21-77 | 11-14-77 to 11-22-77 | 11-14-77 to 11-22-77 | 11-14-77 to 11-21-77 |
| | 11-21-77 to 11-28-77 | 11-21-77 to 11-28-77 | 11-21-77 to 11-28-77 | 11-21-77 to 11-28-77 | 11-21-77 to 11-28-77 | 11-22-77 to 11-28-77 | 11-22-77 to 11-28-77 | 11-21-77 to 11-28-77 |
| December | 11-28-77 to 12-06-77 | 11-28-77 to 12-06-77 | 11-28-77 to 12-06-77 | 11-28-77 to 12-05-77 | 11-28-77 to 12-05-77 | 11-28-77 to 12-06-77 | 11-28-77 to 12-06-77 | 11-28-77 to 12-05-77 |
| | 12-06-77 to 12-12-77 | 12-06-77 to 12-12-77 | 12-06-77 to 12-12-77 | 12-05-77 to 12-13-77 | 12-05-77 to 12-13-77 | 12-06-77 to 12-12-77 | 12-06-77 to 12-12-77 | 12-05-77 to 12-12-77 |
| | 12-12-77 to 12-19-77 | 12-12-77 to 12-19-77 | 12-12-77 to 12-19-77 | 12-13-77 to 12-20-77 | 12-13-77 to 12-20-77 | 12-12-77 to 12-19-77 | 12-12-77 to 12-19-77 | 12-12-77 to 12-19-77 |
| | 12-19-77 to 12-27-77 | 12-19-77 to 12-27-77 | 12-19-77 to 12-27-77 | 12-20-77 to 12-28-77 | 12-20-77 to 12-28-77 | 12-19-77 to 12-27-77 | 12-19-77 to 12-27-77 | 12-19-77 to 12-27-77 |

(1) Unable to service air monitor due to poor weather conditions.

TABLE C-19

CONCENTRATIONS OF TRITIUM, ALPHA AND BETA EMITTERS IN PRECIPITATION
(Station: SA-RW-2F2)

Results in Units of pCi/1 ± 2 sigma

| COLLECTION PERIOD | H-3 | ALPHA | BETA |
|---|---|---|---|
| 1-03-77 to 2-01-77 | <80 | 6.3±1.1 | <3.7 |
| 2-01-77 to 3-01-77 | <80 | <1.5 | 18±3 |
| 3-01-77 to 4-04-77 | 97±70 | <1.5 | 39±5 |
| 4-04-77 to 5-03-77 | 85±55 | <1.5 | 82±8 |
| 5-03-77 to 6-07-77 | <80 | 12±4 | 776±78 |
| 6-07-77 to 7-05-77 | 195±73 | 0.7±0.7 | 98±10 |
| 7-05-77 to 8-02-77 | 128±75 | <1.5 | 53±5 |
| 8-02-77 to 9-06-77 | <80 | <1.5 | 35±4 |
| 9-06-77 to 10-03-77 | <80 | <1.5 | 121±12 |
| 10-03-77 to 11-01-77 | <80 | 0.7±0.5 | 28±3 |
| 11-01-77 to 12-06-77 | <80 | 0.8±0.6 | 18±3 |
| 12-06-77 to 1-03-78 | <80 | <1.5 | 18±3 |
| Average | - | - | 107±427 |

TABLE C-20

CONCENTRATIONS OF STRONTIUM-89* AND-90, AND GAMMA EMITTERS**
IN QUARTERLY COMPOSITES OF PRECIPITATION
(Station: SA-RW-2F2)

Results in Units of pCi/1 ± 2 sigma

| NUCLIDE | 1-03-77 to 4-04-77 | 4-04-77 to 7-05-77 | 7-05-77 to 10-03-77 | 10-03-77 to 1-03-78 |
|---|---|---|---|---|
| Sr-89 | <4.5 | 7.4±1.4 | 7.8±2.1 | 1.1±0.5 |
| Sr-90 | 2.4±0.5 | 1.4±0.6 | <1.0 | <0.5 |
| Be-7 | <MDL | 33±11 | 15±4 | 10±5 |
| K-40 | <30 | <10 | <9.0 | 58±12 |
| ZrNb-95 | <2.0 | 32±3 | (1) | (2) |
| Ru-103 | <MDL | 5.5±1.7 | 2.2±0.6 | <0.5 |
| Cs-137 | <2.0 | <1.0 | 0.8±0.5 | <0.5 |
| BaLa-140 | <3.0 | <1.0 | 1.7±1.0 | <0.9 |
| Ce-141 | <MDL | <MDL | 1.9±0.8 | <0.7 |
| Ce-144 | <10 | <6.0 | 5.7±1.9 | <3.0 |

* Sr-89 results decay corrected to sample stop date.

** All other gamma emitters <MDL; typical MDLs are given in Table C-33.

(1) The activity for Zr-95 was 1.1±0.7, and for Nb-95 was 2.6±0.6.

(2) The activity for Zr-95 was 1.5±0.9, and for Nb-95 was 1.7±0.7.

TABLE C-21

CONCENTRATIONS OF TRITIUM, ALPHA AND BETA EMITTERS, AND POTASSIUM-40 IN WELL WATER

Results in Units of pCi/l ± 2 sigma

| STATION NO. RADIOACTIVITY | 1-11-77 | 2-14-77 | 3-14-77 | 4-11-77 | 5-09-77 | 6-13-77 |
|---|---|---|---|---|---|---|
| SA-WW-4S1 | | | | | | |
| H-3 | <80 | <80 | <80 | 334±67 | <80 | 100±73 |
| Alpha | <2.7 | <1.5 | <1.7 | <1.5 | <1.7 | <1.5 |
| Beta | 7.2±3.6 | 8.9±2.9 | 10±3 | 13±3 | 10±3 | <3.0 |
| K-40 | 1.7±0.2 | 11±1 | 11±1 | 8.7±0.9 | 9.7±1.0 | 2.8±0.3 |
| SA-WW-5D1 | | | | | | |
| H-3 | 236±74 | <80 | <80 | <80 | <80 | 167±73 |
| Alpha | <2.1 | 1.5±1.1 | <1.5 | <1.6 | <1.6 | <1.5 |
| Beta | <3.3 | 2.6±2.4 | 2.3±2.1 | 4.8±2.6 | 3.6±1.9 | 3.2±2.4 |
| K-40 | 0.80±0.08 | 3.2±0.3 | 3.0±0.3 | 2.4±0.2 | 2.5±0.3 | 3.3±0.3 |
| SA-WW-3E1 | | | | | | |
| H-3 | 200±69 | <80(1) | 250±69 | 402±72 | <80 | 77±72 |
| Alpha | <2.8 | <1.5(1) | <1.8 | <1.5 | <2.0 | <1.6 |
| Beta | 5.3±3.5 | 6.5±2.8(1) | 8.3±2.6 | 13±3 | 7.3±2.6 | 12±3 |
| K-40 | 1.4±0.1 | 8.4±0.8(1) | 8.8±0.9 | 4.3±0.4 | 7.3±0.7 | 9.0±0.9 |

| STATION NO. RADIOACTIVITY | 7-11-77 | 8-08-77 | 9-12-77 | 10-11-77 | 11-14-77 | 12-12-77 | AVERAGE |
|---|---|---|---|---|---|---|---|
| SA-WW-4S1 | | | | | | | |
| H-3 | <80 | <80 | <80 | 81±71 | <80 | <80(3) | - |
| Alpha | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 | <1.5(3) | - |
| Beta | 12±3 | 9.3±3.3 | 9.6±2.6 | 12±2 | 12±3 | 12±3(3) | 9.9±5.5 |
| K-40 | 7.6±0.8 | 11±1 | 9.5±1.0 | 12±1 | 12±1 | 11±1(3) | 9.0±6.8 |
| SA-WW-5D1 | | | | | | | |
| H-3 | <80(2) | <80 | <80 | 142±71 | <80 | <80 | - |
| Alpha | <1.5(2) | <1.5 | <1.5 | <1.5 | <1.5 | <1.5 | - |
| Beta | 5.0±2.5(2) | <3.0 | <3.0 | 7.9±2.2 | 2.8±1.8 | 4.8±2.4 | 3.9±3.1 |
| K-40 | 4.1±0.4(2) | 1.6±0.2 | 1.1±0.1 | 3.5±0.4 | 2.8±0.3 | 3.1±0.3 | 2.6±2.0 |
| SA-WW-3E1 | | | | | | | |
| H-3 | <80 | 189±77 | <80 | <80 | <80 | <80 | - |
| Alpha | <1.5 | <1.6 | <1.5 | <1.5 | <1.5 | <1.5 | - |
| Beta | 11±3 | 7.7±3.2 | 8.4±2.6 | 11±2 | 8.1±2.3 | 9.2±2.7 | 9.0±4.6 |
| K-40 | 5.5±0.6 | 8.3±0.8 | 6.3±0.6 | 11±1 | 11±1 | 9.0±0.9 | 7.5±5.6 |

(1) Sampling date was 2-15-77.
(2) Sampling date was 7-12-77.
(3) Sampling date was 12-13-77.

