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U. S. Nuclear Regulatory Commission
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Subject: Arkansas Nuclear One - Units 1 and 2
Docket Nos. 50-313 and 50-368
License Nos. DPR-51 and NPF-6
Annual Radiological Environmental Report - 1992

Gentlemen:

Arkansas Nuclear One, Units 1 and 2 (ANO-1 & 2) Technical Specifications 6.12.2.5 and 6.9.4, respectively, require the submittal of an annual radiological environmental report for the previous calendar year prior to May 1 of each year.

Attached is the annual radiological environmental report for ANO for the year 1992. This report fulfills the reporting requirements referenced above.

Should you have any questions regarding this submittal, please contact my office.

Very truly yours,

James J. Fisicaro

James J. Fisicaro
Director, Licensing

JJF/JJD
Attachment

040041

IE25

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ARKANSAS NUCLEAR ONE

UNITS 1 AND 2

ANNUAL RADIOLOGICAL ENVIRONMENTAL REPORT FOR 1992

SUMMARY

The Annual Radiological Environmental Report (ARER) presents data obtained through analyses of environmental samples collected for Arkansas Nuclear One's (ANO) Radiological Environmental Monitoring Program (REMP) for the period January 1, 1992 through December 31, 1992. The ARER fulfills the requirements of ANO Unit 1 Technical Specifications 6.12.2.5 and Unit 2 Technical Specifications 6.9.4.

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Radiation and radioactivity are monitored around ANO within a 22-mile radius. The environment around ANO has been monitored for radiation and radioactivity for approximately 20 years. The REMP was established about two years before the station became operational. This program provided data on background radiation and radioactivity which is normally present in the area. ANO has continued to monitor the environment by sampling air, milk, water, food products, vegetation, sediment and fish, as well as measuring radiation directly. Samples are collected from both indicator and control locations. Indicator locations are within approximately five miles of the site, and are expected to show any increases or buildup of radioactivity that might occur due to station operation. Control locations are farther away from the station, and are expected to indicate the presence of only naturally occurring radioactivity. The results obtained from indicator locations are compared with control locations and with concentrations present in the environment before the station became operational. This allows for assessment of any impact the operation of ANO might have had on the surrounding environment.

In 1992, approximately 1088 radiological environmental samples were collected and analyzed for radioactivity. Radionuclide concentrations measured at indicator locations were compared with control locations as well as those measured in previous years. ANO personnel

assessed plant operations using this data and concluded that no significant impact occurred on the environs surrounding the plant. Radiation levels in the environment were undetectable in many cases and at or near previous levels in significant pathways associated with ANO. Therefore, plant operation has had no harmful effects nor resulted in any irreversible damage to the environment.

ATTACHMENTS

Attachment I contains results of air, milk, water, food products, vegetation, sediment and fish samples collected in 1992 and analyzed by Entergy Services, Inc. (ESI) System Chemistry. Results of ESI System Chemistry's participation in the Environmental Protection Agency (EPA) Interlaboratory Comparison Program are also contained in Attachment I.

Attachment II contains results of thermoluminescent dosimeters (TLDs) collected in 1992 and analyzed by ANO Dosimetry.

Attachment III contains the statistical analyses performed and equations that were utilized.

Attachment IV contains dose calculations performed for sediment using generalized equation from Regulatory Guide 1.109.

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INTRODUCTION

INTRODUCTION

1.1 RADIATION

People are always subjected to natural radiation. This radiation exposure comes from the sun and naturally occurring radioactive materials present in the earth, structures we inhabit, and in the food and water we consume. There are radioactive gases in the air we breathe and our bodies are themselves radioactive. The levels of natural or background radiation vary greatly from location to location. For example, the average Unites States resident receives approximately 300 millirem in a year from natural background as shown in Table 1-1. If an individual lives in Denver as shown in Figure 1-1, an additional 80 to 81 millirem could be expected; thereby total exposure would be 380 millirem in a year. In addition, man-made sources of radiation, such as X-rays, radiation for medical purposes, fallout from nuclear explosives testing and radioactive materials from nuclear power plants contribute additional exposure. However, as shown in Table 1-1 and Figure 1-1, an individual receives the major portion of dose from natural background and other sources with nuclear power plants contributing <1 millirem. This would also be the case for individuals living around or next to ANO.

1.2 BENEFITS OF RADIATION

Nuclear power plays an important part in meeting today's electricity needs, and will continue to serve as an important source of energy well into the future. In addition, other uses of radiation have brought tremendous benefits to our everyday lives during the past 20 or 30 years. Radioisotopes and controlled radiation are used, for example, to sterilize medical supplies, to improve the keeping qualities of foodstuffs, in industrial processes, in medical science, and in the study of environmental pollution, agriculture and hydrology. Medical diagnosis

and treatment are the main sources of public exposure to man-made radiation but the benefit in terms of human lives and health is enormous.

1.3 SAFETY OF RADIATION

Radiation and the safety of radiation command considerable public attention. Although it is not generally realized, safety regulations for radioactive materials are much stricter than for other potentially dangerous substances. For example, a person living near a 1000 MWe coal fired plant could receive 7.2 millirem in a year from naturally occurring radioactive materials contained in the coal that is burnt. A person living adjacent to a similar size nuclear plant is expected to receive less than 1.0 millirem in a year.

In addition, radioactive elements lose their radioactivity, and resulting toxicity, with time. Potentially toxic non-radioactive materials, such as lead, silver and mercury, can present a danger to humans until properly treated, stabilized, and disposed. Table 1-1 presents illustrations of relative radiation exposure risks as compared to other health risks.

1.4 PURPOSE AND DESIGN CRITERIA OF THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

The REMP was established to ensure that plant operating controls properly function to minimize any associated radiation endangerment to human health or the environment. The **purpose** of the REMP is:

- To measure radiation levels and their variations in environmental media in the area surrounding the plant
- To determine average levels of radiation and radioactive material in various environmental media
- To evaluate environmental sampling procedures, equipment and techniques

- To detect effects, if any, of ANO operation on the environmental radiation levels and concentrations.

The **design criteria** for the REMP are:

- To analyze important pathways for anticipated types and quantities of radionuclides released into the environment
- To consider the possibility of a buildup of long-lived radionuclides in the environment and physical and biological accumulations that may contribute to human exposures
- To consider the potential radiation exposure to plant and animal life in the environment surrounding ANO
- To correlate levels of radiation and radioactivity in the environment with radioactive releases from station operation.

1.5 DOSE PATHWAYS ASSOCIATED WITH ANO

Figure 1-2 shows potential exposure pathways that could occur as a result of a nuclear power plant. However, the most significant environmental dose pathways from a nuclear power station are direct dose from gaseous effluent and thyroid dose due to the ingestion of milk. ANO operations are expected to have little, if any, impact by these pathways due to the very low levels of radiation released.

1.6 PATHWAYS MONITORED

The airborne, waterborne, ingestion and direct radiation pathways are monitored as required by ANO Technical Specifications. The REMP includes the sampling program required to meet the above intent. This program is supplemented with additional sampling in order to provide a comprehensive and well-balanced program. Sample locations to monitor exposure pathways are described in Table 1-2 and shown in Figure 1-3. Section 2.0 of this report provides a discussion of 1992 sampling results.

1.7 PREVIOUS DATA COMPARISON

A comparison of 1992 results to preoperational studies, operational controls and previous ARERs shows no significant changes. Results remained at levels, similar to those of previous years. Such results confirm that ANO effluent controls and equipment are performing satisfactorily.

Radiation Risks in Perspective

Radiation Dose Comparisons

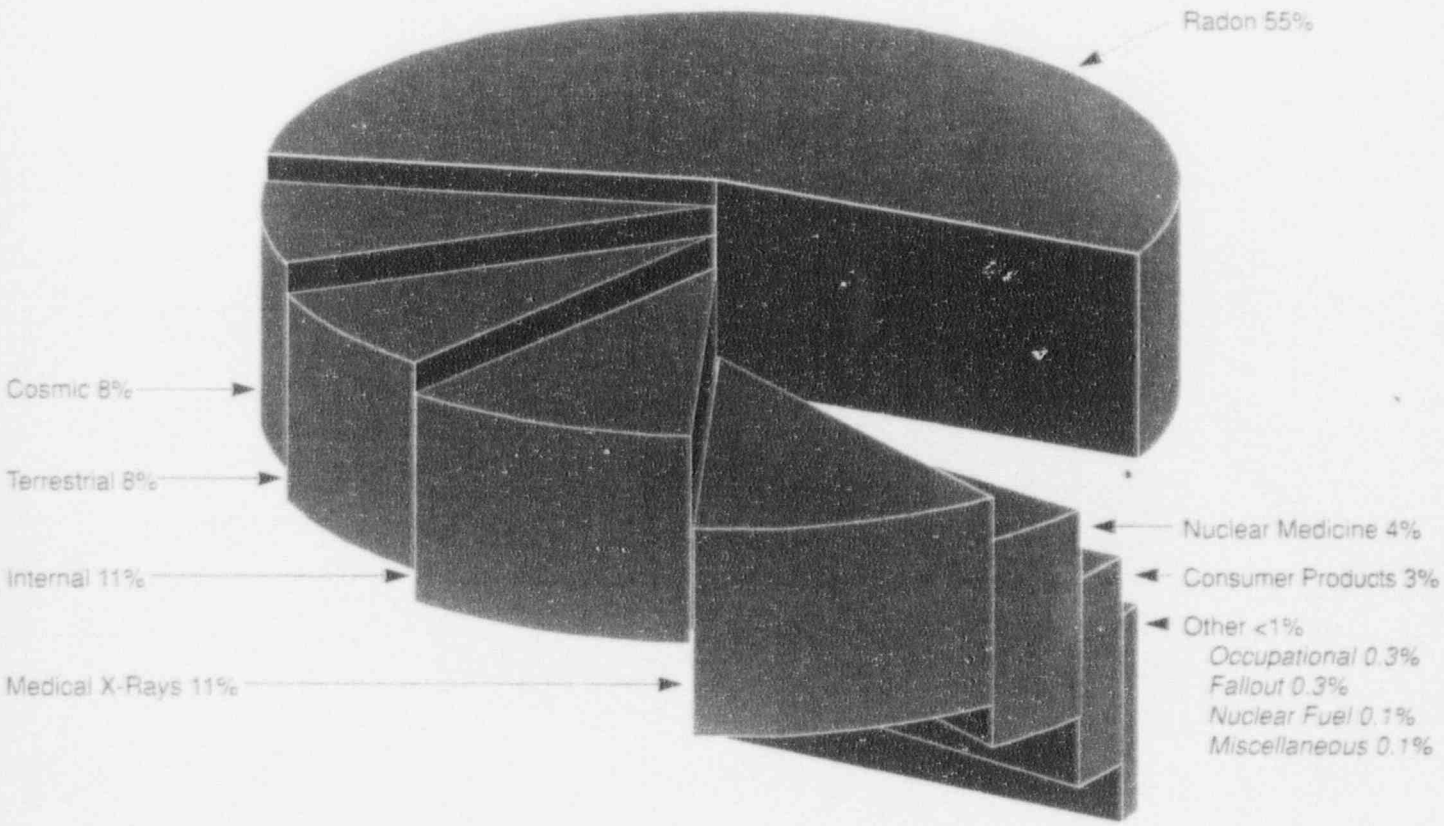
Natural Background	Approximate MREM/Year
Average U.S. Resident	300
Average Denver Resident	380
Radon in average households	
New York/New Jersey	360
Massachusetts	475
Medical Exposure	
Average U.S. Citizen	50
Typical Medical Examination	
Dental X-Rays *(Full Mouth)*	3,000 *(Skin)*
Chest X-Rays	10 *(Bone)*
Gastro-Intestinal Series *(Upper & Lower)*	1,400 *(Bone)*
Occupational Exposure	
Average Pilgrim Station Radiation Worker *(since 1980)*	600 MREM/Year

Estimated Loss of Average Life

Expectancy From Various Health Risks

Health Risk	Estimated Days of Life Expectancy Lost (average)
Smoking 20 Cigarettes/Day	2370 *(6.5 years)*
Overweight *(by 20%)*	985 *(2.7 Years)*
All Accidents Combined	435 *(1.2 Years)*
Auto Accidents	200
Alcohol Consumption *(U.S. Average)*	130
Home Accidents	95
Drowning	41
Natural Background Radiation	8
Medical Diagnostic X-Rays *(U.S. Average)*	6
All Catastrophes *(Earthquake, Etc.)*	3.5
One REM Radiation	1

Background Radiation Sources



The percentage contribution of various radiation sources to the total average effective dose equivalent in the U.S. population.

TABLE 1-2
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SAMPLE STATIONS

Sample Station Number: 1
Approximate Direction and Distance from Plant: 88° - 0.6 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:
The sample station is near the meteorology tower approximately 0.6 miles east of ANO.

Sample Station Number: 2
Approximate Direction and Distance from Plant: 235° - 0.4 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:
IF traveling from ANO,
THEN go approximately 0.2 miles west toward Gate 4. Turn left and go approximately 0.1 miles. Turn right and go approximately 0.1 miles. The sample station is on the right at the former AP&L lodge location.
IF traveling south on Flatwood Road,
THEN go approximately 0.25 miles from sample station 109. Veer left at fork in road and go approximately 0.2 miles. Turn right and go approximately 0.1 miles. Turn right and go approximately 0.1 miles. The sample station is on the right at the former AP&L lodge location.

Sample Station Number: 3
Approximate Direction and Distance from Plant: 0° - 0.6 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
4) Groundwater (alternate)
Sample Station Location:
IF traveling west on Highway 333,
THEN go approximately 0.35 miles from Gate 2 at ANO. Turn left onto gravel road and go approximately 0.05 miles. The sample station is on the left.
IF traveling east On Highway 333,
THEN go approximately 0.9 miles from junction of Highway 333 and Flatwood Road. Turn right onto gravel road and go approximately 0.05 miles. The sample station is on the left.

TABLE 1-2
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SAMPLE STATIONS

Sample Station Number: 4
Approximate Direction and Distance from Plant: 180° - 0.7 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:
Go approximately 0.25 miles south from bridge over intake canal. Turn right onto gravel road. Proceed approximately 0.1 miles west of May Cemetery entrance. The sample station is on the left approximately 50 feet south of the road.

Sample Station Number: 5
Approximate Direction and Distance from Plant: 298° - 8.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:
While traveling on Highway 64, turn onto Cherry Street in Knoxville, AR and go approximately 0.7 miles. Turn left onto Highway 64 South and go approximately 0.2 miles. The sample station is on the right.

Sample Station Number: 6
Approximate Direction and Distance from Plant: 111° - 7.0 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:
Go to the AP&L local office which is located off Highway 7T in Russellville, AR (305 South Knoxville Avenue). The sample station is in the southeast corner of the back lot.

Sample Station Number: 7
Approximate Direction and Distance from Plant: 209° - 19.3 miles
Sample Types: 1) Airborne radioiodines
2) Airborne particulates
3) Direct radiation
Sample Station Location:
Turn west at junction of Highway 7 and Highway 27 in Dardanelle, AR. Proceed to junction of Highway 27 and Highway 10 in Danville, AR. Turn right onto Highway 10 and proceed a short distance to the AP&L supply yard, which is on the right adjacent to an AP&L substation. The sample station is in the southwest corner of the supply yard.

Sample Station Number: 8
Approximate Direction and Distance from Plant: 180° - 0.1 miles
Sample Types: 1) Surface water (composite)
2) Shoreline sediment
3) Fish
Sample Station Location: Plant discharge canal

TABLE 1-2
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SAMPLE STATIONS

Sample Station Number: 10
Approximate Direction and Distance from Plant: 95° - 0.9 miles
Sample Types: 1) Surface water (composite)
2) Shoreline sediment
3) Fish
Sample Station Location:
Surface water (composite) is collected at plant intake structure. Shoreline sediment and fish are collected at plant inlet canal.

Sample Station Number: 13
Approximate Direction and Distance from Plant: 271° - 0.5 miles
Sample Types: 1) Broadleaf vegetation
Sample Station Location:
IF traveling south on Flatwood Road,
THEN go approximately 0.2 miles from sample station 109. The sample station is on the left.
IF traveling west from ANO toward Gate 4,
THEN go approximately 0.4 miles and turn right onto Flatwood Road. Go a short distance (approximately 30 yards). The sample station is on the right.

Sample Station Number: 14
Approximate Direction and Distance from Plant: 70° - 5.3 miles
Sample Types: 1) Drinking water
Sample Station Location:
From junction of Highway 7 and Water Works Road, go approximately 0.8 miles west on Water Works Road. The sample station is on the left at the intake to the Russellville city water system from the Illinois Bayou.

Sample Station Number: 16
Approximate Direction and Distance from Plant: 290° - 5.9 miles
Sample Types: 1) Shoreline sediment
Sample Station Location:
From junction of Highway 64 and Highway 359 (Flat Rock Piney Bay Recreational Area turnoff), go approximately 0.7 miles west on Highway 64. The sample station is at the Piney Creek area on Lake Dardanelle.

Sample Station Number: 19
Approximate Direction and Distance from Plant: 95° - 5.1 miles
Sample Types: 1) Milk

TABLE 1-2
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SAMPLE STATIONS

Sample Station Location:
Turn from Highway 7 onto Harrell Drive in Russellville, AR and go approximately 0.1 miles. Turn right and go approximately 0.25 miles. The sample station is on the left at the Arkansas Tech Dairy.

Sample Station Number: 29
Approximate Direction and Distance from Plant: 24° - 6.9 miles
Sample Types: 1) Milk (alternate)
Sample Station Location:
Turn south from Highway 333 onto County Road 141 and to approximately 0.55 miles. Turn left and go approximately 0.6 miles. Turn left and go approximately 0.05 miles. The sample station is on the right at the Harold Steuber Dairy.

Sample Station Number: 32
Approximate Direction and Distance from Plant: 132° - 0.9 miles
Sample Types: 1) Groundwater
2) Food products
Sample Station Location:
From bridge over intake canal, go south approximately 0.25 miles. Turn left and go approximately 0.25 miles. Turn left on Bunker Hill Lane and go approximately 0.05 miles. The sample station is on the right at Clifton Stewart's Resident.

Sample Station Number: 33
Approximate Direction and Distance from Plant: 94° - 3.8 miles
Sample Types: 1) Groundwater
Sample Station Location:
From junction of Highway 64 and Highway 326 (Dike Road), go approximately 0.3 miles east on Dike Road. The sample station is on the left at the Quita Lake Recreation Area on the Illinois Bayou.

Sample Station Number: 36
Approximate Direction and Distance from Plant: 140° - 0.05 miles
Sample Types: 1) Pond water
2) Pond sediment
Sample Station Location:
The sample station is at the Settling Pond on the ANO site east of the discharge canal.

Sample Station Number: 37
Approximate Direction and Distance from Plant: 0° - 7.5 miles
Sample Types: 1) Milk

TABLE 1-2
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SAMPLE STATIONS

Sample Station Location:
IF traveling north on Highway 333,
THEN go approximately 3.5 miles from junction of Highway 333 and Mill Creek Road on Highway 333. Turn left and go approximately 0.1 miles. The sample station is on the left at the Lawrence Steuber Dairy.
IF traveling from junction of Highway 7 and Highway 333,
THEN go approximately 6.0 miles west on Highway 333. Turn right and go approximately 0.1 miles. The sample station is on the left at the Lawrence Steuber Dairy.

Sample Station Number: 38
Approximate Direction and Distance from Plant: 314° - 2.4 miles
Sample Types: 1) Food products (alternate)
Sample Station Location:
From west junction of Highway 64 and Highway 333 in London, AR, go approximately 0.4 miles west on Highway 64. Turn right at Hornet Estate and go approximately 0.1 miles. Turn left and go approximately 0.1 miles. The sample station is on the left at Ronnie Jones' residence.

Sample Station Number: 40
Approximate Direction and Distance from Plant: 119° - 2.2 miles
Sample Types: 1) Food products
Sample Station Location:
From junction on Highway 64 and Highway 326 (Marina Road), go approximately 2.0 miles on Marina Road. The sample station is on the left at Horace Hollis' residence just prior to curve.

Sample Station Number: 41
Approximate Direction and Distance from Plant: 358° - 3.8 miles
Sample Types: 1) Milk
Sample Station Location:
IF traveling from junction of Highway 333 and Mill Creek Road,
THEN go approximately 1.8 miles on Mill Creek Road. Turn right onto Lowe Lane and go approximately 0.1 miles. Turn right and go approximately 0.05 miles. The sample station is on the right at the James Gibson Dairy.
IF traveling from junction of Highway 64 and Mill Creek Road,
THEN go approximately 3.6 miles on Mill Creek Road. Turn left onto Lowe Lane and go approximately 0.1 miles. Turn right and go approximately 0.05 miles. The sample station is on the right at the James Gibson Dairy.

Sample Station Number: 42
Approximate Direction and Distance from Plant: 73° - 12.4 miles
Sample Types: 1) Milk

SAMPLE STATIONS

Sample Station Location:
From junction of Highway 124 and Highway 326 in Gum Log, AR, go approximately 1.1 miles northeast on Highway 124. Turn left onto Gravel Hill Road and go approximately 0.6 miles. Turn right onto Hudson Loop and go approximately 0.3 miles. The sample station is on the left at the Hudson Dairy.

Sample Station Number: 45
Approximate Direction and Distance from Plant: 90° - 0.9 miles
Sample Types: 1) Broadleaf vegetation
Sample Station Location:
The sample station is located near mouth of intake canal.

Sample Station Number: 46
Approximate Direction and Distance from Plant: 295° - 4.1 miles
Sample Types: 1) Food products
Sample Station Location:
From west junction on Highway 64 and Highway 333 in London, AR, go west on Highway 64 approximately 2.4 miles. Turn right onto Scottie Lane and go approximately 0.1 miles. The sample station is on the right at Dewey Gregory's residence.

Sample Station Number: 108
Approximate Direction and Distance from Plant: 301° - 0.9 miles
Sample Types: 1) Direct radiation
2) Food products (alternate)
Sample Station Location:
IF traveling from Highway 333,
THEN turn south onto Flatwood Road and go approximately 0.4 miles. The sample station is on the right.
IF traveling north on Flatwood Road,
THEN go approximately 0.4 miles from sample station 109. The sample station is on the left.

Sample Station Number: 109
Approximate Direction and Distance from Plant: 285° - 0.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling south on Flatwood Road,
THEN go approximately 0.4 miles from sample station 108. Sample station 109 is on a utility pole on the left across from the junction of Flatwood Road and Round Mountain Road just before pavement ends.
IF traveling west from ANO toward Gate 4,
THEN go approximately 0.4 miles and turn right onto Flatwood Road. Go approximately 0.2 miles. The sample station is on a utility pole on the right across from the junction of Flatwood Road and Round Mountain Road just after pavement begins.

TABLE 1-2
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SAMPLE STATIONS

Sample Station Number: 110
Approximate Direction and Distance from Plant: 138° - 0.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:
From bridge over intake canal, go south approximately 0.25 miles. Turn left and go approximately 0.25 miles. Turn right on Bunker Hill Lane. The sample station is on the first utility pole on the left.

Sample Station Number: 111
Approximate Direction and Distance from Plant: 121° - 2.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:
From junction of Highway 64 and Highway 326 (Marina Road) , go approximately 2.1 miles on Marina Road. The sample station is on a utility pole on the left just prior to curve.

Sample Station Number: 112
Approximate Direction and Distance from Plant: 74° - 2.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Go to the junction of Highway 64 and the I-40 exit which is approximately 1.3 miles east of sample station 113. Sample station 112 is on a utility pole on the northeast corner of the junction.

Sample Station Number: 113
Approximate Direction and Distance from Plant: 52° - 1.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Go to the east junction of Highway 333 and Highway 64. The sample station is on a utility pole on the southwest corner of the junction.

Sample Station Number: 114
Approximate Direction and Distance from Plant: 31° - 1.3 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling west on Highway 64,
THEN go approximately 0.6 miles west of the east junction of Highway 64 and Highway 333. The sample station is on a utility pole on the right.
IF traveling east on Highway 64,
THEN go approximately 1.1 miles from sample station 115. Sample station 114 is on a utility pole on the left.

SAMPLE STATIONS

Sample Station Number: 115
Approximate Direction and Distance from Plant: 344° - 1.4 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling west on Highway 64,
THEN go approximately 1.1 miles west of sample station 114. Sample Station 115 is on a utility pole on the right.
IF traveling east on Highway 64,
THEN go approximately 0.8 miles from the west junction of Highway 64 and Highway 333 in London, AR. The sample station is on a utility pole on the left.

Sample Station Number: 116
Approximate Direction and Distance from Plant: 320° - 1.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Go one block south of the west junction of Highway 333 and Highway 64 in London, AR. The sample station is on a utility pole north of the railroad tracks.

