

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8605080281 DOC. DATE: 85/12/31 NOTARIZED: NO DOCKET #
 FACIL: 50-397 WPPSS Nuclear Project, Unit 2, Washington Public Power 05000397
 AUTH. NAME AUTHOR AFFILIATION
 POWERS, C. M. Washington Public Power Supply System
 POWELL, P. L. Washington Public Power Supply System
 GRAYBEAL, R. G. Washington Public Power Supply System
 RECIPI. NAME RECIPIENT AFFILIATION

*See
 Environment
 Rept.*

SUBJECT: "Radiological Environ Monitoring Program Annual Rept - Plant
 2, 1985." W/860501 ltr.

DISTRIBUTION CODE: IE25L COPIES RECEIVED: LTR 1 ENCL 14 ^{on Sub P.} SIZE: 225
 TITLE: Periodic Environ Monitoring Rept (50 DKT)-Annual/Semiannual/Effluent/

NOTES:

RECIPIENT		COPIES		RECIPIENT		COPIES	
ID CODE/NAME		LTTR	ENCL	ID CODE/NAME		LTTR	ENCL
BWR PD3 PD 04		5	5	BWR PSB		3	3
INTERNAL: ACRS 11		1	1	AEOD		1	1
IE FILE 01		1	1	NRR BWR ADTS		1	1
NRR PWR-A ADTS		1	1	NRR PWR-B ADTS		1	1
<u>NRR/DSRO/RRAB</u>		1	1	RGN2/DRSS/EPRPB		1	1
RM/DDAMI/MIB		1	1				
EXTERNAL: 24X		1	1	LPDR 03		1	1
NRC PDR 02		1	1				

TOTAL NUMBER OF COPIES REQUIRED: LTTR 20 ENCL 28

6

221

Washington Public Power Supply System

P.O. Box 968 3000 George Washington Way Richland, Washington 99352 (509) 372-5000

May 1, 1986
EP-CJC-86-045Document Control Desk
Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

SUBJECT: 1985 RADIOLOGICAL ENVIRONMENTAL
MONITORING PROGRAM ANNUAL REPORT

Enclosed are fourteen copies of the 1985 Radiological Environmental Monitoring Program Annual Report. This makes a total of sixteen copies that have been sent to you. If you have any questions concerning this report, please feel free to contact C. J. Card at (509) 377-8066.

Very truly yours,

for *R B Sorensen*G. C. Sorensen, Manager
Regulatory Programs

GCS/CJC/vlc

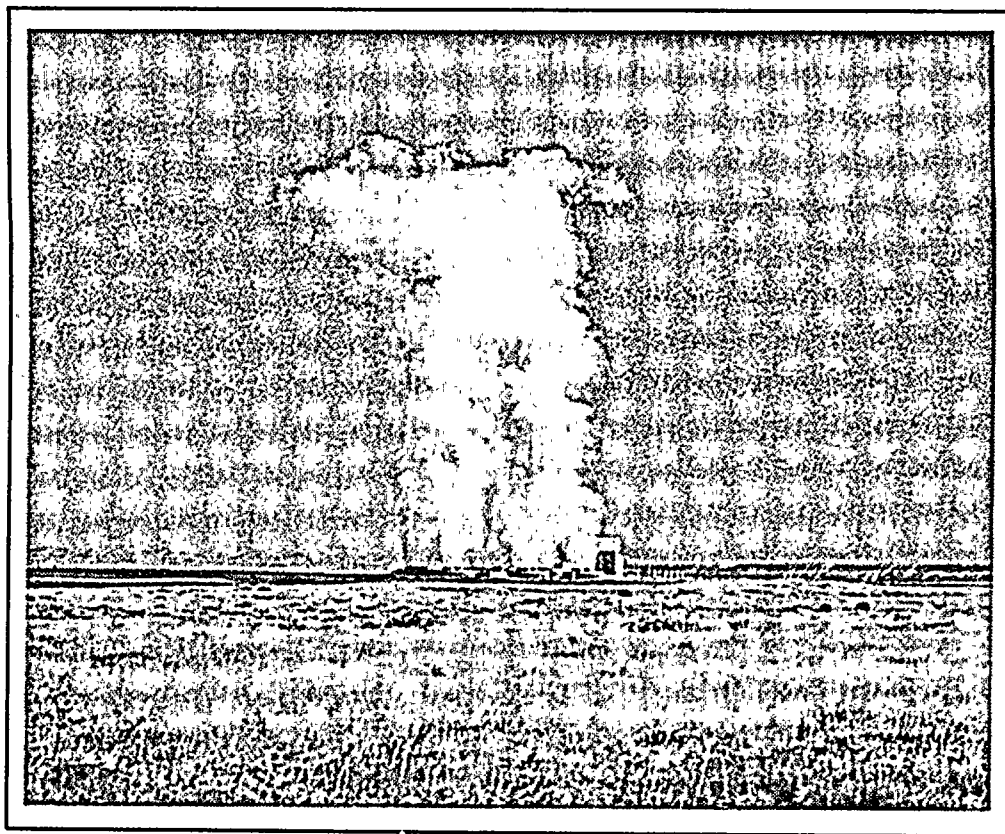
Enclosure

IE25
1/14

RTS MASTER FILE

ENV-85

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL REPORT PLANT 2



1985

860357



WASHINGTON PUBLIC POWER
SUPPLY SYSTEM

8605080281

1985 Radiological Environmental Monitoring Program

Annual Report - Plant 2

April 1986

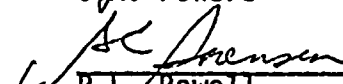
Approvals:

WNP-2 Plant Manager


C.M. Powers

4-23-86
Date

WNP-2 Licensing Manager


P.L. Powell

4-24-86
Date

WNP-2 Health Physics/
Chemistry Manager


R.G. Graybeal

4-23-86
Date

Emergency Planning and
Environmental Programs


R.A. Chitwood

4-23-86
Date

Originated By:


C.J. Card

4-22-86
Date

1985

ANNUAL REPORT

RADIOLOGICAL ENVIRONMENTAL
MONITORING PROGRAM

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PLANT NUMBER 2

Prepared By:

C.J. Card
Washington Public Power Supply System
T.E. Chapman
Washington Public Power Supply System
M.M. Lardy
United States Testing Company
A. Robinson
United States Testing Company

ACKNOWLEDGEMENTS

The authors would like to gratefully acknowledge L.S. Schleder, W. Davis III, J.P. Chasse, and M. Feucht for their fine efforts in the production and review of this report.

TABLE OF CONTENTS

1.0	INTRODUCTION	1-1
2.0	PROGRAM DESCRIPTION	2-1
2.1	Sample Deviation	2-1
2.2	Land Use Census	2-15
3.0	SAMPLING METHODS	3-1
3.1	Direct Radiation	3-1
3.2	Airborne Particulate/Air Iodine	3-2
3.3	Water	3-3
3.4	Soil	3-4
3.5	Shoreline Sediment	3-4
3.6	Fish	3-5
3.7	Milk	3-5
3.8	Garden Produce	3-6
4.0	ANALYTICAL PROCEDURES	4-1
4.1	Determination of Gross Beta Activity on Particulate Filters	4-1
4.2	Gamma Determination of I-131 Adsorbed on Charcoal	4-1
4.3	Measurement of Gamma-Ray Emitters	4-1
4.4	Determination of Gross Beta Activity in Water	4-2
4.5	Determination of Iodine-131 in Water By Solvent Extraction Method	4-3
4.6	Determination of Tritium in Water	4-3
4.7	Determination of Strontium-90 in Milk and Water	4-3
4.8	Determination of Iodine-131 in Milk By Batch Ion Exchange Method	4-4
5.0	DISCUSSION OF ANALYTICAL RESULTS AND SUMMARY	5-1
5.1	Direct Radiation	5-7
5.2	Airborne Particulate/Air Iodine	5-27
5.3	Water	5-29
5.4	Soil	5-32
5.5	Shoreline Sediment	5-32

5.6	Fish	5-33
5.7	Milk	5-33
5.8	Garden Produce	5-36
5.9	Summary	5-36
6.0	REFERENCES	6-1

APPENDIX

Appendix A	Results	A-1
Appendix B	Quality Control	B-1
	B.1 Supply System Environmental TLD Quality Control Program	B-1
	B.2 United States Quality Control Program	B-6
Appendix C	WNP-2 Effluents and Dose Assessment	C-1
	C.1 Introduction	C-1
	C.2 Liquid Effluents	C-1
	C.3 Gaseous Effluents	C-2

LIST OF TABLES

2-1	REMP Sample Locations By Sector	2-4
2-2	Radiological Environmental Monitoring Program Plan	2-8
2-3	1985 Deviation in the REMP Sampling Program	2-11
2-4	Distances In Miles to Nearest Points of Interest Within the Five Mile Radius From WNP-2 Containment	2-16
4-1	REMP Radiochemical Analyses	4-5
5-1	REMP Data Summary	5-2
5-2	A Comparison of the Contractual and Branch Technical Position Lower Limits of Detection	5-5
5-3	Radiological Environmental Monitoring Program 1985 Annual Summary	5-8
5-4	Quarterly TLD Data Summary For the Preoperational and Operational Periods	5-20
5-5	Annual TLD Data Summary For the Preoperational and Operational Periods	5-22
5-6	1985 Quarterly Versus Annual TLD Data	5-25
5-7	Comparison of the Results For Station 27 and Its Duplicate, Station 72	5-31
5-8	Comparison of the Results For Station 36 and Its Duplicate, Station 37	5-35

Appendix A:

A-1	1985 Quarterly TLD Results	A-1
A-2	1985 Annual TLD Results	A-7
A-3	Gross Beta On Air Particulate Filter	A-10
A-4	Gamma Spectrometry of Particulate Filters	A-24
A-5	I-131 in Charcoal Filter	A-29
A-6	Gross Beta in Water	A-43
A-7	Tritium in Water	A-45
A-8	Gamma Spectrometry of Water	A-46
A-9	Gamma Spectrometry of Soil	A-63
A-10	Gamma Spectrometry of Sediment Bottom	A-66
A-11	Gamma Spectrometry of Fish	A-67
A-12	Iodine-131 in Raw Milk	A-71
A-13	Gamma Spectrometry of Raw Milk	A-73

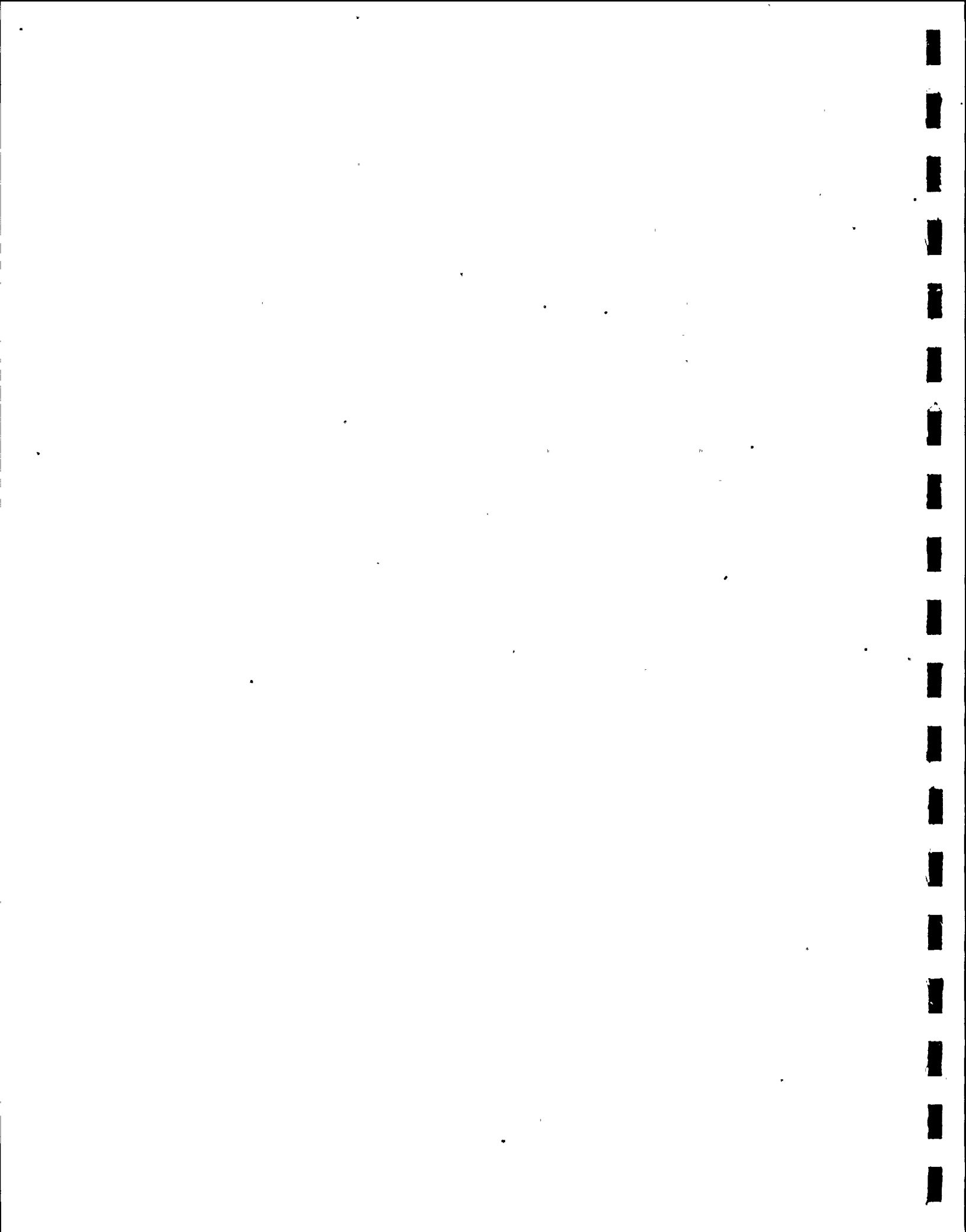
A-14	Gamma Spectrometry of Root Crop	A-82
A-15	Gamma Spectrometry of Fruit	A-84
A-16	Gamma Spectrometry of Vegetable Stock	A-86

Appendix B:

B-1	Environmental Audit Dosimeter Results For Third and Fourth Quarters 1985	B-3
B-2	Summary of 1985 Blank Quality Control Data	B-18
B-3	Summary of 1985 Spike Quality Control Data	B-18
B-4	EPA Interlaboratory Comparison of Analytical Results	B-20

Appendix C:

C-1	WNP-2 Liquid Effluents - Source Terms	C-5
C-2	Summary of Doses From 1985 Liquid Effluents - Maximum Individual	C-7
C-3	Average Individual Doses From 1985 Liquid Effluents	C-8
C-4	50-Miles Population Doses From 1985 Liquid Effluents	C-9
C-5	WNP-2 1985 Gaseous Effluents - Source Terms	C-10
C-6	Summary of Organ and Air Doses From WNP-2 1985 Gaseous Effluents	C-12
C-7	Average Individual Doses from 1985 Gaseous Effluents	C-13
C-8	50-Mile Population Doses From 1985 Gaseous Effluents	C-14



LIST OF FIGURES

2-1	REMP Sampling Locations Within the 10 Mile Radius	2-2
2-2	REMP Sampling Locations Outside the 10 Mile Radius	2-3
5-1	1985 Quarterly TLD Results	5-14
5-2	Log Probability Plot of First Quarter 1985 TLD Results	5-15
5-3	Log Probability Plot of Second Quarter 1985 TLD Results	5-16
5-4	Log Probability Plot of Third Quarter 1985 TLD Results	5-17
5-5	Log Probability Plot of Fourth Quarter 1985 TLD Results	5-18
5-6	Log Probability Plot of 1985 Annual TLD Results	5-19
5-7	1985 Gross Beta in Air Average Weekly Results	5-28
5-8	Iodine-131 in Milk Results for April Through June 1985	5-35
Appendix B:		
B-1	Supply System Environmental TLD Preparation - Use Cycle	B-4
B-2	Supply System TLD Evaluation	B-5
B-3	Sample Receiving	B-10
B-4	General Work Flow Plan	B-11
B-5	Preparation of Blanks and Spikes by the QC Department	B-12
B-6	Data Evaluation	B-13

1.0 INTRODUCTION

The Radiological Environmental Monitoring Program for the Washington Public Power Supply System Nuclear Plant Number 2 (WNP-2) was initiated in March 1978. The preoperational phase extended from that time until initial criticality on January 19, 1984. The results of environmental measurements obtained from the time of initial criticality until December 31, 1984, were summarized in the 1984 Radiological Environmental Monitoring Program Annual Report. The results of environmental measurements obtained during CY 1985 for the Radiological Environment Monitoring Program (REMP) are presented in the following report.

The WNP-2 REMP provides for measurement of radiation and radioactive materials in the environment around the WNP-2 site. The environmental media used for the program are those pertaining to the radionuclides and exposure pathways for which the highest potential dose commitment to a member of the public could result from plant operations. Although in-plant monitoring programs are used to ensure that 10CFR20 and 10CFR50 criteria for release of radioactive effluents are met, the REMP provides a mechanism for verifying that the accumulation of radioactivity in the environment from plant operations is not greater than expected, based upon effluent measurement and dose modeling of environmental exposure pathways. The WNP-2 REMP is designed to conform to regulatory guidance provided by Regulatory Guides 4.1, 4.8 and the Radiological Assessment Branch Technical Position (BTP)¹, taking into account site specific characteristics. The preoperational phase of the program provided a baseline of environmental data. Variability of the background levels of radioactivity, due to differences in geologic composition, weapons test fallout, meteorological conditions and seasonal changes, is reflected in the preoperational data. Any radiological effect of the plant on its environment must be distinguished from the normal variation in background radiation levels. The monitoring results obtained during each year of the plant's operation are compared to the preoperational data, and to data from previous operating years, in order to determine whether a significant accumula-

tion of plant-produced radionuclides has occurred in the environment. Should a significant accumulation be observed and be attributed to plant operation, steps would be taken to locate the release pathway and prevent further releases.

Analysis of the WNP-2 REMP environmental samples during 1985 was performed by U.S. Testing Company, Richland, Washington. Processing of the thermoluminescent dosimeters used in the REMP to determine direct radiation was performed by the Supply System External Dosimetry Laboratory under the Radiological Programs and Standards Department.

2.0 PROGRAM DESCRIPTION

Seventy-three locations were included in the 1985 monitoring program. Sixty-eight indicator and two control, i.e. background, locations were within 10 miles (16 kilometers) of WNP-2 containment. Two additional control stations were 26.5 and 30 miles from the plant. The number and locations of monitoring stations was based on factors such as applicable regulations, population distribution, meteorological conditions, station accessibility, security and future program integrity. In Table 2-1, sample stations are listed by meteorological sector, sample media and approximate distance from WNP-2.

The Radiological Environmental Monitoring Program Plan, presented in Table 2-2, summarizes the sample locations, collection frequency and type of analysis performed. Maps of the REMP sampling locations described in Tables 2-1 and 2-2 are presented in Figures 2-1 and 2-2 for locations within and outside the 10 mile radius, respectively.

2.1 Sample Deviations

Deviations from the sampling schedule presented in Table 2-2 are listed in Table 2-3. In each case, the problems resulting in the deviations were resolved, so no long term impact on the program resulted. An additional deviation from the sampling program, as defined in Table 3.12-1 of the WNP-2 Technical Specifications, was the use of composite water samplers that collect water at a preset rate, rather than at a rate proportional to the flow of the water being sampled. As defined in footnote f to that table, a composite sample is one in which "the quantity of liquid sampled is proportional to the quantity of flowing liquid and in which the method of sampling employed results in a specimen that is representative of the liquid flow".² This definition of composite sampling is appropriate in situations where there is a significant potential for a rapid increase in radionuclide concentrations, such as the plant discharge line (Station 27), or where the samples are used to determine radionuclide inventory. But for samples intended to be representative of the radionuclide content in public

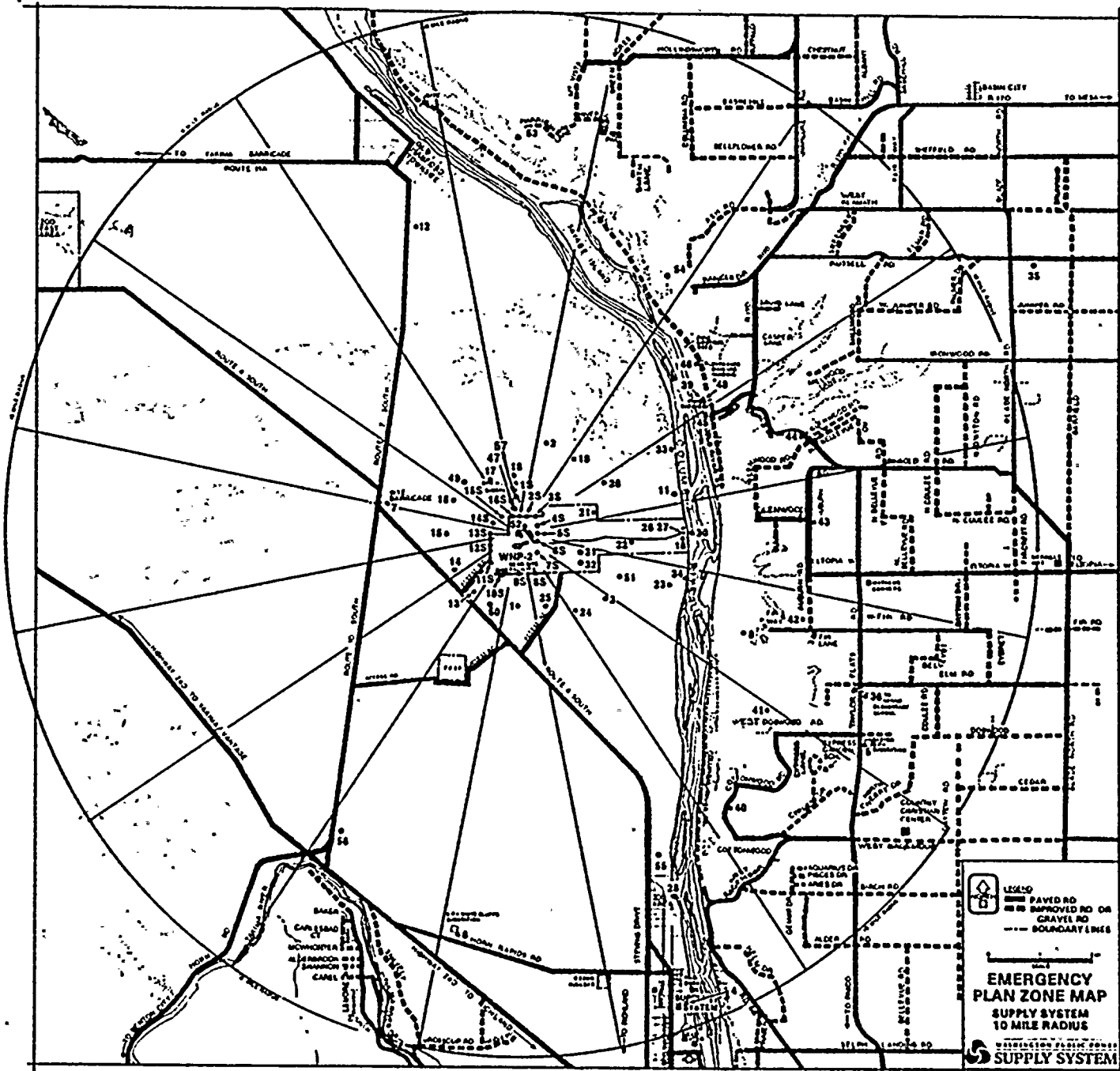


FIGURE 2-1
REMP SAMPLING LOCATIONS WITHIN THE 10 MILE RADIUS

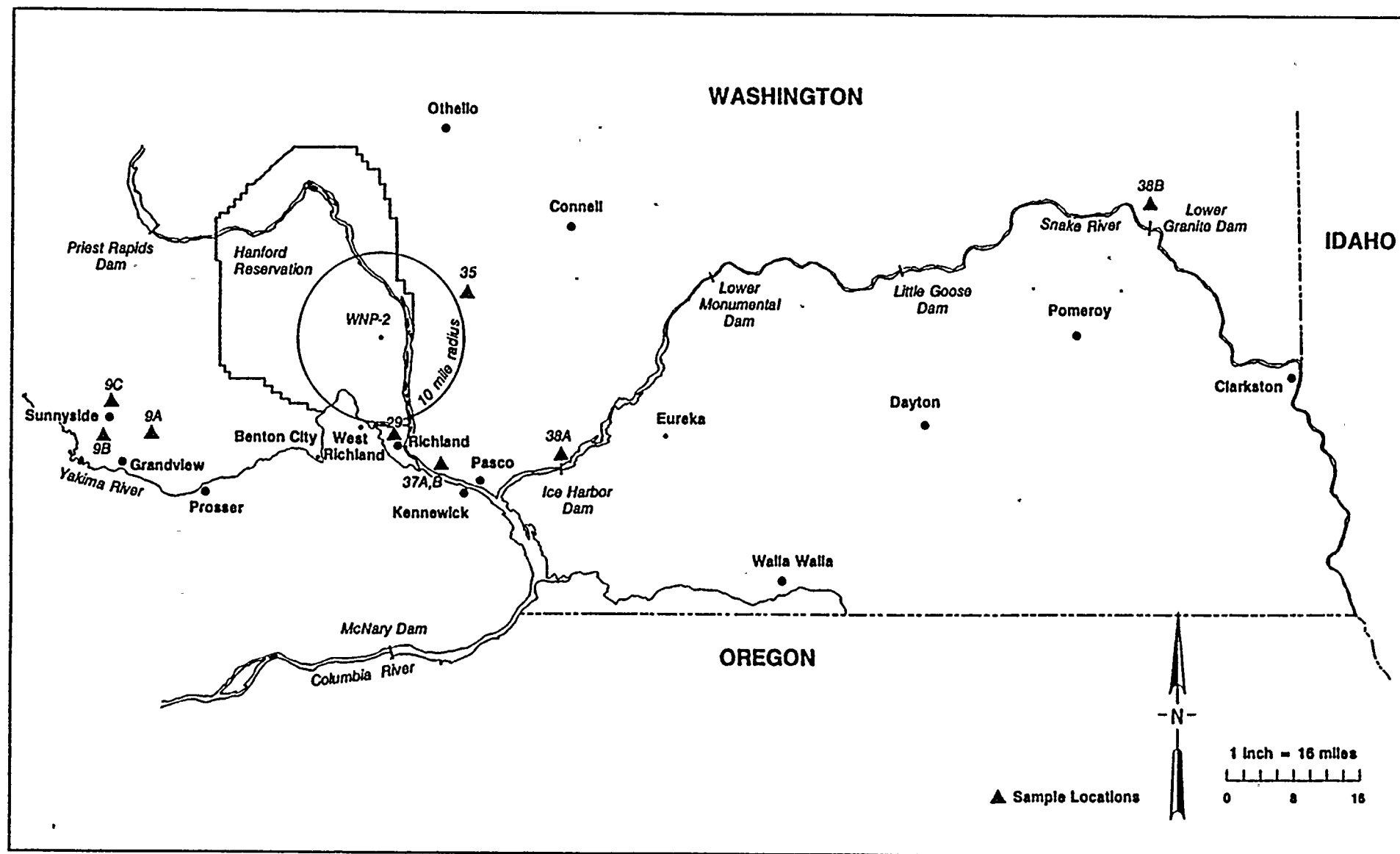


FIGURE 2-2

REMP SAMPLING LOCATIONS OUTSIDE THE 10 MILE RADIUS

TABLE 2-1

REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ^a	STATION ^b NUMBER	DISTANCE ^c		SAMPLE TYPE ^d
		MILES	METERS	
N (1)	52	0.10	161	GW
	71(1S)	0.30	483	TLD
	47	0.50	805	TLD
	57	0.75	1201	AP/AI
	18	1.10	1770	TLD
	53	7.50	12068	TLD
NNE (2)	72(2S)	0.40	644	TLD
	2	1.80	2896	TLD
	54	6.50	10459	TLD
NE (3)	73(3S)	0.50	805	TLD
	19	1.80	2896	TLD
	48	4.30	6919	AP/AI
	39	4.40	7084	FI
	46	4.70	7562	TLD
ENE (4)	74(4S)	0.40	644	TLD
	21	1.50	2414	AP/AI/SO/TLD
	20	1.90	3057	TLD
	11	3.10	4988	TLD
	33	3.60	5792	SE
	45	4.20	6758	TLD
	44	5.70	9171	TLD
	35	10.50	16895	MI