TABLE C-22

CONCENTRATIONS OF STRONTIUM-89* AND-90, AND GAMMA EMITTERS**
IN QUARTERLY COMPOSITES OF WELL WATER

Results in Units of pCi/l ± 2 sigma

| STATION NO. RADIOACTIVITY | 1-11-77 to 3-14-77 | 4-11-77 to 6-13-77 | 7-11-77 to 9-12-77 | 10-11-77 to 12-12-77 |
|---|---|---|---|---|
| SA-WW-4S1 | | | | |
| Sr-89 | <0.7 | 0.4±0.4 | <0.8 | <0.5(2) |
| Sr-90 | <0.4 | <0.4 | <0.4 | <0.3(2) |
| K-40 | 16±10 | <7.0 | <8.0 | 10±8(2) |
| SA-WW-5D1 | | | | |
| Sr-89 | <1.1 | 0.5±0.4 | <0.7(1) | <1.1 |
| Sr-90 | <0.6 | <0.4 | <0.4(1) | <0.7 |
| K-40 | <6.0 | <7.0 | <7.0(1) | <7.0 |
| SA-WW-3E1 | | | | |
| Sr-89 | <1.1 | <0.6 | <0.9 | <0.5 |
| Sr-90 | <0.6 | 0.6±0.3 | <0.5 | <0.3 |
| K-40 | <6.0 | <7.0 | 13±9 | <7.0 |

* Sr-89 results decay corrected to sample stop date.
** All other gamma emitters <MDL; typical MDLs are given in Table C-33.
(1) Collection dates were 7-12-77 to 9-12-77.
(2) Collection dates were 10-11-77 to 12-13-77.

TABLE C-23

CONCENTRATIONS OF TRITIUM, ALPHA AND BETA EMITTERS, AND POTASSIUM-40
IN RAW AND TREATED POTABLE WATER
(Sampled at location 2F3)

Results in Units of pCi/l ± 2 sigma

| RADIOACTIVITY | | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|---|
| H-3 | (Raw) | <80 | 173±69 | 102±70 | <80 | <80 | 254±72 |
| | (Treated) | <80 | 175±69 | 161±70 | <80 | <80 | 143±71 |
| Alpha | (Raw) | 1.0±0.7 | 0.7±0.4 | 1.1±0.5 | 1.0±0.6 | <1.0 | 0.4±0.4 |
| | (Treated) | 1.0±0.9 | 1.8±0.8 | 0.8±0.5 | 1.0±0.7 | 0.7±0.5 | 1.2±0.7 |
| Beta | (Raw) | 1.4±0.9 | 3.1±0.5 | 4.4±0.5 | 5.6±0.6 | 3.1±0.5 | 11±1 |
| | (Treated) | <1.0 | 2.7±0.5 | 4.0±0.5 | 4.1±0.6 | 20±2 | 9.2±1.2 |
| K-40 | (Raw) | 1.5±0.2 | 1.3±0.1 | 1.5±0.2 | 1.5±0.2 | 1.4±0.1 | 0.61±0.06 |
| | (Treated) | 1.5±0.2 | 1.3±0.1 | 1.6±0.2 | 2.2±0.2 | 1.3±0.1 | 0.76±0.08 |

| RADIOACTIVITY | | JUL | AUG | SEP | OCT | NOV | DEC | AVERAGE |
|---|---|---|---|---|---|---|---|---|
| H-3 | (Raw) | 178±77 | 204±72 | 302±72 | 94±73 | <80 | 96±78 | 144±154 |
| | (Treated) | 255±77 | 195±72 | 317±72 | 76±72 | <80 | 79±78 | 143±161 |
| Alpha | (Raw) | 0.7±0.4 | 0.4±0.4 | <1.3 | 0.4±0.3 | 0.9±0.5 | <0.4 | 0.8±0.6 |
| | (Treated) | 1.7±0.8 | 0.9±0.6 | <1.0 | <1.0 | <1.0 | <0.6 | 1.1±0.7 |
| Beta | (Raw) | 3.8±0.5 | 3.2±0.5 | 2.9±0.7 | 3.6±0.5 | 5.6±0.8 | 6.0±0.6 | 4.5±4.9 |
| | (Treated) | 3.6±0.5 | 2.4±0.4 | 3.0±0.6 | 2.5±0.4 | 3.7±0.7 | 4.5±0.5 | 5.1±10.2 |
| K-40 | (Raw) | 1.7±0.2 | 1.3±0.1 | 1.2±0.1 | 1.0±0.1 | 1.8±0.2 | 2.0±0.2 | 1.4±0.7 |
| | (Treated) | 2.1±0.2 | 1.8±0.2 | 3.2±0.3 | 1.1±0.1 | 1.8±0.2 | 2.0±0.2 | 1.7±1.3 |

TABLE C-24

CONCENTRATIONS OF STRONTIUM-89*AND-90, AND GAMMA EMITTERS**
IN QUARTERLY COMPOSITES OF POTABLE WATER
(Sampled at location 2F3)

Results in Units of pCi/l ± 2 sigma

| SAMPLE | 1-01-77 to 3-31-77 | 4-01-77 to 6-30-77 | 7-01-77 to 9-30-77 | 10-01-77 to 12-31-77 |
|---|---|---|---|---|
| Raw | | | | |
| Sr-89 | 1.2±1.2 | <0.9 | <1.1 | <0.7 |
| Sr-90 | <0.6 | 1.0±0.3 | 0.7±0.3 | 0.6±0.3 |
| Gamma Emitters | All<MDL | All<MDL | All<MDL | All<MDL |
| Treated | | | | |
| Sr-89 | <1.9 | 0.8±0.6 | <1.0 | <0.7 |
| Sr-90 | 0.5±0.4 | 0.6±0.3 | 0.5±0.3 | 0.4±0.3 |
| Gamma Emitters | All<MDL | All<MDL | All<MDL | All<MDL |

* Sr-89 results decay corrected to sample stop date.