Sample Station Number: 117
Approximate Direction and Distance from Plant: 305° - 17.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling west on I-40,
THEN take Exit 58 at Clarksville, AR. Turn right onto Rogers Street. At junction of Rogers Street and Highway 64, turn left and proceed west to first stop light. Turn left onto Cravens Street. The sample station is on a utility pole on the right between the county courthouse and the post office.
IF traveling west on Highway 64,
THEN go to first stop light past junction of Rogers Street and Highway 64. Turn left onto Cravens Street. The sample station is on a utility pole on the right between the county courthouse and the post office.

Sample Station Number: 118
Approximate Direction and Distance from Plant: 294° - 5.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling east on Highway 64,
THEN go approximately 0.3 miles from bridge which goes across Piney. The sample station is on a utility pole on the left.
IF traveling west on Highway 64,
THEN go approximately 0.4 miles past Flat Rock Piney Bay Recreational Area turnoff. The sample station is on a utility pole on the right.

SAMPLE STATIONS

Sample Station Number: 119
Approximate Direction and Distance from Plant: 309° - 4.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Turn west from Highway 333 onto Will Baker Road, which intersects Highway 333 approximately 1.4 miles north of the I-40 Overpass near London, AR. Go approximately 2.0 miles. The sample station is on a utility pole on the left just prior to pavement ending.

Sample Station Number: 120
Approximate Direction and Distance from Plant: 336° - 4.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling from I-40 Overpass in London, AR,
THEN go north on Highway 333 approximately 2.4 miles. The sample station is on a utility pole on the right near Martin Chapel.
IF traveling from junction of Mill Creek Road and Highway 333,
THEN go approximately 1.0 mile south on Highway 333. The sample station is on a utility pole on the left near Martin Chapel.

Sample Station Number: 121
Approximate Direction and Distance from Plant: 349° - 4.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling from I-40 Overpass in London, AR,
THEN go north on Highway 333 approximately 3.4 miles to Mill Creek Road. Turn right onto Mill Creek Road and go approximately 0.7 miles. The sample station is on a utility pole on the right.
IF traveling northwest on Mill Creek Road,
THEN go approximately 0.4 miles past East Point Baptist Church and Cemetery. The sample station is on a utility pole on the left.

Sample Station Number: 122
Approximate Direction and Distance from Plant: 18° - 3.3 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling north from junction of Highway 64 and Mill Creek Road,
THEN go approximately 2.5 miles. The sample station is on a utility pole on the right.
IF traveling southeast on Mill Creek Road,
THEN go approximately 1.9 miles from East Point Baptist Church. The sample station is on a utility pole on the left.

Sample Station Number: 123
Approximate Direction and Distance from Plant: 46° - 3.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Turn north from Pleasant View Road onto Ball Hill Road and go approximately 0.8 miles. The sample station is on a utility pole on the left.

SAMPLE STATIONS

Sample Station Number: 124
Approximate Direction and Distance from Plant: 60° - 3.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling from junction of Highway 64 and Mill Creek Road,
THEN go north on Mill Creek Road approximately 0.7 miles. Turn right onto Pleasant View Road and go approximately 1.3 miles. The sample station is on the right on a utility pole which is across from a siren and below a transmission line.
IF traveling west from junction of Highway 7 and Pleasant View Road,
THEN go approximately 3.1 miles. The sample station is on the left on a utility pole which is across from a siren and below a transmission line.

Sample Station Number: 125
Approximate Direction and Distance from Plant: 46° - 9.1 miles
Sample Types: 1) Direct radiation
Sample Station Location:
While traveling north on Highway 7, turn left onto Water Street in Dover, AR. Go one block and turn left onto South Elizabeth Street. Go one block and turn right onto College Street. The sample station is on a utility pole at the southeast corner of the red brick school building, which is located on top of hill.

Sample Station Number: 126
Approximate Direction and Distance from Plant: 81° - 5.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:
The sample station is located on the west side of Highway 7 directly across from Shiloh Road, which is approximately 1.3 miles north of the junction of Highway 7 and Dike Road.

Sample Station Number: 127
Approximate Direction and Distance: 102° - 5.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:
The sample station is located on the Arkansas Tech Campus on West 0 Street on a security light pole in front of Bryan Hall, which is the first building on the left when traveling from North Arkansas on West 0 Street.

Sample Station Number: 128
Approximate Direction and Distance from Plant: 113° - 8.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:
The sample station is on a utility pole inside the security fence near the Russellville Airport Office. The airport is located off of East 16th Street and is well marked by airport signs.

SAMPLE STATIONS

Sample Station Number: 129
Approximate Direction and Distance from Plant: 118° - 7.3 miles
Sample Types: 1) Direct radiation
Sample Station Location:
The sample station is on a utility pole north of the Russellville High School sign, which is in front of high school on east side of Highway 7T.

Sample Station Number: 130
Approximate Direction and Distance from Plant: 245° - 4.6 miles
Sample Types: 1) Direct radiation
Sample Station Location:
At junction of Highway 7 and Highway 22 in Dardanelle, AR, take Highway 22 toward Delaware, AR. Go approximately 0.4 miles west of Delaware Recreation Area turnoff. The sample station is on a utility pole on the right in Delaware, AR near Shirley's Beauty Salon.

Sample Station Number: 131
Approximate Direction and Distance from Plant: 244° - 2.4 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Turn north from Highway 22 onto Highway 393 at Delaware Recreation Area turnoff and go approximately 2.9 miles. The sample station is located past the boat ramp on an oak tree near crosstie steps in northeast quadrant of circle drive.

Sample Station Number: 132
Approximate Direction and Distance from Plant: 267° - 5.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Turn north from Highway 22 onto Highway 393 at Delaware Recreation Area turnoff and go approximately 0.9 miles. Turn left onto dirt road and go approximately 2.3 miles. The sample station is on a utility pole on the right.

Sample Station Number: 133
Approximate Direction and Distance from Plant: 233° - 3.7 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling west on Highway 22,
THEN go approximately 2.0 miles from sample station 134. Sample station 133 is on the south side of the Highway 22 causeway attached to the first NO PARKING ANY TIME sign west of the bridge.
IF traveling east on Highway 22 from Delaware, AR,
THEN go approximately 0.8 miles from Delaware Recreation Area turnoff. The sample station is on the south side of the Highway 22 causeway attached to the first NO PARKING ANY TIME sign west of the bridge.

TABLE 1-2
Page 12 of 14
SAMPLE STATIONS

Sample Station Number: 134
Approximate Direction and Distance from Plant: 200° - 2.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling west on Highway 22,
THEN go approximately 0.8 miles from sample station 135. Sample station 134 is on a utility pole on the right at Mockingbird Lane.
IF traveling east on Highway 22,
THEN go approximately 2.0 miles from sample station 133. Sample station 134 is on a utility pole on the left at Mockingbird Lane.

Sample Station Number: 135
Approximate Direction and Distance from Plant: 188° - 3.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling west on Highway 22,
THEN go approximately 1.7 miles from sample station 136. Sample station 135 is on a utility pole on the right.
IF traveling east on Highway 22,
THEN go approximately 0.8 miles from sample station 134. Sample station 135 is on a utility pole on the left.

Sample Station Number: 136
Approximate Direction and Distance from Plant: 168° - 4.3 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling west on Highway 22,
THEN go approximately 3.7 miles from junction of Highway 22 and Highway 7. The sample station is on the right on the first utility pole west of the Little Hays Creek Bridge.
IF traveling east on Highway 22,
THEN go approximately 1.7 miles from sample station 135. Sample station 136 is on the left on the first utility pole west of the Little Hays Creek Bridge.

Sample Station Number: 137
Approximate Direction and Distance from Plant: 150° - 8.4 miles
Sample Types: 1) Direct radiation
Sample Station Location:
At junction of Highway 7 and Highway 28 in Dardanelle, AR, go approximately 0.2 miles on Highway 28. The sample station is on a speed limit sign on the right in front of the Morris R. Moore Arkansas National Guard Armory.

Sample Station Number: 138
Approximate Direction and Distance from Plant: 193° - 5.8 miles
Sample Types: 1) Direct radiation

SAMPLE STATIONS

Sample Station Location:
At junction of Highway 22 and Highway 155 (Mt. Nebo Road) in Dardanelle, AR, turn west and go to top of mountain. Veer right at stop sign and proceed toward Sunset Point. The sample station is down a dirt road on the right which is approximately 0.1 miles southeast of Sunset Point. The sample station is on the left side of the dirt road on a utility pole near a TV tower.

Sample Station Number: 139
Approximate Direction and Distance from Plant: 178° - 19.2 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Take Highway 7 South through Dardanelle, AR to Ola, AR. Turn left at junction of Highway 7 and Highway 10 West in Ola, AR and go approximately 1/2 block. The sample station is on a utility pole on the left in front of the U. S. Post Office.

Sample Station Number: 140
Approximate Direction and Distance from Plant: 151° - 21.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:
Proceed through Ola, AR and take Highway 10 East to Casa, AR, which is in Perry County. Turn right at the Perry-Casa High School. The sample station is on a utility pole at the southwest corner of the school.

Sample Station Number: 141
Approximate Direction and Distance from Plant: 125° - 3.8 miles
Sample Types: 1) Direct radiation
Sample Station Location:
While traveling southwest on Highway 326 (Marina Road), go approximately 2.4 miles from sample station 111. Sample station 141 is on the right on a utility pole, which is approximately 50 yards east of a transmission line. (The sample station is approximately 0.35 miles west of the junction of Hilltop Drive and Marina Road.)

Sample Station Number: 142
Approximate Direction and Distance from Plant: 129° - 5.1 miles
Sample Types: 1) Direct radiation
Sample Station Location:
The sample station is on a utility pole at the junction of Skyline Drive and Nordin Lane in Russellville, AR, near a peach orchard.

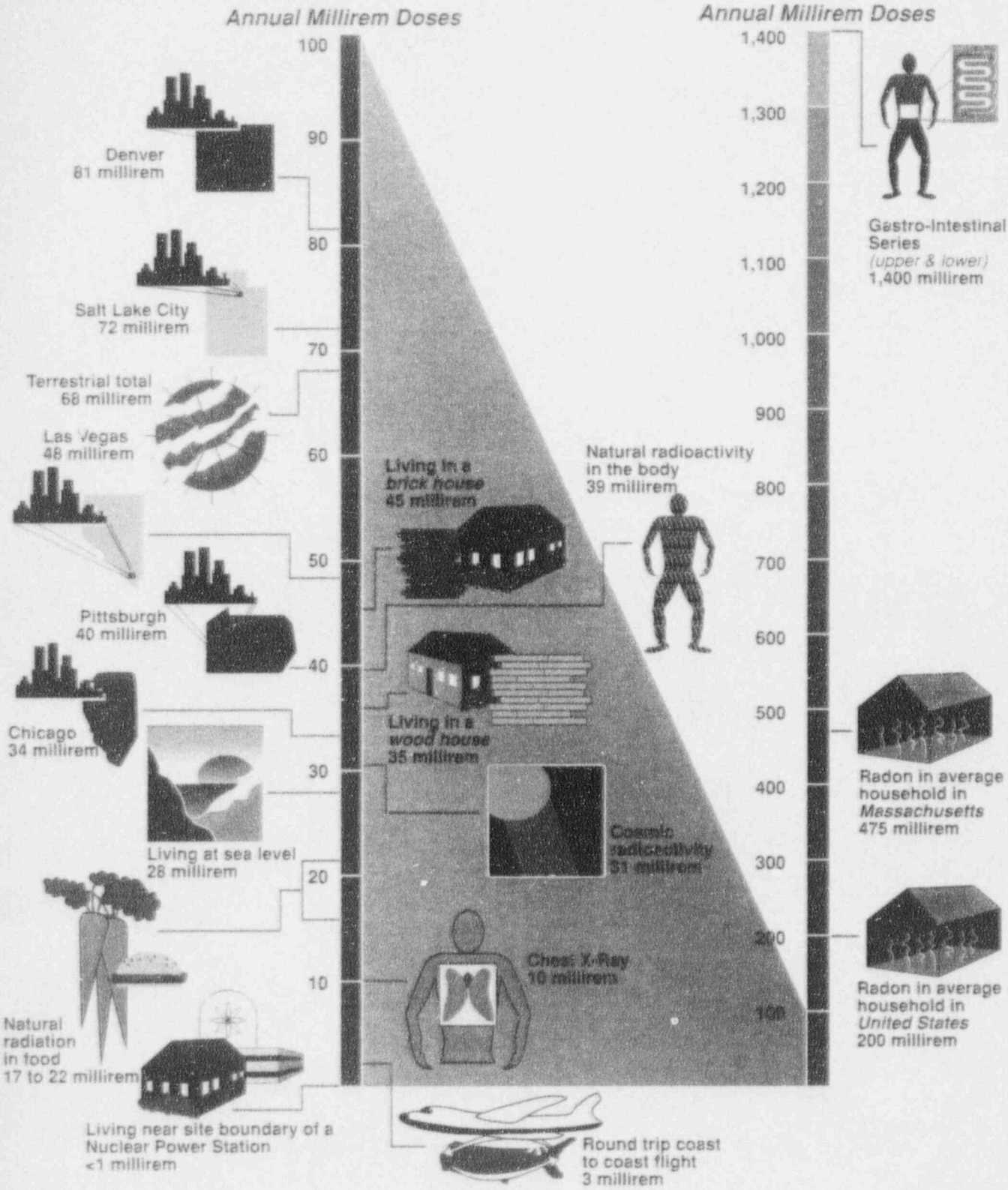
TABLE 1-2
Page 14 of 14
SAMPLE STATIONS

Sample Station Number: 143
Approximate Direction and Distance from Plant: 106° - 17.5 miles
Sample Types: 1) Direct radiation
Sample Station Location:
IF traveling east on Highway 64 to Atkins, AR,
THEN turn left at junction of Highway 64 and North Church Street. Proceed north. The sample station is on a utility pole on the left in front of Atkins High School near stop sign at corner of North Church Street and Northeast 3rd Street.
IF traveling east on Interstate 40,
THEN take Exit 94 at Atkins, AR. Turn left onto North Church Street and proceed south. The sample station is on a utility pole on the right in front of Atkins High School near stop sign at corner of North Church Street and Northeast 3rd Street.

Sample Station Number: 144
Approximate Direction and Distance from Plant: 313° - 12.7 miles
Sample Types: 1) Direct radiation
Sample Station Location:
While traveling on Highway 64, turn south onto Cumberland Street in Lamar, AR, and go approximately 0.7 miles. Veer left at stop sign. The sample station is on a utility pole across the one way fire lane in front of Lamar Elementary School.

FIGURE 1-1

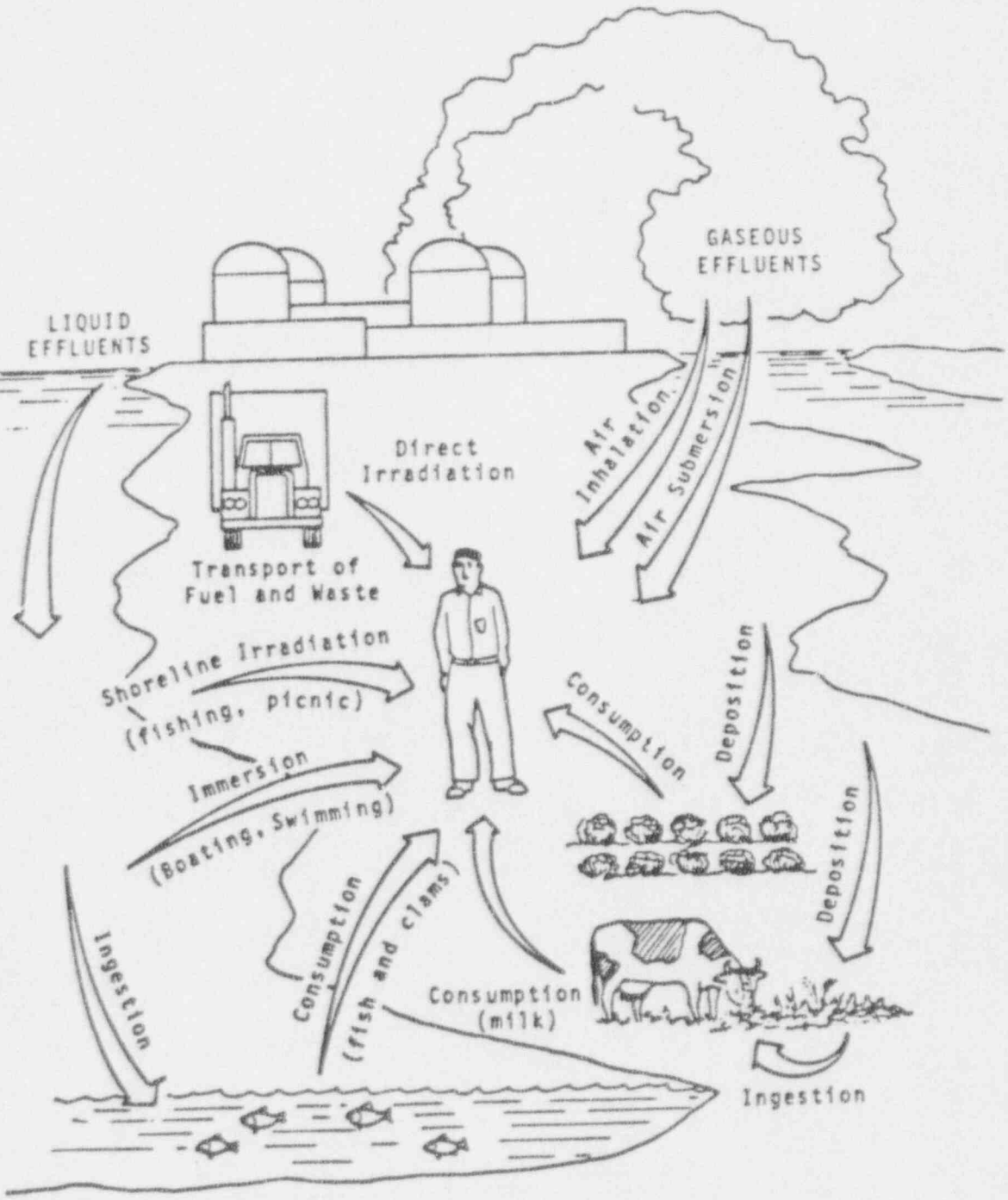
RADIATION SOURCES



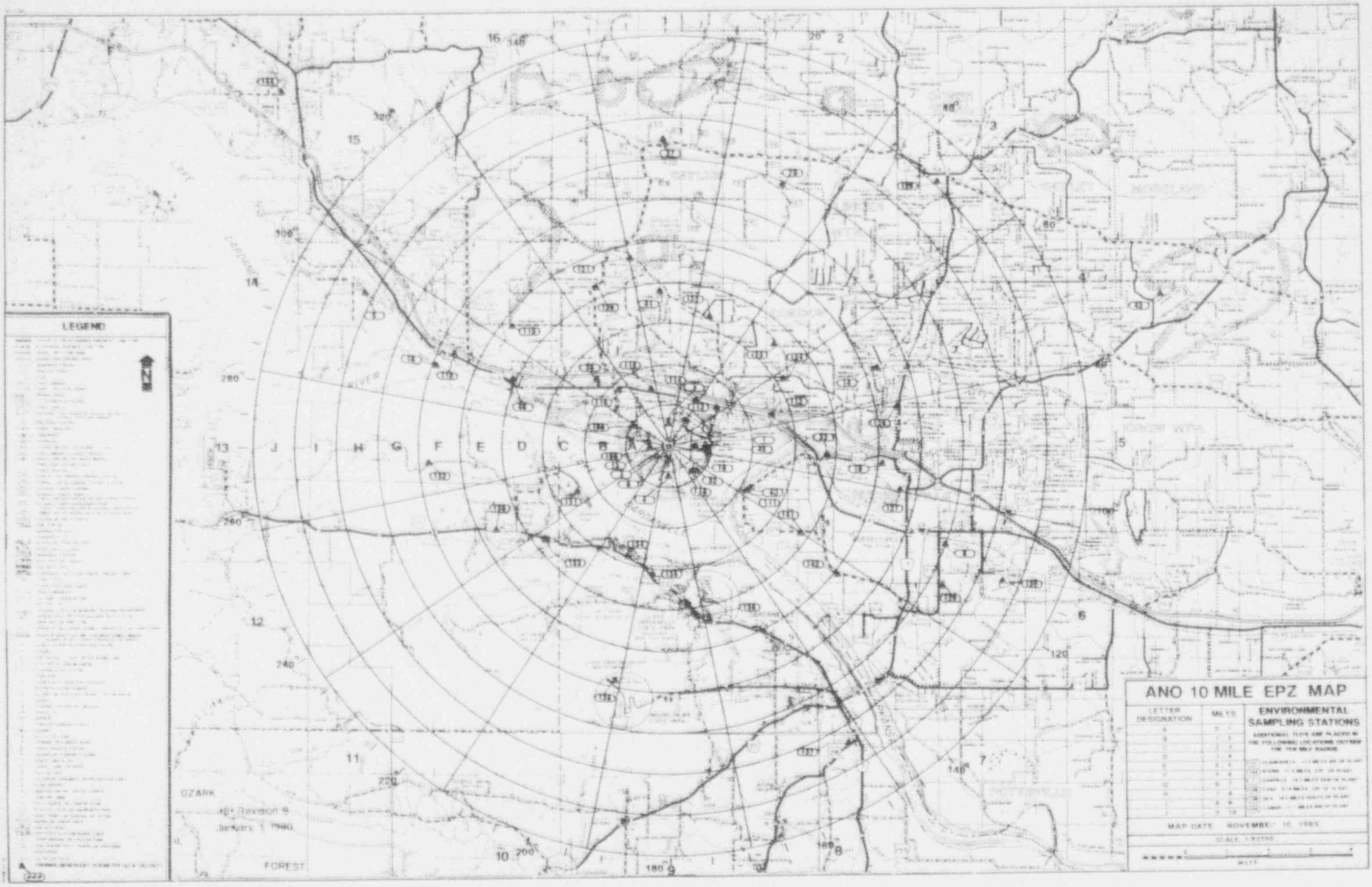
EPA annual dose limit from Uranium Fuel Cycle is 25 millirem

BOSTON EDISON

FIGURE 1-2
EXPOSURE PATHWAYS



SAMPLE COLLECTION SITES



SECTION 2.0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

- INTERPRETATIONS AND TRENDS OF RESULTS
- DEVIATIONS FROM THE REMP
- PROGRAM DESCRIPTION

2.1 AIR PARTICULATES AND RADIOIODINES

NOTE: Analytical results are presented in Tables 1.1 through 1.7 of Attachment I and summarized in Section 4.0.

2.1.1 INTERPRETATIONS AND TRENDS OF RESULTS

Air particulate and Iodine-131 results for 1992 were similar to those obtained in previous years of the operational REMP. In addition, results were well below the preoperational average of .14 pCi/m^3 for indicator locations and .092 for control locations. However, fallout from atmospheric nuclear weapons testing was detected during the preoperational period. Therefore, preoperational air results are not representative of actual conditions.

In 1992, gross beta results for indicator locations ranged from .005 - .038 pCi/m3 with an average of .016 pCi/m3 as compared to control locations which ranged from .004 - .037 pCi/m3 with an average of .015 pCi/m3. All Iodine-131 results were less than the lower limit of detection (LLD). This indicates the airborne exposure pathway has not been affected by the operation of ANO and that airborne concentrations continue to be at or near background levels.

In addition, the standard "t" test was used to compare average gross beta concentrations from the indicator locations to the control. The result from this test indicates concentrations at indicator locations to be statistically the same as the control. Attachment III summarizes the result of this analysis.

Gross beta concentrations shown in Figure 2-1 further emphasizes that ANO has had no influence on the airborne pathway. This figure shows 1992 monthly average results compared to a 1982 baseline average and 1986 through 1992 yearly average results for indicator locations compared to controls.

2.1.2 DEVIATIONS FROM THE REMP

Air samples required by ANO Technical Specifications were collected and analyzed during 1992 without exception.