TABLE 2-1 (Cont'd)

REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ^a	STATION ^b NUMBER	DISTANCE ^c		SAMPLE TYPE ^d
		MILES	METERS	
E (5)	75(5S)	0.40	644	TLD
	22	2.10	3379	TLD
	10	3.10	4988	TLD
	26	3.20	5149	PW
	27	3.20	5149	DW
	30	3.30	5311	FI
	43	5.70	9171	TLD
ESE (6)	76(6S)	0.40	644	TLD
	31	1.1	1770	GW
	32	1.2	1931	GW
	51	2.10	3379	TLD
	23	3.00	4827	AP/AI/SO/TLD
	34	3.50	5632	SE
	8	4.70	7562	AP/AI/TLD
	42	5.60	9010	TLD
	36	7.20	11585	MI
	5	7.70	12389	AP/AI/TLD
	38	26.50	42639	FI
SE (7)	77(7S)	0.50	805	TLD
	24	1.90	3057	TLD
	3	2.00	3218	TLD
	41	5.80	9332	TLD
	40	6.40	10298	AP/AI/MI/TLD

TABLE 2-1 (Cont'd)

REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ^a	STATION ^b NUMBER	DISTANCE ^c		SAMPLE TYPE ^d
		MILES	METERS	
SSE (8)	78(8S)	0.70	1126	TLD
	25	1.60	2574	TLD
	55	7.00	11263	TLD
	28	7.40	11907	PW
	4	9.30	14964	AI/AP/TLD
	29	11.00	17699	PW
	37	16.00	25744	GP
S (9)	79(9S)	0.70	1126	TLD
	1	1.30	2092	AP/AI/SO/TLD
	6	7.70	12389	AP/AI/TLD
SSW (10)	80(10S)	0.80	1287	TLD
	50	1.20	1931	TLD
	56	7.00	11263	TLD
SW (11)	81(11S)	0.74	1126	TLD
	13	1.40	2253	TLD
WSW (12)	82(12S)	0.50	805	TLD
	14	1.40	2253	TLD
	ge	30.00	48270.	AP/AI/MI/GP/ TLD/SO
W (13)	83(13S)	0.50	805	TLD
	15	1.40	2253	TLD

TABLE 2-1 (Cont'd)
REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ^a	STATION ^b NUMBER	DISTANCE ^c		SAMPLE TYPE ^d
		MILES	METERS	
WNW (14)	84(14S)	0.50	805	TLD
	16	1.40	2253	TLD
	7	2.70	4344.	AP/AI/SO/TLD
NW (15)	85(15S)	0.50	805	TLD
	49	1.20	1931	TLD
NNW (16)	86(16S)	0.40	644	TLD
	17	1.20	1931	TLD
	12	6.10	9815	TLD

^a The area in the vicinity of the WNP-2 plant is separated into 16 separate sectors for reporting purposes. The 16 sectors cover 360 degrees in equal 22.5 degree sections, beginning with Sector 1 (N) at 348.75 to 11.25 degrees continuing clockwise through Sector 16 (NNW).

^b The alternate designations for TLD Stations 71-86 are given in parentheses, i.e. 1S-16S.

^c Distances are estimated from map positions for each location as a radial distance from WNP-2 containment.

^d Sample Type Key:

TLD - Thermoluminescent Dosimeter	MI - Milk
AP - Air Particulate	PW - Drinking/ Surface Water
AI - Air Iodine	GW - Ground Water
SE - Sediment	DW - Discharge Water
FI - Fish	GP - Garden Produce

^e Station 9 designates the Sunnyside-Grandview control area and is actually 3 separate stations within a few miles of each other (9-A for TLD/AI/AP/SO, 9-B for GP, and 9-C for MI) all within 30-35 miles of WNP-2.

TABLE 2-2

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM PLAN

<u>Sample Type^a</u>	<u>Sample Location Code^b</u>	<u>Sampling and Collection Frequency^c</u>	<u>Type and Frequency of Analysis</u>
1. AIRBORNE			
Particulates and radioiodine (6/12)	1, 4-9, 21, 23, 40, 48, and 57	Continuous sampling Weekly collection	Particulate: Gross Beta ^d , weekly; gamma isotopic ^e quarterly composite (by location)
Soil ^f (0/5)	9, 1, 7, 21 and 23	Annually	Gamma isotopic ^e
2. DIRECT RADIATION			
TLD ^g (34/56)	1-9, 10-25, 40-47, 49-51, 53-56, 71-86 (S1-S16) ^h	Quarterly, annually	Gamma, quarterly data review
PIC ⁱ (0/3)	1, 21, and 23	Continuous recording, monthly tape exchange	Gamma, monthly data review
3. WATERBORNE			
Surface/ Drinking Water ^k (3/4)	26, 27, 28 and 29	Composite aliquots ^j monthly	Gamma isotopic ^e , Gross Beta; Tritium quarterly composite
Ground Water (2/3)	31, 32, and 52	Quarterly	Gamma isotopic ^e and tritium, quarterly
Sediment from shoreline (1/2)	33 and 34	Semiannually	Gamma isotopic ^e
4. INGESTION			
Milk ^l (4/4)	9, 35, 36, 40	Semimonthly during grazing season, monthly at other times	Gamma isotopic ^e Iodine-131

TABLE 2-2 (Cont'd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM PLAN

<u>Sample Type^a</u>	<u>Sample Location Code^b</u>	<u>Sampling and Collection Frequency^c</u>	<u>Type and Frequency of Analysis</u>
4. INGESTION (Cont'd)			
Fish ^m (2/2)	30 and <u>38</u> , or 39	Seasonal or Semiannually	Gamma isotopic ^e
Garden Produce ⁿ (1/2)	37 and <u>9</u>	Monthly during growing season in the Riverview area of Pasco and a control near Grandview	Gamma isotopic ^e

^aThe fraction in parentheses for each sample type indicates the ratio of Technical Specification sample locations to total number of sample locations currently being monitored in the surveillance program.

^bThe underlined sample location designates a control station.

^cDeviations are permitted if samples are unobtainable due to hazardous conditions, seasonal availability, malfunction of automatic sampling equipment, or other legitimate reasons. Such deviations are documented in Table 2-3.

^dParticulate sample filters will be analyzed for gross beta after at least 24-hour decay. If gross beta activity is greater than 10 times the mean of the result for the control Station 9A, gamma isotopic analysis should be performed on the individual sample.

^eGamma isotopic means identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents of the facility.

^fSoil samples are collected to satisfy the requirements of the WNP-2 Site Certification Agreement (SCA).

TABLE 2-2 (Cont'd)

^gTLD refers to thermoluminescent dosimeter. For purposes of WNP-2 REMP, a TLD is a phosphor card (31.75mm x 44.75mm x 0.4mm) with eight individual read-out areas (four main dosimeter areas and four back-up dosimeter areas) in each badge case. TLDs used in REMP meet the requirements of Regulatory Guide 4.13 (ANSI N545-1975), except for specified energy-dependence response. Correction factors are available for energy ranges with response outside of the specified tolerances.

^hTLD stations 71-86 are special interest stations and are not included among the 34 routine TLD stations required by Plant Technical Specifications, Table 3.12-1. Their alternate designations are S1-S16.

ⁱPressurized ion chambers (PICs) are no longer required as part of the routine monitoring program. They are used only as a supplemental or backup system.

^jComposite (integrated grab) samples are collected with equipment which is capable of collecting an aliquot at time intervals which are short relative to the compositing period.

^kStation 26, WNP-2 makeup water intake from the Columbia River is both an upstream surface water sample and drinking water control sample location. Station 28, 300 Area sample is both a downstream surface water sample and drinking water sample. Two week composite sample analysis for Iodine-131 is initiated when the dose calculated for the consumption of water is greater than 1 mrem per year maximum organ dose using ODCM methodology and parameters.

^lMilk samples will be obtained from farms or individual milk animals which are located in sectors with high calculated annual average ground-level D/Qs and high dose potential. Routine milk samples are collected in areas of high dose potential instead of within 5 kilometers, due to location of milk animals. If cesium-134 or cesium-137 is measured in an individual milk sample in excess of 30 pCi/l, then strontium-90 analysis will be performed.

^mThere are no commercially important species in the Hanford reach of the Columbia River. Most recreationally important species in the area are anadromous, primarily salminoids. Four fish specimens will normally be collected by electroshock technique in the vicinity of the plant discharge (Station 30). If electroshocking produces insufficient fish samples, anadromous species may be obtained from a catch pond at Ringold Fish Hatchery (Station 39).

ⁿGarden produce will routinely be obtained from farms or gardens using Columbia River water for irrigation. One sample of a root crop, leafy vegetable, and a fruit is collected each sample period, if available. The variety of the produce sample will be dependent on seasonal availability.

TABLE 2-3

1985 DEVIATIONS IN THE REMP SAMPLING PROGRAM

<u>Sample Type</u>	<u>Locations</u>	<u>Sampling Period</u>	<u>Problem</u>
Air	5	12/31/84-1/7/85	Blown fuse; shortened sampling time
	9	1/7/85-1/14/85	Pump failure; no sample
	48	1/14/85-1/21/85	Blown fuse; shortened sampling time
	48	1/21/85-1/28/85	Power failure; shortened sampling time
	7	2/25/85-3/4/85	Blown fuse; sample submitted for gross count
	5	3/4/85-3/11/85	Blown fuse; shortened sampling time
	57	4/1/85-5/20/85	Sampler found out of tolerance during routine calibration; length of time operating at low cfm estimated for purposes of correcting results
	1	4/1/85-4/8/85	Power outage; shortened sampling time
	1	4/29/85-5/6/85	Sampler failure; no sample

TABLE 2-3 (Cont'd)

1985 DEVIATIONS IN THE REMP SAMPLING PROGRAM

<u>Sample Type</u>	<u>Locations</u>	<u>Sampling Period</u>	<u>Problem</u>
Air (Cont'd)	48	5/13/85-5/20/85	Sampler malfunction; no sample; replacement sampler also malfunctioned, so replacement not made until 5/21/85
	57	5/20/85-5/28/85	Sampler failure; shortened sampling time
	1	5/20/85-5/28/85	Sampler failure; no sample
	57	6/17/85-6/24/85	Blown fuse; shortened sampling time
	57	6/24/85-7/1/85	Pump failure, but timer operable; sample volume estimated
	7	7/8/85-7/15/85	Blown fuse; shortened sampling time
	6	7/22/85-7/23/85	Sampler failure after one day sample submitted for analysis
	21	8/5/85-8/12/85	Power outage; shortened sampling time
	7	8/12/85-8/19/85	Pump failure; sample submitted for gross count
	7	11/11/85-11/18/85	Sampler failure; shortened sampling time

TABLE 2-3 (Cont'd)

1985 DEVIATIONS IN THE REMP SAMPLING PROGRAM

<u>Sample Type</u>	<u>Locations</u>	<u>Sampling Period</u>	<u>Problem</u>
Water	26	1/23/85-2/12/85	Sampler malfunctioned during period; aliquots not collected regularly.
	26, 27	2/21/85-3/20/85	DSHS split samples invalid since no HCl was added
	26	6/19/85-7/17/85	Intake valve turned off; no sample
	28	9/18/85-10/17/85	Sample collected 10/17 rather than 10/16 due to weather conditions
	26	11/20/85-12/18/85	Tritium sample from composite sampler lost; grab sample from Columbia River upstream used
Produce		4/24/85	Local produce unavailable, no sample
		5/21/85	Local produce unavailable; no sample
TLD	12	6/27/85-9/26/85	Quarterly TLD missing; no results reported
	7, 8, 17	12/27/84-12/26/85	Annual TLDs missing; no results reported

TABLE 2-3 (Cont'd)

1985 DEVIATIONS IN THE REMP SAMPLING PROGRAM

<u>Sample Type</u>	<u>Locations</u>	<u>Sampling Period</u>	<u>Problem</u>
TLD (Cont'd)	46	6/27/85-9/27/85	Quarterly and annual TLD destroyed by fire; replaced on 8/26/85
	9S	9/27/85-12/26/85	Quarterly TLD missing; no results reported

drinking water (such as Stations 26, 28, and 29), the fixed interval sampling method currently used is appropriate.³ The appropriateness, cost and feasibility of converting all or part of the current nonproportional system to a proportional one is currently being studied, along with the appropriateness of modifying the Technical Specification.

2.2 Land Use Census

In August the annual land use census was performed, as required by Plant Technical Specifications.⁴ One purpose of the land use census is to identify, within a distance of 5 miles, the locations of the nearest milk animal, residence and garden greater than 50 m² in each of the 16 meteorological sectors. Another objective of the census is to determine whether any site located during the census has a calculated dose or dose commitment greater than the sites currently monitored for the same exposure pathway. If so, routine sampling of that exposure pathway would be initiated at that new site.

The results of the 1985 land use census within 5 miles are given in Table 2-4. No new sampling sites were determined from the census; however, the need to locate vegetable sampling sites closer to the plant was identified. The current indicator sampling location is in Pasco, at a distance of approximately 16 miles. Fruits and vegetables are also obtained from Pasco vendors selling locally grown produce. The lack of availability from year to year of garden sites irrigated by Columbia River water, however, limits the sampling options.

As shown in Table 2-4, no milk animals are located within the 5 mile radius. The closest locations are at 5.75 miles (SE) and 6.5 miles (ESE). Currently milk sampling is performed at sites 6.4 miles and 7.2 miles ESE. Because the calculated dose estimates for the two new sites was not significantly greater than those for the existing sampling sites and milk cows are not consistently present at the new sites, no changes were made in milk sampling locations.

TABLE 2-4

DISTANCES IN MILES TO NEAREST POINTS OF INTEREST
WITHIN THE FIVE MILE RADIUS FROM WNP-2 CONTAINMENT

<u>Sector/ Parameter</u>	<u>Resident</u>	<u>Garden (50m)</u>	<u>Dairy Animals^a</u>	<u>Livestock</u>
N	0	0	0	0
NNE	0	0	0	0
NE	4.2	4.2	0	0
ENE	3.8	3.8	0	0
E	4.4	4.5	0	4.5
ESE	4.1	4.3	0	4.8
SE	4.8	4.8	0	0
SSE	0	0	0	0
S	0	0	0	0
SSW	0	0	0	0
SW	0	0	0	0
WSW	0	0	0	0
W	0	0	0	0
WNW	0	0	0	0
NW	0	0	0	0
NNW	0	0	0	0

^aThe closest dairy animal locations are at 5.75 miles SE and 6.5 miles ESE.

3.0 SAMPLING METHODS

The collection of environmental samples for the Radiological Environmental Monitoring Program (REMP) was performed according to the schedule in Table 2-2. All samples were collected by personnel in the Supply System Emergency Preparedness and Environmental Programs Department. The documented procedures contained in the Environmental Program Instruction Manual were used for sample collection and preparation.

The following sections describe the Supply System's sampling and preparation methods.

3.1 Direct Radiation

Thermoluminescent dosimeters (TLDs) were used to determine the direct radiation levels at fifty-six (56) monitoring locations. The environmental dosimeter consists of a card containing $\text{CaSO}_4:\text{Dy}$ phosphor (25%) in a Teflon matrix. Following oven annealing at 250°C for 2 hours, the 31.75 mm x 44.75 mm x 0.4 mm thick card is loaded into a plastic case (Teledyne Model EB-2) lined with 0.58 mm copper (520 mg/cm^2) to lessen the TLD's overresponse to low energy photons⁵. The TLD is prepared for the field by wrapping the case with aluminum foil and placing the TLD in a cotton bag, which is hung from a metal post at each site.

Two sets of TLDs were employed at each location. One set was exchanged on a quarterly basis and the other exchanged on an annual basis. Exposure of the field TLDs during transport to the TLD sites was monitored by a set of control dosimeters that accompanied the field dosimeters to and from the field locations.

The environmental dosimeters were processed on a Teledyne Isotopes Model 9100 Automatic Reader. Following the initial processing, the field dosimeters were annealed and given a calibration exposure to 100 mR of Cs-137 gamma, in order to determine dose response (or calibration) factors for each dosimeter. The calibration factor was used to determine the total exposure received by each TLD.

Until late 1985, the WNP-2 Site Certification Agreement required the use of pressurized ion chambers (PICs) to measure direct radiation at three locations on the site boundary. Because of lightning damage to these units and frequent malfunctioning, the requirement for the routine use of the PICs was waived. The units are currently maintained for use in special monitoring situations or as back-up monitoring systems. Solar panels are under construction for each unit to eliminate the occurrence of power surges and lightning damage.

3.2 Airborne Particulate/Air Iodine

Air particulate and air iodine (I-131) samples were obtained through the use of portable, low volume (1.5 cfm) constant flow rate sampling units at each of twelve (12) locations. The samples drawn at Station 9 are considered control, or background, samples; the ones drawn at the other locations are indicator samples. Air particulates were collected by drawing air through a 47 millimeter diameter glass fiber filter. Air iodine was collected by drawing air through a 57 millimeter diameter TEDA-impregnated charcoal cartridge. The particulate air filter and charcoal cartridge were placed in tandem, particulate filter first, in a holder that attached to the air inlet of the sampler unit. The sampler units were placed in ventilated metal weather housings mounted on elevated platforms at each air sample location.

The air sampler units were run continuously, with the filter and charcoal cartridge exchanged weekly for analysis. The total sample time for each filter and cartridge was recorded from the elapsed time indicator and the sample volume was calculated and recorded. The filters and cartridges were delivered to U.S. Testing within one day of collection.

3.3 Water

The water sampling network consists of seven (7) sampling locations: four (4) for evaluation of surface/drinking water and three for the evaluation of groundwater. The surface/drinking water stations are located at the plant intake and discharge lines, the DOE 300 Area river intake and the Richland Water Treatment Plant. The sample drawn from the plant intake line is considered the control sample, while the samples drawn from the other locations are indicator samples. A Collins Model 42 composite sampler is installed at each of these locations to periodically collect 25-ml aliquots of water, which are added to large collection bottles. At the prescribed intervals, the sampler collects, alternately, an aliquot for the sample designated for gross beta analysis and an aliquot for the sample designated for tritium analysis.

Prior to the start of each monthly sampling period, concentrated nitric acid is added to the large collection bottles receiving the gross beta water samples, in order to inhibit biological growth and plateout of dissolved ions on the bottle wall. One gallon of the gross beta samples is poured into a clean plastic cubitainer each month. A 250-ml cubitainer is used to hold the monthly sample submitted for the quarterly tritium composite.

Nonroutine analyses include strontium-90 analysis, when the gross beta activity in the drinking water exceeds 8 pCi/liter or ten (10) times the mean of the previous three months' activity for a specific location, and I-131 analysis, when the dose calculated for the consumption of water exceeds 1 mrem per year. Neither of these nonroutine analyses were performed during 1985.

The ground water stations are located on Supply System property: one well on the WNP-2 Site (0.1 mile north of the Reactor Building) and two on the WNP-1 site (1.2 miles downgradient from WNP-2). Water from the WNP-2 well is no longer routinely used; however, water from the WNP-1 wells supplies some of the drinking and fire protection water for that site. Quarterly grab samples are taken from each of these wells. One gallon is collected from each well for gamma analysis and 250 ml is drawn for tritium analysis. The samples are not acidified.

3.4 Soil

Soil samples were collected once during 1985, as required by the Site Certification Agreement. Samples were taken from five (5) locations. The sample taken at Station 9 is the control sample, while the other four samples are indicator samples. Each sample was taken from an area of approximately one square foot to a depth of approximately one inch. Approximately two (2) kilograms of soil were used in each sample.

3.5 Shoreline Sediment

Two shoreline sediment samples were collected twice during 1985. One sediment sampling location is approximately two (2) miles upstream and the other location is approximately one (1) mile downstream of the liquid effluent discharge point. Samples were scooped from underwater near the river shoreline. Each sample consisted of approximately two (2) kilograms of the shallow surface sediment. The samples were placed in clean plastic bags and delivered to U.S. Testing within a day of collection.

3.6 Fish

Fish sampling was performed during two weeks in April and September, when the likelihood of obtaining anadromous* species was high. Fish samples collected from the Columbia River (Station 30) were indicator samples, while the fish collected on the Snake River (Station 38) were control samples.

Four separate fish samples, an anadromous species and three other species generally considered edible, or potentially edible, types, such as carp, catfish and whitefish, were collected at each location. Most of the fish were collected through the use of electroshock, but samples of the anadromous species were also collected from the Ringold Fish Hatchery on the Columbia River and the fish trap at Ice Harbor Dam on the Snake River. The fish were filleted to obtain one (1) kilogram of edible flesh per sample. The fillets were placed in clean plastic bags for delivery to U.S. Testing.

3.7 Milk

Milk samples were collected monthly during January, February, March, -October, November and December and semi-monthly during the remaining six months, when the cows were likely to be grazing. Routine samples were collected from three indicator locations (Stations 35, 36 and 40) across the Columbia River in Franklin County and from the control location (Station 9) near Grandview. One gallon of raw milk was collected from each location. The milk was delivered to U.S. Testing within a day of collection.

*Fish species known to ascend rivers from the sea for breeding.

3.8 Garden Produce

Samples of local garden produce were collected monthly during the four months from June to September, when the produce was readily available. When possible, three types of produce samples -- a root crop, fruit and a leafy vegetable -- were collected at each location. The indicator samples were collected from a region in the predominant downwind direction from the plant (Station 37), where irrigation from the Columbia River, which is potentially affected by plant liquid effluents, is likely. The control samples were obtained from local produce stands in the Sunnyside area (Station 9), the direction least likely to be affected by plant effluents.

4.0 ANALYTICAL PROCEDURES

The following is a description of the analytical procedures used by U.S. Testing for the REMP samples during the reporting period. A summary of these procedures is presented in Table 4-1.

4.1 Determination of Gross Beta Activity on Particulate Filters

The filters are stored under cover for about one week before they are counted to allow for the decay of natural radioactivity collected on the filters. The filters are counted directly with beta counters.

4.2 Gamma Determination of I-131 Adsorbed on Charcoal

A direct count is made of the charcoal canister using a germanium detector. The gamma spectrometry data is transferred to the main computer for the final report.

The iodine-131 content is reported in units of picocuries per cubic meter of air, using appropriate calibration factors.

4.3 Measurement of Gamma-Ray Emitters

Environmental samples are prepared for gamma analysis using the following procedures:

- 1) The air filters are composited into a plastic bottle for counting with a germanium detector.
- 2) The charcoal cartridge is placed into a plastic bottle for counting with a germanium detector.
- 3) Water samples are well mixed, acidified, and evaporated down to a volume of approximately 50 milliliters. The sample is adjusted to 50, 100 or 200 ml with de-ionized water. It is submitted to the counting room for counting with a germanium detector.

- 4) Dried soil/sediment is transferred to a tared marinelli beaker. The weight of the sample is determined and the sample is submitted for counting with a germanium detector.
- 5) The edible portion of foodstuff is transferred to a tared container, weighed and counted with a germanium detector.
- 6) The milk sample is measured and transferred into a 500-ml marinelli beaker for counting with a germanium detector.

Samples are prepared for direct counting in one of several standard counting geometries. The samples are then counted on a germanium detector for a period that will ensure meeting the specified detection limit. Reduction of a gamma ray pulse height spectrum is accomplished using a Nuclear Data Systems ND6700 (ND) computer and ND software.

The pulse height analysis program for spectra obtained using germanium detection, analyzes the spectra by locating the peaks, determining the centroid values for the peaks, calculating their corresponding energies in KeV, the area for each peak, and the associated standard deviation. The areas of the peaks are calculated by summation of the number of counts in each channel of the peak, without assuming a gaussian peak shape. The peak areas are converted to activity units per sample units by applying efficiency factors determined by using NBS traceable standards, corrected for the counting geometry and sample aliquot factor, when needed.

4.4 Determination of Gross Beta Activity in Water (Total or Suspended and Dissolved Solids)

While the measured gross activity is not indicative of any specific nuclide, it provides an index to the radioactive contamination of the sample. The beta counting efficiency is based on a strontium-yttrium-90 standard, corrected for self-absorption. Samples are evaporated with HNO_3 and placed on planchets for counting. Hence, the chemical yield is taken as 100%.

4.5 Determination of Iodine-131 in Water by Solvent Extraction Method

Iodide ion is separated from interferences by oxidation to I_2 with $NaNO_2$ and extraction into CCl_4 from dilute acid media. The iodine is then reduced to iodide with $NaHSO_3$, extracted into water, precipitated with $AgNO_3$ and slurried onto a 1" planchet for counting. Radiochemical purity and concentration at sampling time are determined by decay counting. Chemical yields are normally about 89%. Iodine-131 is determined with low background gas flow beta proportional counters having background counts of about 1.5 cpm. Isotopic purity can be determined by recounting the sample and checking for the proper decay of the iodine-131.

4.6 Determination of Tritium in Water

Tritium in water is measured by a direct count of the distilled sample using a liquid scintillation spectrometer. After distillation, a 5-ml sample is pipetted into 15 ml of scintillator solution. The mixture is transferred to the refrigerated sample changer of the liquid scintillation counter and is allowed to remain there for 24 hours before counting. This waiting period allows for temperature equilibrium to be reached and for the decay of light excitation within the plastic vials. The counting efficiency of each sample (including corrections for quenching) is determined by using the external standard technique. A quench curve is obtained by counting samples with known amounts of tritium and varying amounts of quenching material. The degree of quenching is determined using an external radioactive source and is correlated with the counting efficiency of the appropriate standard. When a sample is counted, its quench parameter is determined and compared to the quench curve to obtain the counting efficiency.