** Typical MDLs are given in Table C-33.

TABLE C-25

CONCENTRATIONS OF IODINE-131 IN MILK

Results*in Units of pCi/l

| STATION NO. | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|
| SA-M-2F1 | <0.04 | <0.03 | <0.04 | <0.05 | <0.05 | <0.06 |
| | <0.05 | <0.04 | <0.03 | <0.04 | <0.04 | <0.05 |
| SA-M-5F2 | <0.05 | <0.04 | <0.03 | <0.04 | <0.05 | <0.04 |
| | <0.05 | <0.04 | <0.04 | <0.04 | <0.05 | <0.05 |
| SA-M-14F1 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.07 |
| | <0.05 | <0.04 | <0.06 | <0.05 | <0.05 | <0.08 |
| SA-M-15F1 | <0.06 | <0.04 | <0.04 | <0.05 | <0.06 | <0.05 |
| | <0.05 | <0.05 | <0.05 | <0.05 | <0.06 | <0.06 |
| SA-M-3G1 | <0.06 | <0.04 | <0.04 | <0.03 | <0.05 | <0.05 |
| | <0.06 | <0.04 | <0.05 | <0.04 | <0.05 | <0.06 |

| STATION NO. | JUL | AUG | SEP** | OCT** | NOV | DEC |
|---|---|---|---|---|---|---|
| SA-M-2F1 | <0.07 | <0.05 | <0.03 | 25±3 | 1.4±0.1 | <0.04 |
| | <0.05 | <0.04 | <0.03 | 9.9±1.0 | 0.30±0.05 | <0.07 |
| | | | 1.4±0.1 | 3.9±0.4 | | |
| SA-M-5F2 | <0.07 | <0.04 | <0.04 | 23±2 | 0.9±0.1 | <0.04 |
| | <0.05 | <0.05 | <0.04 | 8.4±0.8 | 0.21±0.07 | <0.06 |
| | | | 2.9±0.3 | 1.6±0.2 | | |
| SA-M-14F1 | <0.07 | <0.06 | <0.04 | 15±2 | 0.45±0.08 | 0.07±0.03 |
| | <0.05 | <0.06 | <0.05 | 8.5±0.9 | 0.13±0.06 | <0.1 |
| | | | 1.9±0.2 | 2.3±0.2 | | |
| SA-M-15F1 | <0.07 | <0.05 | <0.04 | 13±1 | 1.3±0.3 | 0.11±0.04 |
| | <0.04 | <0.05 | <0.06 | 6.3±0.6 | 0.31±0.07 | <0.09 |
| | | | 0.55±0.07 | 1.7±0.2 | | |
| SA-M-3G1 | <0.07 | <0.04 | <0.05 | 5.6±0.6 | <0.07 | <0.04 |
| | <0.06 | <0.05 | <0.04 | 2.8±0.3 | <0.08 | <0.09 |
| | | | 0.64±0.06 | 0.29±0.09 | | |

* I-131 results decay corrected to sample stop date.

** Additional samples taken in September and October following the nuclear weapon test by the People's Republic of China on September 17, 1977.

TABLE C-26

CONCENTRATIONS OF GAMMA EMITTERS* AND STRONTIUM-89** AND-90 IN MILK

Results in Units of pCi/l ± 2 sigma

| STATION NO. | NUCLIDE | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|---|
| SA-M-2F1 | K-40 | 1300±130 | 1100±110 | 1200±120 | 1400±140 | 1600±160 | 1600±160 |
| | I-131 | <0.5 | <0.4 | <0.5 | <0.5 | <0.5 | <0.5 |
| | Cs-137 | 1.9±0.8 | 1.8±0.8 | <0.7 | 1.9±0.9 | 5.1±1.0 | 4.3±1.0 |
| | Sr-89 | <2.2 | <1.4 | <0.9 | <0.6 | <0.7 | <0.9 |
| | Sr-90 | 2.0±0.4 | 1.3±0.6 | 1.1±0.3 | <0.4 | 0.4±0.3 | 0.4±0.3 |
| SA-M-5F2 | K-40 | 1400±140 | 1000±100 | 1000±100 | 1500±150 | 1500±150 | 1700±170 |
| | I-131 | <0.5 | <0.4 | <0.4 | <0.5 | <0.5 | <0.5 |
| | Cs-137 | 1.3±0.9 | <0.6 | 1.0±0.7 | 1.6±0.9 | <0.7 | 4.4±1.0 |
| | Sr-89 | <2.0 | <1.3 | <0.9 | <0.8 | <0.7 | <1.3 |
| | Sr-90 | 0.8±0.3 | 1.8±0.5 | 1.1±0.3 | 0.8±0.3 | <0.4 | 0.6±0.4 |
| SA-M-14F1 | K-40 | 1400±140 | 1000±100 | 1200±120 | 1600±160 | 1500±150 | 1500±150 |
| | I-131 | <0.5 | <0.5 | <0.4 | <0.5 | <0.5 | <0.5 |
| | Cs-137 | 1.9±1.0 | <0.6 | <0.6 | 1.4±0.9 | 1.9±0.9 | 3.3±0.9 |
| | Sr-89 | <1.5 | <1.0 | <1.4 | <0.7 | <0.8 | <1.1 |
| | Sr-90 | <0.6 | 1.6±0.4 | <0.7 | <0.4 | 0.3±0.3 | 0.3±0.3 |
| SA-M-15F1 | K-40 | 1300±130 | 1200±120 | 1100±110 | 1800±180 | 1500±150 | 1600±160 |
| | I-131 | <0.5 | <0.5 | <0.4 | <0.5 | <0.5 | <0.5 |
| | Cs-137 | 1.2±0.8 | 1.3±0.8 | 0.9±0.8 | 1.3±1.0 | 1.8±0.9 | 2.0±1.0 |
| | Sr-89 | <0.8 | <1.6 | <1.0 | <0.6 | <0.5 | <1.0 |
| | Sr-90 | <0.4 | 1.5±0.7 | <0.6 | <0.4 | <0.3 | 0.4±0.3 |
| SA-M-3G1 | K-40 | 1600±160 | 1100±110 | 1100±110 | 1600±160 | 1400±140 | 1700±170 |
| | I-131 | <0.5 | <0.4 | <0.5 | <0.5 | <0.5 | <0.5 |
| | Cs-137 | 2.8±1.0 | 1.7±0.9 | 1.7±0.8 | 2.1±0.9 | 2.2±0.9 | 3.2±1.0 |
| | Sr-89 | <1.6 | <1.9 | <1.0 | <0.7 | <0.7 | <1.0 |
| | Sr-90 | 0.7±0.3 | 3.1±0.8 | 0.7±0.4 | <0.4 | <0.4 | 0.6±0.3 |

| STATION NO. | NUCLIDE | JUL | AUG | SEP | OCT | NOV | DEC |
|---|---|---|---|---|---|---|---|
| SA-M-2F1 | K-40 | 1600±160 | 1600±160 | 1500±150 | 1500±150 | 1400±140 | 1300±130 |
| | I-131 | <0.5 | <0.5 | <0.5 | 20±3 | <0.5 | <0.5 |
| | Cs-137 | 4.7±1.0 | 3.3±1.0 | 3.9±1.0 | 6.2±1.1 | 2.9±0.9 | 3.6±0.9 |
| | Sr-89 | <4.5 | <2.9 | <1.2 | 14±7 | <44(1) | 4.3±2.9 |
| | Sr-90 | 5.2±1.1 | 2.4±0.8 | 1.3±0.5 | 8.6±1.4 | <15(1) | 8.3±1.2 |
| SA-M-5F2 | K-40 | 1700±170 | 1500±150 | 1700±170 | 1600±160 | 1600±160 | 1600±160 |
| | I-131 | <0.5 | <0.5 | <0.5 | 32±3 | <0.5 | <0.5 |
| | Cs-137 | 3.3±1.0 | 1.9±0.9 | 2.1±1.0 | 5.6±1.1 | 6.4±1.1 | 5.4±1.0 |
| | Sr-89 | <4.1 | <3.1 | <3.1 | 9.0±8.9 | <6.2 | 10±6 |
| | Sr-90 | 2.3±1.0 | 1.7±0.9 | 4.9±1.2 | 5.0±1.8 | 6.4±0.9 | 4.2±2.4 |
| SA-M-14F1 | K-40 | 1500±150 | 1600±160 | 1800±180 | 1400±140 | 1400±140 | 1400±140 |
| | I-131 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 | <0.5 |
| | Cs-137 | 1.3±1.0 | 2.2±0.9 | 3.5±1.0 | 2.4±1.0 | 3.3±0.9 | 4.7±1.1 |
| | Sr-89 | 2.1±1.2 | <2.5 | <2.1 | <7.6 | <7.7 | 5.7±4.5 |
| | Sr-90 | 1.0±0.7 | 1.0±0.7 | 1.2±0.8 | 3.6±2.8 | 4.2±1.7 | 2.7±1.7 |
| SA-M-15F1 | K-40 | 1700±170 | 1600±160 | 1800±180 | 1600±160 | 1600±160 | 1500±150 |
| | I-131 | <0.5 | <0.5 | <0.5 | 14±3 | <0.5 | <0.5 |
| | Cs-137 | 1.1±0.9 | 1.9±1.0 | 4.0±1.1 | 4.2±1.0 | 3.9±1.1 | 3.4±1.0 |
| | Sr-89 | 2.3±1.4 | <2.6 | <3.1 | <6.2 | 6.6±4.3 | <4.4 |
| | Sr-90 | 2.2±0.8 | <1.1 | 1.2±1.1 | 3.7±2.3 | 2.5±0.9 | 3.1±0.9 |
| SA-M-3G1 | K-40 | 1700±170 | 1700±170 | 1500±150 | 1400±140 | 1700±170 | 1700±170 |
| | I-131 | <0.5 | <0.5 | <0.5 | 45±5 | <0.5 | <0.5 |
| | Cs-137 | 3.5±1.0 | 3.4±1.0 | 3.0±1.0 | 7.3±1.0 | 3.9±1.1 | 4.1±1.0 |
| | Sr-89 | <1.8 | <2.8 | <3.2 | 15±8 | <9.1 | <6.0 |
| | Sr-90 | 1.4±0.6 | <1.2 | 2.8±1.2 | 6.0±1.6 | 2.3±1.9 | 5.0±1.6 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.
** Sr-89 results decay corrected to sample stop date.
(1) This high MDL is a result of a low chemical yield.