2.1.3 PROGRAM DESCRIPTION

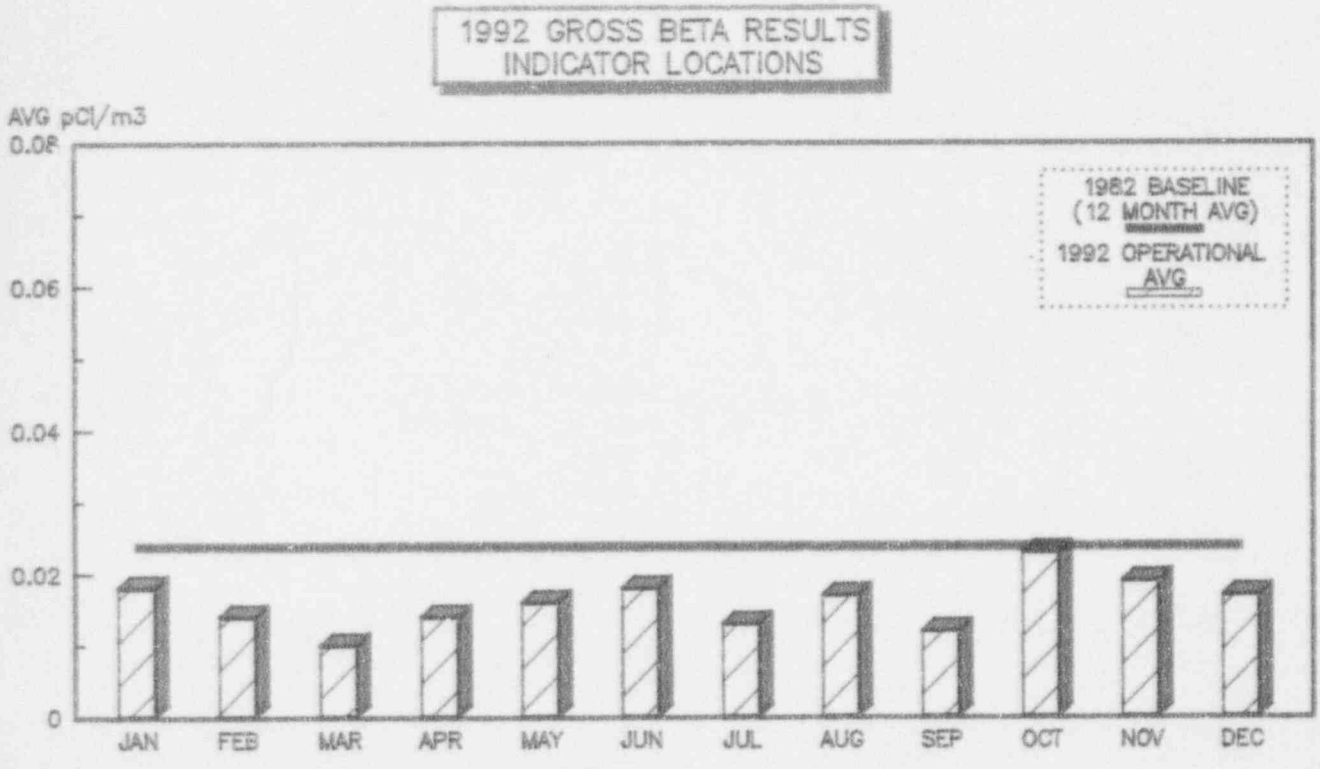
ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-1 and

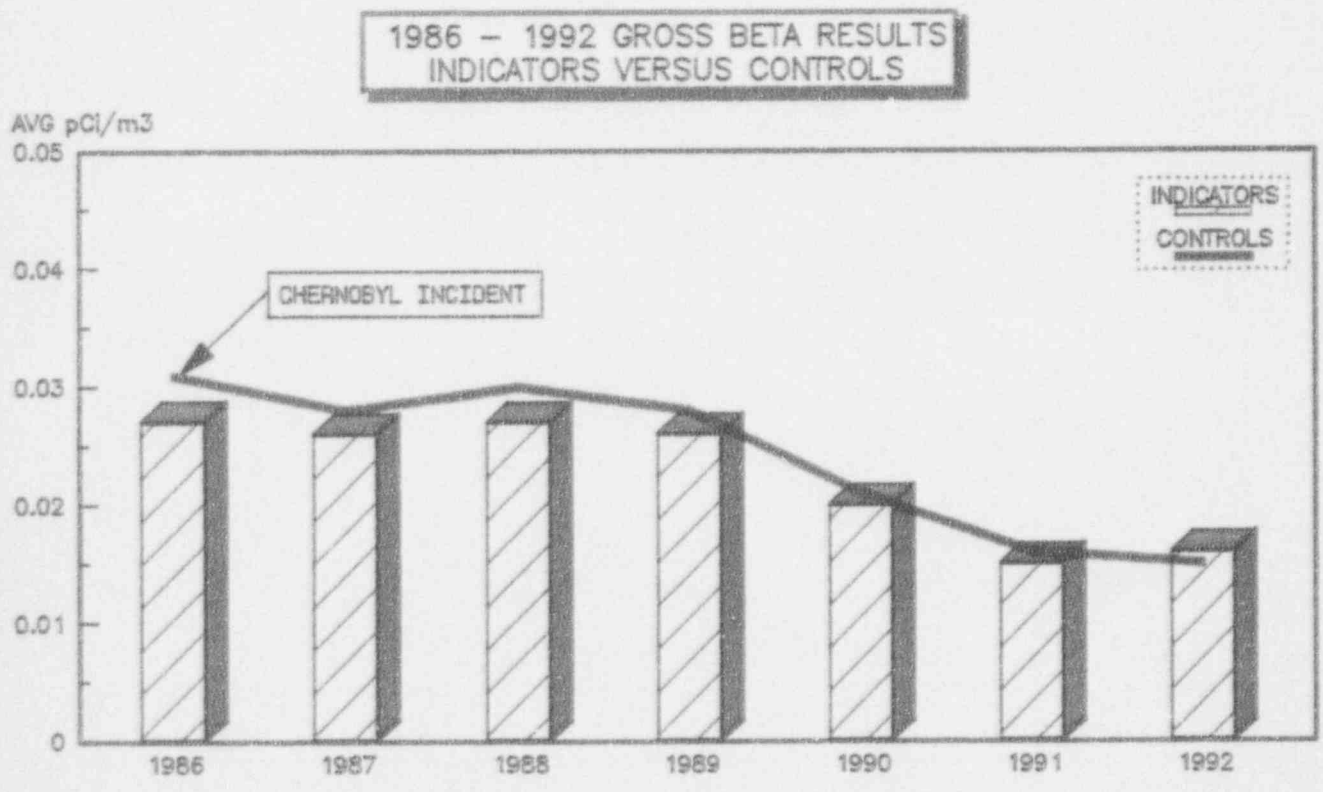
3.12-1, respectively, require five air sampler locations for measurement of radioactivity in the airborne exposure pathway. ANO used six continuous air samplers to provide gross beta, gamma and radioiodine activity measurements. Four of the air samplers were used as indicators (Stations 1, 2, 3 and 4) with the remaining two utilized as controls (Stations 6 and 7). These air samplers were placed at distances from 0.4 to 19.3 miles (Table 1-2 and Figure 1-3).

The air samplers wer : placed approximately one meter above the ground in weatherproof houses. A 47-millimeter glass fiber filter was installed in the intake line by the vacuum pump with a charcoal cartridge located directly downstream. Flows were adjusted to 30 ± 3 liters per minute. Filters and cartridges were changed weekly and analyzed for gross beta radionuclides and radioiodine activity, respectively. In addition, the filters were composited quarterly and analyzed for gamma radionuclides.

FIGURE 2-1

AIR SAMPLE GROSS BETA CONCENTRATIONS





2.2 THERMOLUMINESCENT DOSIMETRY

NOTE: Analytical results are presented in Attachment II and summarized in Section 4.0.

2.2.1 INTERPRETATIONS AND TRENDS OF RESULTS

Gamma radiation dose in 1992 was similar to that obtained in previous years as illustrated in Table 2-1. Quarterly doses recorded by TLDs were as follows:

- 0 - 2 miles, mean of 27.0 mrem and range of 17 - 37 mrem
- 2 - 5 miles, mean of 25.0 mrem and range of 11 - 45 mrem
- >5 miles, mean of 27.0 mrem and range of 18 - 46 mrem

These results indicate that the ambient radiation levels remained at or near background in 1992 and have been uninfluenced by the operation of ANO. In addition, the standard "t" test was used to compare quarterly average radiation doses from the 0 - 2 and 2 - 5 mile TLDs to the >5 mile TLDs. The results from this test indicates radiation doses at the 0 - 2 and 2 - 5 mile range to be statistically the same as the >5 mile range. Attachment III summarizes the result of this analysis.

Radiation doses shown in Figure 2-2 further emphasizes that ambient radiation levels have remained at or near background levels. This figure shows 1992 quarterly average results compared to preoperational and 1987 through 1992 annual quarterly average results for indicator locations compared to controls.

Although not required, ANO also utilized semiannual TLDs on a supplemental basis. These results are summarized in Section 4.0.

2.2.2 DEVIATIONS FROM THE REMP

Five quarterly TLDs were lost or damaged in the field during 1992 due to vandalism or water moisture. Lost or damaged TLDs were replaced by ANO personnel once discovered. In addition, these losses were isolated instances which did not recur again during the year.

However, TLD losses of this type are characteristic of other TLD programs. The 1992 recovery rate for quarterly and semiannual TLDs was 97% (171 of 176) and 100% (14 of 14), respectively, which is comparable with other TLD programs.

2.2.3 PROGRAM DESCRIPTION

ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-1 and 3.12-1, respectively, require forty TLD locations for measurement of direct radiation doses. ANO measured ambient radiation in the environment surrounding the plant with 44 quarterly and 7 semiannual TLDs (two lithium borate and calcium sulfate elements) to provide a quantitative measurement of the area radiation levels. ANO personnel placed these environmental TLDs at distances from 0.4 to 21.8 miles (Table 1-2 and Figure 1-3).

Each dosimeter was sealed in a plastic protective holder and normally suspended one meter above the ground, where feasible. The dosimeters were collected and analyzed quarterly and semiannually. The TLD locations may be summarized as follows:

- 11 quarterly stations in the 0 - 2 mile range
- 15 quarterly stations in the 2 - 5 mile range
- 18 quarterly stations > 5 miles
- 4 semiannual stations in the 0 - 2 mile range
- 3 semiannual stations > 5 miles

TABLE 2-1

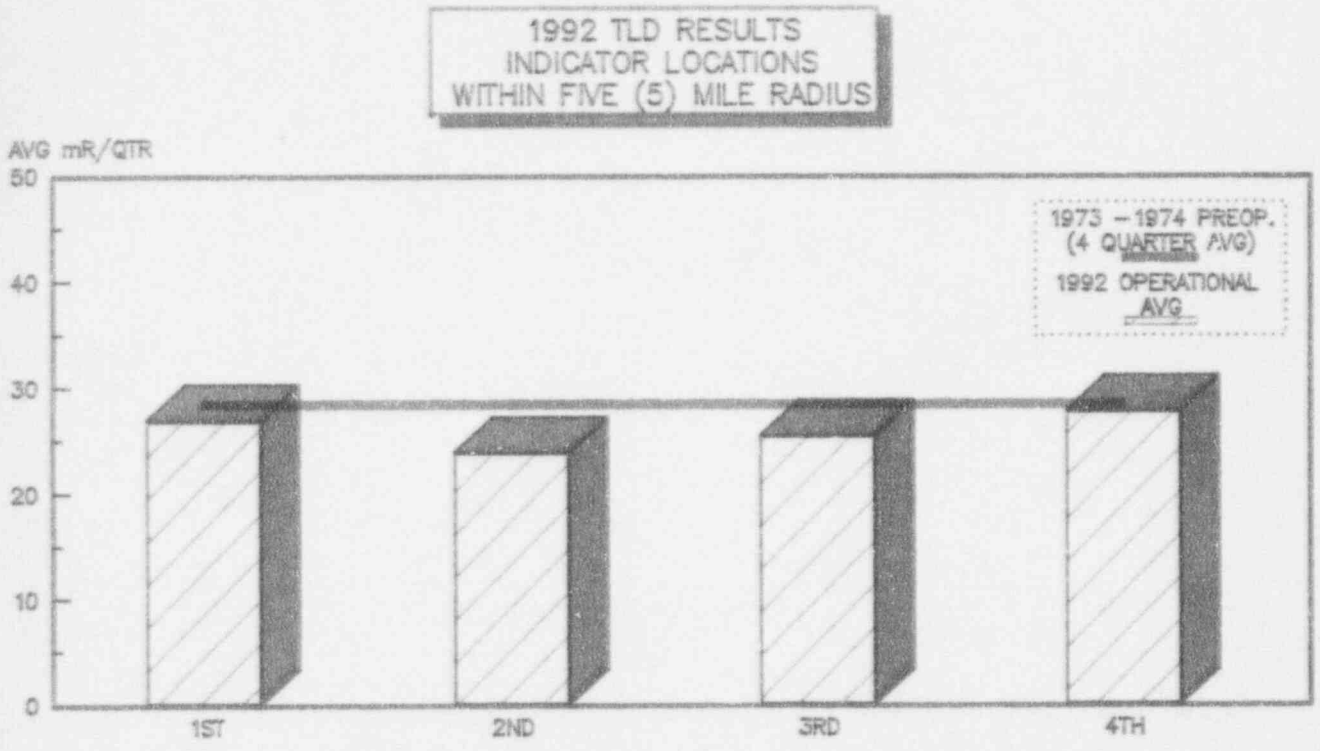
TLD DOSE RATES *

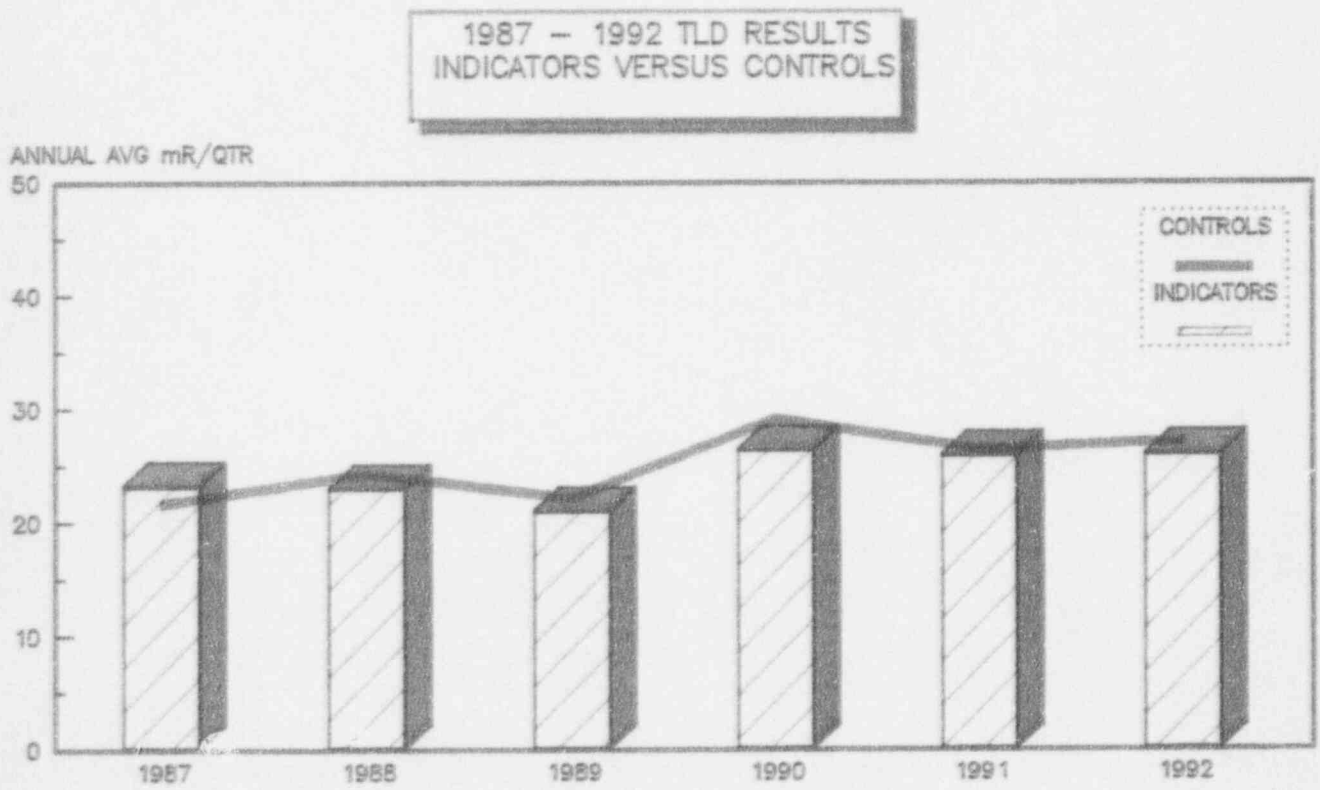
YEAR	INDICATORS	CONTROLS
1973	20.8	24.3
1974	24.0	29.3
1987**	23.2	21.5
1988	23.0	24.2
1989	21.0	22.0
1990	26.4	29.0
1991	25.9	26.3
1992	26.0	27.0

* Values reported as annual average mR/quarter.

** Began utilizing Panasonic TLDs.

FIGURE 2-2
TLD RADIATION DOSE





2.3 MILK

NOTE : Analytical results are presented in Tables 2.1 through 2.4 of Attachment I and summarized in Section 4.0.

2.3.1 INTERPRETATIONS AND TRENDS OF RESULTS

Milk samples were collected monthly from four locations in 1992 and analyzed for Iodine-131 and gamma radionuclides. Gamma radionuclides and Iodine-131 were below detectable limits. These results were compared to preoperational Iodine-131 results which averaged 2.6 pCi/l and gamma radionuclides which were not detected. Also, 1992 results were compared to 1988 through 1991 operational Iodine-131 results which averaged 0.6 pCi/l and Cs-137 results which averaged 3.8 pCi/l, with no other gamma radionuclides detected. Therefore in 1992, the operation of ANO had no impact on this pathway, as has been the case in previous years.

2.3.2 DEVIATIONS FROM THE REMP

Milk samples required by ANO Technical Specifications were collected and analyzed during 1992 without exception.

2.3.3 PROGRAM DESCRIPTION

ANO Unit 1 and Unit 2 Technical Specification Tables 4-30-1 and 3.12-1, respectively, require four milk locations for the measurement of radioactivity by the ingestion exposure pathway. ANO and ADH personnel collected milk monthly from four locations at distances from 3.8 to 12.4 miles (Table 1-2 and Figure 1-3). Two of the locations were utilized as indicators (Arkansas Tech and Gibson) with the remaining two locations as controls (Steuber and Hudson).

Milk was collected from each location in two labeled gallon containers. Samples were preserved with formaldehyde and then analyzed for Iodine-131 and gamma radionuclides.

2.4 WATER

NOTE: Analytical results are presented in Tables 3.1 through 5.2 of Attachment I and summarized in Section 4.0.

2.4.1 INTERPRETATIONS AND TRENDS OF RESULTS

Analytical results for 1992 drinking water, surface water and groundwater samples were similar to those reported in previous years.

Drinking water samples were collected monthly from one location and analyzed for gross beta radionuclides, Iodine-131, tritium and gamma radionuclides. Tritium and gamma radionuclides were below detectable limits, which is consistent with preoperational data. Gross beta concentrations ranged from 1.1 - 6.8 pCi/l with a mean of 2.9 pCi/l, which are consistent with preoperational and operational levels. Iodine-131 was detected twice, with concentrations ranging from 0.2 - 0.3 pCi/l and a mean of 0.25 pCi/l. However, since this concentration is 75% below the required LLD, there exists a degree of uncertainty. In addition, these levels are similar to previous operational results which were reported as less than values and is also consistent with preoperational data. Therefore, concentrations continue to be at or near background levels.

Surface water samples were collected monthly and analyzed for gamma radionuclides and a composite was analyzed quarterly for tritium. In addition, the ADH and ANO split monthly grab samples from the Discharge and Piney Creek locations. These samples were analyzed monthly for gamma radionuclides and tritium.

ANO's May discharge sample contained a Cobalt-58 concentration of 3 pCi/l. However, this level is 80% below the required LLD, therefore it contains a degree of uncertainty. In addition, gamma radionuclides were detected in the April and September discharge split samples. The April sample contained Cobalt-58 at a concentration of 5 pCi/l and Cesium-137 at a concentration of 3 pCi/l. The September sample, which was due to reactor

shutdown, contained Cobalt-58 at a concentration of 20 pCi/l and Iodine-131 at a concentration of 6 pCi/l. Overall, no sample results exceeded reporting levels as outlined in ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-3 and 3.12-3, respectively, when averaged over any calendar quarter. Results are summarized in Section 4.0.

ANO's fourth quarter composite contained tritium at a concentration of 460 pCi/l. Tritium levels for the ADH split discharge location samples ranged from 630 - 2590 pCi/l with a mean of 1610 pCi/l. However, as shown in Figure 2-3, 1992 tritium levels detected in the discharge appear to be similar to those of previous years. Overall, results are similar to previous preoperational and operational levels.

Groundwater samples were collected quarterly from two locations and analyzed for gamma radionuclides and tritium. As in preoperational and previous operational years, concentrations continue to be at or near background levels.

2.4.2 DEVIATIONS FROM THE REMP

Water samples required by ANO Technical Specifications were collected and analyzed during 1992 without exception.

2.4.3 PROGRAM DESCRIPTION

ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-1 and 3.12-1, respectively, require one drinking water location, two surface water locations, and two groundwater locations for the measurement of radioactivity by the waterborne exposure pathway.

Drinking water was sampled monthly from a control location (Intake to Russellville City Water System from Illinois Bayou) at a distance of 5.3 miles (Table 1-2 and Figure 1-3). Water was collected in two labeled gallon containers.

Upon return from the field, the samples were acidified with hydrochloric acid and then analyzed for gross beta radionuclides, Iodine-131 and gamma radionuclides. In addition, a composite was analyzed quarterly for tritium.

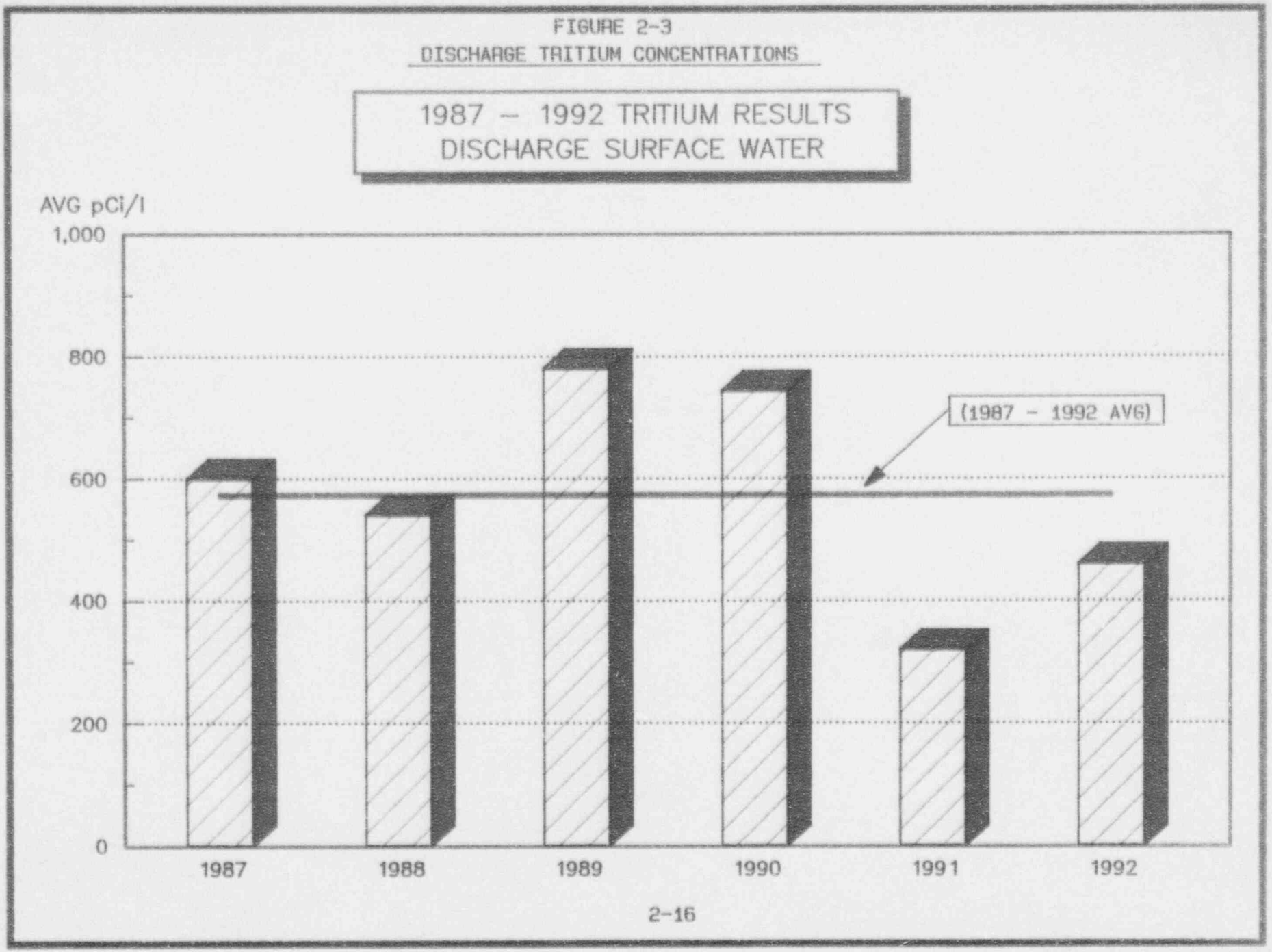
Surface water samples were collected from three locations, an indicator location (Discharge) and two controls (Intake and Piney Creek) at distances from 0.1 to 5.9 miles (Table 1-2 and Figure 1-3). The discharge and intake surface water samples were composited with an automatic sampler that collected a preset volume at set intervals (~ 2 gallons per week). Weekly, one gallon of sample from each location was acidified with hydrochloric acid and placed in an appropriate labeled composite carboy. At the end of the month, a one gallon sample from each composite carboy was placed in a labeled container. The samples were then analyzed for gamma radionuclides and a composite was analyzed quarterly for tritium.