4.7 Determination of Strontium-90 in Milk and Water

Strontium is precipitated sequentially, first as the nitrate and then as the carbonate. The fuming nitric acid separation removes most of the other interfering ions and concentrated nitric acid precipitations

remove calcium. Radioisotopes of barium, radium, and lead are co-precipitated with barium chromate. Iron and final traces of other fission products are separated by a hydroxide scavenge. Following a final carbonate precipitation, gravimetric yield and the strontium-89/90 activity are determined. Yttrium-90 is permitted to grow into equilibrium with the strontium-90, then separated from the strontium by successive hydroxide and oxalate precipitations. The oxalate is transferred to a counting dish, dried under a heat lamp, ignited to yttrium oxide, weighed for chemical recovery, and counted on a low background beta proportional counter. Decay counts are made to check the purity of the yttrium-90.

4.8 Determination of Iodine-131 in Milk by Batch Ion Exchange Method

Iodine-131 in milk is adsorbed onto the resin and removed from the resin using NaOCl. After reduction to I_2 by hydroxylamine hydrochloride, the iodine is extracted into carbon tetra-chloride. The I_2 is reduced to I^- , extracted into water and precipitated as palladous iodide. Chemical yield is determined gravimetrically, based upon the amount of iodine carrier added. The iodine-131 concentration is determined by counting the palladous iodide precipitate in a low background beta counter. The isotopic purity may be determined by performing a decay count on the sample and checking the radioactive decay of iodine-131.

TABLE 4-1

REMP RADIOCHEMICAL ANALYSES

<u>Sample Type</u>	<u>Frequency</u>	<u>Analyses</u>	<u>Procedure Used</u>
Air Particulate	Weekly	Gross Beta	Direct count on beta counter.
	Quarterly	Gamma Isotopic	Composited in plastic bottle; counted on germanium detector.
Air Iodine	Weekly	I-131	Direct count on germanium detector.
River/Drinking Water	Monthly	Gamma Isotopic	Acidified, evaporated to 50 ml, counted on germanium detector.
	Monthly	Gross Beta	HNO ₃ added, evaporated, counted in planchet on beta counter.
	Quarterly	Tritium	Distillation, followed by counting in liquid scintillation counter.
	(As Needed)	Sr-90	Nitrate, carbonate, oxalate precipitations; beta counting of yttrium oxide.
	(As Needed)	I-131	Solvent extraction; beta counting.
Discharge Water	Monthly	Gamma Isotopic	Acidified, evaporated to 50 ml, counted on germanium detector.
	Monthly	Gross Beta	HNO ₃ added, evaporated, counted in planchet on beta counter.
	Quarterly	Tritium	Distillation, followed by counting in liquid scintillation counter.

TABLE 4-1 (Cont'd)

REMP RADIOCHEMICAL ANALYSES

<u>Sample Type</u>	<u>Frequency</u>	<u>Analyses</u>	<u>Procedure Used</u>
Ground Water	Quarterly	Gamma Isotopic	Acidified, evaporated to 50 ml, counted on germanium detector.
		Tritium	Distillation, followed by counting in liquid scintillation counter.
Milk	Monthly or Semi Monthly	Gamma Isotopic	Direct counting on germanium detector.
		I-131	Batch ion exchange; palladium iodide precipitate counted on beta counter.
	(As Needed)	Sr-90	Nitrate, carbonate, oxalate precipitations; beta counting of yttrium oxide.
Sediment	Semi-Annual	Gamma Isotopic	Direct counting on germanium detector.
	Annual	Gamma Isotopic	Direct counting on germanium detector.
		(As Needed) Sr-90	Leaching; nitrate, carbonate, oxalate precipitations, beta counting of yttrium oxide.
Fish	Semi-Annual (seasonal)	Gamma Isotopic	Edible portion counted on germanium detector.
Garden Produce	Monthly (growing season)	Gamma Isotopic	Edible portion counted on germanium detector.

5.0 DISCUSSION OF ANALYTICAL RESULTS AND SUMMARY

REMP sample results were reported by U.S. Testing as the net results, negative or positive, after background subtraction. The reported results, as presented in Appendix A, also include the total, or 2σ error, which approximates the 95% confidence limits.* This method of reporting differs from that used by Eberline and NUS, the analytical services vendors during the preoperational period and during part of 1984. Both Eberline and NUS reported results that were less than the associated 2σ error as less than the lower limit of detection ($< \text{LLD}$). Data averaging and statistical evaluations reported in the preoperational and 1984 reports used the LLD value for results reported as $< \text{LLD}$. The data averaging performed by U.S. Testing, however, determines the arithmetic mean of the results, inclusive of both positive and negative data. This method prevents the statistical loss of information that occurs when a "less than" ($<$) value is used.

Comparing the mean results obtained during 1985 to those obtained during the preoperational and 1984 periods is difficult. The preoperational and 1984 data averages, shown in Table 5-1, are biased averages derived from "less than" values. Comparing the range of data observed for all three reporting periods, however, gives an indication whether the 1985 data exceeds the range of data previously observed. Evaluations and summaries of the data for each type of media are presented in Subsections 5.1 through 5.8.

The results reported for individual samples are given in Tables A-3 through A-16 of Appendix A. The asterisk appearing to the left of most of the results indicates that the result is below the contractual lower limit of detection (CLLD). The CLLDs are lower than the LLDs specified in the Branch Technical Position, as shown in Table 5-2.

*The 95% confidence limits are the values around the reported result, within which the real value can be expected to occur with a 95% probability.

TABLE 5-1

REMP DATA SUMMARY

Media/Analysis	Preoperational ^a		1984 Operational ^b		1985 Operational ^b	
	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>
Air: pCi/m ³						
Gross Beta	< 0.02	(<0.003 - 0.130)	0.02	(0.003 - 0.164)	0.0281	(0.0066 - 0.140)
Cs-134	< 0.01	(<0.001 - 0.04)	<0.001	(-0.0006 - <0.003)	0.00006	(-0.0021 - 0.0008)
Cs-137	< 0.01	(<0.001 - 0.04)	<0.001	(-0.0006 - <0.004)	0.00013	(-0.0011 - 0.0014)
I-131	< 0.05	(<0.01 - 0.11)	<0.02	(0.02 - <0.08)	0.00002	(-0.022 - 0.045)
Water: pCi/l ^c						
Gross Beta	< 4.4	(<1.00 - <22.0)	<3.1	(-0.23 - 4.8)	2.65	(0.375 - 8.06)
Ba-140	<50.5	(<4.00 - <300.00)	<6.5	(-14.2 - 61.1)	2.54	(-22.9 - 24.3)
Cs-134	< 3.8	(<1.00 - <12.00)	<1.2	(-5.41 - <7.0)	0.168	(-3.35 - 2.21)
Cs-137	< 3.8	(0.77 - <16.00)	<1.4	(-3.10 - <7.0)	0.126	(-3.10 - 2.65)
Co-58	< 4.6	(<1.00 - <25.00)	<1.4	(-1.38 - <6.0)	0.169	(-3.25 - 1.92)
Co-60	< 4.6	(<0.11 - <13.0)	<1.7	(-1.08 - <8.0)	-0.0355	(-2.43 - 1.75)
H-3	<463.1	(<10.0 - <2600)	295.3	(-516.0 - 850.0)	97.2	(-165.0 - 289.0)
Fe-59	<12.1	(<2.00 - <93.00)	<3.0	(-8.86 - <14.0)	0.588	(-6.39 - 6.57)
La-140	<25.5	(<3.00 - <160.00)	<1.1	(-64.80 - <13.0)	-1.79	(-48.1 - 13.5)
Mn-54	< 4.2	(<1.00 - <16.00)	<1.5	(-1.23 - <6.0)	0.0716	(-3.18 - 2.58)
Nb-95	< 5.1	(<1.00 - <29.00)	<1.5	(-2.00 - <6.0)	0.116	(-3.28 - 3.78)
Zn-65	< 8.0	(<1.38 - <27.00)	<2.8	(-16.2 - <13.0)	-0.0346	(-4.58 - 3.85)
Zr-95	<10.6	(<2.00 - <63.00)	<2.7	(-3.09 - <12.0)	0.177	(-6.98 - 4.31)

^aAll stations, all years^bIndicator stations only^cIncludes ground and surface/drinking water

TABLE 5-1 (Cont'd)

REMP DATA SUMMARY

Media/Analysis	Preoperational ^a		1984 Operational ^b		1985 Operational ^b	
	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>
Sediment: pCi/kg						
Co-60	<254.6	(<130.00 - 610.00)	129.0		83.6	(73.6 - 93.6)
Cs-134	<112.5	(<50 - <150.00)	<72.7	(55.3 - 90.0)	41.8	(36.0 - 47.6)
Cs-137	<287.0	(<50 - 560.00)	<343.5	(230.0 - 457.0)	1090	(296 - 1890)
Soil: pCi/kg						
Cs-137	<364.3	(<20.00 - 1880.0)	<237.0	(<70.00 - 610.0)	320.0	(9.41 - 586.0)
Cs-134	< 65.3	(<20.0 - <150.00)	<110.0	(<90.0 - <130.0)	34.2	(19.2 - 43.5)
Milk: pCi/l						
Ba-140	< 72.1	(<6.00 - <2000.0)	< 10.4	(-38.5 - <30.0)	3.63	(-44.3 - 42.7)
Cs-134	< 3.7	(<0.90 - <14.00)	< 2.9	(-6.58 - <10.0)	-0.0623	(-7.43 - 8.12)
Cs-137	< 3.8	(<1.00 - <12.00)	< 3.7	(-7.40 - <11.0)	0.961	(-6.14 - 7.65)
La-140	< 33.3	(<5.00 - <1000.0)	< 4.8	(-17.0 - <15.0)	-1.89	(-24.2 - 9.00)
I-131	< 0.5	(<0.09 - <1.00)	< 0.04	(-0.305 - <0.169)	0.0336	(-0.392 - 0.598)
Fish: pCi/kg						
Cs-134	< 61.2	(<6.00 - <130.00)	< 25.3	(-20.4 - <70.0)	4.62	(-4.25 - 13.3)
Cs-137	< 88.8	(<10.00 - <130.00)	< 30.7	(-35.1 - <80.0)	11.4	(-3.02 - 30.7)
Co-58	< 87.7	(<9.00 - <130.00)	< 37.2	(1.1 - <80.0)	-3.10	(-16.8 - 11.5)
Co-60	< 80.6	(<9.00 - <130.00)	< 31.8	(-18.4 - <110)	-0.874	(-16.5 - 19.1)
Fe-59	<130.0	(<30.00 - <260.00)	< 85.0	(-34.6 - <190)	-7.86	(-34.2 - 11.5)
Mn-54	< 88.3	(<8.00 - <130.00)	< 37.1	(-10.3 - <80.0)	1.06	(-5.53 - 6.37)

^aAll stations, all years^bIndicator stations only

TABLE 5-1 (Cont'd)

REMP DATA SUMMARY

Media/Analysis	Preoperational ^a		1984 Operational ^b		1985 Operational ^b	
	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>	<u>Mean</u>	<u>Range</u>
Produce: pCi/kg						
Cs-134	< 49.1	(<10.00 - <140.00)	9.55	(-24.8 - 19.8)	1.85	(-9.29 - 13.1)
Cs-137	< 69.8	(<10.00 - <140.00)	<13.37	(-2.21 - <30.8)	0.547	(-9.77 - 9.89)
I-131	< 105.6	(<10.00 - <1000.00)	<19.36	(-0.84 - <30.8)	1.45	(-19.7 - 14.2)
TLD: mR/day						
Quarterly	0.24	(0.11 - 0.32)	0.22	(0.18 - 0.33)	0.23	(0.16 - 0.29)
Annual	0.24	(0.20 - 0.31)	0.22	(0.16 - 0.27)	0.22	(0.19 - .27)

5-4

^aAll stations, all years^bIndicator stations only

TABLE 5-2

A COMPARISON OF THE CONTRACTUAL AND BRANCH
TECHNICAL POSITION LOWER LIMITS OF DETECTION

<u>Media (Units)</u>	<u>Analysis</u>	<u>UST Nominal Lower Limits of Detection</u>	<u>BTP Lower Limit of Detection</u>
Air	Gross Beta	0.003	0.01
Particulates:	Gamma Spectrometry	0.01	
(pCi/m ³)	Cs-134	0.008	0.05
	Cs-137	0.01	0.06
Air Iodine:	I-131	0.04	0.07
(pCi/m ³)			
Water:	Gross Beta	4	4
(pCi/l)	Tritium	300	2000
	I-131	1	1
	Sr-90	1	--
	Gamma Spectrometry	10	--
	Mn-54	10	15
	Fe-59	20	30
	Co-58	10	15
	Co-60	10	15
	Zn-65	20	30
	Zr-95	20	30
	Nb-95	10	15
	Cs-134	10	15
	Cs-137	10	18
	Ba-140	35	60
	La-140	10	15

TABLE 5-2 (Cont'd)

A COMPARISON OF THE CONTRACTUAL AND BRANCH
TECHNICAL POSITION LOWER LIMITS OF DETECTION

<u>Media (Units)</u>	<u>Analysis</u>	<u>UST Nominal Lower Limits of Detection</u>	<u>BTP Lower Limit of Detection</u>
Soil/	Gamma Spectrometry	100	--
Sediment:	Co-60	100	--
(pCi/kg)	Cs-134	100	150
	Cs-137	100	180
	Sr-90	10	--
Fish:	Gamma Spectrometry	100	--
(pCi/kg)	Mn-54	90	130
	Fe-59	170	260
	Co-58	90	130
	Co-60	90	130
	Zn-65	170	260
	Cs-134	90	130
	Cs-137	100	150
Milk:	I-131	1	1
(pCi/l)	Gamma Spectrometry	10	--
	Cs-134	10	15
	Cs-137	10	18
	Ba-140	35	60
	La-140	15	15
Garden	Gamma Spectrometry	50	--
Produce:	Cs-134	50	60
(pCi/Kg)	Cs-137	50	80
	I-131	50	60

A summary of the analytical results for 1985 is contained in Table 5-3. For any reported result above the CLLD, the highest result and the data means and ranges for that analysis are given for the control and indicator stations.

Because the CLLDs for the specific radionuclides under gamma spectrometry were not specified in the current Supply System - U.S. Testing contract, CLLD values were determined for these radionuclides from their current actual LLD values relative to the actual Cs-137 LLD.

5.1 Direct Radiation

Environmental radiation dose rates due primarily to gamma radiation, as determined by the thermoluminescent dosimeters (TLDs), are summarized in Tables 5-4 through 5-6. Naturally occurring radioactivity such as radiation from cosmic origins and natural radioactivity in the atmosphere and soil, as well as fallout radioactivity from atmospheric testing of nuclear weapons, constitute the background radiation at each sampling location. Statistically significant variations in background radiation occur between geographical areas within the region, as indicated by the station to station variability observed in the summary tables of results. From the quarterly TLD results given on Table A-1 of Appendix A, it is also clear that some variability in results occurred between quarters. The lower results obtained for each station during the first quarter were likely due to problems encountered during the determination of calibration factors. This problem was identified and corrected, so it did not affect the results of the remaining three quarters.

In Table 5-4, the 1985 TLD results are compared to the preoperational and 1984 results. The mean TLD results for each quarter in 1985 are compared to the preoperational mean in Figure 5-1. No significant increases were indicated in the 1985 data. Quarterly TLD results

TABLE 5-3
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM 1985 ANNUAL SUMMARY

Name of Facility Supply System WNP-2

Location Hanford

Docket No. 50-397

Reporting Period January 1, 1985-December 31, 1985

Medium or Pathway Sampled	Type and Total Number of Analyses Performed	Contractual Lower Limit of Detection ^a (CLLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range	Number of Nonroutine Reported Measurements ^c
				Name Distance & Direction	Mean (f) ^b Range		
Air Particle Filter	Gross Beta (619)	0.003 pCi/m ³	0.0281(567/ 567) (0.00663- 0.140)	Station 57 0.75 miles N	0.0312(52/ 52) (0.00785- 0.140)	0.0228(52/52) (0.00638-0.072)	
	Gamma (48)						
Cs	Cs-134	0.008 pCi/m ³	CLLD			CLLD	
	Cs-137	0.01 pCi/m ³	CLLD			CLLD	
Air Iodine	I-131 (619)	0.04 pCi/m ³	1.87E-05(1/ 568) (-0.0221 - 0.0453)	Station 57 0.75 miles N	7.48E-04(0/ 52) (-0.0221 - 0.0160)	-0.0015(0/51) (-0.0197 - 0.0119)	
Water	Gross Beta (52)	4 pCi/l	2.65(6/41) (0.375 -8.06)	Station 27 3.20 miles E	3.81(4/12) (0.620 -8.06)	1.33(0/11) (0.203 -3.55)	
	Tritium (32)	300 pCi/l	CLLD			CLLD	
	Gamma (64)						
	Mn-54	10 pCi/l	CLLD			CLLD	
	Fe-59	20 pCi/l	CLLD			CLLD	
	Co-58	10 pCi/l	CLLD			CLLD	

TABLE 5-3 (Cont'd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM 1985 ANNUAL SUMMARY

Medium or Pathway Sampled	Type and Total Number of Analyses Performed	Contractual Lower Limit of Detection ^a (CLLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range	Number of Nonroutine, Reported Measurements ^c
				Name Distance & Direction	Mean (f) ^b Range		
Water (Cont'd)	Co-60	10 pCi/l	CLLD			CLLD	
	Zn-65	20 pCi/l	CLLD			CLLD	
	Zr-95	20 pCi/l	CLLD			CLLD	
	Nb-95	10 pCi/l	CLLD			CLLD	
	Cs-134	10 pCi/l	CLLD			CLLD	
	Cs-137	10 pCi/l	CLLD			CLLD	
	Ba-140	35 pCi/l	2.54(0/53) (-22.9 -24.3)	Station 28 7.40 miles SSE	10.7(0/12) (-5.18 -24.3)	-2.03(1/11) (-29.1 -35.8)	
	La-140	10 pCi/l	CLLD			CLLD	
Soil	Gamma (5)						
	Cs-134	100 pCi/kg	CLLD			CLLD	
	Cs-137	100 pCi/kg	320(3/4) (9.41 -586.0)	Station 23 3.00 miles ESE	586(1/1)	4.87(0/1)	

TABLE 5-3 (Cont'd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM 1985 ANNUAL SUMMARY

Medium or Pathway Sampled	Type and Total Number of Analyses Performed	Contractual Lower Limit of Detection ^a (CLLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range	Number of Nonroutine Reported Measurements ^c
				Name Distance & Direction	Mean (f) ^b Range		
Sediment	Gamma (4)						
	Co-60	100 pCi/kg	CLLD			CLLD	
	Cs-134	100 pCi/kg	CLLD			CLLD	
	Cs-137	100 pCi/kg	1.09E+03(2/2) (296 -1890)	Only one indicator location sampled for this medium		99.7(1/2) (84.3 -115)	
Fish 5-10	Gamma (17)						
	Mn-54	90 pCi/kg	CLLD			CLLD	
	Fe-59	170 pCi/kg	CLLD			CLLD	
	Co-58	90 pCi/kg	CLLD			CLLD	
	Co-60	90 pCi/kg	CLLD			CLLD	
	Zn-65	170 pCi/kg	CLLD			CLLD	
	Cs-134	90 pCi/kg	CLLD			CLLD	
	Cs-137	100 pCi/kg	CLLD			CLLD	

TABLE 5-3 (Cont'd)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM 1985 ANNUAL SUMMARY

Medium or Pathway Sampled	Type and Total Number of Analyses Performed	Contractual Lower Limit of Detection ^a (CLLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range	Number of Nonroutine Reported Measurements ^c
				Name Distance & Direction	Mean (f) ^b Range		
Milk	I-131 (79)	1.0 pCi/l	CLLD			CLLD	
	Gamma (79)						
	Cs-134	10 pCi/l	-0.0623(0/61) (-7.43-8.12)	Station 37 16.00 miles SSE	0.522(0/7) (-3.43 -4.34)	1.80(1/18) (-5.8 -14.5)	
	Cs-137	10 pCi/l	CLLD			CLLD	
	Ba-140	35 pCi/l	3.63(1/61) (-44.3 -42.7)	Station 37 16.00 miles SSE	5.03(0/7) (-16.4 -17.3)	0.666(0/18) (-14.4 -17.8)	
5-11 Roots	La-140	15 pCi/l	CLLD			CLLD	
	Gamma (8)						
	I-131	50 pCi/kg	CLLD			CLLD	
	Cs-134	50 pCi/kg	CLLD			CLLD	
	Cs-137	50 pCi/kg	CLLD			CLLD	

TABLE 5-3 (Continued)

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM 1985 ANNUAL SUMMARY

Medium or Pathway Sampled	Type and Total Number of Analyses Performed	Contractual Lower Limit of Detection ^a (CLLD)	All Indicator Locations Mean (f) ^b Range	Location with Highest Annual Mean		Control Locations Mean (f) ^b Range	Number of Nonroutine Reported Measurements ^c
				Name Distance & Direction	Mean (f) ^b Range		
Fruit	Gamma (8)						
	I-131	50 pCi/kg	CLLD			CLLD	
	Cs-134	50 pCi/kg	CLLD			CLLD	
	Cs-137	50 pCi/kg	CLLD			CLLD	
Veg Stock	Gamma (8)						
	I-131	50 pCi/kg	CLLD			CLLD	
	Cs-134	50 pCi/kg	CLLD			CLLD	
	Cs-137	50 pCi/kg	CLLD			CLLD	

^aContractual Lower Limit of Detection (CLLD) is defined in Nuclear Project No. 2, Contract C-20028.

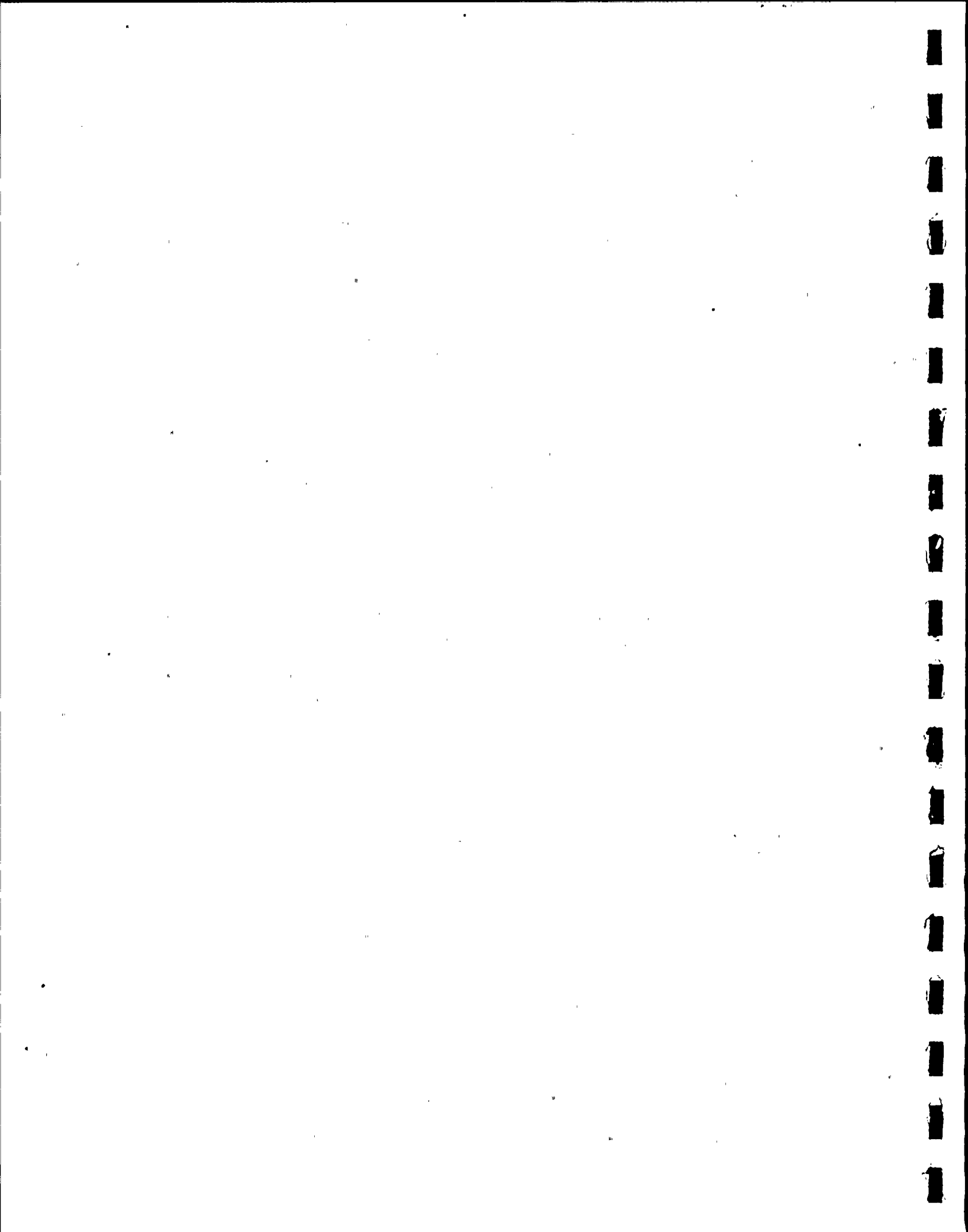
^b(f) is the ratio of positive results above the CLLD to the number of samples analyzed for the parameter of interest.

^cThere were no nonroutine reported measurements for the period.