TABLE C-27

SAMPLING DATES FOR MILK SAMPLES

| MONTH | STATION NO. 2F1 | 5F2 | 14F1 | 15F1 | 3G1 |
|---|---|---|---|---|---|
| January | 1-02-77 to 1-03-77 | 1-02-77 to 1-03-77 | 1-02-77 to 1-04-77 | 1-03-77 to 1-04-77 | 1-02-77 to 1-03-77 |
| | 1-16-77 to 1-17-77 | 1-16-77 to 1-17-77 | 1-16-77 to 1-18-77 | 1-17-77 to 1-18-77 | 1-16-77 to 1-17-77 |
| February | 2-07-77 to 2-08-77 | 2-07-77 to 2-08-77 | 2-06-77 to 2-07-77 | 2-06-77 to 2-07-77 | 2-07-77 to 2-08-77 |
| | 2-21-77 to 2-22-77 | 2-21-77 to 2-22-77 | 2-21-77 to 2-22-77 | 2-20-77 to 2-22-77 | 2-21-77 to 2-22-77 |
| March | 3-07-77 to 3-08-77 | 3-07-77 to 3-08-77 | 3-05-77 to 3-07-77 | 3-06-77 to 3-07-77 | 3-07-77 to 3-08-77 |
| | 3-21-77 to 3-22-77 | 3-21-77 to 3-22-77 | 3-20-77 to 3-21-77 | 3-20-77 to 3-21-77 | 3-21-77 to 3-22-77 |
| April | 4-04-77 to 4-05-77 | 4-04-77 to 4-05-77 | 4-03-77 to 4-04-77 | 4-03-77 to 4-04-77 | 4-04-77 to 4-05-77 |
| | 4-18-77 to 4-19-77 | 4-18-77 to 4-19-77 | 4-17-77 to 4-18-77 | 4-17-77 to 4-18-77 | 4-18-77 to 4-19-77 |
| May | 5-02-77 to 5-03-77 | 5-02-77 to 5-03-77 | 5-01-77 to 5-02-77 | 5-02-77 to 5-03-77 | 5-02-77 to 5-03-77 |
| | 5-16-77 to 5-17-77 | 5-16-77 to 5-17-77 | 5-15-77 to 5-16-77 | 5-15-77 to 5-16-77 | 5-16-77 to 5-17-77 |
| June | 6-05-77 to 6-06-77 | 6-05-77 to 6-06-77 | 6-06-77 to 6-07-77 | 6-06-77 to 6-07-77 | 6-05-77 to 6-06-77 |
| | 6-19-77 to 6-20-77 | 6-19-77 to 6-20-77 | 6-20-77 to 6-21-77 | 6-20-77 to 6-21-77 | 6-19-77 to 6-20-77 |

TABLE C-27 (Cont.)

SAMPLING DATES FOR MILK SAMPLES

| MONTH | STATION NO. 2F1 | 5F2 | 14F1 | 15F1 | 3G1 |
|---|---|---|---|---|---|
| July | 7-05-77 to 7-06-77 | 7-05-77 to 7-06-77 | 7-04-77 to 7-05-77 | 7-04-77 to 7-05-77 | 7-05-77 to 7-06-77 |
| | 7-17-77 to 7-18-77 | 7-17-77 to 7-18-77 | 7-18-77 to 7-19-77 | 7-18-77 to 7-19-77 | 7-17-77 to 7-18-77 |
| August | 7-31-77 to 8-01-77 | 7-31-77 to 8-01-77 | 8-01-77 to 8-02-77 | 8-01-77 to 8-02-77 | 7-31-77 to 8-01-77 |
| | 8-14-77 to 8-15-77 | 8-14-77 to 8-15-77 | 8-15-77 to 8-16-77 | 8-15-77 to 8-16-77 | 8-14-77 to 8-15-77 |
| September | 9-05-77 to 9-06-77 | 9-05-77 to 9-06-77 | 9-06-77 to 9-07-77 | 9-06-77 to 9-07-77 | 9-05-77 to 9-06-77 |
| | 9-19-77 to 9-20-77 | 9-19-77 to 9-20-77 | 9-19-77 to 9-20-77 | 9-19-77 to 9-20-77 | 9-19-77 to 9-20-77 |
| | 9-25-77 to 9-26-77 | 9-25-77 to 9-26-77 | 9-25-77 to 9-26-77 | 9-25-77 to 9-26-77 | 9-25-77 to 9-26-77 |
| October | 10-03-77 to 10-04-77 | 10-03-77 to 10-04-77 | 10-03-77 to 10-04-77 | 10-03-77 to 10-04-77 | 10-03-77 to 10-04-77 |
| | 10-17-77 to 10-18-77 | 10-17-77 to 10-18-77 | 10-17-77 to 10-18-77 | 10-17-77 to 10-18-77 | 10-17-77 to 10-18-77 |
| | 10-31-77 to 11-01-77 | 10-31-77 to 11-01-77 | 10-31-77 to 11-01-77 | 10-31-77 to 11-01-77 | 10-31-77 to 11-01-77 |
| November | 11-06-77 to 11-07-77 | 11-06-77 to 11-07-77 | 11-06-77 to 11-07-77 | 11-06-77 to 11-07-77 | 11-06-77 to 11-07-77 |
| | 11-20-77 to 11-21-77 | 11-20-77 to 11-21-77 | 11-20-77 to 11-21-77 | 11-20-77 to 11-21-77 | 11-20-77 to 11-21-77 |
| December | 12-04-77 to 12-05-77 | 12-04-77 to 12-05-77 | 12-04-77 to 12-05-77 | 12-04-77 to 12-05-77 | 12-04-77 to 12-05-77 |
| | 12-18-77 to 12-19-77 | 12-18-77 to 12-19-77 | 12-19-77 to 12-20-77 | 12-19-77 to 12-20-77 | 12-18-77 to 12-19-77 |

TABLE C-28

CONCENTRATIONS OF STRONTIUM-89 AND-90*, AND GAMMA EMITTERS** IN MEAT AND GAME

Results in Units of pCi/g(wet) ± 2 sigma

| STATION NO. | DATE | SAMPLE TYPE | K-40 | Sr-89 | Sr-90 | Cs-137 |
|---|---|---|---|---|---|---|
| SA-FPB-14F1 | 2-15-77 | Beef | 0.63±0.06 | | | <0.002 |
| SA-FPB-3E1 | 3-16-77 | Beef | 2.7±0.3 | | | 0.017±0.006 |
| SA-FPB-3E1 | 11-03-77 | Beef | 3.4±0.3 | | | 0.02±0.01 |
| SA-GM-11D1 | 2-25-77 | Muskrat | 3.4±0.3 | 0.9±0.1 | 1.0±0.1 | <0.005 |
| SA-GM-3E1 | 2-21-77 | Muskrat | 0.72±0.07 | 0.62±0.07 | 0.80±0.05 | <0.002 |
| SA-GM-3E1 | 12-09-77 | Muskrat | 3.7±0.4 | 0.9±0.3 | 0.5±0.1 | 0.028±0.009 |
| SA-GM-11D1 | 12-12-77 | Muskrat | 3.2±0.3 | 1.2±0.4 | 0.5±0.1 | <0.007 |
| SA-GD-2E2 | 12-00-77(1) | Deer | 3.0±0.3 | | | 0.021±0.008 |

* Radiostrontium performed on muskrat bones only. Sr-89 results decay corrected to sample stop date.
** All other gamma emitters <MDL; typical MDLs are given in Table C-33.
(1) Deer sample obtained on approximately 12-09-77.