In addition, monthly grab surface water samples from the discharge and Piney Creek locations were collected by the ADH and split with ANO. These samples were analyzed monthly for gamma radionuclides and tritium.

Groundwater was sampled quarterly from two locations, the Stewart Residence (indicator) and Quita Lake (control), at distances from 0.9 to 3.8 miles (Table 1-2 and Figure 1-3). Water was collected from each location in two labeled gallon containers. Upon return from the field, the samples were acidified with hydrochloric acid and then analyzed for gamma radionuclides and tritium.

FIGURE 2-3

DISCHARGE TRITIUM CONCENTRATIONS



2.5 VEGETATION AND FOOD PRODUCTS

NOTE: Analytical results are presented in Tables 8.1 through 8.7 of Attachment I and summarized in Section 4.0.

2.5.1 INTERPRETATIONS AND TRENDS OF RESULTS

Vegetation and food product samples were collected when available from six locations in 1992 and analyzed for Iodine-131 and gamma radionuclides. The 1992 levels remained undetectable, as has been the case since 1989, with exception of the ADH split food product sample from the Stewart garden, which contained a Cesium-137 concentration of 13 pCi/kg. However, this concentration is 84% below the required LLD, therefore it contains a degree of uncertainty. Overall, concentrations continue to remain at or near background levels, and continue to be well below the preoperational Iodine-131 average levels of 60 pCi/kg and Cesium-137 average levels of 350 pCi/kg.

2.5.2 DEVIATIONS FROM THE REMP

Vegetation and food product samples required by ANO Technical Specifications were collected and analyzed during 1992 without exception.

2.5.3 PROGRAM DESCRIPTION

ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-1 and 3.12-1, respectively, require three food product locations and one vegetation location for measurement of radioactivity by the ingestion exposure pathway. ANO personnel collected, when available, from two vegetation indicator locations (Flatwood Road and Intake Canal) and four food product indicator locations (Stewart, Jones, Hollis and Gregory) at distances of 0.5 to 4.1 miles (Table 1-2 and Figure 1-3). The ADH split food product samples from the Stewart location with ANO.

The preferred source of food products were fruits, flowering vegetables and tubular vegetables. The preferred source of non-food products were any vegetation with relatively broad leaves on which airborne radioactive particulate material might be deposited. Normally when available, a minimum of 1000 grams of food products or vegetation was collected. The samples were then analyzed for gamma radionuclides and Iodine-131.

2.6 SEDIMENT

NOTE: Analytical results are presented in Table 7.1 of Attachment I and summarized in Section 4.0.

2.6.1 INTERPRETATIONS AND TRENDS OF RESULTS

Sediment samples were collected semiannually from three locations in 1992 and analyzed for gamma radionuclides. As in previous years, radionuclides attributable to ANO were detected in the discharge sediment. Table 2-2 shows 1985 through 1992 average levels of radionuclides detected as compared to preoperational levels. Figure 2-4, which is derived from Table 2-2, shows that 1992 levels are similar to those of previous years.

Since reporting levels for radionuclides in sediment have not been established, an evaluation of potential dose to the public from this media was performed as shown in Attachment IV. The annual maximum dose from all radionuclides to the skin and total body was approximately .01 millirem. Design objectives given in 10CFR50, Appendix I for liquid effluents are annual doses of ≤ 3 millirem total body and ≤ 10 millirem any organ. The values of .01 millirem for the skin and total body are well within the design objective criteria. Therefore, the level of radionuclides detected in 1992 had no significant impact on the environment or public.

2.6.2 DEVIATIONS FROM THE REMP

Sediment samples required by ANO Technical Specifications were collected and analyzed during 1992 without exception.

2.6.3 PROGRAM DESCRIPTION

ANO Unit 1 and Unit 2 Specification Tables 4.30-1 and 3.12-1, respectively, require two sediment locations for measurement of radioactivity by the waterborne exposure pathway. Contract personnel collected sediment semiannually from three locations, an indicator (Discharge) and two control

locations (Intake and Piney Creek), at distances from 0.1 to 5.9 miles (Table 1-2 and Figure 1-3). A minimum of 1.5 liters of sample was collected with a dredge from the top layer of sediment from each location. After foreign objects were discarded, the samples were transferred to labeled containers and then analyzed for gamma radionuclides.

TABLE 2-2

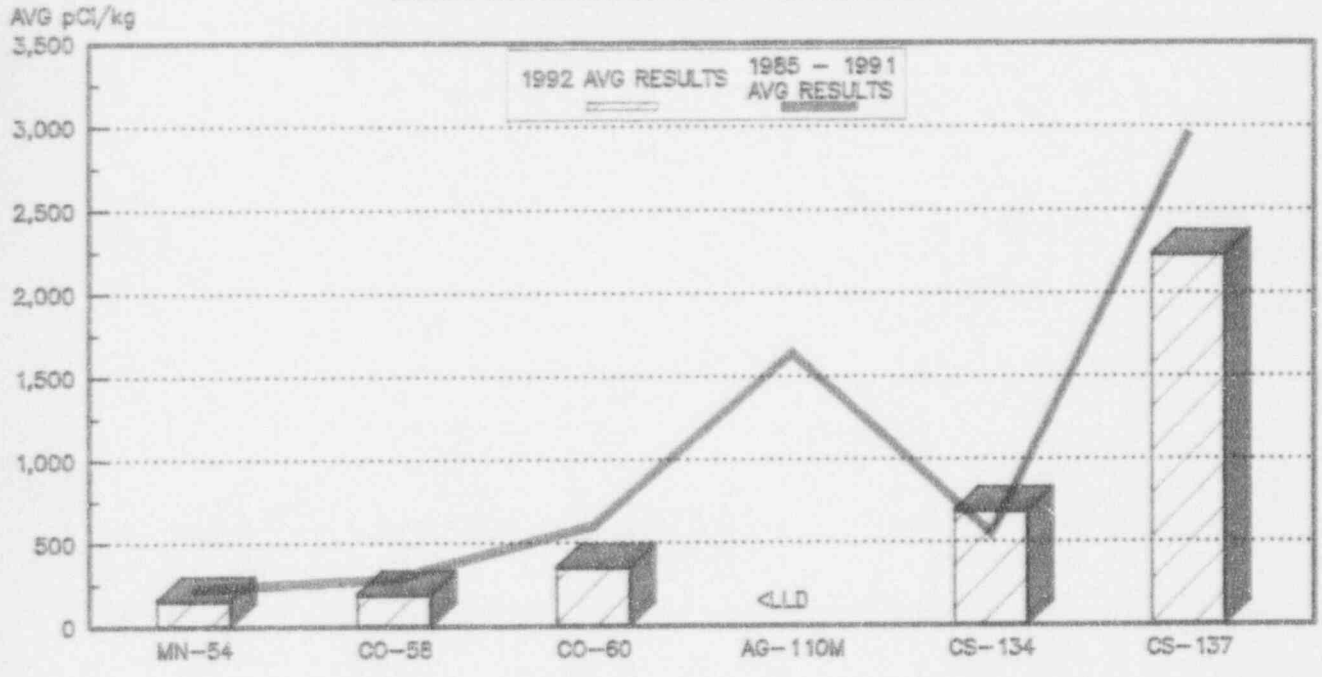
DISCHARGE SEDIMENT ANALYTICAL SUMMARY

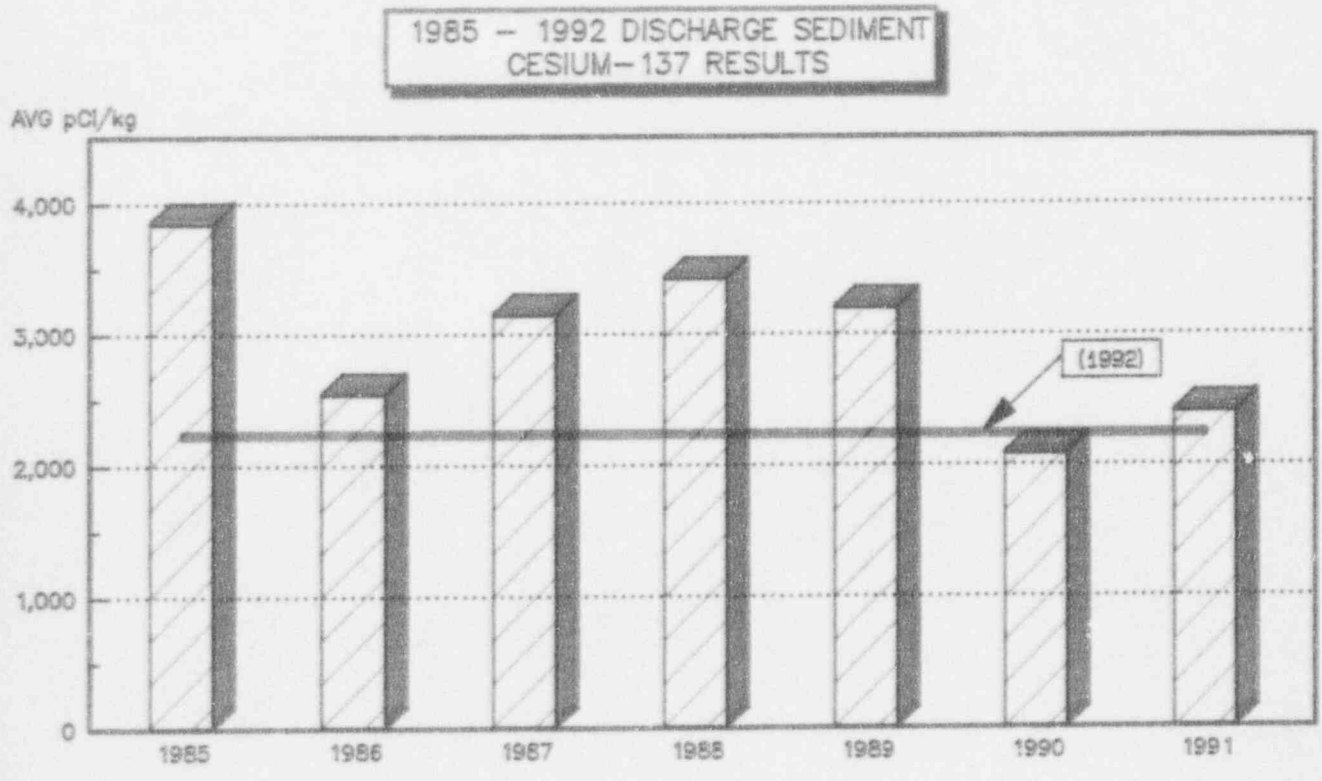
YEAR	Mn-54 (pCi/kg)	Co-58 (pCi/kg)	Co-60 (pCi/kg)	Ag-110m (pCi/kg)	Cs-134 (pCi/kg)	Cs-137 (pCi/kg)
1973	ND*	ND*	ND*	ND*	ND*	200
1974	18	ND*	ND*	ND*	ND*	170
1985	54.6	133.2	1439	ND*	703.6	3848
1986	15.5	54	528	ND*	408	2546
1987	83	162	460	ND*	590	3147
1988	359	901	619	4130	785	3425
1989	606	246	508	1535	658	3200
1990	204	126	304	690	290	2087
1991	228	338.5	340.5	197	387	2404.5
1992	154.5	190.5	350.5	ND*	686	2228

* None detected

FIGURE 2-4

DISCHARGE SEDIMENT





2.7 FISH

NOTE: Analytical results are presented in Tables 6.1 through 6.4 of Attachment I and summarized in Section 4.0.

2.7.1 INTERPRETATIONS AND TRENDS OF RESULTS

Fish samples were collected semiannually from two locations and analyzed for gamma radionuclides. As in previous years, Cesium-134 and Cesium-137 were detected in fish from the discharge. ANO samples contained Cesium-134 at a concentration of 14 pCi/kg and Cesium-137 activity at a range of 20 - 30 pCi/kg with a mean of 25 pCi/kg. In addition, ADH split samples contained Cesium 134 at a range of 25 - 26 pCi/kg with a mean of 25.5 pCi/kg and, Cesium-137 at a range of 31 - 44 pCi/kg with a mean of 39.3 pCi/kg. During the preoperational monitoring period, gamma radionuclides were not detected.

However, no reporting levels as outlined in ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-3 and 3.12.3 respectively, were exceeded when averaged over any calendar quarter. Also as shown in Figure 2-5, all detectable activities over previous years were well below the required LLD, and therefore contains a degree of uncertainty.

In addition, atmospheric fallout from nuclear weapons testing during the preoperational years and the most recent incident, Chernobyl in 1986, could be contributing to these levels since Cesium-137 has been detected in the control location, as shown in Section 4.0 of this report. However overall, the operation of ANO had no significant radiological impact upon the environment or public by this pathway.

2.7.2 DEVIATIONS FROM THE REMP

Fish samples required by ANO Technical Specifications were collected and analyzed during 1992 without exception.

2.7.3 PROGRAM DESCRIPTION

ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-1 and 3.12-1, respectively, requires two fish locations for measurement of

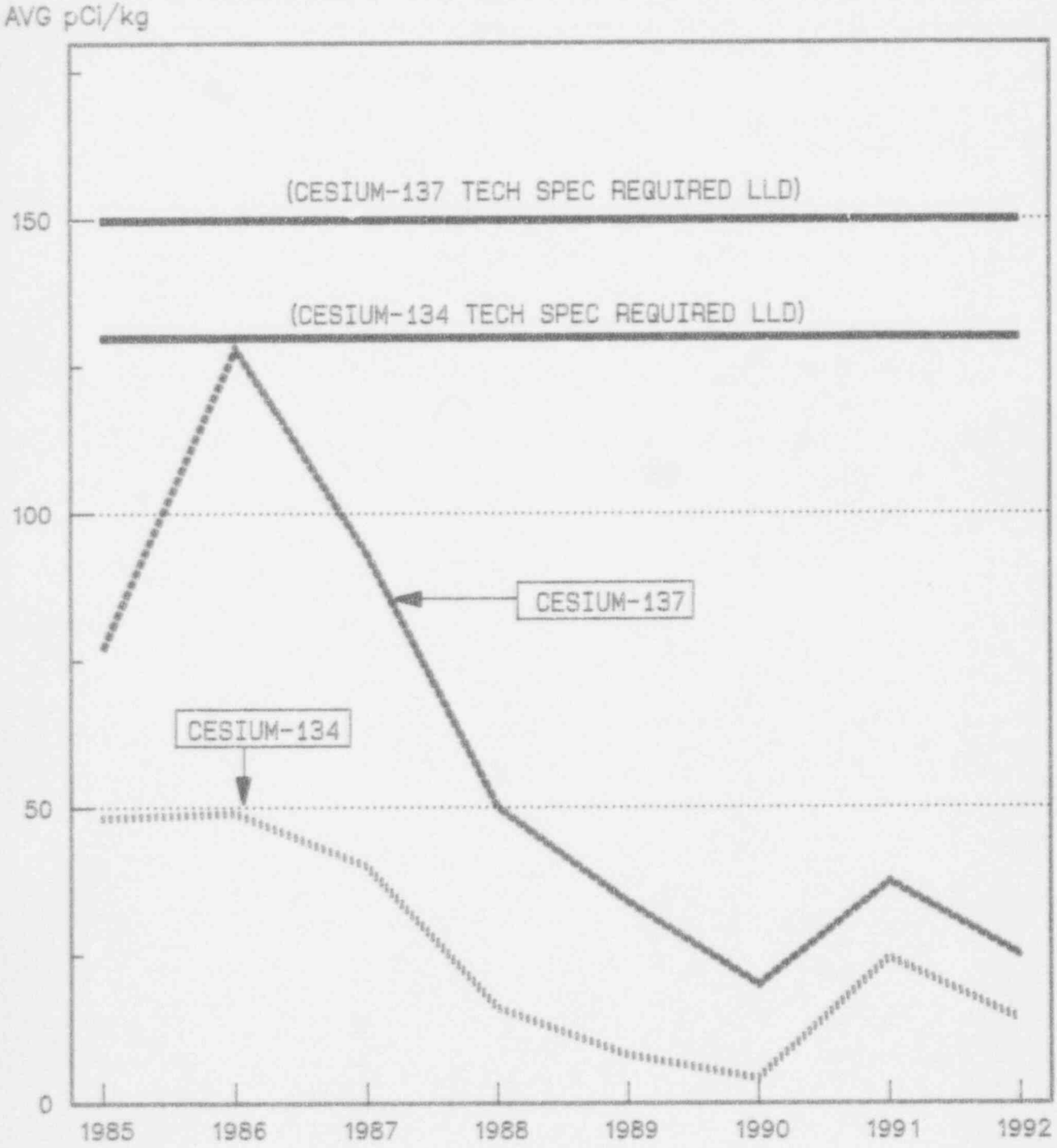
radioactivity by the ingestion exposure pathway. Fish were collected semiannually by a contractor from two locations, an indicator (Discharge) and a control (Intake) at distances from 0.1 to 0.9 miles (Table 1-2 and Figure 1-3). In addition, the ADH and ANO split samples at the discharge location.

A sufficient amount was collected from each location to provide a minimum of 1000 grams (wet weight) of eviscerated fish sample. The samples were than analyzed for gamma radionuclides.

FIGURE 2-5

DISCHARGE FISH

1985 – 1992 RADIONUCLIDE CONCENTRATIONS DISCHARGE FISH



2.8 ANNUAL LAND USE CENSUS

2.8.1 INTERPRETATIONS AND TRENDS OF RESULTS

ANO did not modify the REMP, even though some minor charges occured from 1991 to 1992. Also, the land use census identified no location which yielded a calculated dose or dose commitment greater than those currently being calculated. Results of the 1992 Land Use Census are presented in Tables 2-3 and 2-4.

2.8.2 DEVIATIONS FROM THE REMP

The Annual Land Use Census required by ANO Technical Specifications was conducted during 1992 without exception.

2.8.3 PROGRAM DESCRIPTION

ANO personnel conducted an Annual Land Use Census, as required by ANO Unit 1 and Unit 2 Technical Specifications 4.30.2 and 3/4.12.2, respectively. The purpose of the census was to identify changes in uses of land within five miles of ANO which would require modifications to the REMP or the Offsite Dose Calculation Manual (ODCM). The most important criteria during the census were to determine location, in each of the 16 meteorological sectors, of the nearest:

- Residence
- Animal milked for human consumption
- Garden of greater than 50 m^2 (500 ft^2) producing broadleaf vegetation.

The method used for conducting the 1992 Land Use Census was as follows:

- ANO personnel conducted door-to-door field surveys in each meteorological sector out to five miles in order to locate the nearest resident, milk animal and garden.

- Consultation with local agricultural authorities was used in instances when personal contact could not be made.

- As a result of these surveys, the following information was obtained in each meteorological sector:

  - Nearest permanent residence
  - Nearest garden and approximate size
  - Nearest milking animal.

- ANO personnel identified locations on the map, measured distances to ANO and recorded results.

- ANO personnel compared 1992 Census results to 1991 Census results.

TABLE 2-3
Page 1 of 3
1992 LAND USE CENSUS

LAND USE CENSUS OF MILK-PRODUCING ANIMALS WITHIN A RADIUS OF FIVE (5) MILES OF ARKANSAS NUCLEAR ONE

(September 3-4, 1992)

Milk - producing animals are divided into two categories defined as:

1. **Class A Dairies**: dairies in which milk is intended primarily for human consumption as Grade A milk.
2. **Individual Milk Animals**: family animals in which the milk is intended for home use.

CLASS A DAIRIES

Dairy	Azimuth - Distance
James Gibson	358 degrees - 3.8 miles

INDIVIDUAL MILK ANIMALS

Bryan Irby	344 degrees - 2.8 miles

CURRENTLY SAMPLED MILK-PRODUCING ANIMALS OUTSIDE FIVE MILES
CLASS A DAIRIES

Dairy	Azimuth - Distance
Arkansas Tech. Univ. Dairy	95 degrees - 5.1 miles
Harold Steuber (alternate)	24 degrees - 6.9 miles
Lawrence Steuber	0 degrees - 7.5 miles
Hudson Dairy (control)	73 degrees - 12.4 miles

INDIVIDUAL MILK ANIMALS

None

TABLE 2-3
Page 2 of 3
1992 LAND USE CENSUS

(September 3-4, 1992)

LOCATION OF NEAREST RESIDENCE

Sector	Residence	Location	Distance (miles)
1	S.Lynn	Hwy 333	0.7
2	R. Horn	Hwy 64	1.2
3	G. Murray	Gum Lane	0.9
4	Knight	Knight Lane	0.7
5	O. Bibler	Bibler Lane	0.9
6	Cravens	Scott Lane	0.8
7	Douglas	Bunker Hill Lane	0.8
8	M. A. Wood	Wood Lane	0.8
9	J. Kelley	Rt. 2 Dardanelle	2.8
10	McClurley	May Road	0.8
11	Mhalderman	Hwy 22	3.2
12	G. Shelton	Flatwood Road	0.7
13	J. Nichols	Flatwood Road	1.0
14	Young	Rt. 2 Box 344 Russellville	0.7
15	Stiles	Flatwood Road	0.9
6	C. Bohannan	Hwy 64	1.2

TABLE 2-3
Page 3 of 3
1992 LAND USE CENSUS

(September 3-4, 1992)

DISTANCE TO NEAREST MILK ANIMAL, RESIDENCE AND GARDEN (miles)

Sector	Milk Animal	Residence	Garden
1	3.8	0.7	1.4
2		1.2	1.3
3		0.9	0.9
4		0.7	1.1
5		0.9	0.9
6		0.7	0.7
7		0.8	0.8
8		0.8	4.2
9		2.8	2.8
10		0.8	0.8
11		3.2	3.4
12		0.7	3.3
13		1.0	4.2
14		0.7	0.9
15		0.9	0.9
16	2.8	1.2	1.5

TABLE 2-4

RELATIVE DEPOSITION FOR GARDEN LOCATIONS

Sector	Distance (miles)	Distance (meters)	Location or Landowner	Depostion Rate (L/M)	Wind Frequency (M/S)	Relative Deposition (m^{-2})	Notes
1	1.4	2,253	A. Hickey	3.00E-05	3.22E-02	1.09E-09	1
2	1.3	2,092	W. W. Hale	3.20E-05	2.67E-02	1.04E-09	1
3	0.9	1,448	G. Murray	4.50E-05	2.25E-02	1.78E-09	1
4	1.1	1,770	Husereav	3.80E-05	4.89E-02	2.67-E09	1
5	0.9	1,448	O. Bibler	4.50E-05	9.03E-02	7.15E-09	1
	0.9	1,448	Intake Canal	4.50E.05	9.03E-02	7.15E-09	2,3
6	0.8	1,287	Cravens	4.80E-05	7.31E-02	6.94E-09	1
	2.2	3,540	H. Hollis	2.20E-05	7.31E-02	1.16E-09	1,3
7	0.9	1,448	C. Stewart	4.50E-05	2.69E-02	2.13E-09	1,3
8	4.2	6,759	T. Race	1.40E-05	1.92E-02	1.01E-10	1
9	2.8	4,506	J. Kelley	1.80E-05	2.63E-02	2.68E-10	1
10	0.8	1,287	McClurley	4.80E-05	4.47E-02	4.25E-09	1
11	3.4	5,471	D. Johnson	1.70E-05	8.60E-02	6.81E-10	1
12	3.3	5,310	Underwood	1.70E-05	1.37E-01	1.12E-09	1
13	0.5	804	Flatwood Rd.	6.00E-05	1.59E-01	3.02E-08	2,3
	4.2	6,759	G. Garrison	1.50E-05	1.59E-01	8.99E-10	1
14	0.9	1,448	T. Shivers	4.50E-05	9.08E-02	7.19E-09	1
	4.1	6,598	D. Gregory	1.40E-05	9.08E-02	4.91E-10	1,3
15	0.9	1,448	Stiles	4.50E-05	6.06E-02	4.80E-09	1
	2.4	3,862	R. Jones	2.10E-05	6.06E-02	8.39E-10	1,4
16	1.5	2,414	R. Vincent	3.00E-05	4.03E-02	1.28E-09	1

Note 1 Food Product
Note 2 Non-food broadleaf
Note 3 Location currently sampled
Note 4 Location currently an alternate

SECTION 3.0

ANALYTICAL PROGRAM TECHNICAL DESCRIPTION

3.1 SAMPLE HANDLING AND TREATMENT

Once a representative sample is received by analytical laboratory, laboratory staff is responsible for properly treating and storing the sample. Environmental samples frequently require treatment prior to analysis. Treatment of the sample after it is received depends on sample and analyses to be performed.