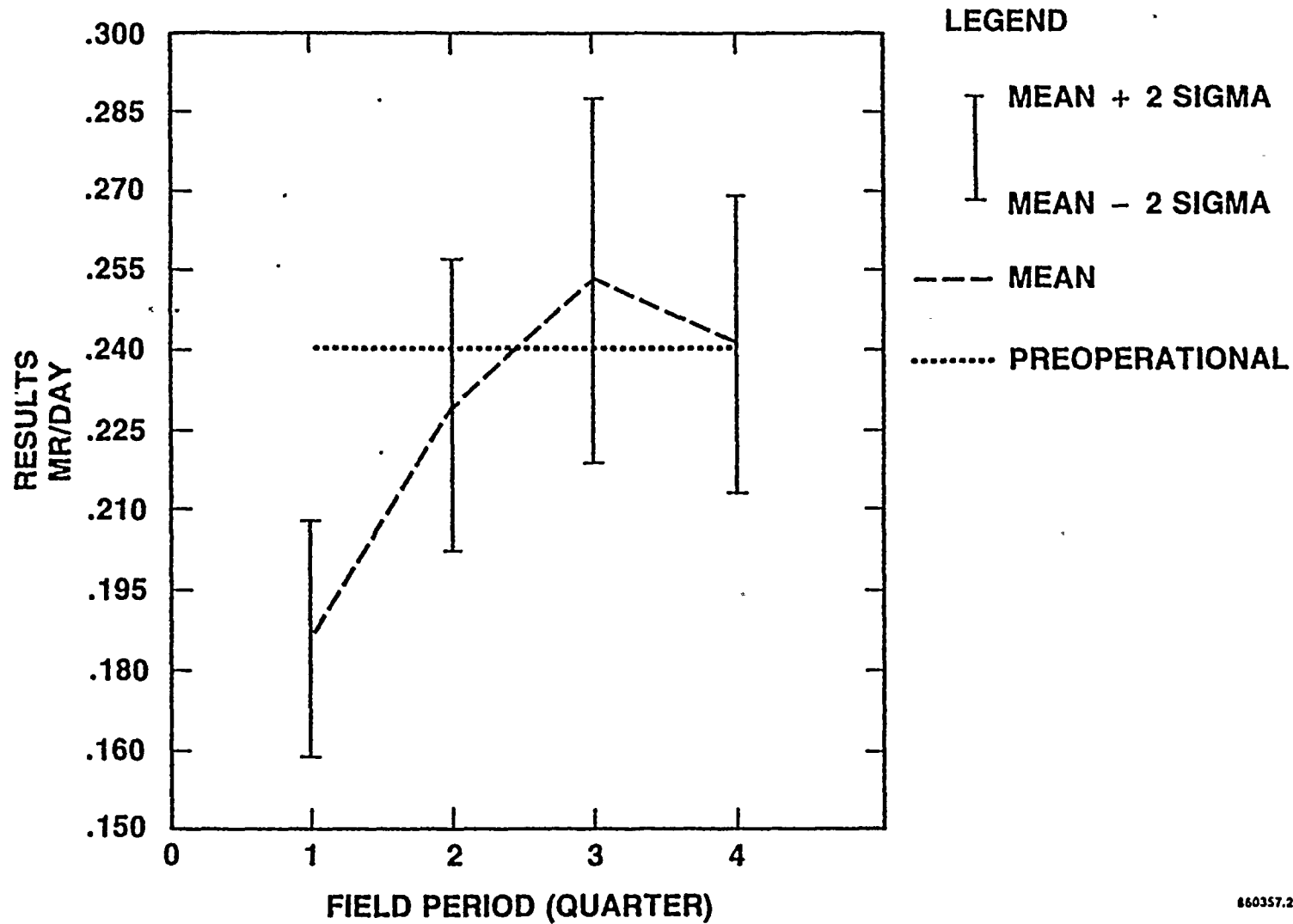
ranged from 0.16 to 0.29 mR/day, while the annual TLD results ranged from 0.19 to 0.27 mR/day. The slight low bias observed in the annual TLD data (Table A-2 of Appendix A), compared to the quarterly data, likely results from fading of the thermoluminescent signal over the period in the field.

Log probability plots of the quarterly and annual TLD are presented in Figures 5-2 through 5-6. The linearity of the data, indicates that the TLD data fits a log normal distribution. The linear data, as well as consistent slopes, or geometric standard deviations, indicate that there were no changes in the direct radiation levels at the sampling sites during 1985. The geometric standard deviations determined for the data from each quarter and for the annual TLDs ranged from 1.06 - 1.07, indicating a consistent variability among the results for each period. As noted above, the first quarter results were biased low compared to the other three quarters and the annual results.

An analysis of variance performed on the quarterly TLD data again indicated a significant difference between the results of Station 46 and the results all the other stations. This station is located just outside the Wahluke hunting area and is likely in a region having a higher background radioactivity than the other TLD stations. The results of Station 46 reported for the preoperational period also support this conclusion.⁶



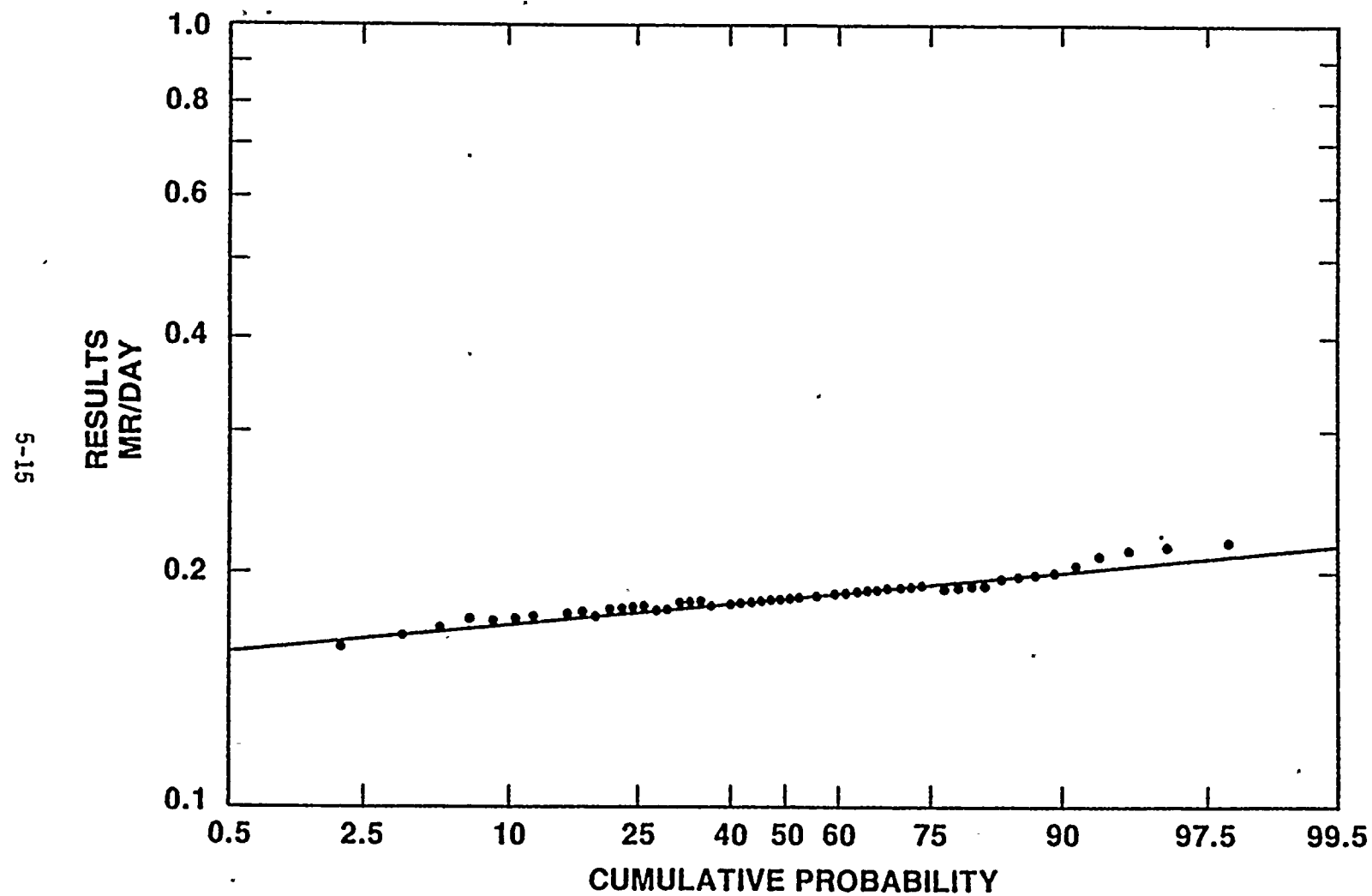
5-14



860357.2

FIGURE 5-1
1985 QUARTERLY TLD RESULTS

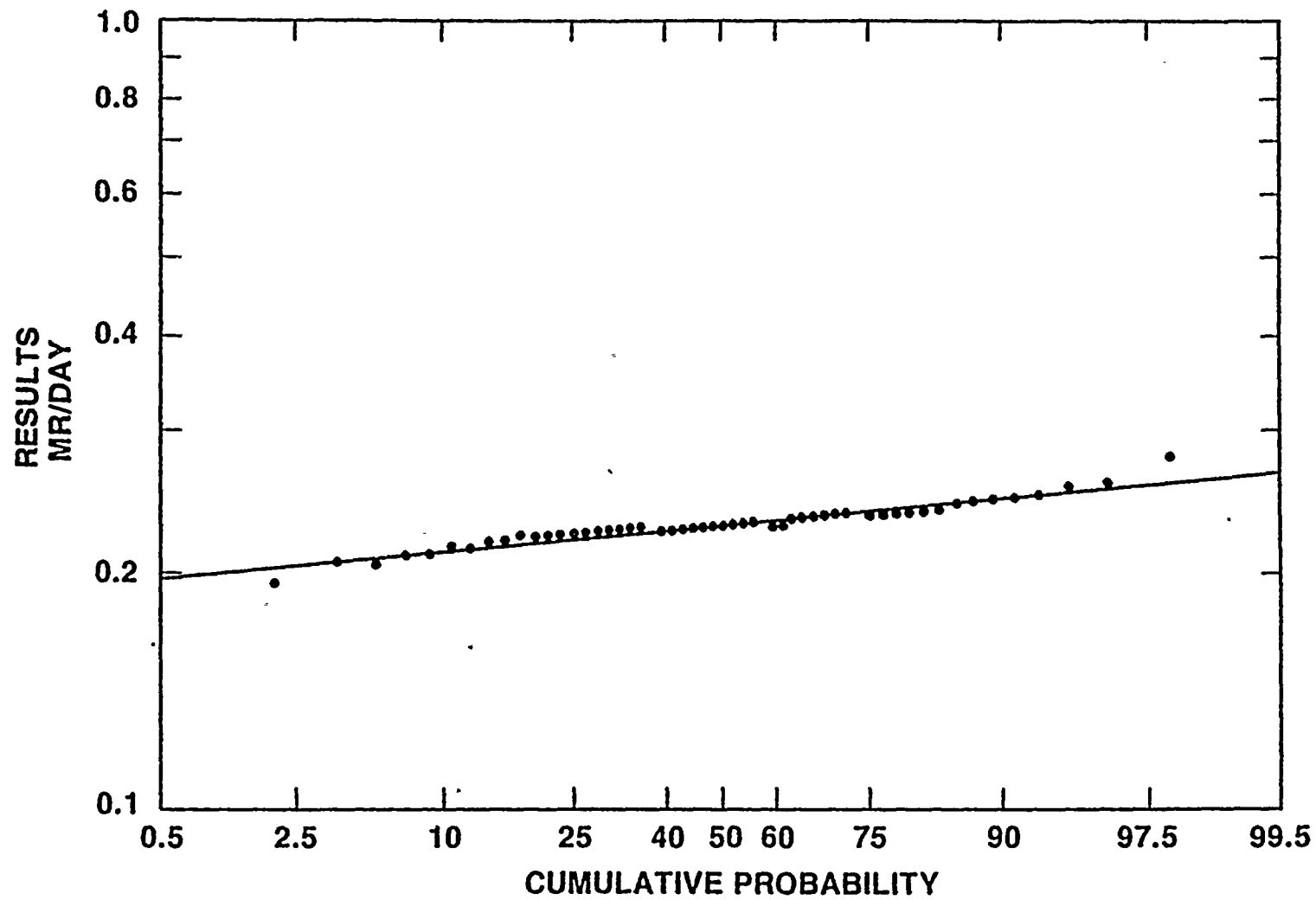




860357

FIGURE 5-2
LOG PROBABILITY PLOT OF FIRST QUARTER 1985 TLD DATA

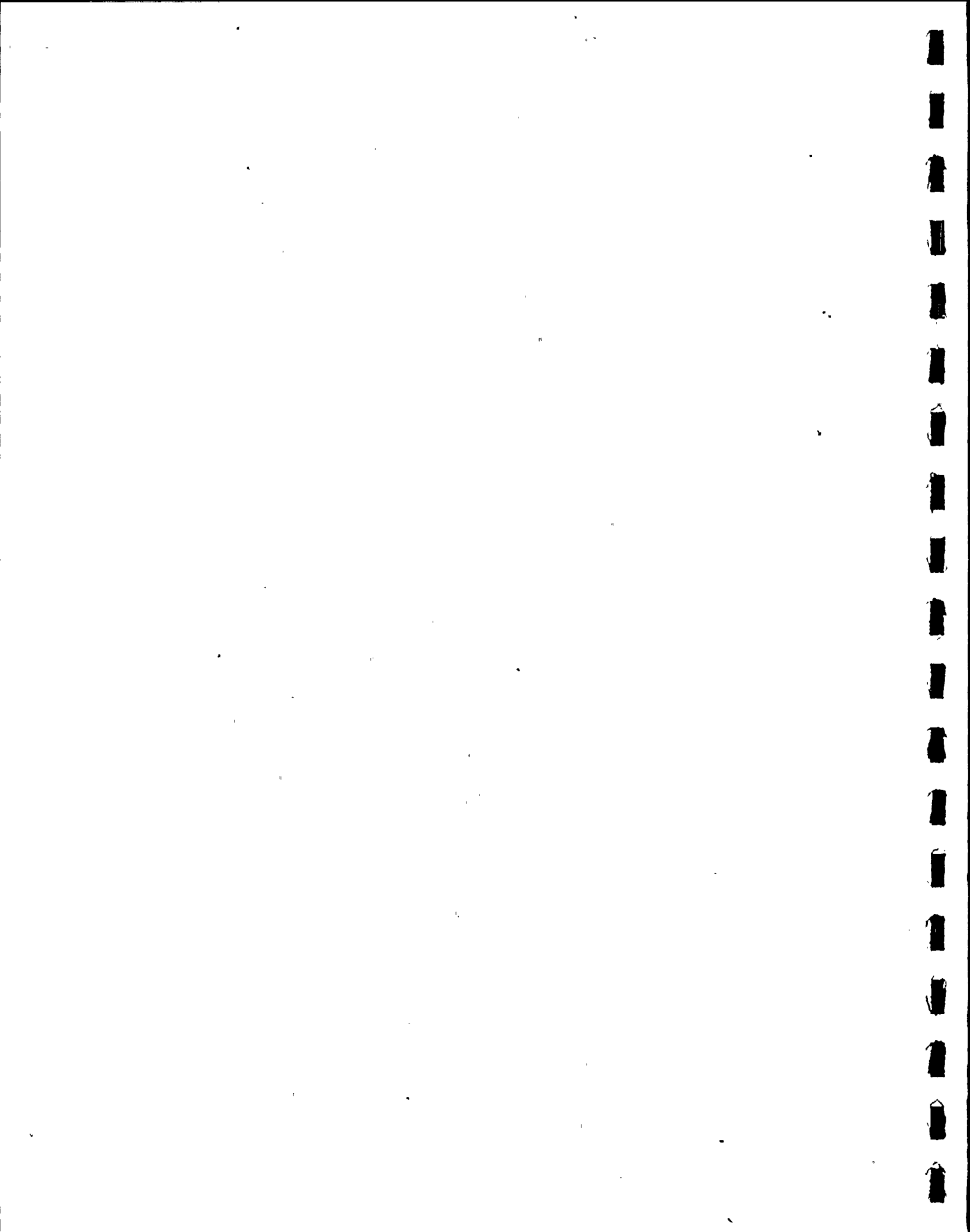
5-16



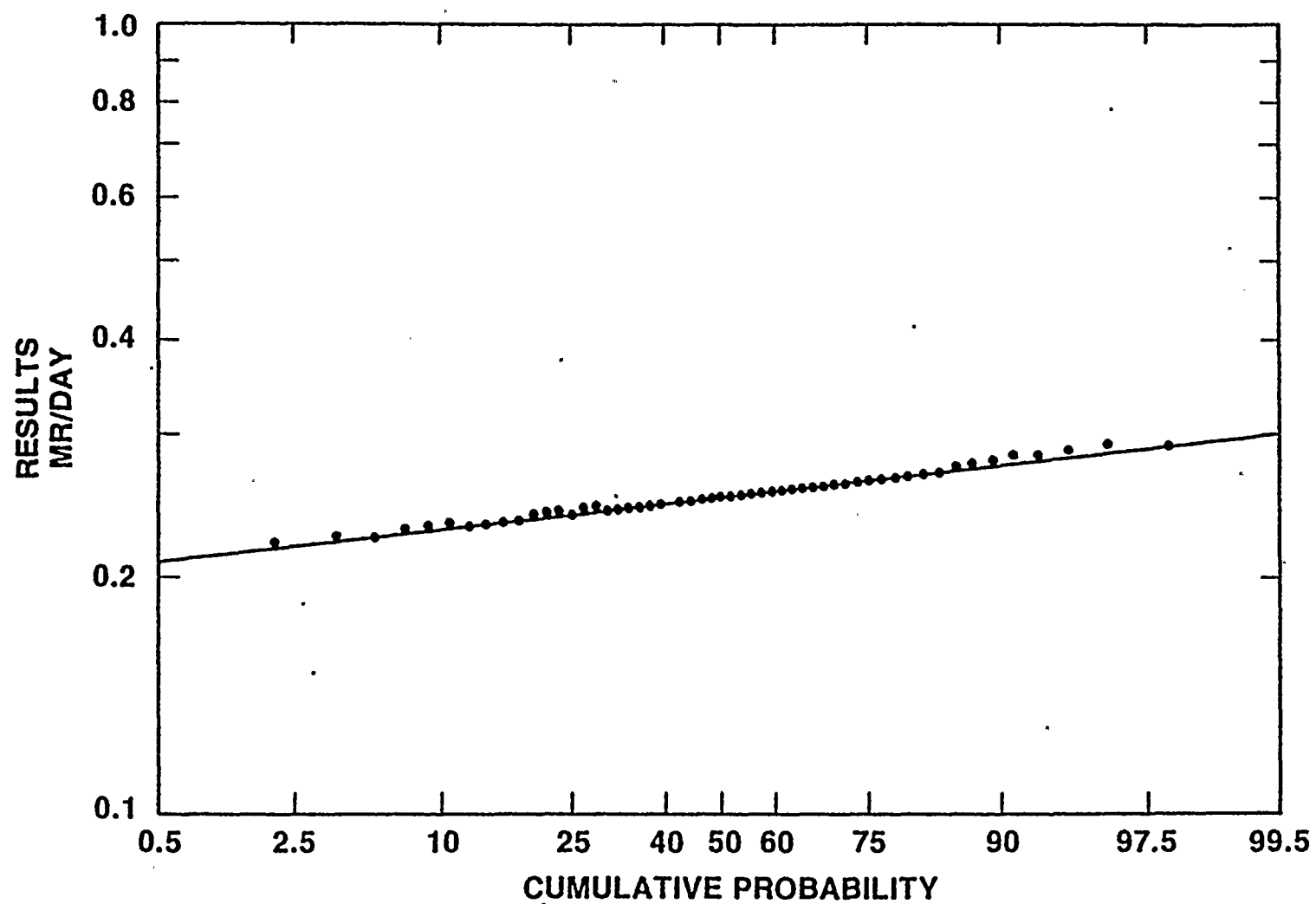
860357

FIGURE 5-3

LOG PROBABILITY PLOT OF SECOND QUARTER 1985 TLD DATA



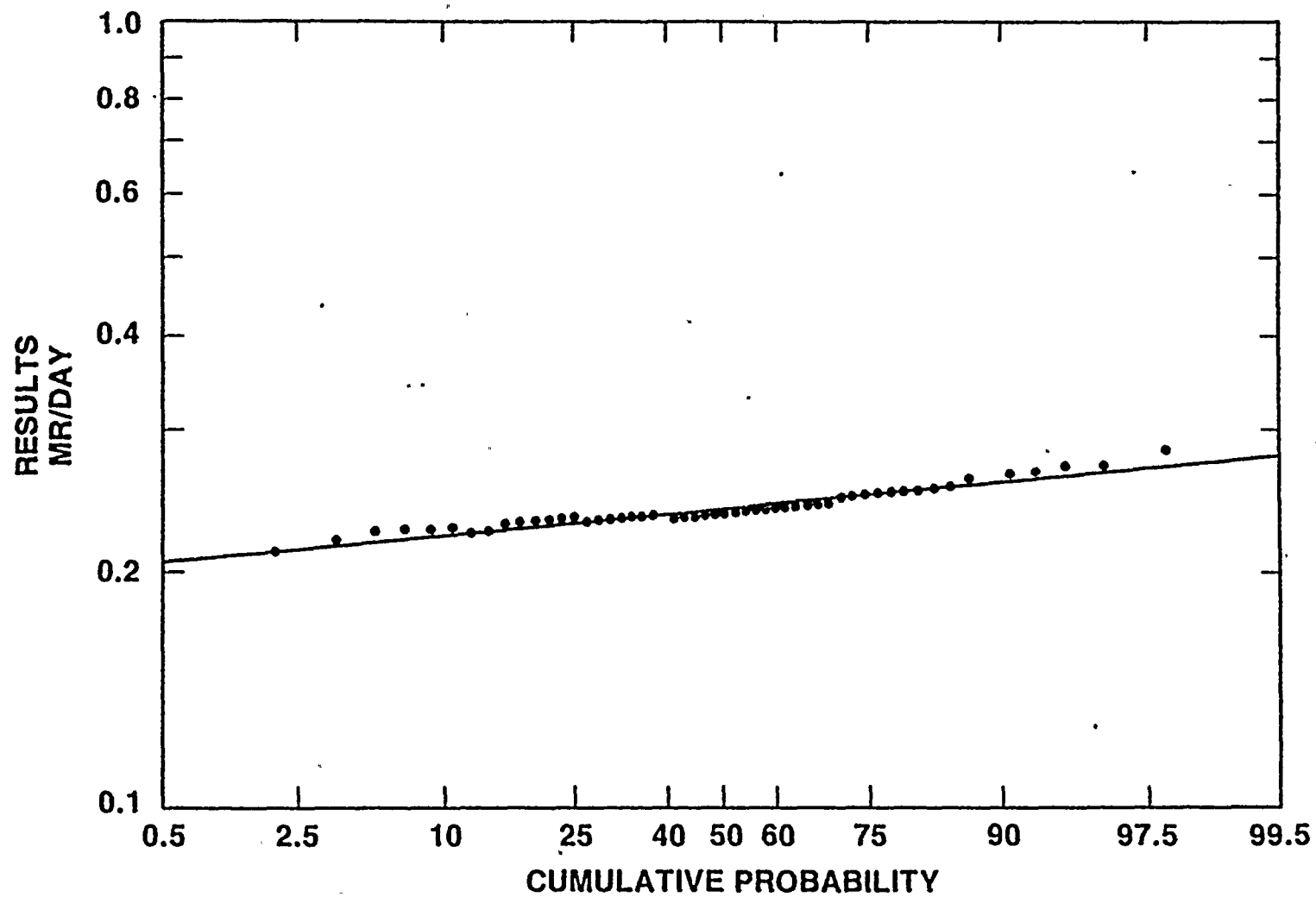
5-17



860357

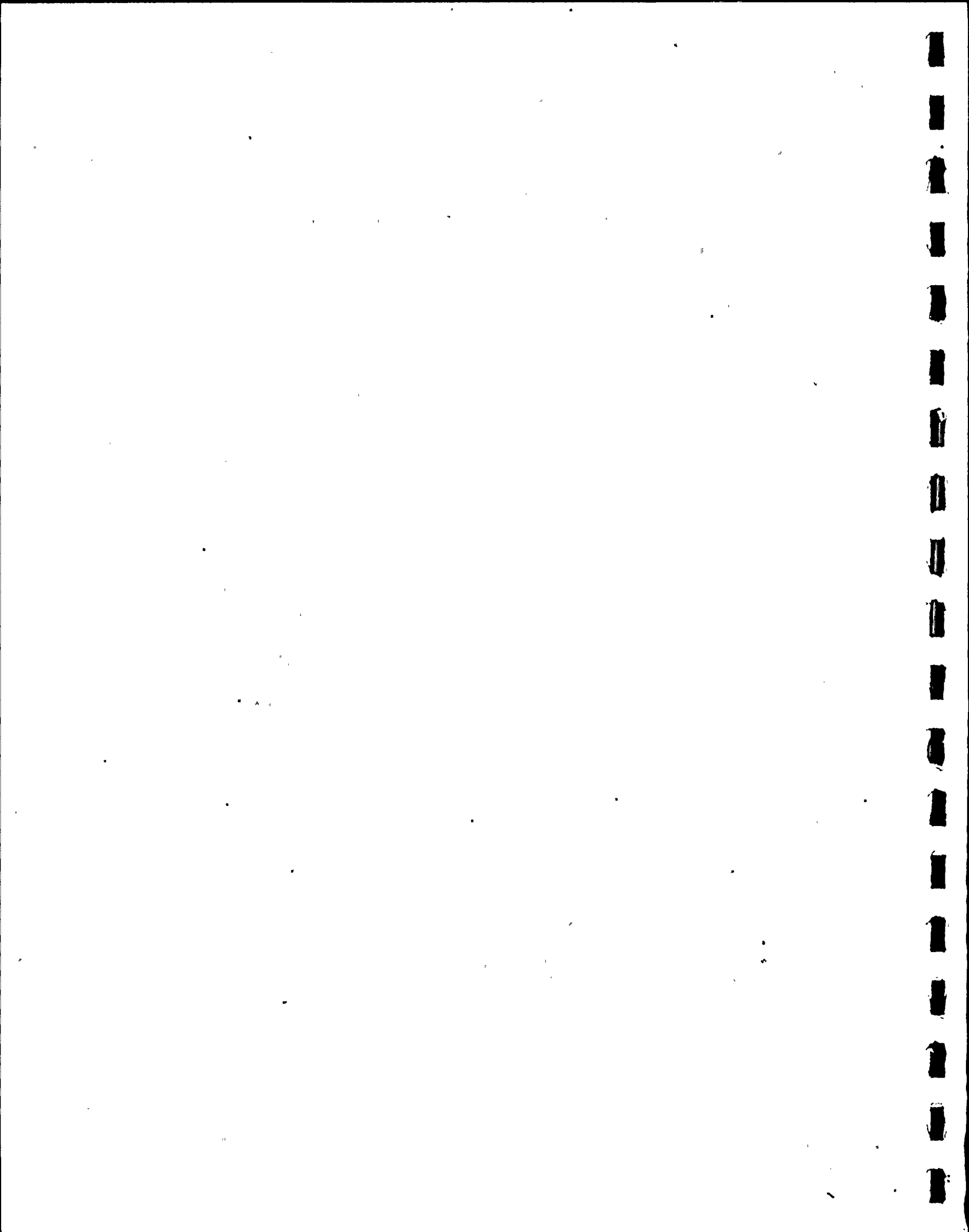
FIGURE 5-4
LOG PROBABILITY PLOT OF THIRD QUARTER 1985 TLD DATA

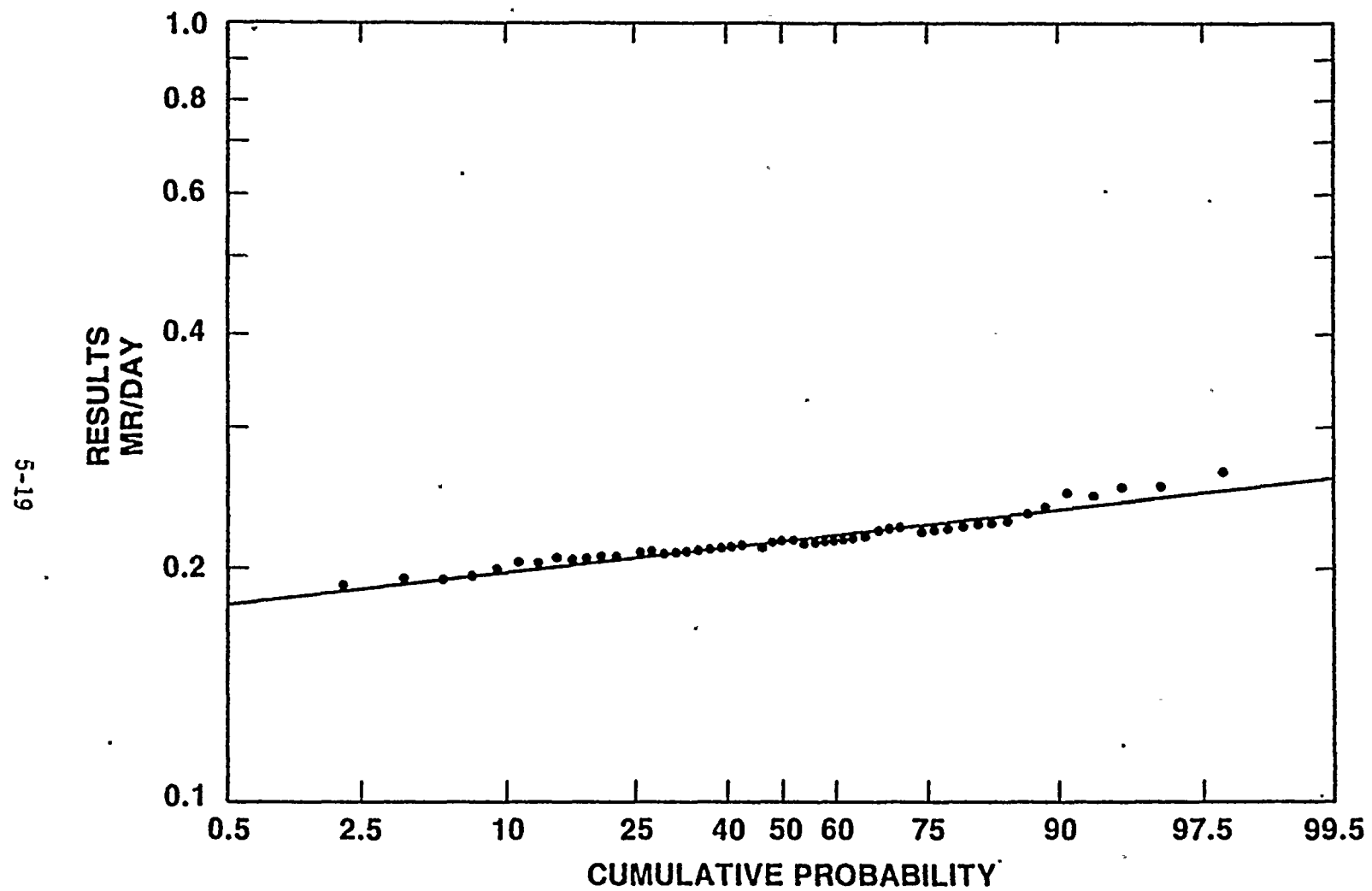
5-18



860357

FIGURE 5-5
LOG PROBABILITY PLOT OF FOURTH QUARTER 1985 TLD DATA





860357

FIGURE 5-6
LOG PROBABILITY PLOT OF 1985 ANNUAL TLD DATA

TABLE 5-4

MEAN QUARTERLY TLD DATA SUMMARY FOR THE PREOPERATIONAL
AND OPERATIONAL PERIODS (MR/DAY)