TABLE C-29

CONCENTRATIONS OF GAMMA EMITTERS* IN BOVINE THYROID

Results in Units of pCi/g (wet) ± 2 sigma

| STATION NO. | DATE | I-131 | K-40 |
|---|---|---|---|
| SA-THB-14F1 | 2-15-77 | <0.05 | <0.8 |
| SA-THB-3E1 | 3-16-77 | <0.05 | <0.8 |
| SA-THB-3E1 | 11-03-77 | 2.3±0.2 | 0.9±0.8 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.

TABLE C-30

CONCENTRATIONS OF STRONTIUM-89* AND-90, AND GAMMA EMITTERS** IN FOOD PRODUCTS

Results in Units of pCi/g(wet) ± 2 sigma

| STATION NO. | DATE | SAMPLE TYPE | K-40 | Sr-89 | Sr-90 |
|---|---|---|---|---|---|
| SA-FPV-1G1 | 4-19-77 | Asparagus | 2.8±0.3 | <0.005 | <0.003 |
| SA-FPV-2E1 | 5-01-77 | Asparagus(1) | 3.0±0.3 | <0.006 | 0.004±0.003 |
| SA-FPV-3H4 | 7-25-77 | Corn | 3.5±0.4 | <0.03 | <0.01 |
| SA-FPV-3H4 | 7-25-77 | Peppers | 2.5±0.3 | <0.02 | <0.008 |
| SA-FPV-3H4 | 7-25-77 | Tomatoes | 2.2±0.2 | <0.02 | <0.01 |
| SA-FPV-2E1 | 7-25-77 | Green Peppers | 2.4±0.2 | <0.03 | <0.007 |
| SA-FPV-1G1 | 7-25-77 | Corn | 2.7±0.3 | <0.03 | <0.01 |
| SA-FPV-1G1 | 7-26-77 | Tomatoes | 3.3±0.3 | <0.03 | <0.01 |
| SA-FPV-15E1 | 7-26-77 | Corn | 3.3±0.3 | <0.04 | <0.02 |
| SA-FPV-1G2 | 8-22-77 | Squash(2) | 1.0±0.1 | <0.01 | <0.007 |
| SA-FPV-3H4 | 8-22-77 | Cucumbers | 1.3±0.1 | <0.01 | <0.006 |
| SA-FPV-5F1 | 8-22-77 | Tomatoes | 2.3±0.2 | <0.009 | <0.005 |
| SA-FPV-3H4 | 8-22-77 | Eggplant | 2.3±0.2 | <0.009 | <0.005 |
| SA-FPV-1G1 | 8-23-77 | Eggplant | 2.5±0.3 | <0.008 | <0.004 |

* Sr-89 results decay corrected to sample stop date.
** All other gamma emitters <MDL; typical MDLs are given in Table C-33.
(1) ZrNb-95 was also observed in this sample with a concentration of 0.013±0.003 pCi/g(wet).
(2) Cs-137 was also observed in this sample with a concentration of 0.004±0.002 pCi/g(wet).

TABLE C-31

CONCENTRATIONS OF GAMMA EMITTERS* IN FODDER CROP SAMPLES

Results in Units of pCi/g(dry) ± 2 sigma

| STATION NO. | DATE | SAMPLE TYPE | Be-7 | K-40 | Mn-54 | Zr-95(2) | Nb-95 | Ru-103 |
|---|---|---|---|---|---|---|---|---|
| SA-V-3G1 | 9-12-77 | Corn Silage | 0.8±0.1 | 8.2±0.8 | <0.01 | 0.09±0.02 | 0.19±0.02 | <0.009 |
| SA-V-2F1 | 9-14-77 | Grass | 4.3±0.4 | 13±1 | 0.03±0.02 | 0.51±0.05 | 1.0±0.1 | 0.06±0.02 |
| SA-V-3G1 | 9-14-77 | Green Chop | 1.3±0.2 | 7.0±0.7 | <0.02 | 0.08±0.03 | 0.17±0.03 | <0.02 |
| SA-V-5F2 | 9-14-77 | Grass | 7.2±0.7 | 18±2 | 0.03±0.02 | 0.52±0.05 | 1.1±0.1 | 0.07±0.02 |
| SA-V-14F1 | 9-15-77 | Grass | 4.2±0.4 | 14±1 | 0.01±0.01 | 0.39±0.04 | 0.83±0.08 | 0.06±0.02 |
| SA-V-15F1 | 9-15-77 | Grass | 2.9±0.3 | 23±2 | 0.02±0.01 | 0.27±0.03 | 0.64±0.06 | 0.05±0.02 |
| SA-V-15F1 | 9-15-77 | Silage | <MDL | 19±2 | <0.02 | 0.19±0.03(1) | - | <MDL |
| SA-V-1B1 | 9-28-77 | Corn Silage | <MDL | 3.4±0.4 | <0.02 | <0.02 | - | <MDL |
| SA-C-3G1 | 10-23-77 | Soybeans | <MDL | 19±2 | <0.02 | <0.02 | - | <MDL |
| SA-V-5D1 | 10-24-77 | Soybeans | <MDL | 19±2 | <0.02 | <0.02 | - | <MDL |
| SA-V-15F1 | 10-24-77 | Soybeans | <MDL | 19±2 | <0.02 | <0.02 | - | <MDL |

| STATION NO. | DATE | SAMPLE TYPE | Ru-106(3) | Sb-125 | Cs-137 | Ce-141 | Ce-144 | Ra-226 |
|---|---|---|---|---|---|---|---|---|
| SA-V-3G1 | 9-12-77 | Corn Silage | <0.08 | <0.02 | 0.03±0.01 | <0.01 | 0.37±0.06 | <0.03 |
| SA-V-2F1 | 9-14-77 | Grass | <0.30 | <0.07 | 0.12±0.03 | <0.03 | <0.10 | <0.06 |
| SA-V-3G1 | 9-14-77 | Green Chop | <0.20 | <0.05 | 0.03±0.02 | <0.02 | 0.6±0.1 | <0.04 |
| SA-V-5F2 | 9-14-77 | Grass | 0.6±0.2 | 0.07±0.04 | 0.13±0.02 | 0.06±0.03 | 2.4±0.2 | <0.03 |
| SA-V-14F1 | 9-15-77 | Grass | 0.4±0.1 | 0.06±0.03 | 0.08±0.02 | 0.02±0.01 | 1.5±0.2 | 0.10±0.04 |
| SA-V-15F1 | 9-15-77 | Grass | 0.4±0.1 | 0.05±0.04 | 0.08±0.02 | <0.01 | 1.2±0.1 | 0.07±0.04 |
| SA-V-15F1 | 9-15-77 | Silage | <0.09 | <MDL | <0.02 | <MDL | <0.10 | <0.04 |
| SA-V-1B1 | 9-28-77 | Corn Silage | <0.09 | <MDL | <0.02 | <MDL | <0.10 | <0.04 |
| SA-V-3G1 | 10-23-77 | Soybeans | <0.10 | <MDL | 0.04±0.03 | <MDL | <0.10 | <0.04 |
| SA-V-5D1 | 10-24-77 | Soybeans | <0.09 | <MDL | <0.02 | <MDL | <0.10 | <0.04 |
| SA-V-15F1 | 10-24-77 | Soybeans | <0.09 | <MDL | <0.02 | <MDL | <0.10 | <0.04 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.
(1) This result is for ZrNb-95.
(2) The MDL's are for ZrNb-95.
(3) The MDL's are for RuRh-106.