3.1.1 Water Samples

Depending on sample type, one-gallon water samples were acidified with five to twenty milliliters (ml) of concentrated HCl acid when collected. Samples for tritium analyses should not be stored in polyethylene bottles for more than 3 or 4 months because water can evapo' through polyethylene.

3.1.2 Air Filters

Air filters were handled with care when heavy dust loadings were observed because particulate matter is easily removed from filter. Air filters were normally received by laboratory in plastic containers, some extremely low-level analyses required analysis of the container as well as sample.

3.1.3 Milk

Milk samples were usually refrigerated until analyses could be performed. Milk samples analyzed for Iodine-131 had 100 ml formaldehyde added to avoid binding of the iodine that may occur with smaller levels of formaldehyde.

3.1.4 Soil and Bottom Sediment

Soil and sediment samples were dried, pulverized and sieved before analysis. To ensure a homogeneous sample, thorough mixing was required.

3.1.5 Other Samples

Perishable samples were preserved by refrigeration or freezing. Vegetation and other samples may need to be dried, pulverized or ashed before or after analysis for long-term storage.

3.2 ANALYSIS OF AIR SAMPLES FOR GROSS BETA RADIONUCLIDES

Air filters were counted in a low-background alpha-beta counter at least 24 hours after collection in order to allow for decay of short-lived materials such as radon and thoron.

Calculations of the results, two sigma error and LLD were performed as indicated in the following:

BETA RESULT (pCi/m3) $= [(N/T)-(B/t)-(r)(N/T)] / (2.22 \cdot V \cdot E)$

TWO SIGMA ERROR (pCi/m3) $= 1.96 \sqrt{(N/T^2) + (B/t^2)} / (2.22 \cdot V \cdot E)$

LLD (pCi/m3) $= 4.66 \sqrt{(B)} / (2.22 \cdot V \cdot E \cdot t)$

where: N = Gross counts of sample
T = Number of minutes sample was counted
B = Counts of blank
t = Number of minutes blank was counted
2.22 = dpm/pCi
V = Sample aliquot size (cubic meters)
E = Counting efficiency
r = Ratio of alpha counts in beta counting (cross-talk)

3.3 ANALYSIS OF WATER SAMPLES FOR GROSS BETA RADIONUCLIDES

This section describes process used to measure overall beta radionuclides of water samples without identifying specific radioactive isotope present. No chemical separation techniques were involved. Two hundred ml of sample was evaporated in a beaker on a hot plate. The residue was transferred and dried in a 2-inch stainless steel planchet. The planchets were counted for 100 minutes in a low-background alpha-beta counting system. Calculation of activity includes a self-absorption correction factor for counter efficiency based on weight of residue on each planchet.

Calculations of the results, two sigma error and LLD were performed as indicated in the following:

BETA RESULT (pCi/l) $= [(N/T) - (B/t) - (r)(N/T)] / (2.22 \cdot V \cdot E)$

TWO SIGMA ERROR (pCi/l) $= 1.96 \sqrt{(N/T^2) + (B/t^2)} / (2.22 \cdot V \cdot E)$

LLD (pCi/l) $= 4.66 \sqrt{(B)} / (2.22 \cdot V \cdot E \cdot t)$

where:

N	=	Gross counts of sample
T	=	Number of minutes sample was counted
B	=	Counts of blank
t	=	Number of minutes blank was counted
2.22	=	dpm/pCi
V	=	Sample aliquot size (liters)
E	=	Counting efficiency
r	=	Ratio of alpha counts in beta counting (cross-talk)

If net activity [(N/T) - (B/t)] was equal to or less than counting error, the activity on collection date was below limits of detection and was designated less than the LLD.

3.4 ANALYSIS OF WATER SAMPLES FOR TRITIUM

Five ml of water was added to 15 ml of liquid scintillation solution in a 25 ml vial. The sample was inserted into a liquid scintillation spectrometer and counted for 300-500 minutes.

Calculations of the results, two sigma error and LLD were performed as indicated in the following:

RESULT (pCi/l) $= [(N/T) - (B/t)] / [(2.22 \cdot V \cdot E) \exp(-\lambda \Delta t_2)]$

TWO SIGMA ERROR (pCi/l) $= 1.96 \sqrt{(N/T^2)+(B/t^2)} / [(2.22 \cdot V \cdot E) \exp(-\lambda \Delta t_2)]$

LLD (pCi/l) $= \dfrac{4.66 \sqrt{B}}{2.22 \cdot E \cdot V \cdot t \cdot \exp(-\lambda \Delta t_2)}$

where:

N	=	Gross counts of sample
T	=	Number of minutes sample was counted
B	=	Counts of blank
t	=	Number of minutes blank was counted
2.22	=	dpm/pCi
V	=	Sample aliquot size (1)
E	=	Counting efficiency
$\exp(-\lambda \Delta t_2)$	=	Decay correction where Δt_2, is time elapsed between collection of sample and date of counting.

3.5 ANALYSIS OF SAMPLES FOR IODINE-131

Up to four liters of sample was thoroughly mixed with a stable iodine carrier solution. The sample was then passed through an anion exchange resin

column to remove iodine from the sample. The iodine was then stripped from the resin with a sodium hypochlorite solution, reduced with hydroxylamine hydrochloride and extracted into carbon tetrachloride as free iodine. It was then back-extracted into sodium bisulfite solution and was precipitated as silver iodide. The precipitate was weighed to determine chemical yield and mounted on a stainless steel planchet for low-level beta counting. The chemical yield was corrected by measuring the stable iodide content of milk or water with a specific ion electrode.

Calculations of the results, two sigma error and LLD were performed as indicated in the following:

RESULT (pCi/l) = $(N/t - B/t) / [(2.22 \cdot E \cdot V \cdot Y) \exp(-\lambda \Delta t_2)$

TWO SIGMA ERROR (pCi/l) = $1.96 \sqrt{(N/t^2) + (B/t^2)} / [(2.22 \cdot E \cdot V \cdot Y) \exp(-\lambda \Delta t_2)]$

LLD (pCi/l) = $4.66 \sqrt{B/t^2} / [(2.22 \cdot E \cdot V \cdot Y) \exp(-\lambda \Delta t_2)]$

where:

N	=	Total counts from sample (counts)
t	=	Counting time for sample (min)
B	=	Total counts of blank (counts)
2.22	=	dpm/pCi
E	=	Efficiency of the counter for Iodine I-131 corrected for self absorption effects
V	=	Volume of sample analyzed
Y	=	Chemical yield of the amount of sample counted
$\exp(-\lambda \Delta t_2)$	=	Decay factor from the time of collection to the counting date

3.6 ANALYSIS OF SAMPLES FOR GAMMA RADIONUCLIDES

3.6.1 Milk and Water

A 3.5-liter Marinelli beaker was filled with a representative aliquot of the sample. The sample was then counted for minimum of 240 minutes, or until required LLDs were achieved, in a shielded Germanium-Lithium (GeLi) detector.

A computer software program defined peaks by certain changes in slope of the spectrum. The program also compared energy of each peak with a library of peaks for radionuclide identification and then performed calculation using appropriate fractional gamma ray abundance, half-life, detector efficiency and net counts in the peak region.

3.6.2 Vegetation, Food and Garden Crops and Fish

A maximum quantity of undried vegetation, food or garden crop sample was loaded into a tared 3.5-liter Marinelli beaker and weighed. The sample was then counted for a minimum of 200 minutes, or until required LLDs were achieved, in a shielded GeLi detector as described in Section 3.6.1.

As much as possible (up to the total sample) of the edible portion of a fish was loaded into a tared Marinelli beaker and weighed. The sample was then diluted with deionized water to weigh 3.5 kg and counted for a minimum of 240 minutes, or until required LLDs were achieved, in a shielded GeLi detector as described in Section 3.6.1.

3.6.3 Soils and Sediments

Soils and sediments were dried at a low temperature (less than 100°C), loaded into a tared 1.0-liter Marinelli beaker and weighed. The sample was then counted for 240 minutes, or until required LLDs were achieved, in a shielded GeLi detector as described in Section 3.6.1.

3.6.4 Charcoal Cartridges

Charcoal cartridges were counted in a Marinelli beaker, with one to four cartridges positioned on the face of a GeLi detector and up to seven cartridges on its side. Each detector was calibrated for both top and side positions and a counting efficiency determined. The Iodine-131 detection limit was determined for each charcoal cartridge, assuming no positive results for Iodine-131, by utilizing smallest volume of air recorded for a cartridge within Marinelli beaker. If Iodine-131 was observed in the screening count of a set of cartridges, each charcoal cartridge was positioned on face of the detector and then counted separately.

3.6.5 Air Particulate

The 12 to 14 (depending on the calendar quarter) air particulate filters for a quarterly composite for each field station were stacked one on top of another and counted for at least four hours, or until required LLDs were achieved, in a shielded GeLi detector as described in Section 3.6.1.

The calculations of results, two sigma error and LLD in pCi/volume or pCi/mass were performed as indicated in the following:

$$\textbf{RESULT} = (S - B) / [(2.22 \cdot T \cdot E \cdot V \cdot F) \exp(-\lambda \Delta t_2)]$$

$$\textbf{TWO SIGMA ERROR} = 1.96 \sqrt{(S+B)} / [(2.22 \cdot T \cdot E \cdot V \cdot F) \exp(-\lambda \Delta t_2)]$$

$$LLD = 4.66 \sqrt{B} / (2.22 \cdot T \cdot E \cdot V \cdot F) \exp(-\lambda \Delta t_2)$$

where: S = Area, in counts, of sample peak and background (region of spectrum of interest)
B = Background area, in counts, under sample peak, determined by a linear interpolation of the representative backgrounds on either side of the peak
2.22 = dpm/pCi
T = Length of time in minutes the sample was counted
E = Detector efficiency for energy of interest and geometry of sample
V = Sample aliquot size (liters, cubic meters, kilograms, or grams)
F = Fractional gamma abundance (specific for each emitted gamma)
$\exp(-\lambda \Delta t_2)$ = Decay factor from the time of collection to the counting date

3.7 THERMOLUMINESCENT DOSIMETERS

Environmental radiation doses were measured using TLDs that contained two lithium borate and calcium sulfate elements. Approximately forty-eight hours prior to installation, the TLDs were annealed. After cooling, the TLDs were mounted in appropriate labeled blue clamshell type hangers and double sealed in whirl-pak, or similar protective covering. Upon return from the field, TLDs were read in a Panasonic UD-710A TLD Reader.

3.8 DATA REPORTING CONVENTIONS

The mean of analytical results is as follows:

$$\bar{X} = \Sigma Xi / n$$

where: $\bar{X}$ = Mean
Xi = Individual sample results
n = Number of sample results

Rounding of calculated values is accomplished by inspection of digits to the right of last reported digit with values less than 5 rounded down and values greater than 5 rounded up. When value equals 5, reported value is rounded to an even number.

Analytical results which are less than the 2 sigma counting error are reported as less than LLD calculated for that sample. Analytical results greater than the 2 sigma counting error are reported along with associated 2 sigma counting error as a plus or minus (±) term.

Calendar quarters are considered to be the following time periods:

1ST QUARTER = JAN - MAR
2ND QUARTER = APR - JUN
3RD QUARTER = JUL - SEP
4TH QUARTER = OCT - DEC

SECTION 4.0

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

4.1 1992 PROGRAM RESULTS SUMMARY

Table 4-1, which includes all sampling locations and samples split with the ADH, summarizes the 1992 REMP results. Table 4-2 lists indicator and control locations used to develop Table 4-1. ANO personnel did not use values reported as less than (<) when determining ranges and means for indicator and control locations.

TABLE 4-1
Page 1 of 8
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility ANO - Units 1 and 2 Docket No. 50-313 and 50-368
Location of Facility Pope, Arkansas Reporting Period January - December 1992
(County, State)

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non-Routine Results [e]
				Location [d]	Mean (F)[c] [Range]		
Air Particulates (pCi/m^3)	GB 312	0.01	.016 (207/208) [.005 - .038]	Station 1 (88°, 0.6 mi)	.017 (52/52) [.005 - .034]	.015 (103/104) [.004 - .037]	0
	GS 24						
	Cs-134	0.01	< LLD	N/A	N/A	< LLD	0
	Cs-137	0.01	< LLD	N/A	N/A	< LLD	0
Airborne Iodine (pCi/m^3)	I-131 312	0.07	< LLD	N/A	N/A	< LLD	0
TLD (0-2 Miles) (mR/Qtr.)	Gamma 44	(f)	27.0 (43/44) [17 - 37]	Station 1 (88°, 0.6 mi)	30.8 (4/4) [26 - 37]	N/A	0
TLD (2-5 Miles) (mR/Qtr.)	Gamma 58	(f)	25.0 (58/58) [11 - 45]	Station 124 (60°, 3.2 mi)	32.0 (4/4) [27 - 39]	N/A	0
TLD (> 5 Miles) (mR/Qtr.)	Gamma 69	(f)	N/A	N/A	N/A	27.0 (69/69) [18 - 46]	0
TLD (0-2 Miles) (mR/192 Days)	Gamma 8	(f)	45.6 (8/8) [37 - 56]	Station 1 (88°, 0.6 mi)	50.0 (2/2) [44 - 56]	N/A	0
TLD (> 5 Miles) (mR/192 Days)	Gamma 6	(f)	N/A	N/A	N/A	39.5 (6/6) [35 - 44]	0

TABLE 4-1
Page 2 of 8
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility ANO - Units 1 and 2 Docket No. 50-313 and 50-368
Location of Facility Pope, Arkansas Reporting Period January - December 1992
(County, State)

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F)[c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non-Routine Results [e]
				Location [d]	Mean (F)[c] [Range]		
Drinking Water (pCi/l)	GB 13	4	N/A	N/A	N/A	2.9 (7/13) [1.1 - 6.8]	0
	I-131 13	1.0	N/A	N/A	N/A	0.25 (2/13) [0.2 - 0.3]	0
	H-3 4	1000	N/A	N/A	N/A	< LLD	0
	GS 13						
	Mn-54	15	N/A	N/A	N/A	< LLD	0
	Fe-59	30	N/A	N/A	N/A	< LLD	0
	Co-58	15	N/A	N/A	N/A	< LLD	0
	Co-60	15	N/A	N/A	N/A	< LLD	0
	Zn-65	30	N/A	N/A	N/A	< LLD	0
	Zr-95	15	N/A	N/A	N/A	< LLD	0
	Nb-95	15	N/A	N/A	N/A	< LLD	0
	Cs-134	10	N/A	N/A	N/A	< LLD	0
	Cs-137	18	N/A	N/A	N/A	< LLD	0
	Ba-140	15	N/A	N/A	N/A	< LLD	0
	La-140	15	N/A	N/A	N/A	< LLD	0

TABLE 4-1
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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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(County, State)

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F)[c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non-Routine Results [e]
				Location [d]	Mean (F)[c] [Range]		
Surface Water (pCi/l)	H-3 8	2000	460 (1/4) [N/A]	Station 8 (180°, 0.1 mi)	460 (1/4) [N/A]	< LLD	0
	GS 24						
	Mn-54	15	< LLD	N/A	N/A	< LLD	0
	Fe-59	30	< LLD	N/A	N/A	< LLD	0
	Co-58	15	3.0 (1/12) [N/A]	Station 8 (180°, 0.1 mi)	3.0 (1/12) [N/A]	< LLD	0
	Co-60	15	< LLD	N/A	N/A	< LLD	0
	Zn-65	30	< LLD	N/A	N/A	< LLD	0
	Zr-95	15	< LLD	N/A	N/A	< LLD	0
	Nb-95	15	< LLD	N/A	N/A	< LLD	0
	Cs-134	15	< LLD	N/A	N/A	< LLD	0
	Cs-137	18	< LLD	N/A	N/A	< LLD	0
	Ba-140	15	< LLD	N/A	N/A	< LLD	0
	La-140	15	< LLD	N/A	N/A	< LLD	0

TABLE 4-1
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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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Location of Facility Pope, Arkansas Reporting Period January - December 1992
(County, State)

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F)[c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non-Routine Results [e]
				Location [d]	Mean (F)[c] [Range]		
Surface Water (ADH Split) (pCi/l)	H-3 24	2000	1610 (2/12) [630 - 2590]	Station 8 (180°, 0.1 mi)	1610 (2/12) [630 - 2590]	< LLD	0
	I-131 24	15	6.0 (1/12) [N/A]	Station 8 (180°, 0.1 mi)	6.0 (1/12) [N/A]	< LLD	0
	GS 24						
	Mn-54	15	< LLD	N/A	< LLD	< LLD	0
	Fe-59	30	< LLD	N/A	< LLD	< LLD	0
	Co-58	15	12.5 (2/12) [5 - 20]	Station 8 (180°, 0.1 mi)	12.5 (2/12) [5 - 20]	< LLD	0
	Co-60	15	< LLD	N/A	N/A	< LLD	0
	Zn-65	30	< LLD	N/A	N/A	< LLD	0
	Zr-95	15	< LLD	N/A	N/A	< LLD	0
	Nb-95	15	< LLD	N/A	N/A	< LLD	0
	Cs-134	15	< LLD	N/A	N/A	< LLD	0
	Cs-137	18	3.0 (1/12) [N/A]	Station 8 (180°, 0.1 mi)	3.0 (1/12) [N/A]	< LLD	0
	Ba-140	15	< LLD	N/A	N/A	< LLD	0
	La-140	15	< LLD	N/A	N/A	< LLD	0

TABLE 4-1
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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

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(County, State)

Sample Type (Units)	Type and Number of Analyses[a]	LLD[b]	Indicator Locations Mean (F)[c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non-Routine Results[e]
				Location[d]	Mean (F)[c] [Range]		
Groundwater (pCi/l)	H-3 10	1000	< LLD	N/A	N/A	< LLD	0
	GS 10						
	Mn-54	15	< LLD	N/A	N/A	< LLD	0
	Fe-59	30	< LLD	N/A	N/A	< LLD	0
	Co-58	15	< LLD	N/A	N/A	< LLD	0
	Co-60	15	< LLD	N/A	N/A	< LLD	0
	Zn-65	30	< LLD	N/A	N/A	< LLD	0
	Zr-95	15	< LLD	N/A	N/A	< LLD	0
	Nb-95	15	< LLD	N/A	N/A	< LLD	0
	Cs-134	10	< LLD	N/A	N/A	< LLD	0
	Cs-137	18	< LLD	N/A	N/A	< LLD	0
	Ba-140	15	< LLD	N/A	N/A	< LLD	0
	La-140	15	< LLD	N/A	N/A	< LLD	0
Milk (pCi/l)	I-131 49	1.0	< LLD	N/A	N/A	< LLD	0
	GS 49						
	Cs-134	15	< LLD	N/A	N/A	< LLD	0
	Cs-137	18	< LLD	N/A	N/A	< LLD	0
	Ba-140	15	< LLD	N/A	N/A	< LLD	0
	La-140	15	< LLD	N/A	N/A	< LLD	0

TABLE 4-1
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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility ANO - Units 1 and 2 Docket No. 50-313 and 50-368
Location of Facility Pope, Arkansas Reporting Period January - December 1992
(County, State)

Sample Type (Units)	Type and Number of Analyses[a]	LLD [b]	Indicator Locations Mean (F)[c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non-routine Results [e]
				Location [d]	Mean (F)[c] [Range]		
Vegetation (pCi/kg wet)	I-131 8	60	< LLD	N/A	N/A	N/A	0
	GS 8						
	Cs-134	60	< LLD	N/A	N/A	N/A	0
	Cs-137	80	< LLD	N/A	N/A	N/A	0
Food Product (pCi/kg wet)	I-131 9	60	< LLD	N/A	N/A	N/A	0
	GS 9						
	Cs-134	60	< LLD	N/A	N/A	N/A	0
	Cs-137	80	< LLD	N/A	N/A	N/A	0
Food Product (ADH Split) (pCi/kg wet)	I-131 7	60	< LLD	N/A	N/A	N/A	0
	GS 7						
	Cs-134	60	< LLD	N/A	N/A	N/A	0
	Cs-137	80	13.0 (1/7) [N/A]	Station 32 (132°, 0.9 mi)	13.0 (1/7) [N/A]	N/A	0

TABLE 4-1
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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility ANO - Units 1 and 2 Docket No. 50-313 and 50-368
Location of Facility Pope, Arkansas Reporting Period January - December 1992
(County, State)

Sample Type (Units)	Type and Number of Analyses [a]	LLD [b]	Indicator Locations Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non -Routine Results [e]
				Location [d]	Mean (F)[c] [Range]		
Fish (pCi/kg wet)	GS 8						
	Mn-54	130	< LLD	N/A	N/A	< LLD	0
	Fe-59	260	< LLD	N/A	N/A	< LLD	0
	Co-58	130	< LLD	N/A	N/A	< LLD	0
	Co-60	130	< LLD	N/A	N/A	< LLD	0
	Zn-65	260	< LLD	N/A	N/A	< LLD	0
	Cs-134	130	14.0 (1/4) [N/A]	Station 8 (180°, 0.1 mi.)	14.0 (1/4) [N/A]	< LLD	0
	Cs-137	150	25.0 (2/4) [20 - 30]	Station 8 (180°, 0.1 mi.)	25.0 (2/4) [20 - 30]	12.0 (2/4) [12 - 12]	0
Fish (ADH Split) (pCi/kg wet)	GS 5						
	Mn-54	130	< LLD	N/A	N/A	< LLD	0
	Fe-59	260	< LLD	N/A	N/A	< LLD	0
	Co-58	130	< LLD	N/A	N/A	< LLD	0
	Co-60	130	< LLD	N/A	N/A	< LLD	0
	Zn-65	260	< LLD	N/A	N/A	< LLD	0
	Cs-134	130	25.5 (2/3) [25 - 26]	Station 8 (180°, 0.1 mi.)	25.5 (2/3) [25 - 26]	< LLD	0
	Cs-137	150	39.3 (3/3) [31 - 44]	Station 8 (180°, 0.1 mi.)	39.3 (3/3) [31 - 44]	11 (1/2) [N/A]	0

TABLE 4-1
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RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM SUMMARY

Name of Facility ANO - Units 1 and 2 Docket No. 50-313 and 50-368
Location of Facility Pope, Arkansas Reporting Period January - December 1992
(County, State)

Sample Type (Units)	Type and Number of Analyses[a]	LLD [b]	Indicator Locations Mean (F) [c] [Range]	Location with Highest Annual Mean		Control Locations Mean (F)[c] [Range]	Number of Non -Routine Results [e]
				Location [d]	Mean (F)[c] [Range]		
Bottom Sediment (pCi/kg dry)	GS 6						
	Mn-54	(f)	154.5 (2/2) [141-168]	Station 8 (180°, 0.1 mi.)	154.5 (2/2) [141-168]	18.3 (3/4) [13-24]	0
	Co-58	(f)	190.5 (2/2) [111 - 270]	Station 8 (180°, 0.1 mi.)	190.5 (2/2) [111 - 270]	< LLD	0
	Co-60	(f)	350.5 (2/2) [179-522]	Station 8 (180°, 0.1 mi.)	350.5 (2/2) [179-522]	< LLD	0
	Ag-110m	(f)	< LLD	N/A	N/A	< LLD	0
	Cs-134	150	686 (1/2) [N/A]	Station 8 (180°, 0.1 mi.)	686 (1/2) [N/A]	< LLD	0
	Cs-137	180	2228 (2/2) [1361-3095]	Station 8 (180°, 0.1 mi.)	2228 (2/2) [1361-3095]	230.3 (4/4) [119-465]	0

a GB = Gross beta; I-131 = Iodine-131; H-3 = Tririum; GS = Gamma scan.
b LLD = Required lower limit of detection based on Arkansas Nuclear One Unit 1 and Unit 2 Technical Specification Tables 4.30-2 and 3.12-2, respectively.
c Mean and range based upon detectable measurements only. Fraction of detectable measurements at specified locations in indicated parentheses (F).
d Locations are specified (1) by name and (2) degrees relative to reactor site.
e Non-routine results are those which exceed ten times the control station value. If no control station value is available, the result is considered non-routine if it exceeds ten times the preoperational value for the location.
f LLD is not defined in ANO Unit 1 and Unit 2 Technical Specification Tables.