<u>STATION</u>	<u>PREOPERATIONAL</u>		<u>1984</u>		<u>1985</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
1	0.2404	0.0258	0.2157	0.0115	0.234	0.023
2	0.2334	0.0221	0.2134	0.0126	0.225	0.026
3	0.2248	0.0246	0.2018	0.0146	0.220	0.028
4	0.2221	0.0347	0.1921	0.0160	0.207	0.034
5	0.2287	0.0226	0.1990	0.0089	0.212	0.022
6	0.2227	0.0203	0.2066	0.0182	0.211	0.019
7	0.2357	0.0235	0.2119	0.0138	0.221	0.022
8	0.2601	0.0194	0.2334	0.0167	0.239	0.044
9	0.2171	0.0246	0.2052	0.0127	0.203	0.018
10	0.2302	0.0189	0.2073	0.0120	0.216	0.020
11	0.2361	0.0180	0.2152	0.0103	0.219	0.026
12	0.2509	0.0221	0.2258	0.0140	0.229	0.024
13	0.2372	0.0197	0.2151	0.0161	0.225	0.021
14	0.2439	0.0291	0.2135	0.0121	0.227	0.024
15	0.2548	0.0240	0.2247	0.0139	0.237	0.029
16	0.2444	0.0199	0.2256	0.0145	0.235	0.041
17	0.2501	0.0243	0.2130	0.0205	0.232	0.028
18	0.2416	0.0177	0.2146	0.0136	0.231	0.030
19	0.2400	0.0200	0.2136	0.0141	0.237	0.032
20	0.2368	0.0196	0.2090	0.0127	0.223	0.022
21	0.2273	0.0199	0.1987	0.0098	0.213	0.024
22	0.2420	0.0224	0.2162	0.0118	0.227	0.032
23	0.2376	0.0169	0.2111	0.0095	0.225	0.026
24	0.2431	0.0181	0.2145	0.0130	0.224	0.022
25	0.2540	0.0193	0.2255	0.0146	0.244	0.033
40	0.2184	0.0179	0.2125	0.0077	0.227	0.036
41	0.2587	0.0220	0.2358	0.0083	0.244	0.033
42	0.2458	0.0212	0.2237	0.0139	0.233	0.029

TABLE 5-4 (Cont'd)

MEAN QUARTERLY TLD DATA SUMMARY FOR THE PREOPERATIONAL
AND OPERATIONAL PERIODS (MR/DAY)

<u>STATION</u>	<u>PREOPERATIONAL</u>		<u>1984</u>		<u>1985</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
43	0.2529	0.0195	0.2258	0.0139	0.228	0.027
44	0.2326	0.0173	0.2117	0.0140	0.223	0.030
45	0.2333	0.0192	0.2086	0.0129	0.220	0.024
46	0.2854	0.0234	0.2520	0.0123	0.267	0.031
47	0.2177	0.0173	0.1940	0.0093	0.208	0.021
49	0.2391	0.0151	0.2185	0.0149	0.217	0.023
50	0.2223	0.0082	0.2114	0.0181	0.222	0.024
51	0.2283	0.0146	0.2098	0.0109	0.220	0.025
53	0.2730	0.0196	0.2443	0.0133	0.252	0.032
54	0.2602	0.0117	0.2272	0.0104	0.238	0.025
55	0.2256	0.0085	0.2083	0.0091	0.223	0.025
56	0.2379	0.0102	0.2143	0.0126	0.223	0.023
71(S1)	0.2408	0.0199	0.2159	0.0146	0.247	0.022
72(S2)	0.2495	0.0133	0.2204	0.0144	0.238	0.019
73(S3)	0.2279	0.0144	0.2027	0.0117	0.217	0.020
74(S4)	0.2632	0.0153	0.2263	0.0145	0.239	0.026
75(S5)	0.2247	0.0157	0.1956	0.0099	0.212	0.025
76(S6)	0.2419	0.0124	0.2094	0.0130	0.223	0.022
77(S7)	0.2492	0.0118	0.2174	0.0133	0.219	0.020
78(S8)	0.2474	0.0139	0.2086	0.0114	0.219	0.020
79(S9)	0.2528	0.0233	0.2187	0.0136	0.218	0.024
80(S10)	0.2431	0.0127	0.2114	0.0184	0.221	0.025
81(S11)	0.2433	0.0240	0.2126	0.0102	0.229	0.027
82(S12)	0.2571	0.0181	0.2174	0.0087	0.230	0.025
83(S13)	0.2510	0.0138	0.2256	0.0163	0.229	0.023
84(S14)	0.2443	0.0157	0.2050	0.0108	0.223	0.025
85(S15)	0.2569	0.0176	0.2204	0.0201	0.231	0.027
86(S16)	0.2489	0.0136	0.2240	0.0148	0.248	0.026
A11	0.2401	0.0243	0.2149	0.0170	0.227	0.025

TABLE 5-5

ANNUAL TLD DATA SUMMARY FOR THE PREOPERATIONAL
AND OPERATIONAL PERIODS (MR/DAY)

<u>STATION</u>	<u>PREOPERATIONAL</u>		<u>1984</u>		<u>1985</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
1	0.2521	0.0231	0.2325	0.0048	0.215	0.017
2	0.2301	0.0067	0.2226	0.0151	0.215	0.011
3	0.2297	0.0087	0.2069	0.0098	0.200	0.007
4	0.2397	0.0427	0.1966	0.0052	0.193	0.007
5	0.2396	0.0186	0.2025	0.0096	0.204	0.013
6	0.2243	0.0076	0.2089	0.0169	0.201	0.010
7	0.2341	0.0057	0.2262	0.0198	(a)	
8	0.2647	0.0088	0.2326	0.0120	(a)	
9	0.2186	0.0076	0.1971	0.0115	0.190	0.011
10	0.2312	0.0085	0.2148	0.0125	0.210	0.006
11	0.2346	0.0088	0.2146	0.0111	0.208	0.005
12	0.2553	0.0065	0.2345	0.0169	0.223	0.014
13	0.2376	0.0058	0.2241	0.0061	0.216	0.016
14	0.2339	0.0075	0.2201	0.0122	0.207	0.007
15	0.2598	0.0042	0.2388	0.0086	0.224	0.003
16	0.2486	0.0078	0.2253	0.0177	0.211	0.016
17	0.2426	0.0094	0.2320	0.0119	(a)	
18	0.2523	0.0176	0.2322	0.0145	0.218	0.007
19	0.2346	0.0044	0.2275	0.0101	0.218	0.007
20	0.2367	0.0115	0.2229	0.0070	0.216	0.006
21	0.2246	0.0086	0.2052	0.0110	0.209	0.008
22	0.2368	0.0059	0.2203	0.0103	0.195	0.006
23	0.2338	0.0067	0.2199	0.0230	0.207	0.005
24	0.2373	0.0082	0.2222	0.0095	0.209	0.006
25	0.2547	0.0097	0.2419	0.0253	0.204	0.004
40	0.2097	0.0050	0.2099	0.0075	0.227	0.003
41	0.2635	0.0077	0.2327	0.0092	0.211	0.017

TABLE 5-5 (Cont'd)

ANNUAL TLD DATA SUMMARY FOR THE PREOPERATIONAL
AND OPERATIONAL PERIODS (MR/DAY)

<u>STATION</u>	<u>PREOPERATIONAL</u>		<u>1984</u>		<u>1985</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
42	0.2351	0.0079	0.2206	0.0130	0.217	0.005
43	0.2417	0.0111	0.2232	0.0090	0.222	0.005
44	0.2370	0.0141	0.2105	0.0140	0.210	0.014
45	0.2310	0.0099	0.2060	0.0078	0.212	0.005
46	0.2876	0.0088	0.2717	0.0085	0.269	0.006
47	0.2204	0.0161	0.2117	0.0312	0.193	0.006
49	(b)		0.2247	0.0130	0.214	0.009
50	(b)		0.2263	0.0141	0.209	0.019
51	(b)		0.2115	0.0142	0.204	0.014
53	(b)		0.2426	0.0091	0.252	0.024
54	(b)		0.2333	0.0133	0.226	0.008
55	(b)		0.2195	0.0216	0.212	0.006
56	(b)		0.2224	0.0170	0.212	0.029
71	0.2412	0.0121	0.2314	0.0216	0.252	0.026
72	0.2508	0.0095	0.2307	0.0193	0.238	0.020
73	0.2293	0.0065	0.2096	0.0172	0.208	0.009
74	0.2438	0.0056	0.2371	0.0146	0.221	0.025
75	0.2365	0.0053	0.2067	0.0263	0.212	0.014
76	0.2418	0.0100	0.2189	0.0220	0.231	0.028
77	0.2463	0.0110	0.2241	0.0102	0.223	0.016
78	0.2464	0.0189	0.2229	0.0169	0.268	0.044
79	0.2520	0.0065	0.2254	0.0140	0.218	0.014
80	0.2337	0.0253	0.1902	0.0381	0.215	0.007
81	0.2265	0.0074	0.2214	0.0170	0.216	0.010
82	0.2460	0.0144	0.2281	0.0274	0.223	0.014
83	0.2496	0.0108	0.2449	0.0268	0.222	0.013
84	0.2303	0.0102	0.2154	0.0068	0.208	0.018

TABLE 5-5 (Cont'd).

ANNUAL TLD DATA SUMMARY FOR THE PREOPERATIONAL
AND OPERATIONAL PERIODS (MR/DAY)

<u>STATION</u>	<u>PREOPERATIONAL</u>		<u>1984</u>		<u>1985</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
85	0.2524	0.0072	0.2418	0.0089	0.233	0.014
86	0.2401	0.0075	0.2434	0.0181	0.247	0.012
All	0.2406	0.0179	0.2230	0.0203	0.22	0.015

(a) TLD missing

(b) Stations 49-56 were first monitored during Fourth Quarter 1983.

TABLE 5-6

1985 QUARTERLY VERSUS ANNUAL TLD DATA (MEAN MR/DAY $\pm 1 \sigma$)

<u>Station</u>	<u>Quarterly TLDs</u>	<u>Annual TLDs</u>
1	0.234 \pm 0.023	0.215 \pm 0.017
2	0.225 \pm 0.026	0.215 \pm 0.011
3	0.221 \pm 0.028	0.200 \pm 0.007
4	0.207 \pm 0.033	0.193 \pm 0.007
5	0.212 \pm 0.022	(a)
6	0.211 \pm 0.019	(a)
7	0.221 \pm 0.022	0.190 \pm 0.011
8	0.239 \pm 0.044	0.190 \pm 0.011
9	0.203 \pm 0.018	0.190 \pm 0.011
10	0.216 \pm 0.020	0.210 \pm 0.006
11	0.219 \pm 0.026	0.208 \pm 0.005
12	0.229 \pm 0.024	0.223 \pm 0.014
13	0.225 \pm 0.021	0.216 \pm 0.016
14	0.227 \pm 0.024	0.207 \pm 0.007
15	0.237 \pm 0.029	0.224 \pm 0.003
16	0.235 \pm 0.041	0.211 \pm 0.016
17	0.232 \pm 0.028	(a)
18	0.231 \pm 0.030	0.218 \pm 0.007
19	0.237 \pm 0.032	0.216 \pm 0.006
20	0.223 \pm 0.022	0.210 \pm 0.008
21	0.213 \pm 0.024	0.195 \pm 0.006
22	0.227 \pm 0.032	0.207 \pm 0.005
23	0.225 \pm 0.026	0.209 \pm 0.006
24	0.224 \pm 0.022	0.204 \pm 0.004
25	0.244 \pm 0.033	0.227 \pm 0.003
40	0.227 \pm 0.036	0.211 \pm 0.017
41	0.244 \pm 0.035	0.227 \pm 0.002
42	0.233 \pm 0.029	0.217 \pm 0.005

TABLE 5-6 (Cont'd)

1985 QUARTERLY VERSUS ANNUAL TLD DATA (MEAN MR/DAY $\pm 1\sigma$)

<u>Station</u>	<u>Quarterly TLDs</u>	<u>Annual TLDs</u>
43	0.228 \pm 0.027	0.222 \pm 0.005
44	0.223 \pm 0.030	0.210 \pm 0.0144
45	0.200 \pm 0.024	0.212 \pm 0.005
46	0.267 \pm 0.031	0.269 \pm 0.006
47	0.208 \pm 0.021	0.193 \pm 0.006
49	0.217 \pm 0.023	0.214 \pm 0.009
50	0.222 \pm 0.024	0.209 \pm 0.020
51	0.220 \pm 0.025	0.204 \pm 0.014
53	0.252 \pm 0.032	0.252 \pm 0.024
54	0.238 \pm 0.025	0.226 \pm 0.008
55	0.223 \pm 0.025	0.212 \pm 0.006
56	0.223 \pm 0.023	0.212 \pm 0.030
71 (S1)	0.247 \pm 0.022	0.251 \pm 0.261
72 (S2)	0.238 \pm 0.019	0.238 \pm 0.020
73 (S3)	0.217 \pm 0.020	0.208 \pm 0.010
74 (S4)	0.239 \pm 0.026	0.221 \pm 0.025
75 (S5)	0.212 \pm 0.025	0.212 \pm 0.014
76 (S6)	0.223 \pm 0.022	0.231 \pm 0.028
77 (S7)	0.219 \pm 0.020	0.223 \pm 0.016
78 (S8)	0.219 \pm 0.020	0.268 \pm 0.044
79 (S9)	0.218 \pm 0.024	0.218 \pm 0.014
80 (S10)	0.221 \pm 0.025	0.215 \pm 0.007
81 (S11)	0.229 \pm 0.029	0.216 \pm 0.010
82 (S12)	0.230 \pm 0.025	0.223 \pm 0.014
83 (S13)	0.229 \pm 0.023	0.222 \pm 0.013
84 (S14)	0.223 \pm 0.025	0.208 \pm 0.018
85 (S15)	0.231 \pm 0.027	0.233 \pm 0.014
86 (S16)	0.248 \pm 0.026	0.247 \pm 0.012

(a) TLD missing

5.2 Airborne Particulate/Air Iodine

The results of gross beta analyses on air particulate filters are presented in Table A-3 of Appendix A. A total of 569 indicators and 52 control samples were analyzed. Two of the results for Station 7 (1.79 and 0.577 pCi) were not included in Table A-3 because they were gross counts, not adjusted by the volume of air sampled. All results were above the CLLD for the gross beta analysis. The highest result observed for the indicator stations was 0.140 pCi/m³. This result occurred at Stations 23 and 57 in mid December, when local weather inversion caused a significant increase in the background radiation levels. The effect of this inversion was observed in the results of ten of the eleven indicator stations and in unusually high detector backgrounds reported by U.S. Testing during that period. The range of results for 1985 was similar to the ranges of the preoperational and 1984 results. The average weekly results are plotted in Figure 5-7, along with an indicator of the preoperational mean. Aside from the high results observed in December, the gross beta results during 1985 generally were within previously reported ranges for airborne radioactivity in the Hanford environs.⁷

During 1985, the Supply System REMP participated in a small local intercomparison study sponsored by Battelle Northwest Laboratories. The purpose of the study was to compare the gross beta, gross alpha and gamma spectrometry results that various Hanford DOE contractors and the Supply System obtained for two spiked air filters. The two-inch glass fiber filters, containing known amounts of Sr-90, Cs-137 and Am-241, were submitted to U.S. Testing for routine gross beta analysis only. The results reported for that analysis were 41 ± 4.3 and 45 ± 5.2 pCi, which agreed reasonably well with the known activity of 36 pCi.

5-28

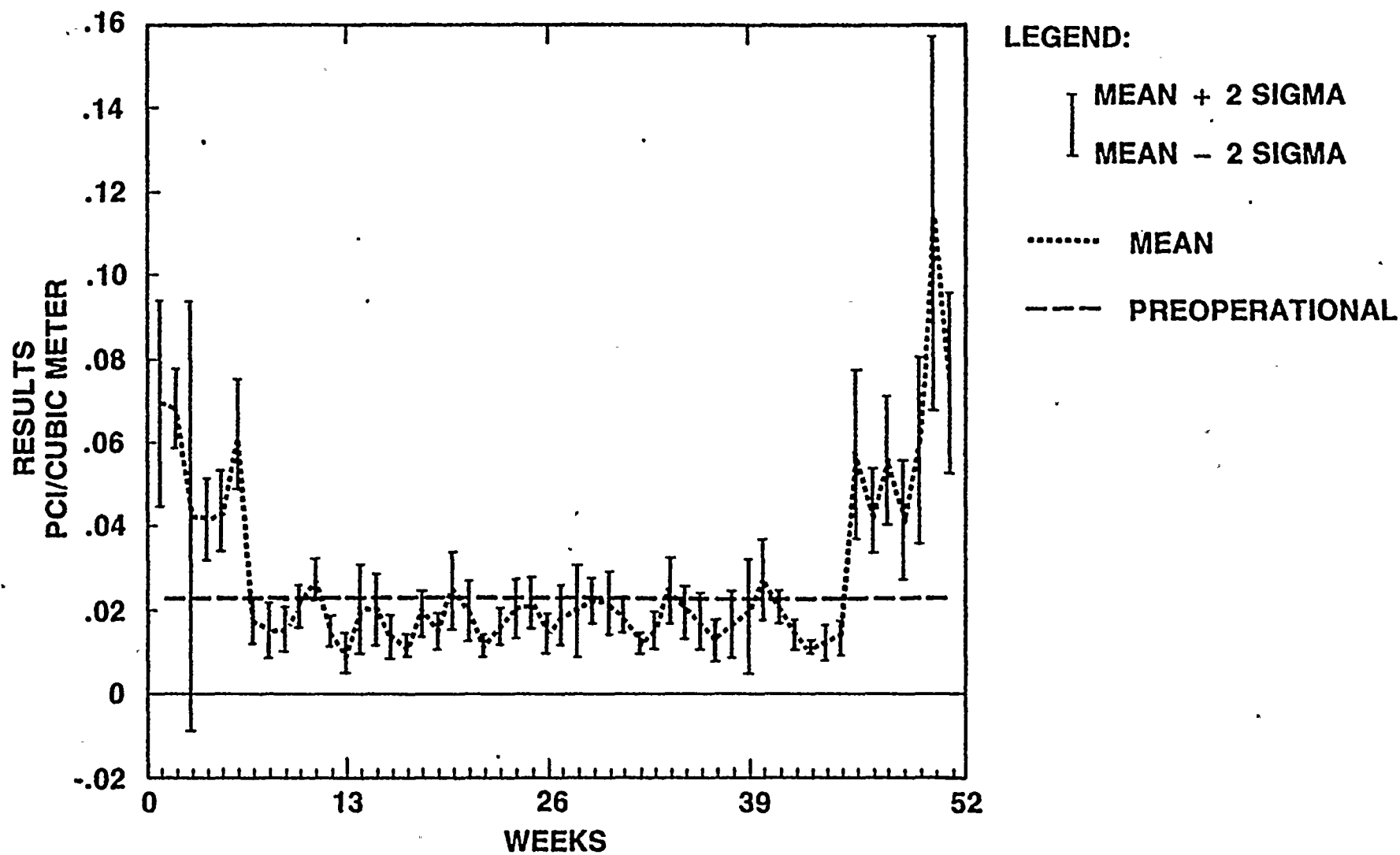


FIGURE 5-7
GROSS BETA IN AIR AVERAGE WEEKLY RESULTS

Routine air filters were composited on a quarterly basis and analyzed using gamma spectrometry. The results of these composite samples are given in Table A-4 of Appendix A. No results above the CLLDs for Cs-137 and Cs-134 were detected. Forty-one of 44 indicator results and 3 of 4 control results were above the CLLD for Be-7, a component of natural background radiation.

Iodine-131 measurements were made on charcoal cartridges collected each week from the air samplers. As shown in Table 5-1, the 1985 results were well within the ranges observed for the preoperational and 1984 data. Only one result from an indicator station exceeded the CLLD for that analysis and that result was less than the LLD for I-131 in air specified in the Branch Technical Position.¹ The I-131 in air results are given in Table A-5 of Appendix A.

5.3 Water

Gross beta measurements were made on 52 water samples: 41 from indicator stations and 11 from the control location. Six of the 52 results were greater than the CLLD (4 pCi/liter). The highest result from an indicator station was 8.06 pCi/liter. The mean gross beta result was 2.65 pCi/liter. These results are within the range observed during the preoperational period for that analysis. The individual gross beta in water results are contained in Table A-6 of Appendix A.

A nonconformance report was issued by U.S. Testing for gross beta analyses performed on the water samples collected on December 18, 1985. Cross-contamination occurring during sample preparation accounted for abnormally high gross beta results. The samples were subsequently reanalyzed and the reported results were corrected.

Tritium in water analyses were performed on 32 water samples during 1985. All tritium results were below the 300 pCi/liter CLLD, as well as Plant Technical Specification limits and Washington State Water Quality Standards. The tritium water results for 1985 were also lower than the results reported for the preoperational and 1984 reporting periods. Individual tritium in water results are given in Table A-7 of Appendix A.

Gamma spectrometry was performed on 64 water samples: 53 from indicator stations and 11 from the control location. All radionuclides detected were below the CLLD, except Ba-140, which exceeded the CLLD in one sample from the control location. In a few cases, it was necessary to calculate the La-140 result from the Ba-140, because the period between sample collection and counting was longer than usual. In order to achieve the required CLLD, transient equilibrium was assumed to exist between the parent and La-140. The gamma spectrometry results are contained in Table A-8 of Appendix A.

During 1985, the Sr-89 and Sr90 analysis was not performed on drinking water because no gross beta results were ten (10) times the mean of the previous three months' activity or significantly greater than 8 pCi/liter.

The I-131 analysis was also not performed on drinking water samples because the calculated dose for the consumption of water was not greater than 1 mrem per year to the maximum organ.⁸

Beginning in July 1985, a second, or duplicate, sample was drawn from the plant discharge line (Station 27) each time the routine sample was drawn. The routine and duplicate samples were analyzed at the same time. The results of the duplicate (Station 72) and routine samples are compared in Table 5-7. In general, the gross beta results for the duplicate samples agree with the routine sample results. The gamma spectrometry results, however, are quite varied and cannot be easily compared. This illustrates the large uncertainty associated with environmental sample results at or below the LLD for a particular procedure.

TABLE 5-7

COMPARISON OF THE RESULTS FOR STATION 27
AND ITS DUPLICATE, STATION 72

<u>Date</u>	<u>Station Number</u>	<u>Gross Beta (pCi/liter)</u>	<u>Gamma Spectrometry (pCi/liter)</u>			
			<u>Cs-134</u>		<u>Cs-137</u>	<u>Co-60</u>
7/17-8/21	27	2.54 \pm 1.54	-0.572	\pm 1.77	0.863 \pm 1.67	1.02 \pm 1.89
	72	2.16 \pm 1.28	0.240	\pm 1.88	0.326 \pm 1.42	1.52 \pm 1.15
8/21-9/18	27	5.61 \pm 2.02	-0.326	\pm 1.30	0.199 \pm 0.86	1.35 \pm 1.11
	72	5.00 \pm 1.87	0.00	\pm 1.47	-1.69 \pm 1.90	0.969 \pm 1.80
9/18-10/16	27	0.620 \pm 1.34	1.61	\pm 1.02	-1.33 \pm 1.99	0.673 \pm 0.778
	72	2.33 \pm 1.51	0.432	\pm 1.44	0.355 \pm 1.62	-2.43 \pm 2.01
10/16-11/20	27	3.49 \pm 1.63	0.439	\pm 1.46	1.13 \pm 1.08	0.294 \pm 1.49
	72	3.39 \pm 1.69	0.958	\pm 1.69	1.37 \pm 1.16	-0.325 \pm 1.34
11/20-12/18	27	3.24 \pm 1.32	-0.0788	\pm 1.80	2.61 \pm 1.18	-0.862 \pm 1.83
	72	3.00 \pm 1.28	-1.03	\pm 1.62	-0.913 \pm 1.59	-1.08 \pm 1.78

5.4 Soil

Gamma spectrometry was performed on five samples from four indicator stations and one control station. The Cs-137 levels found in three of the five samples were above the CLLD (100 pCi/kg), but within the range of results observed for the preoperational and 1984 operational periods, as well as the results reported for offsite samples by the Hanford Environmental Monitoring Program⁷. All the Cs-134 results were below CLLD. The other radionuclides indicated in the soil sample results (Table A-9 of Appendix A) are the normal decay products of naturally occurring radionuclides from the Th-232 and U-238 decay series.⁹ The levels of these radionuclides found in the indicator samples were generally less than the levels found in the control samples.