TABLE C-32

CONCENTRATIONS OF STRONTIUM-90 AND GAMMA EMITTERS* IN SOIL

Results in Units of pCi/g (dry) ± 2 sigma

| STATION NO. | DATE | Sr-90 | K-40 | Ru-103 | Cs-137 | Ra-226 | Th-232 |
|---|---|---|---|---|---|---|---|
| SA-E-6S1 | 4-06-77 | 0.13±0.03 | 8.4±0.8 | 0.02±0.01 | 0.11±0.03 | 0.53±0.05 | 0.42±0.06 |
| SA-E-5D1 | 4-06-77 | 0.29±0.05 | 6.6±0.7 | <0.02 | 0.55±0.06 | 0.70±0.07 | 0.64±0.07 |
| SA-E-10D1 | 4-05-77 | 0.26±0.04 | 9.5±1.0 | <0.01 | 0.56±0.06 | 0.90±0.09 | 0.5±0.1 |
| SA-E-2E1 | 4-04-77 | 0.17±0.03 | 8.1±0.8 | <0.01 | 0.46±0.05 | 0.84±0.08 | 0.66±0.07 |
| SA-E-16E1 | 4-05-77 | 0.16±0.04 | 14±1 | <0.01 | 0.27±0.03 | 1.0±0.1 | 0.8±0.2 |
| SA-E-1F1 | 4-04-77 | 0.25±0.04 | 5.6±0.6 | <0.01 | 3.7±0.4 | 0.55±0.06 | 0.40±0.07 |
| SA-E-2F1 | 4-04-77 | 0.31±0.05 | 10±1 | <0.01 | 0.46±0.05 | 1.1±0.1 | 0.6±0.2 |
| SA-E-2F2 | 4-04-77 | 0.06±0.03 | 9.3±0.9 | <0.01 | 0.22±0.03 | 0.48±0.05 | 0.39±0.06 |
| SA-E-5F1 | 4-05-77 | 0.30±0.04 | 6.1±0.6 | <0.01 | 0.83±0.08 | 0.58±0.06 | 0.45±0.05 |
| SA-E-5F2 | 4-05-77 | 0.15±0.03 | 4.8±0.5 | <0.01 | 0.42±0.04 | 0.55±0.06 | 0.45±0.05 |
| SA-E-14F1 | 4-05-77 | 0.19±0.04 | 15±2 | <0.02 | 0.26±0.03 | 1.1±0.1 | 1.0±0.1 |
| SA-E-15F1 | 4-05-77 | 0.42±0.05 | 13±1 | <0.02 | 0.71±0.07 | 1.2±0.1 | 1.0±0.1 |
| SA-E-3G1 | 4-06-77 | 0.17±0.04 | 11±1 | <0.01 | 0.41±0.04 | 1.1±0.1 | 0.8±0.1 |
| SA-E-3H3 | 4-07-77 | 0.68±0.06 | 9.1±0.9 | <0.02 | 0.82±0.08 | 1.0±0.1 | 0.77±0.08 |

* All other gamma emitters <MDL; typical MDLs are given in Table C-33.

TABLE C-33

TYPICAL MDLs FOR GAMMA SPECTROMETRY*

| NUCLIDE | SURFACE WATER (pCi/l) | FISH SHELLFISH (pCi/kg) | SEDIMENT (pCi/g) | AIR PARTICULATES ($10^{-3}$pCi/$m^3$) | PRECIPITATION (pCi/l) | WELL/POTABLE WATER (pCi/l) | MILK (pCi/l) | FOOD PRODUCTS (pCi/kg-wet) | FODDER CROPS (pCi/kg-dry) | GAME (pCi/kg) | BOVINE THYROIDS (pCi/kg) | SOIL (pCi/g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Na-22 | 0.2 | 2 | 0.02 | 0.2 | 0.6 | 0.2 | 0.3 | 0.7 | 10 | 3 | 30 | 0.02 |
| K-40 | 7 | - | - | 3 | 10 | 7 | - | - | - | - | 800 | - |
| Cr-51 | 3 | 30 | 0.1 | 2 | 7 | 4 | 5 | 10 | 100 | 40 | 400 | 0.1 |
| Mn-54 | 0.5 | 8 | 0.02 | 0.2 | 1 | 0.5 | 0.7 | 2 | 20 | 7 | 60 | 0.01 |
| Co-58 | 0.5 | 4 | 0.02 | 0.1 | 1 | 0.5 | 0.7 | 2 | 20 | 2 | 60 | 0.01 |
| Fe-59 | 1 | 10 | 0.02 | 0.3 | 2 | 1 | 2 | 4 | 50 | 10 | 100 | 0.02 |
| Co-60 | 0.6 | 10 | 0.02 | 0.3 | 1 | 0.6 | 1 | 3 | 30 | 9 | 70 | 0.02 |
| Zn-65 | 1 | 20 | 0.03 | 0.3 | 2 | 1 | 2 | 5 | 60 | 20 | 100 | 0.03 |
| ZrNb-95 | 0.5 | 6 | 0.04 | 1 | 1 | 0.5 | 0.6 | 1 | 20 | 6 | 60 | 0.03 |
| Mo-99 | 4 | 50 | 0.1 | 1 | 10 | 4 | 5 | 10 | 200 | 50 | 500 | 0.1 |
| RuRh-106 | 2 | 30 | 0.1 | 3 | 5 | 2 | 3 | 6 | 90 | 30 | 300 | 0.1 |
| Ag-110m | 0.5 | 7 | 0.04 | 0.4 | 1 | 0.5 | 0.7 | 1 | 20 | 6 | 60 | 0.05 |
| Te-129m | 7 | 100 | 0.3 | 2 | 20 | 8 | 10 | 20 | 300 | 100 | 900 | 0.2 |
| I-131 | 0.4 | 3 | 0.01 | 0.2 | 0.8 | 0.4 | 0.5 | 9 | 20 | 5 | 50 | 0.01 |
| Te-132 | 0.4 | 3 | 0.01 | 0.2 | 0.8 | 0.4 | 0.4 | 1 | 20 | 4 | 40 | 0.01 |
| I-133 | 0.5 | 4 | 0.01 | 0.2 | 1 | 0.5 | 0.6 | 2 | 20 | 6 | 50 | 0.01 |
| Cs-134 | 0.5 | 4 | 0.02 | 0.2 | 2 | 0.5 | 0.7 | 2 | 20 | 2 | 60 | 0.02 |
| Cs-136 | 0.7 | 10 | 0.03 | 0.2 | 1 | 0.7 | 1 | 3 | 30 | 10 | 80 | 0.02 |
| Cs-137 | 0.5 | 4 | 0.01 | 2 | 1 | 0.5 | 0.6 | 2 | 20 | 2 | 60 | - |
| BaLa-140 | 0.6 | 9 | 0.02 | 0.4 | 1 | 0.6 | 0.6 | 2 | 20 | 8 | 70 | 0.03 |
| Ce-144 | 3 | 40 | 0.1 | 20 | 6 | 3 | 3 | 30 | 100 | 30 | 300 | 0.1 |
| Ra-226 | 0.9 | 10 | - | 0.6 | 2 | 0.9 | 1 | 3 | 40 | 10 | 100 | - |
| Th-232 | 2 | 20 | - | 0.6 | 4 | 2 | 3 | 6 | 80 | 20 | 200 | - |

* At time of analysis.