TABLE 4-2
Page 1 of 3
INDICATOR & CONTROL LOCATIONS

Sample Type	Locations	Total No. of Samples	Total No. & Type of Analyses
• **AIR**	• Indicators - Station 1 (Met Tower)	52	52 ea. - Gross Beta, I-131; 4-Gamma
	Station 2 (AP&L Lodge)	52	52 ea. - Gross Beta, I-131; 4-Gamma
	Station 3 (Bennett Farm)	52	52 ea. - Gross Beta, I-131; 4-Gamma
	Station 4 (May Cemetary)	52	52 ea. - Gross Beta, I-131; 4-Gamma
	• Controls - Station 6 (Russellville)	52	52 ea. - Gross Beta, I-131; 4-Gamma
	Station 7 (AP&L Substation)	52	52 ea. - Gross Beta, I-131; 4-Gamma
• **TLDs**	• Indicators (Quarterly)		
	- 0 - 2 Miles		
	Stations 1, 2, 3, 4, 108, 109, 110, 113, 114, 115, 116	44	44-Gamma
	- 2 - 5 Miles		
	Stations 111, 112, 119, 120, 121, 122, 123, 124, 130, 131, 133, 134, 135, 136, 141	58	58-Gamma
	• Controls (Quarterly)		
	- > 5 Miles		
	Stations 5, 6, 7, 117, 118, 125, 126, 127, 128, 129, 132, 137, 138, 139, 140, 142, 143, 144	69	69-Gamma
	• Indicators (Semiannually)		
	- 0 - 2 Miles		
	Stations 1, 2, 3, 4	8	8-Gamma
	• Controls (Semiannually)		
	- > 5 Miles		
	Stations 5, 6, 7	6	6-Gamma

TABLE 4-2
Page 2 of 3
INDICATOR & CONTROL LOCATIONS

Sample Type	Locations	Total No. of Samples	Total No. & Type of Analyses
• **WATER**	**Drinking**		
	• Indicator - None	N/A	N/A
	• Control - Station 14 (Russellville)	13	4-Tritium (H-3); 13 ea. - Gross Beta, I-131, Gamma
	Surface		
	• Indicators - Station 8 (Discharge)	12	4-Tritium (H-3); 12 Gamma
	Station 8 (Discharge - ADH Split)	12	12 ea. - Tritium (H-3), Gamma
	• Controls - Station 10 (Intake)	12	4-Tritium (H-3); 12-Gamma
	Station 16 (Piney Creek - ADH Split)	12	12 ea. - Tritium (H-3), Gamma
	Groundwater		
	• Indicator - Station 32 (Stewarts)	5	5 ea. - Tritium (H-3), Gamma
	• Control - Station 33 (Quita Lake)	5	5 ea. - Tritium (H-3), Gamma
• **MILK**	• Indicators - Station 19 (Arkansas Tech)	12	12 ea. - I-131, Gamma
	Station 41 (Gibson)	12	12 ea. - I-131, Gamma
	• Controls - Station 37 (Steuber)	13	13 ea. - I-131, Gamma
	Station 42 (Hudson)	12	12 ea. - I-131, Gamma

TABLE 4-2
Page 3 of 3
INDICATOR & CONTROL LOCATIONS

Sample Type	Locations	Total No. of Samples	Total No. & Type of Analyses
• VEGETATION	• Indicators - Station 13 (Flatwood Road)	4	4 ea. - I-131, Gamma
	Station 45 (Intake Canal)	4	4 ea. - I-131, Gamma
	• Control - None	N/A	N/A
• FOOD PRODUCTS	• Indicators - Station 32 (Stewart Residence - ADH Split)	7	7 ea. - I-131, Gamma
	Station 38 (Jones Residence)	2	2 ea. - I-131, Gamma
	Station 40 (Hollis Residence)	4	4 ea. - I-131, Gamma
	Station 46 (Gregory Garden)	1	1 ea. - I-131, Gamma
	Station 108 (Flatwood Road)	2	2 ea. - I-131, Gamma
	• Control - None	N/A	N/A
• FISH	• Indicators - Station 8 (Discharge)	4	4-Gamma
	Station 8 (Discharge - ADH Split)	3	3-Gamma
	• Controls - Station 10 (Intake)	4	4-Gamma
	Station 10 (Intake - ADH Split)	2	2-Gamma
• SEDIMENT	• Indicator - Station 8 (Discharge)	2	2-Gamma
	• Controls - Station 10 (Intake)	2	2-Gamma
	Station 16 (Piney Creek)	2	2-Gamma

SECTION 5.0

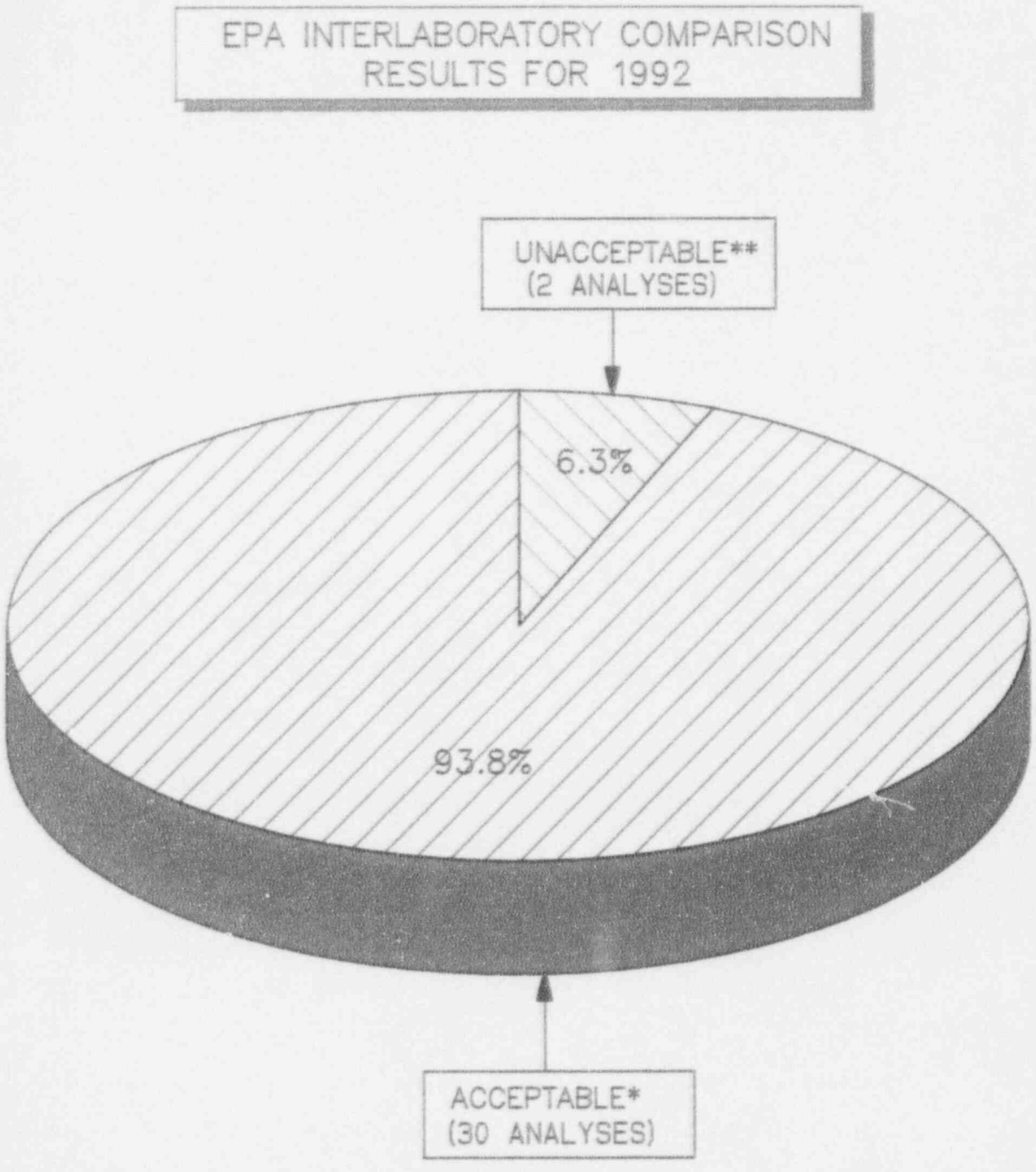
QUALITY CONTROL DATA

5.1 CROSSCHECK PROGRAM RESULTS

ESI System Chemistry analyzed EPA crosscheck samples for ANO to fulfill the requirements of ANO Unit 1 and Unit 2 Technical Specifications 4.30.3 and 3/4.12.3, respectively. Attachment I, 1992 Radiological Environmental Monitoring Program Report, contains these results. ESI System Chemistry's analysis participation shown in Figure 5-1, indicate consistent, valid data based on acceptable sample results.

FIGURE 5-1

EPA INTERCOMPARISON STUDY



SECTION 6.0

1992 SAMPLING AND ANALYTICAL RESULTS

6.1 1992 DATA

Attachments I and II presents analytical data obtained by ESI System Chemistry and ANO'S Dosimetry Section on samples collected from January through December 1992. ESI System Chemistry provided data in monthly progress reports with exception of TLDs. ANO's Dosimetry Section provided TLD data in quarterly and semiannual reports. Data presented in Attachments I and II compare to that encountered in previous years.

6.2 LOWER LIMIT OF DETECTION

In all analyses, ESI System Chemistry counted below the maximum required LLDs specified in ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-2 and 3.12-2, respectively. Factors such as unavoidable small sample size, background fluctuations, presence of interfering radionuclides or other uncontrollable circumstances may cause Technical Specification LLDs to be unachievable. However in 1992, ESI System Chemistry met all Technical Specification LLD requirements.

6.3 REPORTING LEVELS

ANO found radioactivity attributable to plant operations in surface water, sediment and fish from the discharge. However, no reporting levels for radioactivity concentration in environmental samples, as outlined in ANO Unit 1 and Unit 2 Technical Specification Tables 4.30-3 and 3.12-3, respectively, when averaged over any calendar quarter, were equaled or exceeded due to ANO effluents. Therefore, no Radiological Monitoring Special Reports were required.

6.4 SAMPLING DEVIATIONS

Samples required by ANO Unit 1 and Unit 2 Technical Specifications 4.30.1 and 3/4.12.1, respectively, were collected within the scheduled period unless noted otherwise in Attachments I and II. Sample deviations at locations required by ANO Technical Specifications are discussed in Sections 2.1 through 2.7. These sections provide more explanation concerning reasons why samples were missed and describes corrective action where appropriate.

6.5 RADIOACTIVITY NOT ATTRIBUTABLE TO ANO

Radioactivity attributable to other sources has been detected by the ANO REMP in 1977, 1978 and 1981 following nuclear weapons testing. The most recent incident occurred in May 1986 when the radioactive plume release due to reactor core degradation at Chernobyl Nuclear Power Plant was detected.

6.6 SAMPLING RELOCATION

The Bryan Irby Dairy was discontinued from the ANO REMP in 1992 due to the owner's decision to not supply milk to ANO personnel for analysis. In addition, sample station 108 (Flatwood Road) became an alternate food product location in 1992. These changes are reflected in the current ODCM.

6.7 COMPARISON TO FEDERAL AND STATE PROGRAMS

Data from the ANO REMP was compared to federal and state monitoring programs as results became available. The federal monitoring program used for comparison was the U.S. Nuclear Regulatory Commission (NRC) TLD Direct Radiation Monitoring Network. The state program is conducted by the ADH.

The latest available results from the NRC TLD Network, have been compared to those from ANO's. Prior to 1992, no change in TLD results has been attributed to ANO operation.

Radiological monitoring by the ADH entails similar sampling requirements as the ANO REMP. In many cases air samples and TLDs are collocated, while sample media such as food products, water, milk and fish are shared or split. Through 1992, both programs have obtained results that are within similar ranges. The only common location where radioactivity attributable to ANO has been detected is the ANO discharge. Discharge water, sediment and fish results were above background due to ANO effluents.

6.8 UNAVAILABLE RESULTS

Analytical contractor results were received in adequate time for inclusion in this report. No missing results were identified during ANO personnel's review of these results.

6.9 HARMFUL EFFECTS OR IRREVERSIBLE DAMAGE

No harmful effects or evidence of irreversible damage were detected by ANO monitoring. Therefore, no analysis or planned course of action to alleviate problems was necessary.

ATTACHMENT I

1992 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM REPORT

ARKANSAS NUCLEAR ONE
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
DECEMBER, 1992

PREPARED BY:

SYSTEM CHEMISTRY SECTION
ENTERGY SERVICES, INC.

ARKANSAS NUCLEAR ONE
RADIOLOGICAL ENVIRONMENTAL MONITORING REPORT

TABLE OF CONTENTS

Summary of Monitoring Results

Plant related isotopes were detected during the reporting period at the discharge location.

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m^3

Location: 01,Met Tower

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920091	12/31/91	01/07/92	0.033 +/-0.003	< 0.020
920178	01/07/92	01/14/92	0.020 +/-0.002	< 0.019
920206	01/14/92	01/21/92	0.013 +/-0.002	< 0.017
920246	01/21/92	01/28/92	0.016 +/-0.002	< 0.019
920277	01/28/92	02/04/92	0.019 +/-0.002	< 0.022
920342	02/04/92	02/11/92	0.017 +/-0.003	< 0.026
920361	02/11/92	02/18/92	0.005 +/-0.002	< 0.041
920389	02/18/92	02/25/92	0.014 +/-0.002	< 0.027
920450	02/25/92	03/03/92	0.016 +/-0.003	< 0.046
920466	03/03/92	03/10/92	0.014 +/-0.003	< 0.016
920496	03/10/92	03/17/92	0.010 +/-0.002	< 0.024
920544	03/17/92	03/24/92	0.011 +/-0.002	< 0.042
920573	03/24/92	03/31/92	0.010 +/-0.002	< 0.040
920644	03/31/92	04/07/92	0.018 +/-0.002	< 0.027
920695	04/07/92	04/14/92	0.018 +/-0.003	< 0.030
920722	04/14/92	04/21/92	0.012 +/-0.002	< 0.025
920799	04/21/92	04/28/92	0.016 +/-0.002	< 0.034
920822	04/28/92	05/05/92	0.017 +/-0.002	< 0.024
920870	05/05/92	05/12/92	0.018 +/-0.003	< 0.023
920908	05/12/92	05/19/92	0.018 +/-0.002	< 0.023
920951	05/19/92	05/26/92	0.013 +/-0.002	< 0.025

= Control Location * = Low Level Analysis

Location: 01,Met Tower

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920990	05/26/92	06/02/92	0.022 +/-0.003	< 0.026
921050	06/02/92	06/09/92	0.025 +/-0.003	< 0.029
921080	06/09/92	06/16/92	0.016 +/-0.002	< 0.020
921154	06/16/92	06/23/92	0.022 +/-0.003	< 0.024
921190	06/23/92	06/30/92	0.019 +/-0.002	< 0.024
921252	06/30/92	07/07/92	0.016 +/-0.002	< 0.024
921309	07/07/92	07/14/92	0.018 +/-0.002	< 0.027
921335	07/14/92	07/21/92	0.010 +/-0.003	< 0.028
921371	07/21/92	07/28/92	0.011 +/-0.002	< 0.029
921406	07/28/92	08/04/92	0.017 +/-0.002	< 0.042
921444	08/04/92	08/11/92	0.016 +/-0.002	< 0.041
921473	08/11/92	08/18/92	0.014 +/-0.002	< 0.026
921502	08/18/92	08/25/92	0.023 +/-0.002	< 0.033
921548	08/25/92	09/01/92	0.016 +/-0.002	< 0.019
921574	09/01/92	09/08/92	0.014 +/-0.002	< 0.018
921611	09/08/92	09/15/92	0.011 +/-0.002	< 0.015
921665	09/15/92	09/22/92	0.013 +/-0.002	< 0.043
921759	09/22/92	09/29/92	0.012 +/-0.002	< 0.052
921782	09/29/92	10/06/92	0.021 +/-0.002	< 0.037
921825	10/06/92	10/13/92	0.019 +/-0.002	< 0.035
921870	10/13/92	10/20/92	0.016 +/-0.002	< 0.030
921914	10/20/92	10/27/92	0.034 +/-0.003	< 0.036

Table No.: 1.1b

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Air Samples,(Beta,I-131)

Collection: Continuous with Weekly Exchange

Units: pCi/m**3

Location: 01,Met Tower

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921950	10/27/92	11/03/92	0.024 +/-0.003	< 0.047
922005	11/03/92	11/10/92	0.017 +/-0.002	< 0.024
922029	11/10/92	11/17/92	0.018 +/-0.002	< 0.027
922036	11/17/92	11/24/92	0.013 +/-0.002	< 0.014
922083	11/24/92	12/01/92	0.014 +/-0.002	< 0.037
922101	12/01/92	12/08/92	0.012 +/-0.002	< 0.012
922172	12/08/92	12/15/92	0.017 +/-0.002	< 0.031
922179	12/15/92	12/22/92	0.025 +/-0.002	< 0.027
922225	12/22/92	12/29/92	0.020 +/-0.002	< 0.015

= Control Location * = Low Level Analysis

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 02,SW of Site

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920092	12/31/91	01/07/92	0.018 +/-0.003	< 0.020
920179	01/07/92	01/14/92	0.018 +/-0.002	< 0.019
920207	01/14/92	01/21/92	0.012 +/-0.002	< 0.017
920247	01/21/92	01/28/92	0.014 +/-0.002	< 0.019
920278	01/28/92	02/04/92	0.014 +/-0.002	< 0.022
920343	02/04/92	02/11/92	0.014 +/-0.002	< 0.026
920362	02/11/92	02/18/92	0.008 +/-0.002	< 0.041
920390	02/18/92	02/25/92	0.011 +/-0.002	< 0.027
920451	02/25/92	03/03/92	0.015 +/-0.003	< 0.046
920467	03/03/92	03/10/92	0.010 +/-0.003	< 0.016
920497	03/10/92	03/17/92	0.009 +/-0.002	< 0.024
920545	03/17/92	03/24/92	0.011 +/-0.002	< 0.042
920574	03/24/92	03/31/92	0.012 +/-0.003	< 0.040
920645	03/31/92	04/07/92	0.014 +/-0.002	< 0.027
920696	04/07/92	04/14/92	0.016 +/-0.002	< 0.030
920723	04/14/92	04/21/92	0.014 +/-0.002	< 0.025
920800	04/21/92	04/28/92	0.016 +/-0.002	< 0.034
920823	04/28/92	05/05/92	0.014 +/-0.002	< 0.024
920871	05/05/92	05/12/92	0.016 +/-0.003	< 0.023
920909	05/12/92	05/19/92	0.021 +/-0.003	< 0.023
920952	05/19/92	05/26/92	0.011 +/-0.002	< 0.025

= Control Location * = Low Level Analysis

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 02,SW of Site

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920991	05/26/92	06/02/92	0.019 +/-0.003	< 0.026
921051	06/02/92	06/09/92	0.019 +/-0.003	< 0.029
921081	06/09/92	06/16/92	0.012 +/-0.002	< 0.020
921155	06/16/92	06/23/92	0.010 +/-0.002	< 0.024
921191	06/23/92	06/30/92	0.013 +/-0.002	< 0.024
921253	06/30/92	07/07/92	0.012 +/-0.002	< 0.024
921310	07/07/92	07/14/92	0.017 +/-0.002	< 0.027
921336	07/14/92	07/21/92	0.009 +/-0.002	< 0.028
921372	07/21/92	07/28/92	0.010 +/-0.002	< 0.029
921407	07/28/92	08/04/92	0.015 +/-0.002	< 0.042
921445	08/04/92	08/11/92	0.017 +/-0.002	< 0.041
921474	08/11/92	08/18/92	0.014 +/-0.002	< 0.026
921503	08/18/92	08/25/92	0.022 +/-0.002	< 0.033
921549	08/25/92	09/01/92	0.016 +/-0.002	< 0.019
921575	09/01/92	09/08/92	0.013 +/-0.002	< 0.018
921612	09/08/92	09/15/92	0.012 +/-0.002	< 0.015
921666	09/15/92	09/22/92	0.013 +/-0.002	< 0.043
921760	09/22/92	09/29/92	0.008 +/-0.002	< 0.052
921783	09/29/92	10/06/92	0.025 +/-0.002	< 0.037
921826	10/06/92	10/13/92	0.021 +/-0.002	< 0.035
921871	10/13/92	10/20/92	0.017 +/-0.002	< 0.030
921915	10/20/92	10/27/92	0.038 +/-0.003	< 0.036

Location: 02,SW of Site

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921951	10/27/92	11/03/92	0.027 +/-0.003	< 0.047
922006	11/03/92	11/10/92	0.020 +/-0.002	< 0.024
922030	11/10/92	11/17/92	0.021 +/-0.002	< 0.027
922037	11/17/92	11/24/92	0.013 +/-0.002	< 0.014
922084	11/24/92	12/01/92	0.016 +/-0.002	< 0.037
922102	12/01/92	12/08/92	0.015 +/-0.002	< 0.012
922173	12/08/92	12/15/92	0.016 +/-0.002	< 0.031
922180	12/15/92	12/22/92	0.028 +/-0.002	< 0.027
922226	12/22/92	12/29/92	0.022 +/-0.002	< 0.015

Table No.: 1.3
Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Environmental Radiological Monitoring Report

Date: 01/20/93

Location: G3,N of Site

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920093	12/31/91	01/07/92	0.033 +/-0.003	< 0.020
920183	01/07/92	01/14/92	0.014 +/-0.002	< 0.019
920208	01/14/92	01/21/92	0.011 +/-0.002	< 0.017
920248	01/21/92	01/28/92	0.012 +/-0.002	< 0.019
920279	01/28/92	02/04/92	0.017 +/-0.002	< 0.022
920344	02/04/92	02/11/92	0.008 +/-0.002	< 0.026
920363	02/11/92	02/18/92	0.008 +/-0.002	< 0.041
920391	02/18/92	02/25/92	0.017 +/-0.002	< 0.027
920452	02/25/92	03/03/92	0.014 +/-0.002	< 0.045
920468	03/03/92	03/10/92	0.006 +/-0.003	< 0.016
920498	03/10/92	03/17/92	0.008 +/-0.002	< 0.024
920546	03/17/92	03/24/92	0.008 +/-0.002	< 0.042
920575	03/24/92	03/31/92	0.009 +/-0.002	< 0.040
920646	03/31/92	04/07/92	0.012 +/-0.002	< 0.027
920697	04/07/92	04/14/92	0.017 +/-0.002	< 0.030
920724	04/14/92	04/21/92	0.009 +/-0.002	< 0.025
920801	04/21/92	04/28/92	0.017 +/-0.002	< 0.034
920824	04/28/92	05/05/92	0.017 +/-0.003	< 0.024
920872	05/05/92	05/12/92	0.016 +/-0.003	< 0.023
920910	05/12/92	05/19/92	0.019 +/-0.007	< 0.023
920953	05/19/92	05/26/92	0.012 +/-0.002	< 0.025

= Control Location * = Low Level Analysis

Location: 03,N of Site

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920992	05/26/92	06/02/92	0.020 +/-0.003	< 0.026
921052	06/02/92	06/09/92	0.021 +/-0.003	< 0.029
921082	06/09/92	06/16/92	0.014 +/-0.002	< 0.020
921156	06/16/92	06/23/92	0.016 +/-0.002	< 0.024
921192	06/23/92	06/30/92	0.017 +/-0.002	< 0.024
921254	06/30/92	07/07/92	0.014 +/-0.002	< 0.024
921311	07/07/92	07/14/92	0.014 +/-0.002	< 0.027
921337	07/14/92	07/21/92	0.014 +/-0.002	< 0.028
921373	07/21/92	07/28/92	0.007 +/-0.002	< 0.029
921408	07/28/92	08/04/92	0.013 +/-0.002	< 0.042
921446	08/04/92	08/11/92	0.010 +/-0.003	< 0.041
921475	08/11/92	08/18/92	0.013 +/-0.002	< 0.026
921504	08/18/92	08/25/92	0.016 +/-0.002	< 0.033
921550	08/25/92	09/01/92	0.013 +/-0.002	< 0.019
921576	09/01/92	09/08/92	0.011 +/-0.002	< 0.018
921613	09/08/92	09/15/92	0.012 +/-0.002	< 0.015
921667	09/15/92	09/22/92	0.010 +/-0.002	< 0.043
921761	09/22/92	09/29/92	0.010 +/-0.002	< 0.052
921784	09/29/92	10/06/92	0.025 +/-0.002	< 0.037
921827	10/06/92	10/13/92	0.019 +/-0.002	< 0.035
921872	10/13/92	10/20/92	0.012 +/-0.002	< 0.030
921916	10/20/92	10/27/92	0.037 +/-0.003	< 0.036

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 03,N of Site

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921952	10/27/92	11/03/92	0.027 +/-0.003	< 0.047
922007	11/03/92	11/10/92	0.017 +/-0.002	< 0.024
922031	11/10/92	11/17/92	0.018 +/-0.002	< 0.027
922038	11/17/92	11/24/92	0.013 +/-0.002	< 0.014
922085	11/24/92	12/01/92	0.015 +/-0.002	< 0.037
922103	12/01/92	12/08/92	0.010 +/-0.002	< 0.012
922174	12/08/92	12/15/92	0.012 +/-0.002	< 0.031
922181	12/15/92	12/22/92	0.020 +/-0.002	< 0.027
922227	12/22/92	12/29/92	0.013 +/-0.002	< 0.015