5.5 Shoreline Sediment

Gamma spectrometry was performed on four samples, two from indicator locations and two from control locations. The results for sediment samples are presented in Table A-10 of Appendix A. Cesium -137 levels were above the CLLD in both the indicator samples and in one of the control samples. The maximum indicator sample result for Cs-137 was 1890 pCi/kg, which was higher than levels observed during the pre-operational and 1984 reporting periods. Higher than usual levels of Cs-137 were not observed in the WNP-2 discharge water samples during the reporting period, as one might expect, assuming Cs-137 accumulation in the shoreline sediment. It is likely that, with the uncertainties associated with sediment sampling, and considering the 30-year half-life of Cs-137, this high result reflected not the accumulation of new activity from WNP-2 discharge, but the inadvertent inclusion of deeper sediment deposits containing Cs-137 from past Hanford operations.^{10,11}

Further indication that this was an anomalous result and not indicative of plant environmental impact are the relatively consistent levels of Cs-134 in the indicator and control samples. Cesium-134 is a fission

product with a half-life of 2.06 years. It would be expected to be transported and to accumulate in the river sediments along with the Cs-137. The levels of Cs-134 would have also increased, if the elevated Cs-137 results were due to recent deposition.³

Cobalt-60 was reported at levels below the CLLD for the indicator and control samples. The presence of Co-60 in the shoreline sediment is expected as a result of past Hanford operations.^{10,11}

5.6 Fish

Seventeen (17) fish samples were analyzed using gamma spectrometry. All radionuclide concentrations were less than the CLLD. The results of the individual fish samples are presented in Table A-11 of Appendix A.

5.7 Milk

During 1985, 79 milk samples were analyzed for iodine-131 and gamma-emitting radionuclides. All I-131 results were below 1.0 pCi/liter, the current CLLD and the LLD specified in the Branch Technical Position. The highest 1985 results were above the highest results observed for the 1984 reporting period. Although results were within the range specified for the preoperational period, the use of "less than LLD" values for the preoperational results makes comparison difficult. The I-131 results for individual samples are given in Table A-12 of Appendix A.

During the second quarter of 1985, slightly elevated iodine-131 results were observed for the indicator locations and the control location. The results during that period ranged from 0.0197 to 0.487 pCi/liter for the control samples and from -0.106 to 0.598 pCi/liter for indicator samples. Since the plant was in an outage from May 6 to July 1, 1985, and since the WNP-2 reactor coolant concentrations of I-131 remained low during 1985, it is highly unlikely that these results are attributable to WNP-2 plant effluent releases.¹²

The high errors associated with these results and the fact that they are at the level of U.S. Testing's actual lower limit of detection for that procedure greatly reduce their significance in terms of environmental impact.

One outcome of an investigation into the elevated I-131 results was the discovery that much of the feed used for the cows at the control location (Station 9) in the Grandview area consists of hay grown in the Hollingsworth Road area in Franklin County. The feed source is in the most probable downwind direction from the site and, therefore, most likely to be affected by measurable deposition. Because this situation lessens the appropriateness of the current control location, another milk source that would provide consistent control samples was sought. A milk source using only locally grown feed was located in the Sunnyside area. Routine sampling from that source is expected to begin during the second quarter of 1986.

The gamma spectrometry results were generally below CLLD, except for two samples: one, a control sample which exceeded the CLLD for Cs-134 and the other, an indicator sample which exceeded the CLLD for Ba-140. Neither of these results, however, exceeded the LLDs specified in the Branch Technical Position. Gamma spectrometry results for individual samples can be found in Table A-13 of Appendix A.

Duplicate milk samples for Station 36 were collected, beginning in August 1985. The gamma spectrometry and I-131 results for the duplicate samples (Station 37) and the routine results for Station 36 are given in Table 5-8. The variability between the results of these samples, which were taken from the same location at the same time, further exemplifies the difficulty of comparing individual samples containing radionuclides at or below the LLD in order to determine whether a significant difference exists.

TABLE 5-8

COMPARISON OF THE RESULTS FOR STATION 36
AND ITS DUPLICATE, STATION 37

Date	Station Number	Iodine-131 (pCi/liter)	Gamma Spectrometry (pCi/liter)						
			Cs-137	Cs-134		Ba-140		La-140	
8-06	36	0.0229 \pm 0.172	-1.62 \pm 3.46	2.08 \pm 3.08	0.156 \pm 12.0	2.88 \pm 4.36			
	37	-0.117 \pm 0.153	-2.29 \pm 3.60	-1.09 \pm 3.42	8.44 \pm 13.1	-8.18 \pm 6.63			
8-20	36	0.0315 \pm 0.107	6.09 \pm 4.69	0.806 \pm 5.16	-15.7 \pm 19.8	-24.2 \pm 9.03			
	37	-0.0330 \pm 0.123	-2.41 \pm 3.27	-1.89 \pm 3.14	7.94 \pm 12.6	-2.59 \pm 6.34			
9-04	36	0.104 \pm 0.146	1.18 \pm 3.04	0.180 \pm 3.06	-7.43 \pm 13.5	-5.04 \pm 6.32			
	37	0.194 \pm 0.156	0.241 \pm 2.90	3.96 \pm 3.28	6.24 \pm 12.1	-0.199 \pm 4.03			
9-17	36	0.0694 \pm 0.010	3.41 \pm 3.11	1.96 \pm 3.16	-8.05 \pm 11.5	-0.306 \pm 3.86			
	37	0.0294 \pm 0.0496	3.33 \pm 2.80	0.811 \pm 3.34	11.4 \pm 12.0	3.47 \pm 5.49			
10-15	36	0.0256 \pm 0.0758	-0.0802 \pm 3.04	1.10 \pm 3.46	3.55 \pm 10.8	2.89 \pm 2.61			
	37	0.0610 \pm 0.0692	6.03 \pm 3.03	-3.43 \pm 3.51	0.298 \pm 11.3	-2.94 \pm 4.60			
11-19	36	0.155 \pm 0.144	-1.04 \pm 2.99	-0.715 \pm 3.25	0.596 \pm 11.9	0.203 \pm 4.17			
	37	-0.0345 \pm 0.136	-0.802 \pm 3.33	0.954 \pm 3.16	-16.4 \pm 13.2	4.19 \pm 5.16			
12-17	36	-0.104 \pm 0.152	1.32 \pm 2.67	2.05 \pm 2.61	-8.18 \pm 11.8	-1.60 \pm 3.91			
	37	-0.174 \pm 0.230	2.09 \pm 3.00	4.34 \pm 3.06	17.3 \pm 10.9	0.663 \pm 5.13			

5.8 Garden Produce

Garden produce samples are subdivided into three groups: root crops, fruit and vegetable stock. Root crops include carrots, onions, potatoes and beets. Vegetable stock is the consumable portion of the vegetable which grows above ground. Gamma spectrometry was performed on these samples and the concentrations of all radionuclides, were below the respective CLLDs. The results for the individual root crops, vegetable stock, and fruit samples are shown in Tables A-14 through A-16 of Appendix A.

5.9 Summary

As a result of WNP-2 operations during 1985, small quantities of radionuclides were released to the environment. The impact of these releases, in terms of estimated doses to the public is evaluated in Appendix C. All 1985 estimated doses resulting from the liquid and gaseous effluents were far below the Technical Specification limits. The negligible radiological impact of plant operations on the environment is verified by the results of the Radiological Environmental Monitoring Program. Most of the concentrations of radionuclides determined for the samples collected were at or below the lower limits of detection for the procedures used. In light of the low level of the concentrations reported, the high level of error associated with the results, and the fact that 1985 results were generally within the range observed for the preoperational and the 1984 results, the radiological impact of the plant operations was negligible.¹³ In the few cases where a trend or increase over preoperational levels was indicated, there was significant evidence that other factors, such as meteorological conditions, the variability in background radiation and the presence of long-lived radionuclides from past Hanford operations, accounted for the unusual results.

6.0 REFERENCES

1. U.S. Nuclear Regulatory Commission, "An Acceptable Radiological Environmental Monitoring Program", Radiological Assessment Branch Technical Position (Regulatory Guide 4.8), November 1979, Rev. 1.
2. Washington Public Power Supply System Technical Specification 3/4.12.1; Table 3.13-1.
3. Klement, Alfred W., Allen Brodsky, Editor in Chief. Handbook of Environmental Radiation, CRC Press, 1982.
4. Washington Public Power Supply System Technical Specification 3/4.12.2.
5. "Teledyne Isotopes TLD System for Personnel and Environmental Monitoring", Teledyne Isotopes, Westwood, New Jersey, February 2, 1981.
6. Prince, J.K., Card, C.J. and Davis, W.D., Preoperational Environmental Radiological Monitoring Program WNP-2, Washington Public Power Supply System, June 1984 (Revised 1985).
7. Price, K.R., et. al., Environmental Monitoring at Hanford for 1984, PNL 5407, May 1985.
8. WNP-2 Offsite Dose Calculation Manual
9. NCRP Report No. 45, Natural Background Radiation in the United States, November 15, 1975.
10. Sula, M.J., Radiological Survey of Exposed Shorelines and Islands of the Columbia River Between Vernita and the Snake River Confluence, PNL 3127, April 1980.

11. Robertson, D.E., and J.J. Fix, Association of Hanford Origin Radionuclides With Columbia River Sediment, BNWL-2305, August 1977.
12. Washington Public Power Supply System, WNP-2 Semi-Annual Effluent Report - January 1 to June 30, 1985, August 1985.
13. Prince, J.K., et. al., Radiological Environmental Monitoring Program Annual Report - 1984; Washington Public Power Supply System.

TABLE A-1
1985 QUARTERLY TLD RESULTS

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
1	MAR 28, 1985	91	0.2006	0.0200
1	JUN 27, 1985	91	0.2258	0.0092
1	SEP 26, 1985	91	0.2617	0.0083
1	DEC 26, 1985	91	0.2468	0.0096
2	MAR 28, 1985	91	0.1830	0.0165
2	JUN 27, 1985	91	0.2237	0.0019
2	SEP 26, 1985	91	0.2544	0.0178
2	DEC 26, 1985	91	0.2374	0.0197
3	MAR 28, 1985	91	0.1758	0.0128
3	JUN 27, 1985	91	0.2258	0.0059
3	SEP 26, 1985	91	0.2510	0.0117
3	DEC 26, 1985	91	0.2328	0.0084
4	MAR 28, 1985	91	0.1614	0.0339
4	SEP 26, 1985	91	0.2353	0.0037
4	DEC 26, 1985	91	0.2246	0.0202
5	MAR 28, 1985	91	0.1783	0.0128
5	JUN 27, 1985	91	0.2142	0.0102
5	SEP 26, 1985	91	0.2408	0.0094
5	DEC 26, 1985	91	0.2135	0.0058
6	MAR 28, 1985	91	0.1784	0.0112
6	JUN 27, 1985	91	0.2138	0.0056
6	SEP 26, 1985	91	0.2273	0.0202
6	DEC 26, 1985	91	0.2257	0.0073
7	MAR 28, 1985	91	0.1820	0.0098
7	JUN 27, 1985	91	0.2333	0.0069
7	SEP 26, 1985	91	0.2326	0.0111
7	DEC 26, 1985	91	0.2356	0.0078
8	MAR 28, 1985	91	0.1662	0.0929
8	JUN 27, 1985	91	0.2479	0.0168
8	SEP 26, 1985	91	0.2823	0.0159
8	DEC 26, 1985	91	0.2625	0.0175
9	MAR 28, 1985	91	0.1786	0.0109
9	JUN 27, 1985	91	0.1945	0.0087
9	SEP 26, 1985	91	0.2223	0.0140
9	DEC 26, 1985	91	0.2188	0.0063
10	MAR 28, 1985	91	0.1808	0.0154
10	JUN 27, 1985	91	0.2225	0.0114
10	SEP 26, 1985	91	0.2323	0.0431

TABLE A-1 (cont.)

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
10	DEC 26, 1985	91	0.2267	0.0080
11	MAR 28, 1985	91	0.1820	0.0251
11	JUN 27, 1985	91	0.2098	0.0124
11	SEP 26, 1985	91	0.2505	0.0046
11	DEC 26, 1985	91	0.2348	0.0107
12	MAR 28, 1985	91	0.1979	0.0131
12	JUN 27, 1985	91	0.2346	0.0067
12	DEC 26, 1985	91	0.2567	0.0084
13	MAR 28, 1985	91	0.1900	0.0135
13	JUN 27, 1985	91	0.2277	0.0036
13	SEP 26, 1985	91	0.2432	0.0106
13	DEC 26, 1985	91	0.2393	0.0207
14	MAR 28, 1985	91	0.1859	0.0056
14	JUN 27, 1985	91	0.2252	0.0064
14	SEP 26, 1985	91	0.2590	0.0054
14	DEC 26, 1985	91	0.2362	0.0084
15	MAR 28, 1985	91	0.1892	0.0112
15	JUN 27, 1985	91	0.2363	0.0151
15	SEP 26, 1985	91	0.2593	0.0130
15	DEC 26, 1985	91	0.2625	0.0436
16	MAR 28, 1985	91	0.1758	0.0214
16	JUN 27, 1985	91	0.2359	0.0134
16	SEP 26, 1985	91	0.2921	0.0693
16	DEC 26, 1985	91	0.2360	0.0140
17	MAR 28, 1985	91	0.1903	0.0152
17	JUN 27, 1985	91	0.2336	0.0034
17	SEP 26, 1985	91	0.2690	0.0121
17	DEC 26, 1985	91	0.2334	0.0138
18	MAR 28, 1985	91	0.1825	0.0306
18	JUN 27, 1985	91	0.2349	0.0086
18	SEP 26, 1985	91	0.2665	0.0216
18	DEC 26, 1985	91	0.2394	0.0084
19	MAR 28, 1985	91	0.1870	0.0140
19	JUN 27, 1985	91	0.2334	0.0118
19	SEP 26, 1985	91	0.2748	0.0194
19	DEC 26, 1985	91	0.2509	0.0350

TABLE A-1 (cont.)

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
20	MAR 28, 1985	91	0.1859	0.0095
20	JUN 27, 1985	91	0.2265	0.0241
20	SEP 26, 1985	91	0.2453	0.0077
20	DEC 26, 1985	91	0.2347	0.0042
21	MAR 28, 1985	91	0.1742	0.0071
21	JUN 27, 1985	91	0.2124	0.0158
21	SEP 26, 1985	91	0.2384	0.0064
21	DEC 26, 1985	91	0.2262	0.0150
22	MAR 28, 1985	91	0.1767	0.0194
22	JUN 27, 1985	91	0.2270	0.0069
22	SEP 26, 1985	91	0.2640	0.0138
22	DEC 26, 1985	91	0.2420	0.0164
23	MAR 28, 1985	91	0.1866	0.0115
23	JUN 27, 1985	91	0.2253	0.0032
23	SEP 26, 1985	91	0.2607	0.0137
23	DEC 26, 1985	91	0.2290	0.0192
24	MAR 28, 1985	91	0.1866	0.0070
24	JUN 27, 1985	91	0.2295	0.0144
24	SEP 26, 1985	91	0.2396	0.0064
24	DEC 26, 1985	91	0.2412	0.0105
25	MAR 28, 1985	91	0.1899	0.0063
25	JUN 27, 1985	91	0.2593	0.0074
25	SEP 26, 1985	91	0.2784	0.0157
25	DEC 26, 1985	91	0.2498	0.0095
40	MAR 28, 1985	91	0.1699	0.0077
40	JUN 27, 1985	91	0.2281	0.0122
40	SEP 26, 1985	91	0.2695	0.0247
40	DEC 26, 1985	91	0.2414	0.0147
41	MAR 28, 1985	91	0.1912	0.0136
41	JUN 27, 1985	91	0.2494	0.0037
41	SEP 26, 1985	91	0.2826	0.0150
41	DEC 26, 1985	91	0.2531	0.0128
42	MAR 28, 1985	91	0.1897	0.0090
42	JUN 27, 1985	91	0.2381	0.0141
42	SEP 26, 1985	91	0.2702	0.0129
42	DEC 26, 1985	91	0.2338	0.0085
43	MAR 28, 1985	91	0.1842	0.0080
43	JUN 27, 1985	91	0.2295	0.0098

TABLE A-1 (cont.)

STATION	END DATE	ELAPSED DAYS	DOSE RATE (NR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
43	SEP 26, 1985	91	0.2928	0.1525
43	DEC 26, 1985	91	0.2434	0.0055
44	MAR 28, 1985	91	0.1745	0.0066
44	JUN 27, 1985	91	0.2226	0.0051
44	SEP 26, 1985	91	0.2352	0.0779
44	DEC 26, 1985	91	0.2384	0.0242
45	MAR 28, 1985	91	0.1818	0.0163
45	JUN 27, 1985	91	0.2198	0.0179
45	SEP 26, 1985	91	0.2434	0.0189
45	DEC 26, 1985	91	0.2352	0.0133
46	MAR 28, 1985	91	0.2129	0.0164
46	JUN 27, 1985	91	0.2790	0.0122
46	SEP 26, 1985	91	0.2909	0.0173
46	DEC 26, 1985	91	0.2848	0.0109
47	MAR 28, 1985	91	0.1749	0.0092
47	JUN 27, 1985	91	0.2048	0.0047
47	SEP 26, 1985	91	0.2251	0.0140
47	DEC 26, 1985	91	0.2254	0.0133
49	MAR 28, 1985	91	0.1770	0.0165
49	JUN 27, 1985	91	0.2271	0.0088
49	SEP 26, 1985	91	0.2310	0.0146
49	DEC 26, 1985	91	0.2325	0.0140
50	MAR 28, 1985	91	0.1822	0.0095
50	JUN 27, 1985	91	0.2244	0.0133
50	SEP 26, 1985	91	0.2419	0.0094
50	DEC 26, 1985	91	0.2396	0.0083
51	MAR 28, 1985	91	0.1798	0.0095
51	JUN 27, 1985	91	0.2200	0.0086
51	SEP 26, 1985	91	0.2465	0.0213
51	DEC 26, 1985	91	0.2337	0.0097
53	MAR 28, 1985	91	0.2016	0.0100
53	JUN 27, 1985	91	0.2491	0.0048
53	SEP 26, 1985	91	0.2884	0.0191
53	DEC 26, 1985	91	0.2705	0.0140
54	MAR 28, 1985	91	0.1959	0.0097
54	JUN 27, 1985	91	0.2557	0.0584
54	SEP 26, 1985	91	0.2567	0.0211
54	DEC 26, 1985	91	0.2460	0.0151

TABLE A-1 (cont.)

STATION	END DATE	ELAPSED DAYS	DOSE RATE (NR/DAY)	STANDARD DEVIATION
55	MAR 28, 1985	91	0.1814	0.0053
55	JUN 27, 1985	91	0.2284	0.0049
55	SEP 26, 1985	91	0.2491	0.0392
55	DEC 26, 1985	91	0.2323	0.0203
56	MAR 28, 1985	91	0.1840	0.0087
56	JUN 27, 1985	91	0.2315	0.0100
56	SEP 26, 1985	91	0.2411	0.0054
56	DEC 26, 1985	91	0.2377	0.0044
71	MAR 28, 1985	91	0.2142	0.0085
71	JUN 27, 1985	91	0.2410	0.0258
71	SEP 26, 1985	91	0.2673	0.0088
71	DEC 26, 1985	91	0.2653	0.0064
72	MAR 28, 1985	91	0.2080	0.0066
72	JUN 27, 1985	91	0.2331	0.0061
72	SEP 26, 1985	91	0.2581	0.0121
72	DEC 26, 1985	91	0.2536	0.0111
73	MAR 28, 1985	91	0.1812	0.0066
73	JUN 27, 1985	91	0.2288	0.0267
73	SEP 26, 1985	91	0.2298	0.0080
73	DEC 26, 1985	91	0.2265	0.0063
74	MAR 28, 1985	91	0.1953	0.0082
74	JUN 27, 1985	91	0.2425	0.0131
74	SEP 26, 1985	91	0.2553	0.0082
74	DEC 26, 1985	91	0.2615	0.0243
75	MAR 28, 1985	91	0.1731	0.0153
75	JUN 27, 1985	91	0.2064	0.0122
75	SEP 26, 1985	91	0.2377	0.0056
75	DEC 26, 1985	91	0.2305	0.0046
76	MAR 28, 1985	91	0.1872	0.0100
76	JUN 27, 1985	91	0.2242	0.0035
76	SEP 26, 1985	91	0.2421	0.0032
76	DEC 26, 1985	91	0.2369	0.0054
77	MAR 28, 1985	91	0.1903	0.0092
77	JUN 27, 1985	91	0.2332	0.0139
77	SEP 26, 1985	91	0.2418	0.0124
77	DEC 26, 1985	91	0.2474	0.0139
78	MAR 28, 1985	91	0.1855	0.0099
78	JUN 27, 1985	91	0.2219	0.0057

TABLE A-1 (cont.)

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
78	SEP 26, 1985	91	0.2315	0.0100
78	DEC 26, 1985	91	0.2360	0.0087
79	MAR 28, 1985	91	0.1858	0.0083
79	JUN 27, 1985	91	0.2246	0.0064
79	SEP 26, 1985	91	0.2442	0.0066
80	MAR 28, 1985	91	0.1803	0.0072
80	JUN 27, 1985	91	0.2251	0.0095
80	SEP 26, 1985	91	0.2453	0.0099
80	DEC 26, 1985	91	0.2321	0.0042
81	MAR 28, 1985	91	0.1869	0.0081
81	JUN 27, 1985	91	0.2308	0.0080
81	SEP 26, 1985	91	0.2616	0.0674
81	DEC 26, 1985	91	0.2368	0.0167
82	MAR 28, 1985	91	0.1884	0.0122
82	JUN 27, 1985	91	0.2346	0.0171
82	SEP 26, 1985	91	0.2485	0.0143
82	DEC 26, 1985	91	0.2311	0.0228
83	MAR 28, 1985	91	0.1913	0.0085
83	JUN 27, 1985	91	0.2291	0.0079
83	SEP 26, 1985	91	0.2496	0.0090
83	DEC 26, 1985	91	0.2441	0.0055
84	MAR 28, 1985	91	0.1804	0.0065
84	JUN 27, 1985	91	0.2236	0.0099
84	SEP 26, 1985	91	0.2465	0.0103
84	DEC 26, 1985	91	0.2381	0.0052
85	MAR 28, 1985	91	0.1935	0.0063
85	JUN 27, 1985	91	0.2447	0.0149
85	SEP 26, 1985	91	0.2562	0.0074
86	MAR 28, 1985	91	0.2186	0.0104
86	JUN 27, 1985	91	0.2268	0.0148
86	SEP 26, 1985	91	0.2754	0.0145
86	DEC 26, 1985	91	0.2720	0.0217

TABLE A-2
1985 ANNUAL TLD RESULTS

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
1	DEC 26, 1985	364	0.2145	0.0167
2	DEC 26, 1985	364	0.2152	0.0109
3	DEC 26, 1985	364	0.2004	0.0068
4	DEC 26, 1985	364	0.1926	0.0071
5	DEC 26, 1985	364	0.2044	0.0128
6	DEC 26, 1985	364	0.2014	0.0098
9	DEC 26, 1985	364	0.1900	0.0110
10	DEC 26, 1985	364	0.2100	0.0062
11	DEC 26, 1985	364	0.2080	0.0048
12	DEC 26, 1985	364	0.2233	0.0135
13	DEC 26, 1985	364	0.2157	0.0164
14	DEC 26, 1985	364	0.2071	0.0070
15	DEC 26, 1985	364	0.2239	0.0031
16	DEC 26, 1985	364	0.2108	0.0158
18	DEC 26, 1985	364	0.2182	0.0072
19	DEC 26, 1985	364	0.2163	0.0059
20	DEC 26, 1985	364	0.2098	0.0083
21	DEC 26, 1985	364	0.1946	0.0064
22	DEC 26, 1985	364	0.2065	0.0049
23	DEC 26, 1985	364	0.2094	0.0061
24	DEC 26, 1985	364	0.2035	0.0042
25	DEC 26, 1985	364	0.2272	0.0034
40	DEC 26, 1985	364	0.2110	0.0169

TABLE A-2 (cont.)

STATION	END DATE	ELAPSED DAYS	DOSE RATE (NR/DAY)	STANDARD DEVIATION
41	DEC 26, 1985	364	0.2271	0.0024
42	DEC 26, 1985	364	0.2168	0.0054
43	DEC 26, 1985	364	0.2222	0.0046
44	DEC 26, 1985	364	0.2099	0.0144
45	DEC 26, 1985	364	0.2123	0.0050
46	DEC 27, 1985	133	0.2691	0.0061
47	DEC 26, 1985	364	0.1931	0.0059
49	DEC 26, 1985	364	0.2139	0.0094
50	DEC 26, 1985	364	0.2087	0.0197
51	DEC 26, 1985	364	0.2043	0.0140
53	DEC 26, 1985	364	0.2515	0.0244
54	DEC 26, 1985	364	0.2262	0.0076
55	DEC 26, 1985	364	0.2122	0.0060
56	DEC 26, 1985	364	0.2123	0.0295
71	DEC 26, 1985	364	0.2516	0.0261
72	DEC 26, 1985	364	0.2384	0.0200
73	DEC 26, 1985	364	0.2083	0.0097
74	DEC 26, 1985	364	0.2212	0.0254
75	DEC 26, 1985	364	0.2116	0.0136
76	DEC 26, 1985	364	0.2306	0.0275
77	DEC 26, 1985	364	0.2229	0.0162
78	DEC 26, 1985	364	0.2677	0.0435
79	DEC 26, 1985	364	0.2181	0.0140

TABLE A-2 (cont.)