TABLE C-34

DIRECT RADIATION MEASUREMENTS - MONTHLY TLD RESULTS

mrad/standard month*

| STATION NO. | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|
| SA-ID-2S1 | 3.94±0.30 | 3.76±0.46 | 4.45±0.29 | 4.01±0.12 | 4.07±0.42 | 3.94±0.20 |
| SA-ID-5S1 | 3.81±0.23 | 4.20±0.37 | 4.45±0.24 | 4.34±0.28 | 4.62±0.35 | 4.01±0.47 |
| SA-ID-6S1 | 4.94±0.28 | 5.31±0.46 | 5.26±0.57 | 5.49±0.48 | 5.33±0.64 | 5.44±0.38 |
| SA-ID-7S1 | 5.41±0.91 | 5.36±0.55 | 6.16±0.39 | 5.57±0.28 | 6.00±0.64 | 5.77±0.57 |
| SA-ID-10S1 | 5.05±0.44 | 5.33±0.09 | 5.54±0.20 | 5.81±0.96 | 5.67±0.57 | 5.21±0.64 |
| SA-ID-11S1 | 4.13±0.37 | 4.01±0.32 | 4.06±0.33 | 4.21±0.40 | 4.24±0.33 | 4.05±0.35 |
| SA-ID-5D1 | 4.63±0.47 | 4.53±0.28 | 4.83±0.36 | 4.93±0.27 | 5.24±0.77 | 5.03±0.74 |
| SA-ID-10D1 | 5.87±1.11 | 5.49±0.40 | 5.83±0.30 | 5.99±0.55 | 7.83±2.74 | 6.19±0.29 |
| SA-ID-14D1 | 5.27±0.39 | 5.05±0.27 | 5.24±0.36 | 5.46±0.33 | 5.71±0.40 | 5.38±0.43 |
| SA-ID-2E1 | 5.02±0.58 | 4.84±0.39 | 4.97±0.41 | 5.10±0.05 | 5.64±0.40 | 5.78±0.60 |
| SA-ID-3E1 | 5.07±0.09 | 4.93±0.27 | 4.95±0.66 | 5.13±0.32 | 5.31±0.70 | 5.21±0.63 |
| SA-ID-13E1 | 4.81±0.62 | 4.86±0.39 | 5.11±0.35 | 5.15±0.14 | 5.34±0.55 | 5.12±0.21 |
| SA-ID-16E1 | 5.06±0.54 | 5.10±0.30 | 5.52±0.49 | 5.12±1.30 | 5.40±0.38 | 5.50±0.50 |
| SA-ID-1F1 | 5.35±0.28 | 5.30±0.38 | 5.39±0.22 | 5.82±0.79 | 5.77±0.26 | 5.58±0.44 |
| SA-ID-2F2 | 4.23±0.30 | 3.98±0.36 | 4.09±0.51 | 4.61±0.33 | 5.24±0.77 | 4.38±0.50 |
| SA-ID-5F1 | 4.71±0.49 | 4.76±0.38 | 5.53±0.33 | 5.21±0.63 | 5.15±0.71 | 5.30±0.63 |
| SA-ID-6F1 | 4.06±0.12 | 4.29±0.21 | 4.41±0.31 | 4.22±0.89 | 4.51±0.34 | 4.30±0.21 |
| SA-ID-7F2 | 3.65±0.24 | 3.80±0.30 | 3.96±0.23 | 3.75±0.47 | 4.25±0.53 | 3.93±0.47 |
| SA-ID-11F1 | 5.42±0.25 | 5.79±0.27 | 5.59±0.54 | 6.16±0.50 | 6.50±0.38 | 6.40±1.50 |
| SA-ID-13F1 | 4.73±0.36 | 5.07±0.14 | 4.61±1.72 | 5.25±0.52 | 5.28±0.25 | 5.11±0.28 |
| SA-ID-3G1 | 5.41±0.28 | 5.53±0.54 | 5.58±0.42 | 5.83±0.77 | 6.40±0.29 | 6.58±0.76 |
| SA-ID-2H1 | 5.17±0.65 | 5.86±0.53 | 5.72±0.50 | 5.47±0.32 | 5.76±0.57 | 5.68±0.55 |
| SA-ID-3H1 | 5.31±0.40 | 5.88±0.43 | 5.58±0.24 | 5.68±0.47 | 5.92±0.40 | 5.67±0.82 |
| SA-ID-3H3 | 5.46±0.40 | 5.22±0.21 | 5.48±0.33 | 5.45±0.37 | 6.07±0.31 | 6.03±0.61 |
| AVERAGE | 4.85±1.20 | 4.93±1.28 | 5.10±1.23 | 5.16±1.32 | 5.47±1.64 | 5.23±1.56 |

| STATION NO. | JUL | AUG | SEP | OCT | NOV | DEC | AVERAGE |
|---|---|---|---|---|---|---|---|
| SA-ID-2S1 | 5.02±0.29 | 5.21±0.14 | 5.05±0.18 | 5.52±0.16 | 6.00±0.18 | 6.21±0.33 | 4.76±1.71 |
| SA-ID-5S1 | 4.18±0.38 | 4.17±0.40 | 4.21±0.58 | 4.27±0.41 | 4.69±0.42 | 4.55±0.26 | 4.29±0.51 |
| SA-ID-6S1 | 5.22±0.44 | 4.76±0.15 | 5.20±0.53 | 5.47±0.42 | 5.92±1.05 | 5.48±0.51 | 5.32±0.58 |
| SA-ID-7S1 | 5.37±0.52 | 4.86±0.44 | 5.40±0.33 | 5.33±0.37 | 5.57±0.46 | 6.05±0.43 | 5.57±0.74 |
| SA-ID-10S1 | 4.90±0.36 | 4.65±0.11 | 4.69±0.34 | 5.29±0.35 | 5.41±0.19 | 5.31±0.43 | 5.24±0.73 |
| SA-ID-11S1 | 3.82±0.24 | 3.56±0.23 | 3.99±0.26 | 4.17±0.34 | 4.33±0.45 | 4.61±0.18 | 4.10±0.52 |
| SA-ID-5D1 | 4.72±0.48 | 4.17±0.40 | 4.75±0.12 | 4.58±0.22 | 4.88±0.36 | 5.26±0.26 | 4.80±0.62 |
| SA-ID-10D1 | 5.61±0.37 | 5.52±0.08 | 5.49±0.37 | 5.58±0.37 | 5.63±0.42 | 5.78±0.44 | 5.90±1.29 |
| SA-ID-14D1 | 5.12±0.22 | 4.99±0.32 | 5.07±0.49 | 5.20±0.13 | 5.32±0.26 | 5.48±0.22 | 5.27±0.42 |
| SA-ID-2E1 | 4.73±0.43 | 4.63±0.37 | 4.79±0.53 | 5.31±0.46 | 5.12±0.05 | 5.59±0.43 | 5.13±0.76 |
| SA-ID-3E1 | 4.81±0.30 | 4.73±0.40 | 4.45±0.40 | 5.12±0.35 | 4.62±0.23 | 5.09±0.37 | 4.95±0.51 |
| SA-ID-13E1 | 4.76±0.20 | 4.85±0.26 | 4.64±0.28 | 4.93±0.21 | 5.16±0.66 | 4.98±0.27 | 4.97±0.41 |
| SA-ID-16E1 | 5.51±0.44 | 5.10±0.20 | 5.08±0.21 | 5.03±0.26 | 5.32±0.71 | 5.52±0.31 | 5.27±0.42 |
| SA-ID-1F1 | 5.47±0.46 | 4.83±0.32 | 5.25±0.50 | 5.43±0.35 | 5.41±0.37 | 5.94±0.27 | 5.46±0.59 |
| SA-ID-2F2 | 4.27±0.56 | 3.91±0.06 | 3.89±0.23 | 4.43±0.41 | 4.40±0.36 | 4.80±0.26 | 4.35±0.79 |
| SA-ID-5F1 | 5.15±0.43 | 4.55±0.04 | 4.99±0.20 | 4.89±0.47 | 4.80±0.16 | 5.22±0.38 | 5.02±0.57 |
| SA-ID-6F1 | 5.25±1.00 | 3.79±0.15 | 4.16±0.17 | 4.33±0.15 | 4.23±0.41 | 4.47±0.36 | 4.33±0.69 |
| SA-ID-7F2 | 4.20±0.25 | 3.29±0.13 | 4.00±0.23 | 3.86±0.14 | 4.05±0.12 | 4.57±0.38 | 3.94±0.65 |
| SA-ID-11F1 | 5.86±0.64 | 5.31±0.27 | 5.65±0.28 | 5.73±0.13 | 5.58±0.59 | 5.55±0.38 | 5.79±0.75 |
| SA-ID-13F1 | 4.84±0.22 | 4.86±0.25 | 4.99±0.25 | 5.26±0.19 | 4.93±0.29 | 5.29±0.31 | 5.02±0.46 |
| SA-ID-3G1 | 5.86±1.02 | 5.51±0.41 | 5.76±0.92 | 5.63±0.33 | 5.83±0.25 | 6.16±0.55 | 5.84±0.73 |
| SA-ID-2H1 | 5.12±0.48 | 5.03±0.25 | 5.01±0.43 | 5.57±0.21 | 4.96±0.38 | 5.77±0.57 | 5.43±0.69 |
| SA-ID-3H1 | 5.78±0.47 | 5.02±0.51 | 5.14±0.46 | 5.45±0.39 | 6.54±1.57 | 6.42±0.93 | 5.70±0.92 |
| SA-ID-3H3 | 5.37±0.45 | 5.07±0.58 | 5.38±0.31 | 5.54±0.56 | 5.64±0.21 | 6.43±0.68 | 5.59±0.78 |
| AVERAGE | 5.04±1.09 | 4.68±1.18 | 4.88±1.07 | 5.08±1.06 | 5.18±1.24 | 5.44±1.18 | 5.09±1.32 |