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 04,May Cemetery

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920094	12/31/91	01/07/92	0.025 +/-0.003	< 0.020
920180	01/07/92	01/14/92	0.017 +/-0.002	< 0.019
920209	01/14/92	01/21/92	0.010 +/-0.002	< 0.017
920249	01/21/92	01/28/92	0.012 +/-0.002	< 0.019
920280	01/28/92	02/04/92	0.013 +/-0.002	< 0.022
920345	02/04/92	02/11/92	0.012 +/-0.002	< 0.026
920364	02/11/92	02/18/92	< 0.003	< 0.041
920392	02/18/92	02/25/92	0.022 +/-0.003	< 0.027
920453	02/25/92	03/03/92	0.011 +/-0.002	< 0.046
920469	03/03/92	03/10/92	0.009 +/-0.003	< 0.016
920499	03/10/92	03/17/92	0.007 +/-0.002	< 0.024
920547	03/17/92	03/24/92	0.010 +/-0.002	< 0.042
920576	03/24/92	03/31/92	0.010 +/-0.002	< 0.040
920647	03/31/92	04/07/92	0.013 +/-0.002	< 0.027
920698	04/07/92	04/14/92	0.015 +/-0.002	< 0.030
920725	04/14/92	04/21/92	0.008 +/-0.002	< 0.025
920802	04/21/92	04/28/92	0.012 +/-0.002	< 0.034
920825	04/28/92	05/05/92	0.014 +/-0.002	< 0.024
920873	05/05/92	05/12/92	0.012 +/-0.003	< 0.023
920911	05/12/92	05/19/92	0.018 +/-0.002	< 0.023
920954	05/19/92	05/26/92	0.009 +/-0.002	< 0.025

= Control Location * = Low Level Analysis

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 04,May Cemetery

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920993	05/26/92	06/02/92	0.017 +/-0.003	< 0.026
921053	06/02/92	06/09/92	0.019 +/-0.003	< 0.029
921083	06/09/92	06/16/92	0.015 +/-0.002	< 0.020
921157	06/16/92	06/23/92	0.012 +/-0.002	< 0.024
921193	06/23/92	06/30/92	0.020 +/-0.002	< 0.024
921255	06/30/92	07/07/92	0.009 +/-0.002	< 0.024
921312	07/07/92	07/14/92	0.017 +/-0.002	< 0.027
921338	07/14/92	07/21/92	0.013 +/-0.002	< 0.028
921374	07/21/92	07/28/92	0.010 +/-0.002	< 0.029
921409	07/28/92	08/04/92	0.014 +/-0.002	< 0.042
921447	08/04/92	08/11/92	0.018 +/-0.002	< 0.041
921476	08/11/92	08/18/92	0.015 +/-0.002	< 0.026
921505	08/18/92	08/25/92	0.024 +/-0.002	< 0.033
921551	08/25/92	09/01/92	0.015 +/-0.002	< 0.019
921577	09/01/92	09/08/92	0.014 +/-0.002	< 0.018
921614	09/08/92	09/15/92	0.010 +/-0.002	< 0.015
921668	09/15/92	09/22/92	0.015 +/-0.002	< 0.043
921762	09/22/92	09/29/92	0.007 +/-0.002	< 0.052
921785	09/29/92	10/06/92	0.021 +/-0.002	< 0.037
921828	10/06/92	10/13/92	0.014 +/-0.002	< 0.035
921873	10/13/92	10/20/92	0.015 +/-0.002	< 0.030
921917	10/20/92	10/27/92	0.031 +/-0.002	< 0.036

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 04,May Cemetery

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921953	10/27/92	11/03/92	0.029 +/-0.003	< 0.047
922008	11/03/92	11/10/92	0.017 +/-0.002	< 0.024
922032	11/10/92	11/17/92	0.017 +/-0.002	< 0.027
922039	11/17/92	11/24/92	0.012 +/-0.002	< 0.014
922086	11/24/92	12/01/92	0.013 +/-0.002	< 0.037
922104	12/01/92	12/08/92	0.011 +/-0.002	< 0.012
922175	12/08/92	12/15/92	0.013 +/-0.002	< 0.031
922182	12/15/92	12/22/92	0.019 +/-0.002	< 0.027
922228	12/22/92	12/29/92	0.017 +/-0.002	< 0.015

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 06,Local Office

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920095	12/31/91	01/07/92	0.024 +/-0.003	< 0.020
920181	01/07/92	01/14/92	0.015 +/-0.002	< 0.019
920210	01/14/92	01/21/92	0.013 +/-0.002	< 0.017
920250	01/21/92	01/28/92	0.013 +/-0.002	< 0.019
920281	01/28/92	02/04/92	0.014 +/-0.002	< 0.022
920346	02/04/92	02/11/92	0.012 +/-0.002	< 0.026
920365	02/11/92	02/18/92	0.005 +/-0.002	< 0.041
920393	02/18/92	02/25/92	0.022 +/-0.002	< 0.027
920454	02/25/92	03/03/92	0.014 +/-0.002	< 0.046
920470	03/03/92	03/10/92	0.007 +/-0.003	< 0.016
920500	03/10/92	03/17/92	0.004 +/-0.002	< 0.024
920548	03/17/92	03/24/92	0.010 +/-0.002	< 0.042
920577	03/24/92	03/31/92	0.010 +/-0.002	< 0.040
920648	03/31/92	04/07/92	0.014 +/-0.002	< 0.027
920699	04/07/92	04/14/92	0.015 +/-0.002	< 0.030
920726	04/14/92	04/21/92	0.009 +/-0.002	< 0.025
920803	04/21/92	04/28/92	0.012 +/-0.002	< 0.034
920826	04/28/92	05/05/92	0.015 +/-0.002	< 0.024
920874	05/05/92	05/12/92	0.016 +/-0.003	< 0.023
930912	05/12/92	05/19/92	0.017 +/-0.003	< 0.023
920955	05/19/92	05/26/92	0.012 +/-0.003	< 0.025

= Control Location * = Low Level Analysis

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 06,Local Office

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920994	05/26/92	06/02/92	0.017 +/-0.002	< 0.026
921054	06/02/92	06/09/92	0.018 +/-0.003	< 0.029
921084	06/09/92	06/16/92	0.013 +/-0.002	< 0.020
921158	06/16/92	06/23/92	0.013 +/-0.002	< 0.024
921194	06/23/92	06/30/92	0.014 +/-0.002	< 0.024
921256	06/30/92	07/07/92	0.008 +/-0.004	< 0.024
921313	07/07/92	07/14/92	0.023 +/-0.002	< 0.027
921339	07/14/92	07/21/92	0.013 +/-0.002	< 0.028
921375	07/21/92	07/28/92	0.010 +/-0.002	< 0.029
921410	07/28/92	08/04/92	0.017 +/-0.002	< 0.042
921448	08/04/92	08/11/92	0.017 +/-0.002	< 0.041
921477	08/11/92	08/18/92	0.015 +/-0.002	< 0.026
921506	08/18/92	08/25/92	0.024 +/-0.002	< 0.033
921552	08/25/92	09/01/92	0.013 +/-0.002	< 0.019
921578	09/01/92	09/08/92	0.016 +/-0.002	< 0.018
921615	09/08/92	09/15/92	0.012 +/-0.002	< 0.015
921669	09/15/92	09/22/92	0.019 +/-0.002	< 0.043
921763	09/22/92	09/29/92	0.010 +/-0.002	< 0.052
921786	09/29/92	10/06/92	0.022 +/-0.002	< 0.037
921829	10/06/92	10/13/92	0.017 +/-0.002	< 0.035
921874	10/13/92	10/20/92	0.016 +/-0.002	< 0.030
921918	10/20/92	10/27/92	0.037 +/-0.003	< 0.036

= Control Location * = Low Level Analysis

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 06,Local Office

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921954	10/27/92	11/03/92	0.031 +/-0.004	< 0.047
922009	11/03/92	11/10/92	0.020 +/-0.002	< 0.024
922033	11/10/92	11/17/92	0.025 +/-0.002	< 0.027
922040	11/17/92	11/24/92	0.004 +/-0.003	< 0.014
922087	11/24/92	12/01/92	0.012 +/-0.002	< 0.037
922165	12/01/92	12/08/92	0.010 +/-0.002	< 0.012
922176	12/08/92	12/15/92	0.016 +/-0.002	< 0.031
922183	12/15/92	12/22/92	0.023 +/-0.002	< 0.027
922229	12/22/92	12/29/92	0.021 +/-0.002	< 0.015

Table No.: 1.6
Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 07,Danville

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920096	12/31/91	01/07/92	0.034 +/-0.003	< 0.020
920182	01/07/92	01/14/92	0.017 +/-0.002	< 0.019
920211	01/14/92	01/21/92	0.012 +/-0.002	< 0.017
920251	01/21/92	01/28/92	0.014 +/-0.002	< 0.019
920282	01/28/92	02/04/92	0.015 +/-0.002	< 0.022
920347	02/04/92	02/11/92	0.012 +/-0.002	< 0.026
920366	02/11/92	02/18/92	0.008 +/-0.002	< 0.041
920394	02/18/92	02/25/92	0.020 +/-0.002	< 0.027
920455	02/25/92	03/03/92	0.013 +/-0.003	< 0.046
920471	03/03/92	03/10/92	0.013 +/-0.003	< 0.016
920501	03/10/92	03/17/92	0.008 +/-0.002	< 0.024
920549	03/17/92	03/24/92	0.011 +/-0.002	< 0.042
920578	03/24/92	03/31/92	0.006 +/-0.002	< 0.040
920649	03/31/92	04/07/92	0.017 +/-0.002	< 0.027
920700	04/07/92	04/14/92	0.019 +/-0.003	< 0.030
920727	04/14/92	04/21/92	< 0.002	< 0.025
920804	04/21/92	04/28/92	0.011 +/-0.002	< 0.034
920827	04/28/92	05/05/92	0.017 +/-0.002	< 0.024
920875	05/05/92	05/12/92	0.019 +/-0.003	< 0.023
920913	05/12/92	05/19/92	0.019 +/-0.003	< 0.023
920956	05/19/92	05/26/92	0.009 +/-0.002	< 0.025

= Control Location * = Low Level Analysis

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 07,Danville

Lab No.	Begin Date	End Date	Gross-Beta	I-131
920995	05/26/92	06/02/92	0.021 +/-0.003	< 0.026
921055	06/02/92	06/09/92	0.020 +/-0.003	< 0.029
921085	06/09/92	06/16/92	0.016 +/-0.002	< 0.020
921159	06/16/92	06/23/92	0.016 +/-0.002	< 0.024
921195	06/23/92	06/30/92	0.019 +/-0.002	< 0.024
921257	06/30/92	07/07/92	0.012 +/-0.002	< 0.024
921314	07/07/92	07/14/92	0.030 +/-0.003	< 0.027
921340	07/14/92	07/21/92	0.011 +/-0.002	< 0.028
921376	07/21/92	07/28/92	0.011 +/-0.002	< 0.029
921411	07/28/92	08/04/92	0.015 +/-0.002	< 0.042
921449	08/04/92	08/11/92	0.017 +/-0.002	< 0.041
921478	08/11/92	08/18/92	0.007 +/-0.002	< 0.026
921507	08/18/92	08/25/92	0.023 +/-0.002	< 0.033
921553	08/25/92	09/01/92	0.005 +/-0.002	< 0.019
921579	09/01/92	09/08/92	0.017 +/-0.002	< 0.018
921616	09/08/92	09/15/92	0.005 +/-0.002	< 0.015
921670	09/15/92	09/22/92	0.016 +/-0.002	< 0.043
921764	09/22/92	09/29/92	0.008 +/-0.002	< 0.052
921787	09/29/92	10/06/92	0.027 +/-0.002	< 0.037
921830	10/06/92	10/13/92	0.008 +/-0.002	< 0.035
921875	10/13/92	10/20/92	0.024 +/-0.002	< 0.030
921919	10/20/92	10/27/92	0.021 +/-0.002	< 0.036

= Control Location * = Low Level Analysis

Sample: Air Samples,(Beta,I-131)
Collection: Continuous with Weekly Exchange
Units: pCi/m**3

Location: 07,Danville

Lab No.	Begin Date	End Date	Gross-Beta	I-131
921955	10/27/92	11/03/92	0.029 +/-0.003	< 0.047
922010	11/03/92	11/10/92	0.011 +/-0.002	< 0.024
922034	11/10/92	11/17/92	0.019 +/-0.002	< 0.027
922041	11/17/92	11/24/92	0.008 +/-0.002	< 0.014
922088	11/24/92	12/01/92	0.017 +/-0.002	< 0.037
922106	12/01/92	12/08/92	0.005 +/-0.003	< 0.012
922177	12/08/92	12/15/92	0.011 +/-0.002	< 0.031
922184	12/15/92	12/22/92	0.028 +/-0.003	< 0.027
922230	12/22/92	12/29/92	0.015 +/-0.002	< 0.015

= Control Location * = Low Level Analysis

Sample: Air Samples,(Gamma)
Collection: Quarterly Composite of Weekly Samples
Units: pCi/m**3

Location	Lab No.	Begin Date	End Date	Cs-134	Cs-137
01,Met Tower	920588	12/31/91	03/31/92	< 0.0011	< 0.0010
01,Met Tower	921124	03/31/92	06/30/92	< 0.0011	< 0.0011
01,Met Tower	921732	06/30/92	09/29/92	< 0.0008	< 0.0006
01,Met Tower	922237	09/29/92	12/29/92	< 0.0012	< 0.0011
02,SW of Site	920589	12/31/91	03/31/92	< 0.0011	< 0.0010
02,SW of Site	921125	03/31/92	06/30/92	< 0.0015	< 0.0011
02,SW of Site	921733	06/30/92	09/29/92	< 0.0011	< 0.0009
02,SW of Site	922238	09/29/92	12/29/92	< 0.0010	< 0.0008
03,N of Site	920590	12/31/91	03/31/92	< 0.0007	< 0.0006
03,N of Site	921126	03/31/92	06/30/92	< 0.0014	< 0.0012
03,N of Site	921734	06/30/92	09/29/92	< 0.0020	< 0.0014
03,N of Site	922239	09/29/92	12/29/92	< 0.0009	< 0.0009
04,May Cemetery	920591	12/31/91	03/31/92	< 0.0023	< 0.0016
04,May Cemetery	921127	03/31/92	06/30/92	< 0.0015	< 0.0015
04,May Cemetery	921735	06/30/92	09/29/92	< 0.0008	< 0.0006
04,May Cemetery	922240	09/29/92	12/29/92	< 0.0007	< 0.0006
06,Local Office	920592	12/31/91	03/31/92	< 0.0007	< 0.0007
06,Local Office	921128	03/31/92	06/30/92	< 0.0013	< 0.0012
06,Local Office	921736	06/30/92	09/29/92	< 0.0012	< 0.0010
06,Local Office	922241	09/29/92	12/29/92	< 0.0013	< 0.0011
07,Danville	920593	12/31/91	03/31/92	< 0.0011	< 0.0008
07,Danville	921129	03/31/92	06/30/92	< 0.0013	< 0.0009
07,Danville	921737	06/30/92	09/29/92	< 0.0009	< 0.0007
07,Danville	922242	09/29/92	12/29/92	< 0.0007	< 0.0006

= Control Location * = Low Level Analysis

Location: 1?,Ark. Tech.

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
920077	01/07/92	< 0.3	< 3	< 2	< 7	< 2
920263	02/04/92	< 0.4	< 5	< 4	< 17	< 4
920425	03/?0/92	< 0.2	< 5	< 5	< 17	< 5
920662	04/14/92	< 0.2	< 3	< 2	< 8	< 3
920806	05/05/92	< 0.2	< 3	< 2	< 9	< 2
921003	06/09/92	< 0.2	< 4	< 4	< 13	< 3
921229	07/07/92	< 0.2	< 5	< 4	< 15	< 4
921377	08/04/92	< 0.3	< 3	< 2	< 8	< 2
921519	09/01/92	< 0.3	< 5	< 5	< 17	< 4
921821	10/15/92	< 0.4	< 3	< 2	< 9	< 3
921920	11/03/92	< 0.2	< 3	< 2	< 10	< 2
922079	12/08/92	< 0.3	< 2	< 2	< 8	< 2

Table No.: 2.2

Environmental Radiological Monitoring Report

Sample: Milk Samples,(I-131*,Gamma)
Collection: Monthly
Units: pCi/L

Location: 37,Steuber Dairy

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
920080	01/08/92	< 0.3	< 3	< 2	< 10	< 3
920262	02/05/92	< 0.3	< 2	< 2	< 6	< 2
920417	03/04/92	< 0.3	< 3	< 2	< 9	< 3
920550	04/01/92	< 0.2	< 3	< 3	< 11	< 4
920779	04/29/92	< 0.3	< 3	< 3	< 12	< 4
920914	05/26/92	< 0.2	< 3	< 2	< 7	< 2
921115	06/25/92	< 0.3	< 2	< 2	< 6	< 2
921315	07/22/92	< 0.2	< 2	< 2	< 8	< 2
921460	08/19/92	< 0.2	< 3	< 2	< 8	< 2
921601	09/16/92	< 0.3	< 2	< 2	< 8	< 2
921602	10/14/92	< 0.3	< 3	< 3	< 11	< 3
921956	11/11/92	< 0.2	< 3	< 3	< 11	< 3
922099	12/09/92	< 0.3	< 4	< 3	< 11	< 3

= Control Location * = Low Level Analysis

Table No.: 2.3
Sample: Milk Samples,(I-131*,Gamma)
Collection: Monthly
Units: pCi/L

Location: 41,Gibson Dairy

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
920078	01/07/92	< 0.3	< 3	< 2	< 9	< 3
920264	02/04/92	< 0.4	< 4	< 3	< 13	< 4
920426	03/10/92	< 0.4	< 2	< 2	< 8	< 2
920663	04/14/92	< 0.2	< 3	< 2	< 9	< 2
920807	05/05/92	< 0.2	< 2	< 2	< 7	< 2
921004	06/10/92	< 0.2	< 5	< 4	< 16	< 4
921230	07/07/92	< 0.2	< 4	< 4	< 12	< 3
921378	08/04/92	< 0.3	< 4	< 4	< 13	< 3
921520	09/01/92	< 0.4	< 3	< 2	< 8	< 3
921822	10/14/92	< 0.3	< 4	< 4	< 16	< 4
921921	11/03/92	< 0.2	< 5	< 4	< 14	< 4
922080	12/08/92	< 0.3	< 3	< 3	< 9	< 3

= Control Location * = Low Level Analysis

Sample: Milk Samples,(I-131*,Gamma)
Collection: Monthly
Units: pCi/L

Location: 42#,Hudson Dairy

Lab No.	Collection Date	I-131*	Cs-134	Cs-137	Ba-140	La-140
920079	01/07/92	< 0.3	< 2	< 2	< 9	< 3
920265	02/04/92	< 0.3	< 3	< 3	< 12	< 4
920427	03/10/92	< 0.2	< 3	< 3	< 10	< 4
920664	04/14/92	< 0.3	< 5	< 5	< 18	< 4
920808	05/05/92	< 0.2	< 4	< 4	< 16	< 4
921005	06/09/92	< 0.2	< 4	< 3	< 10	< 3
921231	07/07/92	< 0.2	< 4	< 4	< 13	< 4
921379	08/04/92	< 0.3	< 3	< 3	< 16	< 3
921521	09/01/92	< 0.5	< 3	< 3	< 10	< 3
921823	10/15/92	< 0.3	< 3	< 3	< 12	< 4
921922	11/03/92	< 0.2	< 3	< 3	< 12	< 3
922081	12/08/92	< 0.3	< 5	< 5	< 14	< 4

= Control Location * = Low Level Analysis

Sample: Drinking Water,(Beta,I-131,Gamma)
Collection: Monthly
Units: pCi/L

Location: 14,City Water

Lab. No.	Collection Date	Beta	I-131*	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	Cs-134	Cs-137	Ba-140	La-140
920157	01/14/92	< 2.5	< 0.3	< 2	< 2	< 4	< 2	< 7	< 2	< 3	< 2	< 2	< 6	< 2
920295	02/12/92	1.1+/-0.8	< 0.2	< 2	< 2	< 4	< 2	< 6	< 2	< 4	< 2	< 2	< 6	< 3
920424	03/10/92	< 1.2	< 0.2	< 2	< 1	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 6	< 2
920624	04/08/92	< 3.3	0.3+/-0.2	< 3	< 3	< 4	< 3	< 6	< 3	< 7	< 3	< 3	< 12	< 4
920834	05/07/92	4.0+/-2.0	< 0.3	< 2	< 2	< 3	< 3	< 5	< 2	< 5	< 3	< 2	< 10	< 3
920971	06/02/92	< 1.9	< 0.2	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 1	< 6	< 2
921162	07/01/92	< 1.9	< 0.3	< 3	< 3	< 4	< 3	< 6	< 3	< 6	< 3	< 3	< 11	< 4
921367	07/29/92	3.1+/-1.9	0.2+/-0.2	< 2	< 2	< 3	< 3	< 5	< 2	< 5	< 3	< 3	< 13	< 3
921479	08/26/92	6.8+/-2.1	< 0.2	< 2	< 2	< 3	< 2	< 4	< 2	< 5	< 2	< 2	< 8	< 2
921638	09/22/92	< 2.2	< 0.2	< 3	< 2	< 3	< 3	< 4	< 3	< 6	< 3	< 2	< 9	< 4
921849	10/20/92	2.4+/-1.2	< 0.2	< 2	< 2	< 4	< 3	< 7	< 3	< 5	< 2	< 3	< 11	< 3
921991	11/17/92	1.2+/-1.1	< 0.2	< 3	< 3	< 5	< 4	< 7	< 4	< 7	< 4	< 4	< 13	< 4
922134	12/15/92	1.6+/-1.1	< 0.2	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 2	< 2	< 7	< 2

= Control Location * = Low Level Analysis

Sample: Drinking Water,(H-3)
Collection: Quarterly Composite
Units: pCi/L

Location: 14,City Water

Lab. No.	Begin Date	End Date	H-3
920539	01/14/92	03/10/92	< 730
921196	04/08/92	06/02/92	< 630
921639	07/01/92	09/22/92	< 510
922253	10/20/92	12/15/92	< 480

Sample: Surface Water,(Gamma)
Collection: Monthly Composite
Units: pCi/L

Location: 08,Discharge

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920240	01/02/92	01/31/92	< 1	< 2	< 2	< 2	< 4	< 2	< 3	< 2	< 2	< 2	< 6	< 2
920395	01/31/92	02/29/92	< 2	< 2	< 3	< 2	< 5	< 2	< 4	< 3	< 3	< 2	< 9	< 3
920551	02/29/92	03/31/92	< 2	< 2	< 2	< 2	< 3	< 2	< 3	< 2	< 2	< 2	< 7	< 2
920780	03/31/92	04/30/92	< 5	< 6	< 6	< 5	< 11	< 5	< 11	< 8	< 5	< 5	< 23	< 6
920939	04/30/92	06/01/92	< 3	3 +/-2	< 4	< 3	< 6	< 3	< 6	< 3	< 3	< 3	< 10	< 3
921160	06/01/92	06/30/92	< 3	< 4	< 5	< 4	< 9	< 4	< 9	< 4	< 4	< 4	< 13	< 4
921368	06/30/92	07/31/92	< 3	< 2	< 3	< 3	< 5	< 3	< 6	< 7	< 3	< 3	< 15	< 3
921515	07/31/92	08/31/92	< 2	< 2	< 3	< 3	< 5	< 2	< 5	< 2	< 3	< 2	< 9	< 3
921688	08/31/92	10/01/92	< 2	< 3	< 3	< 2	< 5	< 3	< 6	< 4	< 3	< 2	< 11	< 4
921911	10/01/92	10/31/92	< 2	< 2	< 4	< 2	< 6	< 2	< 4	< 3	< 2	< 2	< 8	< 3
922047	10/31/92	11/30/92	< 2	< 3	< 3	< 4	< 6	< 3	< 6	< 3	< 3	< 3	< 11	< 4
922220	11/30/92	12/31/92	< 2	< 2	< 3	< 2	< 5	< 2	< 5	< 3	< 3	< 2	< 9	< 3

= Control Location * = Low Level Analysis

Sample: Surface Water,(H-3)
Collection: Quarterly Composite
Units: pCi/L

Location: 08,Discharge

Lab. No.	Begin Date	End Date	H-3
920561	01/02/92	03/31/92	< 670
921197	03/31/92	06/30/92	< 630
921690	06/30/92	10/01/92	< 470
922222	10/01/92	12/31/92	460 +/- 290