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
80	DEC 26, 1985	364	0.2146	0.0074
81	DEC 26, 1985	364	0.2164	0.0101
82	DEC 26, 1985	364	0.2229	0.0136
83	DEC 26, 1985	364	0.2221	0.0128
84	DEC 26, 1985	364	0.2083	0.0180
85	DEC 26, 1985	364	0.2327	0.0140
86	DEC 26, 1985	364	0.2466	0.0116

TABLE A-3
GROSS BETA ON AIR PARTICULATE FILTERS

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#1	841231 TO 850107	4.92E-02	8.70E-03
	850107 TO 850114	6.64E-02	1.19E-02
	850114 TO 850121	3.71E-02	7.20E-03
	850121 TO 850128	4.27E-02	8.12E-03
	850128 TO 850204	4.70E-02	8.77E-03
	850204 TO 850211	5.32E-02	9.81E-03
	850211 TO 850219	1.76E-02	3.88E-03
	850219 TO 850226	1.23E-02	3.19E-03
	850226 TO 850304	1.85E-02	4.51E-03
	850304 TO 850311	2.50E-02	5.22E-03
	850311 TO 850318	2.80E-02	5.72E-03
	850318 TO 850325	1.47E-02	3.57E-03
	850325 TO 850401	8.58E-03	2.59E-03
	850401 TO 850408	3.59E-02	7.09E-03
	850408 TO 850415	2.23E-02	4.83E-03
	850415 TO 850422	1.19E-02	3.12E-03
	850422 TO 850429	1.07E-02	2.86E-03
	850506 TO 850513	1.66E-02	3.89E-03
	850513 TO 850520	2.64E-02	5.45E-03
	850528 TO 850603	1.05E-02	2.99E-03
	850603 TO 850610	1.83E-02	3.42E-03
	850610 TO 850617	1.84E-02	3.47E-03
	850617 TO 850624	2.31E-02	3.86E-03
	850624 TO 850701	1.53E-02	3.04E-03
	850701 TO 850708	2.03E-02	2.74E-03
	850708 TO 850715	1.90E-02	3.44E-03
	850715 TO 850722	2.24E-02	3.86E-03
	850722 TO 850729	2.42E-02	4.00E-03
	850729 TO 850805	1.85E-02	3.46E-03
	850805 TO 850812	1.23E-02	2.68E-03
	850812 TO 850819	1.41E-02	2.93E-03
	850819 TO 850826	2.73E-02	4.32E-03
	850826 TO 850903	2.06E-02	3.47E-03
	850903 TO 850909	1.74E-02	3.47E-03
	850909 TO 850916	1.59E-02	3.08E-03
	850916 TO 850923	1.48E-02	2.94E-03
	850923 TO 850930	2.51E-02	4.09E-03
	850930 TO 851007	3.02E-02	4.63E-03
	851007 TO 851014	1.96E-02	3.49E-03
	851014 TO 851021	1.52E-02	3.00E-03
	851021 TO 851028	1.05E-02	2.47E-03
	851028 TO 851104	1.50E-02	2.99E-03
	851104 TO 851111	1.36E-02	2.84E-03
	851111 TO 851118	6.10E-02	7.21E-03
	851118 TO 851125	4.42E-02	6.04E-03
	851125 TO 851203	6.40E-02	7.81E-03
	851203 TO 851209	4.93E-02	6.81E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#1	851209 TO 851216	6.88E-02	8.51E-03
	851216 TO 851223	1.29E-01	1.44E-02
	851223 TO 851230	7.65E-02	9.26E-03
#21	841231 TO 850107	5.51E-02	1.01E-02
	850107 TO 850114	6.37E-02	1.15E-02
	850114 TO 850121	3.28E-02	6.47E-03
	850121 TO 850128	3.32E-02	6.53E-03
	850128 TO 850204	3.66E-02	7.08E-03
	850204 TO 850211	5.75E-02	1.05E-02
	850211 TO 850219	1.84E-02	3.97E-03
	850219 TO 850225	1.83E-02	4.31E-03
	850225 TO 850304	1.40E-02	3.38E-03
	850304 TO 850311	1.88E-02	4.25E-03
	850311 TO 850318	2.37E-02	4.99E-03
	850318 TO 850325	1.68E-02	3.86E-03
	850325 TO 850401	6.63E-03	2.16E-03
	850401 TO 850408	2.05E-02	4.36E-03
	850408 TO 850415	1.95E-02	4.21E-03
	850415 TO 850422	1.18E-02	3.04E-03
	850422 TO 850429	1.11E-02	3.05E-03
	850429 TO 850506	1.79E-02	4.04E-03
	850506 TO 850513	1.32E-02	3.28E-03
	850513 TO 850520	2.00E-02	4.38E-03
	850520 TO 850528	1.85E-02	4.04E-03
	850528 TO 850603	9.14E-03	2.82E-03
	850603 TO 850610	1.16E-02	2.55E-03
	850610 TO 850617	1.42E-02	2.85E-03
	850617 TO 850624	1.70E-02	3.21E-03
	850624 TO 850701	1.28E-02	2.73E-03
	850701 TO 850708	1.76E-02	3.36E-03
	850708 TO 850715	1.03E-02	2.44E-03
	850715 TO 850722	1.73E-02	3.27E-03
	850722 TO 850729	1.52E-02	3.02E-03
	850729 TO 850805	1.72E-02	3.68E-03
	850805 TO 850812	1.08E-02	2.52E-03
	850812 TO 850819	1.04E-02	2.50E-03
	850819 TO 850826	1.74E-02	3.38E-03
	850826 TO 850903	1.49E-02	2.84E-03
	850903 TO 850909	1.54E-02	3.36E-03
	850909 TO 850916	8.13E-03	2.19E-03
	850916 TO 850923	1.38E-02	2.85E-03
	850923 TO 850930	1.49E-02	3.00E-03
	850930 TO 851007	1.64E-02	3.13E-03
	851007 TO 851014	1.93E-02	3.49E-03
	851014 TO 851021	1.04E-02	2.46E-03
	851021 TO 851028	1.04E-02	2.39E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3.(cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#21	851028 TO 851104	9.50E-03	4.25E-03
	851104 TO 851111	1.11E-02	2.55E-03
	851111 TO 851118	4.49E-02	6.12E-03
	851118 TO 851125	3.20E-02	4.82E-03
	851125 TO 851203	5.13E-02	6.57E-03
	851203 TO 851209	3.89E-02	5.75E-03
	851209 TO 851216	5.96E-02	7.10E-03
	851216 TO 851223	1.07E-01	1.12E-02
	851223 TO 851230	6.43E-02	7.53E-03
#23	841231 TO 850107	5.95E-02	1.05E-02
	850114 TO 850121	3.43E-02	6.55E-03
	850121 TO 850128	4.29E-02	7.89E-03
	850128 TO 850204	4.53E-02	8.26E-03
	850204 TO 850211	6.80E-02	1.18E-02
	850211 TO 850219	1.68E-02	3.67E-03
	850219 TO 850225	1.60E-02	3.82E-03
	850225 TO 850304	1.52E-02	3.54E-03
	850304 TO 850311	2.12E-02	4.57E-03
	850311 TO 850318	2.99E-02	6.02E-03
	850318 TO 850325	1.42E-02	3.43E-03
	850325 TO 850401	1.00E-02	2.69E-03
	850401 TO 850408	1.74E-02	3.97E-03
	850408 TO 850415	2.13E-02	4.63E-03
	850415 TO 850422	1.28E-02	3.13E-03
	850422 TO 850429	1.04E-02	2.85E-03
	850429 TO 850506	2.01E-02	4.29E-03
	850506 TO 850513	1.48E-02	3.45E-03
	850513 TO 850520	2.47E-02	5.19E-03
	850520 TO 850528	2.16E-02	4.50E-03
	850528 TO 850603	9.86E-03	2.89E-03
	850603 TO 850610	1.76E-02	3.30E-03
	850610 TO 850617	2.47E-02	4.06E-03
	850617 TO 850624	2.20E-02	3.61E-03
	850624 TO 850701	1.55E-02	2.97E-03
	850701 TO 850708	2.00E-02	3.59E-03
	850708 TO 850715	2.04E-02	3.64E-03
	850715 TO 850722	2.44E-02	4.00E-03
	850722 TO 850729	2.47E-02	3.89E-03
	850729 TO 850805	1.91E-02	3.45E-03
	850805 TO 850812	1.21E-02	2.77E-03
	850812 TO 850819	1.62E-02	3.14E-03
	850819 TO 850826	2.89E-02	4.49E-03
	850826 TO 850903	2.01E-02	3.38E-03
	850903 TO 850909	1.96E-02	3.83E-03
	850909 TO 850916	1.33E-02	2.79E-03
	850916 TO 850923	1.59E-02	3.01E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#23	850923 TO 850930	2.25E-02	3.83E-03
	850930 TO 851007	3.12E-02	4.74E-03
	851007 TO 851014	2.11E-02	3.66E-03
	851014 TO 851021	1.42E-02	2.90E-03
	851021 TO 851028	1.12E-02	2.55E-03
	851028 TO 851104	1.36E-02	2.83E-03
	851104 TO 851111	1.04E-02	2.48E-03
	851111 TO 851118	6.83E-02	7.87E-03
	851118 TO 851125	4.61E-02	6.23E-03
	851125 TO 851203	5.98E-02	7.40E-03
	851203 TO 851209	3.49E-02	5.35E-03
	851209 TO 851216	6.93E-02	8.57E-03
	851216 TO 851223	1.40E-01	1.54E-02
	851223 TO 851230	8.42E-02	1.00E-02
#4	841231 TO 850107	8.32E-02	1.46E-02
	850107 TO 850114	7.90E-02	1.40E-02
	850114 TO 850121	2.12E-02	4.10E-03
	850121 TO 850128	4.25E-02	8.05E-03
	850128 TO 850204	3.84E-02	7.42E-03
	850204 TO 850211	7.18E-02	1.28E-02
	850211 TO 850219	1.88E-02	4.05E-03
	850219 TO 850225	1.30E-02	3.43E-03
	850225 TO 850304	1.70E-02	3.89E-03
	850304 TO 850311	1.78E-02	4.06E-03
	850311 TO 850318	2.90E-02	5.85E-03
	850318 TO 850325	1.62E-02	3.75E-03
	850325 TO 850401	1.08E-02	2.85E-03
	850401 TO 850408	1.84E-02	4.14E-03
	850408 TO 850415	1.92E-02	4.24E-03
	850415 TO 850422	1.16E-02	3.01E-03
	850422 TO 850429	1.12E-02	2.94E-03
	850429 TO 850506	1.85E-02	4.21E-03
	850506 TO 850513	1.52E-02	3.61E-03
	850513 TO 850520	2.55E-02	5.28E-03
	850520 TO 850528	1.79E-02	3.93E-03
	850528 TO 850603	1.22E-02	3.20E-03
	850603 TO 850610	1.74E-02	3.26E-03
	850610 TO 850617	2.43E-02	3.99E-03
	850617 TO 850624	2.12E-02	3.74E-03
	850624 TO 850701	1.44E-02	2.94E-03
	850701 TO 850708	2.29E-02	2.99E-03
	850708 TO 850715	2.28E-02	3.84E-03
	850715 TO 850722	2.79E-02	4.38E-03
	850722 TO 850729	2.21E-02	3.85E-03
	850729 TO 850805	1.83E-02	3.35E-03
	850805 TO 850812	1.19E-02	2.63E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#4	850812 TO 850819	1.65E-02	3.15E-03
	850819 TO 850826	2.42E-02	4.00E-03
	850826 TO 850903	2.08E-02	3.33E-03
	850903 TO 850909	1.67E-02	3.33E-03
	850909 TO 850916	1.24E-02	2.69E-03
	850916 TO 850923	1.36E-02	2.83E-03
	850923 TO 850930	2.31E-02	3.88E-03
	850930 TO 851007	2.74E-02	4.33E-03
	851007 TO 851014	2.00E-02	3.43E-03
	851014 TO 851021	1.51E-02	2.92E-03
	851021 TO 851028	1.08E-02	2.54E-03
	851028 TO 851104	1.05E-02	2.42E-03
	851104 TO 851111	1.43E-02	2.85E-03
	851111 TO 851118	6.07E-02	7.69E-03
	851118 TO 851125	4.39E-02	5.68E-03
	851125 TO 851203	5.61E-02	6.57E-03
	851203 TO 851209	4.73E-02	6.64E-03
	851209 TO 851216	4.24E-02	5.87E-03
	851216 TO 851223	1.04E-01	1.20E-02
	851223 TO 851230	7.21E-02	8.82E-03
#40	841231 TO 850107	6.71E-02	1.20E-02
	850107 TO 850114	6.29E-02	1.14E-02
	850114 TO 850121	3.28E-02	6.46E-03
	850121 TO 850128	3.99E-02	7.65E-03
	850128 TO 850204	4.51E-02	8.47E-03
	850204 TO 850211	5.54E-02	1.01E-02
	850211 TO 850219	1.53E-02	3.48E-03
	850219 TO 850225	1.07E-02	3.00E-03
	850225 TO 850304	1.28E-02	3.18E-03
	850304 TO 850311	1.75E-02	3.90E-03
	850311 TO 850318	2.37E-02	4.99E-03
	850318 TO 850325	1.38E-02	3.39E-03
	850325 TO 850401	6.69E-03	2.16E-03
	850401 TO 850408	1.71E-02	3.94E-03
	850408 TO 850415	1.69E-02	3.89E-03
	850415 TO 850422	1.30E-02	3.23E-03
	850422 TO 850429	1.10E-02	2.88E-03
	850429 TO 850506	1.62E-02	3.79E-03
	850506 TO 850513	1.44E-02	3.47E-03
	850513 TO 850520	1.92E-02	4.26E-03
	850520 TO 850528	1.47E-02	3.30E-03
	850528 TO 850603	9.79E-03	2.93E-03
	850603 TO 850610	1.30E-02	2.75E-03
	850610 TO 850617	1.48E-02	2.97E-03
	850617 TO 850624	1.85E-02	3.40E-03
	850624 TO 850701	1.34E-02	2.86E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#40	850701 TO 850708	1.72E-02	3.25E-03
	850708 TO 850715	1.54E-02	3.05E-03
	850715 TO 850722	2.02E-02	3.64E-03
	850722 TO 850729	2.10E-02	3.65E-03
	850729 TO 850805	1.56E-02	3.05E-03
	850805 TO 850812	1.13E-02	2.56E-03
	850812 TO 850819	1.52E-02	3.01E-03
	850819 TO 850826	2.18E-02	3.80E-03
	850826 TO 850903	1.67E-02	3.02E-03
	850903 TO 850909	1.68E-02	3.41E-03
	850909 TO 850916	1.28E-02	2.76E-03
	850916 TO 850923	1.53E-02	3.03E-03
	850923 TO 850930	2.03E-02	3.45E-03
	850930 TO 851007	2.26E-02	3.82E-03
	851007 TO 851014	1.94E-02	3.36E-03
	851014 TO 851021	1.52E-02	2.92E-03
	851021 TO 851028	1.17E-02	2.65E-03
	851028 TO 851104	1.12E-02	2.50E-03
	851104 TO 851111	1.14E-02	2.54E-03
	851111 TO 851118	5.54E-02	7.18E-03
	851118 TO 851125	4.38E-02	5.67E-03
	851125 TO 851203	5.30E-02	6.30E-03
	851203 TO 851209	3.86E-02	5.48E-03
	851209 TO 851216	4.67E-02	6.31E-03
	851216 TO 851223	1.08E-01	1.23E-02
	851223 TO 851230	7.74E-02	9.35E-03
#48	841231 TO 850107	6.94E-02	1.24E-02
	850107 TO 850114	7.06E-02	1.26E-02
	850114 TO 850121	1.25E-01	2.47E-02
	850121 TO 850128	4.36E-02	8.29E-03
	850128 TO 850204	3.52E-02	6.89E-03
	850204 TO 850211	6.86E-02	1.23E-02
	850211 TO 850219	1.27E-02	3.05E-03
	850219 TO 850225	1.47E-02	3.72E-03
	850225 TO 850304	1.54E-02	3.65E-03
	850304 TO 850311	1.93E-02	4.28E-03
	850311 TO 850318	2.53E-02	5.29E-03
	850318 TO 850325	1.28E-02	3.26E-03
	850325 TO 850401	8.41E-03	2.50E-03
	850401 TO 850408	1.74E-02	4.00E-03
	850408 TO 850415	1.58E-02	3.71E-03
	850415 TO 850422	1.45E-02	3.49E-03
	850422 TO 850429	8.97E-03	2.58E-03
	850429 TO 850506	1.88E-02	4.21E-03
	850506 TO 850513	1.57E-02	3.72E-03
	850521 TO 850528	1.91E-02	4.29E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#48	850528 TO 850603	1.10E-02	3.06E-03
	850603 TO 850610	1.68E-02	3.27E-03
	850610 TO 850617	1.91E-02	3.54E-03
	850617 TO 850624	2.34E-02	3.90E-03
	850624 TO 850701	1.70E-02	3.22E-03
	850701 TO 850708	1.92E-02	3.56E-03
	850708 TO 850715	1.78E-02	3.21E-03
	850715 TO 850722	2.09E-02	3.65E-03
	850722 TO 850729	2.33E-02	3.89E-03
	850729 TO 850805	1.78E-02	3.39E-03
	850805 TO 850812	1.29E-02	2.67E-03
	850812 TO 850819	1.63E-02	3.13E-03
	850819 TO 850826	2.70E-02	4.30E-03
	850826 TO 850903	2.09E-02	3.50E-03
	850903 TO 850909	1.85E-02	3.58E-03
	850909 TO 850916	1.52E-02	3.00E-03
	850916 TO 850923	1.88E-02	3.40E-03
	850923 TO 850930	8.65E-03	2.25E-03
	850930 TO 851007	2.87E-02	4.28E-03
	851007 TO 851014	1.91E-02	3.45E-03
	851014 TO 851021	1.35E-02	2.85E-03
	851021 TO 851028	1.14E-02	2.57E-03
	851028 TO 851104	1.23E-02	2.68E-03
	851104 TO 851111	1.41E-02	2.88E-03
	851111 TO 851118	6.32E-02	7.97E-03
	851118 TO 851125	4.91E-02	6.55E-03
	851125 TO 851203	5.82E-02	7.23E-03
	851203 TO 851209	4.90E-02	6.80E-03
	851209 TO 851216	6.52E-02	8.14E-03
	851216 TO 851223	1.19E-01	1.34E-02
	851223 TO 851230	6.43E-02	8.06E-03
#5	841231 TO 850107	6.20E-02	1.09E-02
	850107 TO 850114	7.25E-02	1.25E-02
	850114 TO 850121	3.31E-02	6.35E-03
	850121 TO 850128	3.96E-02	7.37E-03
	850128 TO 850204	4.55E-02	8.28E-03
	850204 TO 850211	6.10E-02	1.07E-02
	850211 TO 850219	1.60E-02	3.66E-03
	850219 TO 850225	1.55E-02	3.92E-03
	850225 TO 850304	1.14E-02	2.94E-03
	850304 TO 850311	2.19E-02	4.96E-03
	850311 TO 850318	2.74E-02	5.46E-03
	850318 TO 850325	1.21E-02	3.09E-03
	850325 TO 850401	8.71E-03	2.47E-03
	850401 TO 850408	1.83E-02	4.01E-03
	850408 TO 850415	1.77E-02	3.93E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#5	850415 TO 850422	1.33E-02	3.22E-03
	850422 TO 850429	1.13E-02	2.95E-03
	850429 TO 850506	1.94E-02	4.29E-03
	850506 TO 850513	1.40E-02	3.34E-03
	850513 TO 850520	2.16E-02	4.68E-03
	850520 TO 850528	1.84E-02	3.97E-03
	850528 TO 850603	1.20E-02	3.29E-03
	850603 TO 850610	1.57E-02	2.99E-03
	850610 TO 850617	1.63E-02	3.03E-03
	850617 TO 850624	1.87E-02	3.40E-03
	850624 TO 850701	1.52E-02	3.02E-03
	850701 TO 850708	1.80E-02	2.51E-03
	850708 TO 850715	1.67E-02	3.24E-03
	850715 TO 850722	2.11E-02	3.55E-03
	850722 TO 850729	2.11E-02	3.66E-03
	850729 TO 850805	1.70E-02	3.12E-03
	850805 TO 850812	1.08E-02	2.63E-03
	850812 TO 850819	1.25E-02	2.65E-03
	850819 TO 850826	2.00E-02	3.43E-03
	850826 TO 850903	1.57E-02	2.92E-03
	850903 TO 850909	1.60E-02	3.41E-03
	850909 TO 850916	9.67E-03	2.39E-03
	850916 TO 850923	2.51E-02	4.08E-03
	850923 TO 850930	6.68E-03	2.00E-03
	850930 TO 851007	2.25E-02	3.68E-03
	851007 TO 851014	1.98E-02	3.53E-03
	851014 TO 851021	1.32E-02	2.81E-03
	851021 TO 851028	1.14E-02	2.57E-03
	851028 TO 851104	1.28E-02	2.74E-03
	851104 TO 851111	1.13E-02	2.56E-03
	851111 TO 851118	5.70E-02	7.34E-03
	851118 TO 851125	4.32E-02	5.93E-03
	851125 TO 851203	4.65E-02	6.07E-03
	851203 TO 851209	3.27E-02	5.14E-03
	851209 TO 851216	5.82E-02	7.44E-03
	851216 TO 851223	1.09E-01	1.14E-02
	851223 TO 851230	6.98E-02	8.01E-03
#57	841231 TO 850107	7.33E-02	1.30E-02
	850107 TO 850114	6.54E-02	1.18E-02
	850114 TO 850121	3.58E-02	6.95E-03
	850121 TO 850128	3.80E-02	7.32E-03
	850128 TO 850204	4.86E-02	9.04E-03
	850204 TO 850211	6.19E-02	1.12E-02
	850211 TO 850219	1.88E-02	4.05E-03
	850219 TO 850225	1.80E-02	4.26E-03
	850225 TO 850304	1.42E-02	3.46E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#57	850304 TO 850311	2.30E-02	4.88E-03
	850311 TO 850318	2.99E-02	6.00E-03
	850318 TO 850325	1.53E-02	3.62E-03
	850325 TO 850401	9.95E-03	2.74E-03
	850401 TO 850408	2.21E-02	5.16E-03
	850408 TO 850415	3.02E-02	6.50E-03
	850415 TO 850422	2.02E-02	4.85E-03
	850422 TO 850429	1.26E-02	3.68E-03
	850429 TO 850506	2.50E-02	5.64E-03
	850506 TO 850513	1.97E-02	4.76E-03
	850513 TO 850520	3.30E-02	6.78E-03
	850520 TO 850528	2.88E-02	6.32E-03
	850528 TO 850603	1.21E-02	3.21E-03
	850603 TO 850610	1.46E-02	2.94E-03
	850610 TO 850617	2.17E-02	3.80E-03
	850617 TO 850624	2.41E-02	4.87E-03
	850624 TO 850701	7.85E-03	2.18E-03
	850701 TO 850708	1.86E-02	3.37E-03
	850708 TO 850715	1.83E-02	3.34E-03
	850715 TO 850722	2.04E-02	3.47E-03
	850722 TO 850729	2.67E-02	4.27E-03
	850729 TO 850805	2.16E-02	3.71E-03
	850805 TO 850812	1.38E-02	2.85E-03
	850812 TO 850819	1.72E-02	3.15E-03
	850819 TO 850826	2.91E-02	4.31E-03
	850826 TO 850903	2.58E-02	3.80E-03
	850903 TO 850909	2.26E-02	3.95E-03
	850909 TO 850916	1.42E-02	2.87E-03
	850916 TO 850923	1.38E-02	2.60E-03
	850923 TO 850930	2.77E-02	4.37E-03
	850930 TO 851007	3.25E-02	4.85E-03
	851007 TO 851014	2.35E-02	3.94E-03
	851014 TO 851021	1.58E-02	3.08E-03
	851021 TO 851028	1.20E-02	2.57E-03
	851028 TO 851104	1.29E-02	2.79E-03
	851104 TO 851111	1.78E-02	3.31E-03
	851111 TO 851118	6.59E-02	8.21E-03
	851118 TO 851125	4.80E-02	6.42E-03
	851125 TO 851203	7.30E-02	8.70E-03
	851203 TO 851209	5.18E-02	7.07E-03
	851209 TO 851216	4.62E-02	6.26E-03
	851216 TO 851223	1.40E-01	1.55E-02
	851223 TO 851230	9.05E-02	1.06E-02
#6	841231 TO 850107	9.18E-02	1.60E-02
	850107 TO 850114	7.00E-02	1.25E-02
	850114 TO 850121	3.84E-02	7.38E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#6	850121 TO 850128	4.83E-02	9.00E-03
	850128 TO 850204	4.68E-02	8.74E-03
	850204 TO 850211	6.47E-02	1.16E-02
	850211 TO 850219	1.91E-02	4.10E-03
	850219 TO 850225	1.83E-02	4.29E-03
	850225 TO 850304	1.50E-02	3.55E-03
	850304 TO 850311	2.16E-02	4.54E-03
	850311 TO 850318	2.90E-02	5.86E-03
	850318 TO 850325	1.65E-02	3.83E-03
	850325 TO 850401	1.34E-02	3.30E-03
	850401 TO 850408	2.04E-02	4.46E-03
	850408 TO 850415	2.10E-02	4.58E-03
	850415 TO 850422	1.24E-02	3.13E-03
	850422 TO 850429	1.08E-02	2.87E-03
	850429 TO 850506	1.80E-02	3.96E-03
	850506 TO 850513	1.44E-02	3.47E-03
	850513 TO 850520	2.28E-02	4.85E-03
	850520 TO 850528	1.92E-02	4.02E-03
	850528 TO 850603	9.66E-03	2.86E-03
	850603 TO 850610	1.90E-02	3.46E-03
	850610 TO 850617	2.29E-02	3.87E-03
	850617 TO 850624	2.02E-02	3.44E-03
	850624 TO 850701	1.39E-02	2.79E-03
	850701 TO 850708	2.01E-02	2.72E-03
	850708 TO 850715	1.91E-02	3.45E-03
	850715 TO 850722	2.13E-02	3.74E-03
	850722 TO 850723	2.50E-02	1.03E-02
	850723 TO 850729	1.65E-02	3.36E-03
	850729 TO 850805	1.84E-02	3.36E-03
	850805 TO 850812	9.69E-03	2.37E-03
	850812 TO 850819	1.35E-02	2.86E-03
	850819 TO 850826	2.12E-02	3.78E-03
	850826 TO 850903	1.67E-02	3.01E-03
	850903 TO 850909	1.11E-02	2.87E-03
	850909 TO 850916	1.16E-02	2.60E-03
	850916 TO 850923	1.64E-02	3.06E-03
	850923 TO 850930	2.09E-02	3.66E-03
	850930 TO 851007	2.82E-02	4.40E-03
	851007 TO 851014	2.39E-02	3.98E-03
	851014 TO 851021	1.51E-02	3.00E-03
	851021 TO 851028	1.15E-02	2.52E-03
	851028 TO 851104	1.14E-02	2.62E-03
	851104 TO 851111	1.36E-02	2.82E-03
	851111 TO 851118	6.09E-02	7.72E-03
	851118 TO 851125	4.58E-02	6.22E-03
	851125 TO 851203	5.72E-02	7.15E-03
	851203 TO 851209	4.77E-02	6.66E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#6	851209 TO 851216	6.83E-02	7.87E-03
	851216 TO 851223	1.21E-01	1.36E-02
	851223 TO 851230	8.14E-02	9.74E-03
#7	841231 TO 850107	8.46E-02	1.49E-02
	850107 TO 850114	6.83E-02	8.90E-03
	850114 TO 850121	4.22E-02	8.03E-03
	850121 TO 850128	4.48E-02	8.45E-03
	850128 TO 850204	4.96E-02	9.26E-03
	850204 TO 850211	6.54E-02	1.18E-02
	850211 TO 850219	2.08E-02	4.39E-03
	850219 TO 850225	1.94E-02	4.50E-03
	850304 TO 850311	1.96E-02	4.33E-03
	850311 TO 850318	2.88E-02	5.87E-03
	850318 TO 850325	1.66E-02	3.88E-03
	850325 TO 850401	1.20E-02	3.10E-03
	850401 TO 850408	1.95E-02	4.34E-03
	850408 TO 850415	2.10E-02	4.57E-03
	850415 TO 850422	1.42E-02	3.44E-03
	850422 TO 850429	1.37E-02	3.36E-03
	850429 TO 850506	1.68E-02	3.87E-03
	850506 TO 850513	1.26E-02	3.21E-03
	850513 TO 850520	2.32E-02	4.79E-03
	850520 TO 850528	1.90E-02	4.13E-03
	850528 TO 850603	9.84E-03	2.95E-03
	850603 TO 850610	1.55E-02	3.05E-03
	850610 TO 850617	2.22E-02	3.77E-03
	850617 TO 850624	2.69E-02	4.28E-03
	850624 TO 850701	1.51E-02	3.04E-03
	850701 TO 850708	8.44E-03	2.38E-03
	850708 TO 850715	3.38E-02	1.08E-02
	850715 TO 850722	2.25E-02	3.82E-03
	850722 TO 850729	2.06E-02	3.62E-03
	850729 TO 850805	1.89E-02	3.41E-03
	850805 TO 850812	1.09E-02	2.46E-03
	850819 TO 850826	2.42E-02	4.07E-03
	850826 TO 850903	2.04E-02	3.42E-03
	850903 TO 850909	2.01E-02	3.77E-03
	850909 TO 850916	1.03E-02	2.47E-03
	850916 TO 850923	1.27E-02	2.74E-03
	850923 TO 850930	1.99E-02	3.40E-03
	850930 TO 851007	3.26E-02	4.89E-03
	851007 TO 851014	2.05E-02	3.60E-03
	851014 TO 851021	1.40E-02	2.86E-03
	851021 TO 851028	1.14E-02	2.58E-03
	851028 TO 851104	1.20E-02	2.64E-03
	851104 TO 851111	1.36E-02	2.83E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#7	851111 TO 851118	3.15E-02	4.55E-03
	851118 TO 851125	3.88E-02	5.54E-03
	851125 TO 851203	4.53E-02	5.97E-03
	851203 TO 851209	3.80E-02	5.39E-03
	851209 TO 851216	6.34E-02	7.99E-03
	851216 TO 851223	8.94E-02	1.05E-02
	851223 TO 851230	6.41E-02	8.03E-03
#8	841231 TO 850107	6.51E-02	1.17E-02
	850107 TO 850114	6.95E-02	9.01E-03
	850114 TO 850121	3.59E-02	6.97E-03
	850121 TO 850128	4.73E-02	8.84E-03
	850128 TO 850204	4.42E-02	8.32E-03
	850204 TO 850211	6.35E-02	1.15E-02
	850211 TO 850219	1.41E-02	3.28E-03
	850219 TO 850225	1.23E-02	3.32E-03
	850225 TO 850304	1.55E-02	3.68E-03
	850304 TO 850311	2.28E-02	4.85E-03
	850311 TO 850318	2.78E-02	5.66E-03
	850318 TO 850325	1.26E-02	3.17E-03
	850325 TO 850401	8.73E-03	2.51E-03
	850401 TO 850408	1.78E-02	4.07E-03
	850408 TO 850415	1.41E-02	3.51E-03
	850415 TO 850422	1.22E-02	3.11E-03
	850422 TO 850429	1.18E-02	3.05E-03
	850429 TO 850506	2.15E-02	4.64E-03
	850506 TO 850513	1.31E-02	3.27E-03
	850513 TO 850520	2.96E-02	5.96E-03
	850520 TO 850528	1.79E-02	3.91E-03
	850528 TO 850603	1.06E-02	3.02E-03
	850603 TO 850610	1.68E-02	3.27E-03
	850610 TO 850617	1.75E-02	3.36E-03
	850617 TO 850624	2.11E-02	3.64E-03
	850624 TO 850701	1.50E-02	3.00E-03
	850701 TO 850708	1.91E-02	3.44E-03
	850708 TO 850715	1.82E-02	3.34E-03
	850715 TO 850722	2.15E-02	3.58E-03
	850722 TO 850729	2.35E-02	3.91E-03
	850729 TO 850805	1.69E-02	3.29E-03
	850805 TO 850812	1.18E-02	2.62E-03
	850812 TO 850819	1.58E-02	2.99E-03
	850819 TO 850826	2.73E-02	4.33E-03
	850826 TO 850903	2.06E-02	3.46E-03
	850903 TO 850909	1.93E-02	3.68E-03
	850909 TO 850916	1.55E-02	3.04E-03
	850916 TO 850923	2.20E-02	3.74E-03
	850923 TO 850930	8.36E-03	2.21E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#8	850930 TO 851007	2.82E-02	4.41E-03
	851007 TO 851014	2.03E-02	3.46E-03
	851014 TO 851021	1.27E-02	2.66E-03
	851021 TO 851028	1.17E-02	2.65E-03
	851028 TO 851104	1.27E-02	2.66E-03
	851104 TO 851111	1.23E-02	2.63E-03
	851111 TO 851118	6.30E-02	7.93E-03
	851118 TO 851125	4.78E-02	6.04E-03
	851125 TO 851203	5.28E-02	6.28E-03
	851203 TO 851209	3.87E-02	5.76E-03
	851209 TO 851216	6.84E-02	8.46E-03
	851216 TO 851223	1.25E-01	1.40E-02
	851223 TO 851230	9.01E-02	1.06E-02
#9	841231 TO 850107	7.20E-02	1.28E-02
	850107 TO 850114	6.42E-02	1.24E-02
	850114 TO 850121	3.29E-02	6.51E-03
	850121 TO 850128	3.37E-02	6.65E-03
	850128 TO 850204	3.80E-02	7.36E-03
	850204 TO 850211	5.10E-02	9.45E-03
	850211 TO 850219	1.33E-02	3.18E-03
	850219 TO 850225	9.60E-03	2.92E-03
	850225 TO 850304	1.12E-02	3.00E-03
	850304 TO 850311	1.77E-02	4.03E-03
	850311 TO 850318	2.41E-02	4.95E-03
	850318 TO 850325	1.37E-02	3.29E-03
	850325 TO 850401	6.38E-03	2.23E-03
	850401 TO 850408	1.56E-02	3.67E-03
	850408 TO 850415	1.58E-02	3.69E-03
	850415 TO 850422	9.39E-03	2.70E-03
	850422 TO 850429	1.06E-02	2.85E-03
	850429 TO 850506	1.55E-02	3.72E-03
	850506 TO 850513	1.25E-02	3.23E-03
	850513 TO 850520	1.78E-02	4.06E-03
	850520 TO 850528	1.74E-02	3.82E-03
	850528 TO 850603	1.27E-02	3.30E-03
	850603 TO 850610	1.56E-02	3.06E-03
	850610 TO 850617	2.03E-02	3.57E-03
	850617 TO 850624	1.77E-02	3.37E-03
	850624 TO 850701	1.37E-02	2.93E-03
	850701 TO 850708	1.74E-02	3.17E-03
	850708 TO 850715	1.80E-02	3.33E-03
	850715 TO 850722	2.08E-02	3.62E-03
	850722 TO 850729	1.54E-02	3.15E-03
	850729 TO 850805	1.44E-02	2.91E-03
	850805 TO 850812	1.12E-02	2.56E-03
	850812 TO 850819	1.33E-02	2.73E-03