* The standard month = 30.4 days.

TABLE C-35

DIRECT RADIATION MEASUREMENTS - QUARTERLY TLD RESULTS

mrad/standard month*

| STATION NO. | JAN-MAR | APR-JUN | JUL-SEP | OCT-DEC | AVERAGE |
|---|---|---|---|---|---|
| SA-ID-2S1 | 3.95±0.39 | 3.95±0.27 | 5.04±0.11 | 5.61±0.88 | 4.64±1.65 |
| SA-ID-5S1 | 4.12±0.70 | 3.95±0.57 | 4.10±0.27 | 4.49±0.39 | 4.16±0.46 |
| SA-ID-6S1 | 5.16±0.32 | 5.17±0.23 | 4.86±0.21 | 5.28±0.54 | 5.12±0.36 |
| SA-ID-7S1 | 5.41±0.45 | 5.60±0.37 | 5.13±0.40 | 5.47±0.27 | 5.40±0.40 |
| SA-ID-10S1 | 5.03±0.38 | 5.29±0.41 | 4.70±0.28 | 4.84±0.22 | 4.96±0.51 |
| SA-ID-11S1 | 3.77±0.25 | 4.00±0.71 | 3.74±0.34 | 4.01±0.42 | 3.88±0.29 |
| SA-ID-5D1 | 4.56±0.48 | 4.98±0.25 | 4.64±0.36 | 4.73±0.64 | 4.73±0.36 |
| SA-ID-10D1 | 5.44±0.33 | 5.61±0.36 | 5.31±0.23 | 5.23±0.21 | 5.40±0.33 |
| SA-ID-14D1 | 5.11±0.31 | 4.99±0.57 | 4.93±0.32 | 5.20±0.51 | 5.06±0.24 |
| SA-ID-2E1 | 5.02±0.30 | 4.97±0.72 | 5.04±0.30 | 5.52±0.42 | 5.14±0.51 |
| SA-ID-3E1 | 4.73±0.41 | 5.48±1.36 | 4.47±0.25 | 4.93±0.46 | 4.90±0.86 |
| SA-ID-13E1 | 4.77±0.44 | 4.69±0.60 | 4.72±0.13 | 4.93±0.23 | 4.78±0.21 |
| SA-ID-16E1 | 5.02±0.39 | 5.08±0.40 | 5.02±0.35 | 5.41±0.51 | 5.13±0.37 |
| SA-ID-1F1 | 4.93±0.45 | 4.94±1.39 | 5.02±0.21 | 5.21±0.70 | 5.02±0.26 |
| SA-ID-2F2 | 4.08±0.38 | 4.26±0.05 | 3.73±0.36 | 4.25±0.56 | 4.08±0.50 |
| SA-ID-5F1 | 4.64±0.32 | 5.08±0.29 | 4.69±0.47 | 4.62±0.23 | 4.76±0.43 |
| SA-ID-6F1 | 4.19±0.29 | 4.08±0.64 | 4.01±0.38 | 4.00±0.11 | 4.07±0.18 |
| SA-ID-7F2 | 3.96±0.21 | 3.82±0.18 | 3.55±0.09 | 3.70±0.22 | 3.76±0.35 |
| SA-ID-11F1 | 5.43±0.27 | 5.62±0.27 | 5.67±0.30 | 5.60±0.55 | 5.58±0.21 |
| SA-ID-13F1 | 4.89±0.27 | 5.21±0.78 | 4.87±0.30 | 5.05±0.32 | 5.00±0.32 |
| SA-ID-2H1 | 5.77±0.25 | 5.56±0.35 | 5.29±0.44 | 5.75±0.13 | 5.59±0.45 |
| SA-ID-3H1 | 5.44±0.41 | 5.46±0.36 | 5.09±0.28 | 5.73±0.37 | 5.43±0.53 |
| SA-ID-3H3 | 5.46±0.54 | 5.90±1.28 | 5.33±0.65 | 5.22±0.40 | 5.48±0.60 |
| SA-ID-3G1 | 5.27±0.82 | 5.56±0.31 | 5.46±0.46 | 5.68±0.44 | 5.49±0.35 |
| Average | 4.84±1.14 | 4.97±1.27 | 4.77±1.14 | 5.02±1.18 | 4.90±1.18 |

* The standard month = 30.4 days.

TABLE C-36

CONCENTRATIONS OF GAMMA EMITTERS IN SPECIAL WEEKLY COMPOSITES OF AIR PARTICULATE SAMPLES

Results* in Units of $10^{-3}$ pCi/$m^3$ ± 2 sigma

| STATION NO. AND DATE | Be-7 | Zr-95 | Nb-95 | Ru-103 | I-131 | Cs-137 | BaLa-140 | Ce-141 | Ce-144 |
|---|---|---|---|---|---|---|---|---|---|
| SA-AP-2S1 | | | | | | | | | |
| 9-19-77 to 9-27-77 | 62±21 | 13±5 | 15±3 | 24±4 | 47±27 | <2 | 34±16 | 21±4 | 16±6 |
| SA-AP-1F1 | | | | | | | | | |
| 9-19-77 to 9-27-77 | 69±28 | 19±6 | 18±4 | 25±5 | <26 | 3±2 | 45±22 | 32±7 | <22 |
| SA-AP-2F2 | | | | | | | | | |
| 9-19-77 to 9-27-77 | <30 | 19±6 | 6.7±2.4 | 19±4 | <14 | <2 | 36±16 | 25±5 | 11±7 |

* All results are decay corrected to sample stop date.

TABLE C-37

COMPARISON OF FOURTH QUARTER STRONTIUM-89 MDL VALUES IN MILK SAMPLES

Results in Units of pCi/l ± 2 sigma

| DATE SAMPLE LOCATIONS | MDL AT TIME OF ANALYSIS | MDL DECAY CORRECTED TO SAMPLE STOP DATE |
|---|---|---|
| October | | |
| SA-M-2F1 | * | * |
| SA-M-5F2 | * | * |
| SA-M-14F1 | <6.2 | <7.6 |
| SA-M-15F1 | <5.1 | <6.2 |
| SA-M-3G1 | * | * |
| November | | |
| SA-M-2F1 | <20(1) | <44 |
| SA-M-5F2 | <1.8 | <6.2 |
| SA-M-14F1 | <3.5 | <7.7 |
| SA-M-15F1 | * | * |
| SA-M-3G1 | <4.1 | <9.1 |
| December | | |
| SA-M-2F1 | * | * |
| SA-M-5F2 | * | * |
| SA-M-14F1 | * | * |
| SA-M-15F1 | | (2) |
| SA-M-3G1 | <3.3 | <6.0 |

* Indicates positive value was detected.
(1) This higher than normal MDL at the time of analysis is a result of a low chemical yield.
(2) MDL (4.4 pCi/l) is within the required sensitivity.