= Control Location * = Low Level Analysis

Sample: Surface Water,(Gamma)
Collection: Monthly Composite
Units: pCi/L

Location: 10#,Intake

Lab. No.	Begin Date	End Date	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Nb-95	Zr-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920241	01/02/92	01/31/92	< 2	< 2	< 3	< 2	< 4	< 2	< 4	< 3	< 2	< 2	< 8	< 2
920396	01/31/92	02/29/92	< 4	< 4	< 5	< 4	< 9	< 4	< 10	< 6	< 5	< 4	< 18	< 5
920552	02/29/92	03/31/92	< 5	< 5	< 6	< 6	< 12	< 5	< 12	< 7	< 6	< 6	< 21	< 6
920781	03/31/92	04/30/92	< 3	< 3	< 4	< 3	< 6	< 3	< 6	< 4	< 3	< 3	< 12	< 4
920940	04/30/92	06/01/92	< 3	< 4	< 5	< 5	< 9	< 4	< 8	< 5	< 5	< 4	< 15	< 4
921161	06/01/92	06/30/92	< 5	< 5	< 6	< 5	< 11	< 5	< 10	< 6	< 6	< 5	< 19	< 6
921369	06/30/92	07/31/92	< 2	< 2	< 2	< 2	< 4	< 2	< 4	< 2	< 2	< 2	< 7	< 3
921516	07/31/92	08/31/92	< 3	< 3	< 4	< 4	< 8	< 4	< 7	< 4	< 4	< 3	< 12	< 4
921689	08/31/92	10/01/92	< 3	< 4	< 5	< 4	< 7	< 4	< 7	< 5	< 4	< 4	< 14	< 4
921912	10/01/92	10/31/92	< 4	< 3	< 5	< 4	< 8	< 4	< 8	< 4	< 4	< 4	< 15	< 4
922048	10/31/92	11/30/92	< 3	< 3	< 4	< 3	< 6	< 3	< 7	< 4	< 3	< 3	< 10	< 4
922221	11/30/92	12/31/92	< 3	< 3	< 4	< 3	< 7	< 3	< 7	< 5	< 4	< 3	< 13	< 4

= Control Location * = Low Level Analysis

Sample: Surface Water,(H-3)
Collection: Quarterly Composite
Units: pCi/L

Location: 10#,Intake

Lab. No.	Begin Date	End Date	H-3
920560	01/02/92	03/31/92	< 670
921198	03/31/92	06/30/92	< 630
921691	06/30/92	10/01/92	< 470
922223	10/01/92	12/31/92	< 470

Table No.: 4.5

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Surface Water split w/ADH(H-3,Gamma)
Collection: Monthly
Units: pCi/L

Location: 08,Discharge

Lab. No.	Collection Date	H-3	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920184	01/21/92	< 640	< 2	< 3	< 2	< 2	< 5	< 5	< 2	< 3	< 3	< 2	< 8	< 3
920317	02/11/92	2590+/-410	< 2	< 3	< 2	< 2	< 4	< 4	< 3	< 6	< 2	< 2	< 13	< 5
920472	03/17/92	< 590	< 2	< 3	< 2	< 3	< 4	< 3	< 2	< 2	< 2	< 2	< 7	< 2
920692	04/20/92	630 +/-300	< 2	< 2	5 +/-2	< 2	< 3	< 4	< 2	< 2	< 2	3 +/-2	< 6	< 6
920878	05/19/92	< 610	< 2	< 3	< 2	< 2	< 4	< 4	< 2	< 2	< 2	< 2	< 7	< 2
921056	06/16/92	< 630	< 3	< 3	< 3	< 3	< 5	< 5	< 3	< 3	< 3	< 3	< 9	< 3
921298	07/16/92	< 600	< 3	< 5	< 3	< 4	< 7	< 8	< 4	< 11	< 4	< 4	< 23	< 4
921431	08/11/92	< 490	< 2	< 3	< 2	< 3	< 5	< 5	< 2	< 3	< 3	< 2	< 10	< 3
921580	09/10/92	< 510	< 3	< 4	20 +/-3	< 3	< 6	< 6	< 3	6 +/-4	< 3	< 3	< 13	< 4
921906	10/27/92	< 490	< 3	< 3	< 4	< 3	< 5	< 6	< 3	< 3	< 4	< 3	< 12	< 4
921947	11/10/92	< 580	< 2	< 2	< 2	< 2	< 3	< 5	< 3	< 3	< 2	< 2	< 10	< 3
922137	12/15/92	< 470	< 2	< 3	< 2	< 3	< 5	< 5	< 3	< 3	< 3	< 3	< 9	< 3

= Control Location * = Low Level Analysis

Table No.: 4.6

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Surface Water split w/ADH(H-3,Gamma)

Collection: Monthly

Units: pCi/L

Location: 16#,Piney Creek

Lab. No.	Collection Date	H-3	Mn-54	Fe-59	Co-58	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920185	01/21/92	< 640	< 2	< 2	< 2	< 2	< 4	< 4	< 2	< 2	< 2	< 2	< 6	< 2
920318	02/11/92	< 640	< 2	< 3	< 2	< 2	< 4	< 5	< 2	< 7	< 2	< 2	< 14	< 5
920473	03/17/92	< 590	< 2	< 3	< 2	< 2	< 5	< 5	< 2	< 3	< 3	< 2	< 9	< 3
920693	04/20/92	< 490	< 2	< 3	< 2	< 2	< 4	< 4	< 2	< 2	< 2	< 2	< 7	< 3
920879	05/19/92	< 610	< 5	< 7	< 5	< 6	< 12	< 12	< 5	< 5	< 5	< 6	< 19	< 5
921057	06/16/92	< 630	< 2	< 4	< 2	< 3	< 6	< 6	< 3	< 3	< 3	< 3	< 11	< 3
921299	07/16/92	< 600	< 2	< 4	< 3	< 3	< 6	< 6	< 3	< 8	< 3	< 3	< 16	< 4
921432	08/11/92	< 490	< 2	< 3	< 2	< 3	< 5	< 5	< 3	< 3	< 2	< 2	< 9	< 3
921581	09/10/92	< 510	< 2	< 3	< 2	< 2	< 4	< 4	< 2	< 3	< 2	< 2	< 9	< 3
921907	10/27/92	< 490	< 3	< 5	< 4	< 4	< 7	< 8	< 4	< 5	< 4	< 4	< 13	< 4
921948	11/10/92	< 580	< 4	< 6	< 4	< 4	< 9	< 10	< 5	< 9	< 5	< 4	< 21	< 6
922138	12/15/92	< 470	< 3	< 5	< 3	< 4	< 7	< 8	< 4	< 6	< 4	< 4	< 15	< 6

= Control Location * = Low Level Analysis

Sample: Ground Water,(H-3,Gamma)
Collection: Quarterly
Units: pCi/L

Location: 32,Stewart Res.

Lab. No.	Collection Date	H-3	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920155	01/14/92	< 740	< 4	< 4	< 5	< 4	< 9	< 9	< 4	< 5	< 5	< 4	< 17	< 5
920622	04/08/92	< 620	< 2	< 2	< 2	< 2	< 4	< 4	< 2	< 2	< 2	< 2	< 7	< 3
921164	07/01/92	< 600	< 3	< 3	< 4	< 3	< 7	< 7	< 3	< 3	< 4	< 3	< 12	< 4
921636	09/22/92	< 510	< 3	< 4	< 4	< 4	< 7	< 7	< 3	< 4	< 4	< 3	< 13	< 4
922135	12/15/92	< 480	< 2	< 2	< 3	< 3	< 5	< 6	< 3	< 3	< 3	< 3	< 11	< 4

= Control Location * = Low Level Analysis

Sample: Ground Water,(H-3,Gamma)
Collection: Quarterly
Units: pCi/L

Location: 33,Quita Rec.

Lab. No.	Collection Date	H-3	Mn-54	Co-58	Fe-59	Co-60	Zn [illegible]	Zr-95	Nb-95	I-131	Cs-134	Cs-137	Ba-140	La-140
920156	01/14/92	< 740	< 2	< 2	< 3	< 2	< 5	< 5	< 2	< 3	< 3	< 2	< 8	< 3
920623	04/08/92	< 620	< 2	< 2	< 3	< 2	< 4	< 4	< 2	< 3	< 2	< 2	< 8	< 2
921163	07/01/92	< 600	< 2	< 2	< 3	< 3	< 5	< 5	< 2	< 4	< [illegible]	< 2	< 11	< 3
921637	09/22/92	< 510	< 2	< 2	< 3	[illegible] 3	< 5	< 5	< 3	< 3	< 3	< 3	< 11	< [illegible]
922136	12/15/92	< 480	< 3	< 3	< 4	< 3	< 6	< 7	< 3	< 5	< 3	< 3	< 14	< 4

= Control Location * = Low Level Analysis

Sample: Fish Samples,(Gamma)
Collection: Semiannually
Units: pCi/kg

Location: 08,Discharge

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
920583	03/28/92	CATFISH	< 6	< 6	< 9	< 6	< 13	< 7	< 6
920584	03/28/92	BASS & CRAPPIE	< 5	< 5	< 7	< 5	< 11	< 5	< 5
921777	09/03/92	CATFISH	< 6	< 9	< 14	< 7	< 15	< 9	30 +/-7
921778	09/03/92	BASS & CRAPPIE	< 5	< 6	< 10	< 5	< 11	14 +/-7	20 +/-5

= Control Location * = Low Level Analysis

Table No.: 6.2

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Fish Samples,(C - Wa)
Collection: Semiannual
Units: pCi/kg

Location: 10#,Intake

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
920585	03/28/92	CATFISH	< 7	< 7	< 10	< 7	< 15	< 7	12 +/-6
920586	03/28/92	BASS & CRAPPIE	< 5	< 6	< 8	< 6	< 13	< 6	12 +/-6
921779	09/12/92	CATFISH	< 7	< 8	< 13	< 7	< 14	< 8	< 7
921780	09/12/92	BASS & CRAPPIE	< 7	< 9	< 11	< 6	< 14	< 7	< 7

= Control Location * = Low Level Analysis

Sample: Fish samples split w/ADH. (Gamma)
Collection: As requested.
Units: pCi/kg

Location: 08,Discharge

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
920784	04/30/92	TYPE NOT GIVEN	< 9	< 9	< 14	< 10	< 22	25 +/-10	43 +/-10
920785	04/30/92	DUPLICATE	< 6	< 6	< 10	< 6	< 15	26 +/-6	31 +/-6
921863	10/21/92	TYPE NOT GIVEN	< 7	< 8	< 12	< 8	< 21	< 12	44 +/-10

Sample: Fish samples split w/ADH. (Gamma)
Collection: As requested.
Units: pCi/kg

Location: 10#,Intake

Lab No.	Collection Date	Sample type	Mn-54	Co-58	Fe-59	Co-60	Zn-65	Cs-134	Cs-137
920782	04/30/92	TYPE NOT GIVEN	< 9	< 11	< 15	< 10	< 23	< 11	11 +/-7
920783	04/30/92	DUPLICATE	< 15	< 16	< 22	< 17	< 36	< 19	< 18

= Control Location * = Low Level Analysis

Sample: Sediment,(Gamma)
Collection: Semiannually
Units: pCi/kg

Location	Lab No.	Collection Date	Mn-54	Co-58	Co-60	Ag-110m	Cs-134	Cs-137
08,Discharge	920506	03/25/92	168 +/-33	111 +/-27	522 +/-46	< 140	686 +/-48	3095 +/-66
08,Discharge	921661	09/26/92	141 +/-17	270 +/-22	179 +/-15	< 41	< 27	1361 +/-27
10#,Intake	920507	03/25/92	24 +/-9	< 14	< 15	< 55	< 20	119 +/-13
10#,Intake	921662	09/26/92	< 13	< 13	< 13	< 38	< 18	465 +/-22
16#,Piney Creek	920508	03/25/92	13 +/-8	< 12	< 13	< 49	< 18	152 +/-19
16#,Piney Creek	921663	09/26/92	18 +/-8	< 11	< 12	< 40	< 16	185 +/-13

= Control Location * = Low Level Analysis

Table No.: B.1

Environmental Radiological Monitoring Report

Date: 01/20/93

Sample: Vegetation: [illegible]f,(I-131,Gamma)

Collection: Monthly wh[illegible]vailable.

Units: pCi/kg

Location: 13,W of Site

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
920983	06/04/92	BROADLEAF	< 13	< 23	< 15
92098[illegible]	06/04/92	DUPLICATE	< 31	< 31	< 28
921268	07/10/92	BROADLEAF	< 26	< 20	< 17
921385	08/06/92	BROADLEAF	< 25	< 19	< 18

= Control Location * = Low Level Analysis

Sample: Vegetation: Broadleaf,(I-131,Gamma)
Collection: Monthly when available.
Units: pCi/kg

Location: 45,E of Site

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
920985	06/04/92	BROADLEAF	< 21	< 23	< 20
920986	06/04/92	DUPLICATE	< 13	< 14	< 13
921269	07/10/92	BROADLEAF	< 30	< 27	< 21
921386	08/06/92	BROADLEAF	< 41	< 38	< 29

Table No.: 8.3
Sample: Veg.:Food Prod. split w/ADH (Gamma)
Collection: As requested.
Units: pCi/kg

Location: 32,Stewart Res.

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
920880	05/19/92	CARRAGE	< 27	< 28	< 25
920881	05/19/92	CARROTS	< 22	< 23	< 25
920882	05/19/92	LETTUCE	< 15	< 17	< 15
921274	07/10/92	BROCC.&EGGPLANT	< 21	< 7	< 7
921275	07/10/92	CABBAGE	< 7	< 5	13 +/-5
921276	07/10/92	MELONS	< 17	< 13	< 10
921277	07/10/92	CARROTS	< 53	< 40	< 29

Sample: Vegetation: Food Products,(Gamma)
Collection: At Time of Harvest
Units: pCi/kg

Location: 40,Hollis Res.

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
921270	07/14/92	POTATOES	< 29	< 16	< 17
921271	07/14/92	PEPPERS	< 25	< 26	< 20
921272	07/14/92	CUCUMBERS	< 26	< 11	< 13
921273	07/14/92	TOMATOES	< 13	< 14	< 12

Sample: Vegetation: Food Products,(Gamma)
Collection: At Time of Harvest
Units: pCi/kg

Location: 38,Jones Res.

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
921433	08/12/92	CUCUMBERS	< 28	< 18	< 17
921461	08/18/92	TOMATOES	< 14	< 11	< 10

= Control Location * = Low Level Analysis

Sample: Vegetation. Food Products,(Gamma)
Collection: At Time of Harvest
Units: pCi/kg

Location: 46,Gregory garde

Lab No.	Collection Date	Sample type	I-131	Cs-134	Cs-137
921791	10/09/92	TURNIPS-SHIVERS	< 13	< 11	< 10

Table No. : 8.7
Sample : Vegetation : Food Products (Gamma)
Collection : As requested
Units : pCi/kg

Environmental Radiological Monitoring Report

Date : 04/09/93

Location : 108, Flatwood Road

Lab No.	Collection Date	Sample Type	I-131	Cs-134	Cs-137
921681	09/30/92	GARDEN VEG.	<4	<4	<3
921682	09/30/92	POTATOES	<11	<11	<10

= Control Location * = Low Level Analysis

EPA CROSS CHECK RESULTS

EPA PREP DATE	DATE RESULTS ISSUED	MEDIA	NUCLIDE	EPA RESULTS	ESI. SYSTEM CHEMISTRY RESULTS	NORM DEV. KNOWN
01/31/92	04/01/92	WATER (pCi/L)	Beta	30.0	20.67	-3.23**1
02/07/92	04/15/92	WATER (pCi/L)	I-131	59.0	60.33	0.38
02/14/92	04/10/92	WATER (pCi/L)	Co-60	40.0	39.67	-0.12
			Zn-65	148.0	148.00	0.00
			Ru-106	203.0	184.67	-1.59
			Cs-134	31.0	29.33	-0.58
			Cs-137	49.0	50.33	0.46
			Ba-133	76.0	80.33	0.94
02/21/92	04/10/92	WATER (pCi/L)	H-3	7904.0	8340.00	0.96
03/27/92	07/15/92	AIR FILTER (pCi/FILTER)	Beta	41.0	50.33	3.23**2
			Cs-137	10.0	10.33	0.12
04/14/92	08/04/92	WATER BLIND B (pCi/L)	Beta	140.0	115.33	-2.03
			Cs-134	24.0	22.00	-0.69
			Cs-137	22.0	23.33	0.46
04/24/92	08/04/92	MILK (pCi/L)	I-131	78.0	78.67	0.14
			Cs-137	39.0	40.67	0.58
			K	1710.0	1763.33	1.07
04/24/92	08/25/92	WATER (pCi/L)	Co-60	20.0	20.33	0.12
			Zn-65	99.0	100.67	0.29
			Ru-106	141.0	132.67	-1.03
			Cs-134	15.0	15.33	0.12
			Cs-137	15.0	14.67	-0.12
			Ba-133	98.0	99.67	0.29
05/15/92	07/15/92	WATER (pCi/L)	Beta	44.0	43.67	-0.12
06/19/92	08/19/92	WATER (pCi/L)	H-3	2125.0	2503.33	1.89
08/07/92	10/28/92	WATER (pCi/L)	I-131	45.0	49.00	1.15
08/28/92	12/29/92	AIR FILTER (pCi/FILTER)	Beta	69.0	70.33	0.23
			Cs-137	18.0	18.00	0.00
09/25/92	01/12/93	MILK (pCi/L)	I-131	100.0	98.00	-0.35
			Cs-137	15.0	16.00	0.35
			K	1750.0	1706.67	-0.83
10/23/92	12/21/92	WATER (pCi/L)	H-3	5962.0	5703.33	-0.75

**1 A new efficiency curve was determined for the beta counter. Recalculation of the 1/31/92 beta in water sample using the new efficiency curve gives results within the control limits.

**2 A new efficiency curve was determined for air filter samples. Recalculation of the 3/27/92 air filter sample using the new efficiency value gives results within the control limits.

ATTACHMENT II

1992 ENVIRONMENTAL THERMOLUMINESCENT DOSIMETRY REPORT

TABLE 1

1992 ANO TLD RESULTS

0-2 MILES

(mrem/QTR)

STATION	1ST QTR	2ND QTR	3RD QTR	4TH QTR	MEAN
1	27	37	26	33	30.8
2	29	26	27	27	27.3
3	25	31	32	29	29.3
4	27	17	19	24	21.8
108	31	23	26	21	25.3
109	33	22	27	*	27.3
110	29	19	24	26	24.5
113	28	30	25	22	26.3
114	28	22	31	25	26.5
115	29	22	37	26	28.5
116	27	24	32	35	29.5
Average	28.5	24.8	27.8	26.8	--

* - Value reported as 0.

TABLE 2

1992 ANO TLD RESULTS

2-5 MILES

(mrem/QTR)

STATION	1ST QTR	2ND QTR	3RD QTR	4TH QTR	MEAN
111	25	30	21	18	23.5
112	25	25	36	24	27.5
119	25	29	19	33	26.5
120	40	16	23	31	27.5
121	27	18	22	*	22.3
122	24	18	25	31	24.5
123	22	19	11	27	19.8
124	27	35	39	27	32.0
130	26	23	23	26	24.5
131	21	21	19	23	21.0
133	23	17	16	45	25.3
134	32	25	22	25	26.0
135	24	24	24	35	26.8
136	17	21	*	29	22.3
141	22	23	25	29	24.8
Average	25.3	22.9	23.2	28.8	—

* - No Data; TLD lost in field.

TABLE 3

1992 ANO TLD RESULTS

> 5 MILES

(mrem/QTR)

STATION	1ST QTR	2ND QTR	3RD QTR	4TH QTR	MEAN
5	24	24	23	26	24.3
6	24	24	24	29	25.3
7	26	28	30	24	27.0
117	24	22	23	27	24.0
118	27	26	18	**	23.7
125	26	20	28	37	27.8
126	28	23	30	31	28.0
127	24	35	29	26	28.5
128	33	25	25	29	28.0
129	29	19	32	29	27.3
132	25	*	26	30	27.0
137	27	24	31	27	27.3
138	26	22	18	25	22.8
139	26	21	41	33	30.3
140	27	**	22	33	27.3
142	46	30	25	27	32.0
143	32	27	32	20	27.8
144	33	25	22	26	26.5
Average	28.2	24.7	26.6	28.2	—

* - No Data; TLD damaged in field.

** - No Data; TLD lost in field.

TABLE 4

1992 ANO TLD RESULTS

(mrem/192 Days)

0-2 MILES

STATION	1ST 6 MONTHS	2ND 6 MONTHS	MEAN
1	56	44	50.0
2	45	45	45.0
3	49	46	47.5
4	37	43	40.0
Average	46.8	44.5	—

> 5 MILES

STATION	1ST 6 MONTHS	2ND 6 MONTHS	MEAN
5	38	44	41.0
6	35	43	39.0
7	39	38	38.5
Average	37.3	41.7	—

ATTACHMENT III

STATISTICAL ANALYSES

STATISTICAL ANALYSES

Calculation of the mean, standard deviation and "t" values are as follows:

Mean: $\bar{X} = \Sigma Xi/n$

where:
- $\bar{X}$ = Mean of sample results
- Xi = Sum of individual results
- n = Number of samples

STANDARD DEVIATION:

where: $Sd = \sqrt{\frac{\sum (X - \bar{X})^2}{n-1}}$

- Sd = Standard deviation
- X = Individual sample result
- $\bar{X}$ = Mean of sample results
- n = Number of samples

"t" VALUE:

$$t = \frac{(\bar{x} - \bar{y})}{\sqrt{\frac{(n_x - 1)s_x^2 + (n_y - 1)s_y^2}{n_x + n_y - 2}} \quad \sqrt{\frac{1}{n_x} + \frac{1}{n_y}}}$$

where:
- t = Calculated "t" value
- $\bar{x}$ = Mean of first data set
- $\bar{y}$ = Mean of second data set
- n_x = Number of variables in first data set
- s_x = Standard deviation of first data set
- n_y = Number of variables in second data set
- s_y = Standard deviation of second data set

STATISTICAL ANALYSES

- Calculated "t" values were compared to tabular "t" values obtained from the CRC Standard Mathematical Tables, 26th Edition (1981) to test the hypothesis that the true mean of the first population is equal to the true mean of the second population. The "t" test was performed for air samples and TLDs as shown below and on the following page.

AIR SAMPLES

Parameter	1	2	3	4	6	7
Gross Beta Mean (10E-3 pCi/m^3)	16.9 (17)	15.7 (16)	14.8 (15)	14.7 (15)	15.4 (15)	15.4 (15)
Gross Beta Standard Deviation (10E-3 pCi/m^3)	5.3	5.6	6.0	5.2	6.3	6.8
Number in Sample	52	52	52	51	52	51
Calculated "t" Value to Comparison with Control Station (7)	1.250	0.245	- 0.475	- 0.584	N/A	N/A
Tabular "t" Value at 95% Confidence (t, 0.025, n)	1.987	1.987	1.987	1.987	N/A	N/A

STATISTICAL ANALYSES

QUARTERLY TLDs

Parameter	0 - 2 Miles	2 - 5 Miles	> 5 Miles
Mean (mrem/Qtr)	26.98 (27.0)	25.03 (25.0)	26.96 (27.0)
Standard Deviation (mrem/Qtr)	4.6	6.3	4.9
Number in Sample	43	58	69
Calculated "t" Value to Comparison with Stations Located >5 Miles	0.022	-1.942	N/A
Tabular "t" Value at 95% Confidence (t, 0.025, n)	1.983	1.979	N/A

ATTACHMENT IV

DOSE CALCULATIONS

DOSE CALCULATIONS

- Dose calculation for the discharge sediment was performed using generalized equation found in Regulatory Guide 1.109, Appendix A as follows:

$$R = (40)(C)(U)(D)(W)$$

where: R = Annual dose to skin or total body in mrem/year;

40 = Area-mass conversion factor given in Appendix A of Regulatory Guide 1.109 in Kg/m^2;

C = 1992 maximum radionuclide concentration in pci/kg;

U = Maximum exposure time given in Table E-5 of Regulatory Guide 1.109 (67 hours for teenager);

D = External dose conversion factor for standing on contaminated ground given in Table E-6 of Regulatory Guide 1.109 in mrem/hr per pCi/m^2, and

W = Shore-width factor (0.1) given in Table A-2 of Regulatory Guide 1.109.

DOSE FROM SEDIMENT IN MILLIREM/YEAR

Radionuclide	1992 Maximum Concentraiton	Conversion Factor For Skin	Total Skin Dose	Conversion Factor For Total Body	Total Body Dose
Mn-54	168	6.80E-09	3.06E-04	5.80E-09	2.61E-04
Co-58	270	8.20E-09	5.93E-04	7.00E-09	5.07E-04
Co-60	522	2.00E-08	2.80E-03	1.70E-08	2.38E-03
Cs-134	686	1.40E-08	2.57E-03	1.20E-08	2.21E-03
Cs-137	3095	4.90E-09	4.06E-03	4.20E-09	3.48E-03
		TOTAL	**1.03E-02**		**8.84E-03**