* Denotes a result less than the detection limit 3.00E-03

TABLE A-3 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#9	850819 TO 850826	2.06E-02	3.49E-03
	850826 TO 850903	1.65E-02	2.90E-03
	850903 TO 850909	1.19E-02	2.81E-03
	850909 TO 850916	9.96E-03	2.42E-03
	850916 TO 850923	1.54E-02	3.03E-03
	850923 TO 850930	1.96E-02	3.49E-03
	850930 TO 851007	2.37E-02	3.79E-03
	851007 TO 851014	1.74E-02	3.27E-03
	851014 TO 851021	1.33E-02	2.82E-03
	851021 TO 851028	1.03E-02	2.44E-03
	851028 TO 851104	7.02E-03	2.04E-03
	851104 TO 851111	1.22E-02	2.66E-03
	851111 TO 851118	5.08E-02	6.74E-03
	851118 TO 851125	3.61E-02	5.21E-03
	851125 TO 851203	4.75E-02	6.19E-03
	851203 TO 851209	2.98E-02	4.82E-03
	851209 TO 851216	3.77E-02	5.39E-03
	851216 TO 851223	5.61E-02	7.24E-03
	851223 TO 851230	5.53E-02	7.16E-03

AVERAGE RESULT (WITHOUT CONTROL) = 2.81E-02 (LOW = 6.63E-03, HIGH = 1.40E-01)
 567 POSITIVE RESULTS FOUND IN 567 SAMPLES

AVERAGE RESULT FOR CONTROL = 2.28E-02 (LOW = 6.38E-03, HIGH = 7.20E-02)
 52 POSITIVE RESULTS FOUND IN 52 SAMPLES

* Denotes a result less than the detection limit 3.00E-03

TABLE A-4
GAMMA SPECTROMETRY OF PARTICULATE FILTERS

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#1	841231 TO 850401	CS-137	* 6.42E-04	5.20E-04
		CS-134	* 2.46E-05	7.06E-04
		BE-7	1.07E-01	2.66E-02
	850401 TO 850701	CS-137	* 2.79E-04	9.85E-04
		CS-134	*-5.01E-04	1.05E-03
		BE-7	2.61E-01	4.61E-02
	850701 TO 850930	CS-137	*-3.92E-05	8.08E-04
		CS-134	*-2.53E-04	5.15E-04
		BE-7	2.21E-01	3.59E-02
	850930 TO 851230	CS-137	* 1.98E-04	5.38E-04
		CS-134	* 6.10E-04	4.99E-04
		BE-7	8.62E-02	2.02E-02
#21	841231 TO 850401	CS-137	* 1.60E-04	4.36E-04
		CS-134	*-2.74E-04	5.62E-04
		BE-7	1.06E-01	2.20E-02
	850401 TO 850701	CS-137	*-9.53E-04	9.97E-04
		CS-134	*-5.54E-05	7.18E-04
		BE-7	2.05E-01	3.88E-02
	850701 TO 850930	CS-137	* 5.69E-04	4.31E-04
		CS-134	* 2.61E-04	7.67E-04
		BE-7	1.04E-01	2.45E-02
	850930 TO 851230	CS-137	* 1.66E-04	2.35E-04
		CS-134	* 3.20E-04	3.70E-04
		BE-7	8.99E-02	2.28E-02
#23	841231 TO 850401	CS-137	*-1.79E-04	3.77E-04
		CS-134	* 6.10E-04	3.54E-04
		BE-7	1.13E-01	2.07E-02
	850401 TO 850701	CS-137	* 3.46E-04	3.47E-04
		CS-134	*-8.30E-04	1.12E-03
		BE-7	1.32E-01	3.30E-02
	850701 TO 850930	CS-137	* 1.42E-04	2.01E-04
		CS-134	* 5.47E-04	4.48E-04
		BE-7	1.76E-01	3.02E-02
	850930 TO 851230	CS-137	* 1.18E-04	5.55E-04
		CS-134	* 2.52E-04	7.41E-04
		BE-7	8.52E-02	2.45E-02

* Denotes a result less than the detection limit

TABLE A-4 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#4	841231 TO 850401	CS-137	*-2.58E-04	4.92E-04
		CS-134	* 2.29E-04	4.00E-04
		BE-7	9.68E-02	1.89E-02
	850401 TO 850701	CS-137	* 4.76E-05	5.86E-04
		CS-134	* 3.63E-04	4.19E-04
		BE-7	2.40E-01	4.06E-02
	850701 TO 850930	CS-137	* 1.07E-04	5.02E-04
		CS-134	*-1.37E-04	5.62E-04
		BE-7	1.88E-01	3.21E-02
	850930 TO 851230	CS-137	*-3.55E-05	4.60E-04
		CS-134	*-2.73E-04	7.94E-04
		BE-7	7.71E-02	1.98E-02
#40	841231 TO 850401	CS-137	* 7.93E-05	4.89E-04
		CS-134	* 4.32E-04	4.49E-04
		BE-7	9.99E-02	1.93E-02
	850401 TO 850701	CS-137	*-3.81E-04	1.08E-03
		CS-134	* 3.63E-04	4.20E-04
		BE-7	1.84E-01	3.48E-02
	850701 TO 850930	CS-137	* 1.07E-03	5.54E-04
		CS-134	*-4.56E-05	5.91E-04
		BE-7	1.40E-01	2.82E-02
	850930 TO 851230	CS-137	*-7.11E-05	6.51E-04
		CS-134	*-6.38E-04	7.07E-04
		BE-7	7.77E-02	2.12E-02
#48	841231 TO 850401	CS-137	* 2.52E-04	4.12E-04
		CS-134	* 2.16E-04	5.50E-04
		BE-7	1.22E-01	2.35E-02
	850401 TO 850701	CS-137	* 1.42E-03	7.63E-04
		CS-134	* 6.50E-04	5.83E-04
		BE-7	2.59E-01	5.02E-02
	850701 TO 850930	CS-137	* 1.57E-04	7.02E-04
		CS-134	*-6.57E-04	9.16E-04
		BE-7	1.90E-01	3.71E-02
	850930 TO 851230	CS-137	* 1.33E-03	6.52E-04
		CS-134	* 4.04E-04	4.04E-04
		BE-7	* 6.86E-02	2.28E-02

* Denotes a result less than the detection limit

TABLE A-4 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#5	841231 TO 850401	CS-137	*-1.84E-05	4.19E-04
		CS-134	* 1.41E-04	4.71E-04
		BE-7	1.16E-01	2.19E-02
	850401 TO 850701	CS-137	* 9.52E-05	8.30E-04
		CS-134	* 2.42E-04	3.43E-04
		BE-7	1.94E-01	3.57E-02
	850701 TO 850930	CS-137	* 1.55E-04	7.58E-04
		CS-134	* 6.96E-04	5.27E-04
		BE-7	1.88E-01	3.56E-02
	850930 TO 851230	CS-137	*-2.38E-04	6.14E-04
		CS-134	*-7.62E-04	1.03E-03
		BE-7	* 5.57E-02	1.69E-02
#57	841231 TO 850401	CS-137	* 5.30E-04	3.74E-04
		CS-134	*-3.03E-04	6.22E-04
		BE-7	9.35E-02	2.43E-02
	850401 TO 850701	CS-137	*-1.07E-03	1.41E-03
		CS-134	* 5.11E-04	5.90E-04
		BE-7	3.04E-01	5.27E-02
	850701 TO 850930	CS-137	* 3.97E-05	5.38E-04
		CS-134	*-2.04E-04	9.11E-04
		BE-7	2.03E-01	3.35E-02
	850930 TO 851230	CS-137	*-2.14E-04	6.21E-04
		CS-134	* 6.38E-04	4.84E-04
		BE-7	9.81E-02	2.11E-02
#6	841231 TO 850401	CS-137	* 2.08E-04	5.37E-04
		CS-134	* 4.42E-04	6.45E-04
		BE-7	9.85E-02	2.26E-02
	850401 TO 850701	CS-137	* 1.45E-04	6.27E-04
		CS-134	* 6.80E-04	1.01E-03
		BE-7	2.16E-01	3.95E-02
	850701 TO 850930	CS-137	*-8.03E-05	7.36E-04
		CS-134	*-1.03E-04	9.45E-04
		BE-7	1.80E-01	3.29E-02
	850930 TO 851230	CS-137	*-3.53E-04	8.38E-04
		CS-134	*-8.58E-04	1.00E-03
		BE-7	9.28E-02	2.58E-02

* Denotes a result less than the detection limit

TABLE A-4 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#7	841231 TO 850401	CS-137	* 5.98E-04	4.85E-04
		CS-134	* 7.68E-04	4.13E-04
		BE-7	1.26E-01	2.03E-02
	850401 TO 850701	CS-137	* 9.24E-04	5.87E-04
		CS-134	*-2.08E-03	1.38E-03
		BE-7	2.47E-01	4.30E-02
	850701 TO 850930	CS-137	* 2.96E-04	5.98E-04
		CS-134	* 7.60E-04	5.76E-04
		BE-7	1.85E-01	3.23E-02
	850930 TO 851230	CS-137	* 3.57E-04	5.84E-04
		CS-134	*-5.09E-04	8.40E-04
		BE-7	* 5.52E-02	2.05E-02
#8	841231 TO 850401	CS-137	* 3.02E-04	4.58E-04
		CS-134	* 6.60E-04	4.61E-04
		BE-7	1.16E-01	2.14E-02
	850401 TO 850701	CS-137	*-8.65E-05	7.93E-04
		CS-134	* 6.64E-04	5.44E-04
		BE-7	2.15E-01	3.83E-02
	850701 TO 850930	CS-137	*-3.55E-05	8.10E-04
		CS-134	* 4.56E-04	4.09E-04
		BE-7	1.80E-01	3.03E-02
	850930 TO 851230	CS-137	*-9.41E-04	8.89E-04
		CS-134	*-7.06E-04	7.83E-04
		BE-7	7.67E-02	2.24E-02
#9	841231 TO 850401	CS-137	* 4.25E-04	3.51E-04
		CS-134	* 0.00E+00	4.43E-04
		BE-7	1.14E-01	2.19E-02
	850401 TO 850701	CS-137	* 7.75E-04	5.50E-04
		CS-134	* 2.48E-04	1.21E-03
		BE-7	9.72E-02	2.77E-02
	850701 TO 850930	CS-137	*-8.62E-04	7.85E-04
		CS-134	*-4.54E-04	9.57E-04
		BE-7	* 6.22E-02	1.97E-02
	850930 TO 851230	CS-137	* 1.42E-04	6.96E-04
		CS-134	* 4.10E-04	7.17E-04
		BE-7	7.23E-02	2.06E-02

* Denotes a result less than the detection limit

TABLE A-4 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
----------	-------------------	--------	---------------

AVERAGE RESULT (WITHOUT CONTROL) = $4.91\text{E-}02$ (LOW = $-2.08\text{E-}03$, HIGH = $3.04\text{E-}01$)
 41 POSITIVE RESULTS FOUND IN 132 SAMPLES

AVERAGE RESULT FOR CONTROL = $2.89\text{E-}02$ (LOW = $-8.62\text{E-}04$, HIGH = $1.14\text{E-}01$)
 3 POSITIVE RESULTS FOUND IN 12 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE		AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137		$1.31\text{E-}04$	$-1.07\text{E-}03$	$1.42\text{E-}03$	44	0
CS-137	(CONTROL)	$1.20\text{E-}04$	$-8.62\text{E-}04$	$7.75\text{E-}04$	4	0
CS-134		$6.25\text{E-}05$	$-2.08\text{E-}03$	$7.68\text{E-}04$	44	0
CS-134	(CONTROL)	$5.10\text{E-}05$	$-4.54\text{E-}04$	$4.10\text{E-}04$	4	0
BE-7		$1.47\text{E-}01$	$5.52\text{E-}02$	$3.04\text{E-}01$	44	41
BE-7	(CONTROL)	$8.64\text{E-}02$	$6.22\text{E-}02$	$1.14\text{E-}01$	4	3

* Denotes a result less than the detection limit

TABLE A-5
IODINE-131 IN CHARCOAL FILTER
 Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#1	841231 TO 850107	*-9.41E-03	1.40E-02
	850107 TO 850114	* 5.96E-03	8.09E-03
	850114 TO 850121	* 6.72E-03	9.55E-03
	850121 TO 850128	*-4.63E-03	1.04E-02
	850128 TO 850204	* 1.09E-03	9.34E-03
	850204 TO 850211	* 1.41E-03	7.10E-03
	850211 TO 850219	*-3.88E-03	7.60E-03
	850219 TO 850226	* 1.03E-03	8.86E-03
	850226 TO 850304	* 0.00E+00	1.07E-02
	850304 TO 850311	*-2.06E-03	9.17E-03
	850311 TO 850318	* 8.70E-04	6.51E-03
	850318 TO 850325	*-6.44E-03	9.71E-03
	850325 TO 850401	* 2.35E-03	7.35E-03
	850401 TO 850408	*-9.58E-03	1.04E-02
	850408 TO 850415	*-6.48E-03	1.16E-02
	850415 TO 850422	* 1.65E-03	9.55E-03
	850422 TO 850429	* 4.86E-04	1.14E-02
	850506 TO 850513	* 2.89E-03	8.88E-03
	850513 TO 850520	* 8.43E-03	8.43E-03
	850528 TO 850603	* 4.53E-03	1.01E-02
	850603 TO 850610	* 1.12E-03	1.36E-02
	850610 TO 850617	* 5.20E-04	8.88E-03
	850617 TO 850624	*-3.68E-03	8.42E-03
	850624 TO 850701	* 1.47E-02	1.47E-02
	850701 TO 850708	*-3.90E-03	1.15E-02
	850708 TO 850715	* 5.93E-04	7.22E-03
	850715 TO 850722	* 7.27E-04	6.61E-03
	850722 TO 850729	*-2.13E-02	1.25E-02
	850729 TO 850805	*-2.09E-03	8.60E-03
	850805 TO 850812	* 8.99E-03	9.07E-03
	850812 TO 850819	* 1.29E-03	8.37E-03
	850819 TO 850826	*-1.58E-02	1.13E-02
	850826 TO 850903	*-6.51E-03	1.05E-02
	850903 TO 850909	* 9.59E-03	1.23E-02
	850909 TO 850916	* 3.66E-03	5.23E-03
	850916 TO 850923	* 3.45E-03	6.66E-03
	850923 TO 850930	* 8.55E-03	1.15E-02
	850930 TO 851007	*-1.34E-03	1.76E-02
	851007 TO 851014	*-2.99E-03	9.80E-03
	851014 TO 851021	* 2.68E-04	8.55E-03
	851021 TO 851028	* 7.38E-03	8.38E-03
	851028 TO 851104	*-3.30E-03	7.55E-03
	851104 TO 851111	*-3.81E-03	1.16E-02
	851111 TO 851118	* 1.31E-03	7.23E-03
	851118 TO 851125	*-8.80E-04	6.35E-03
	851125 TO 851203	* 7.17E-03	7.17E-03
	851203 TO 851209	*-5.92E-03	1.18E-02

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#1	851209 TO 851216	*-8.37E-03	1.13E-02
	851216 TO 851223	*-6.39E-03	8.46E-03
	851223 TO 851230	*-3.91E-03	7.82E-03
#21	841231 TO 850107	* 2.42E-03	1.44E-02
	850107 TO 850114	* 3.40E-03	8.77E-03
	850114 TO 850121	*-8.31E-03	1.10E-02
	850121 TO 850128	*-1.98E-03	8.15E-03
	850128 TO 850204	*-1.79E-03	8.31E-03
	850204 TO 850211	* 7.72E-03	9.48E-03
	850211 TO 850219	*-4.34E-03	9.82E-03
	850219 TO 850225	* 8.75E-04	9.37E-03
	850225 TO 850304	*-5.34E-04	9.00E-03
	850304 TO 850311	* 1.41E-02	7.89E-03
	850311 TO 850318	* 2.86E-03	7.34E-03
	850318 TO 850325	*-2.47E-03	9.60E-03
	850325 TO 850401	*-1.55E-03	7.38E-03
	850401 TO 850408	*-1.17E-03	1.10E-02
	850408 TO 850415	*-2.30E-04	7.26E-03
	850415 TO 850422	* 6.66E-04	8.07E-03
	850422 TO 850429	* 7.93E-03	7.93E-03
	850429 TO 850506	*-2.83E-03	9.26E-03
	850506 TO 850513	*-2.27E-03	8.84E-03
	850513 TO 850520	* 1.59E-03	8.74E-03
	850520 TO 850528	*-1.21E-03	8.57E-03
	850528 TO 850603	* 4.19E-03	7.21E-03
	850603 TO 850610	*-3.32E-03	1.13E-02
	850610 TO 850617	*-8.17E-03	8.23E-03
	850617 TO 850624	* 2.01E-03	6.29E-03
	850624 TO 850701	*-2.17E-03	8.42E-03
	850701 TO 850708	*-7.07E-04	8.40E-03
	850708 TO 850715	*-7.34E-04	7.67E-03
	850715 TO 850722	*-2.93E-03	9.56E-03
	850722 TO 850729	* 3.93E-03	1.03E-02
	850729 TO 850805	*-4.16E-03	1.36E-02
	850805 TO 850812	* 3.42E-03	7.64E-03
	850812 TO 850819	* 3.81E-03	9.77E-03
	850819 TO 850826	*-1.49E-03	9.27E-03
	850826 TO 850903	*-3.92E-03	6.92E-03
	850903 TO 850909	*-3.87E-03	1.05E-02
	850909 TO 850916	* 5.90E-03	9.15E-03
	850916 TO 850923	* 4.64E-04	7.92E-03
	850923 TO 850930	*-2.68E-03	1.04E-02
	850930 TO 851007	*-4.60E-03	1.25E-02
	851007 TO 851014	*-2.74E-03	1.06E-02
	851014 TO 851021	* 8.29E-03	9.78E-03
	851021 TO 851028	*-4.12E-03	9.22E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#21	851028 TO 851104	* 1.12E-02	2.16E-02
	851104 TO 851111	*-6.96E-03	9.40E-03
	851111 TO 851118	* 1.23E-02	1.72E-02
	851118 TO 851125	*-1.70E-03	1.20E-02
	851125 TO 851203	*-2.18E-04	6.91E-03
	851203 TO 851209	* 0.00E+00	9.22E-03
	851209 TO 851216	*-9.42E-03	1.15E-02
	851216 TO 851223	* 5.18E-03	1.02E-02
	851223 TO 851230	*-7.94E-03	1.19E-02
#23	841231 TO 850107	*-1.29E-03	1.35E-02
	850107 TO 850114	*-7.27E-03	9.07E-03
	850114 TO 850121	* 6.04E-03	7.54E-03
	850121 TO 850128	*-5.63E-03	1.01E-02
	850128 TO 850204	*-7.61E-03	8.98E-03
	850204 TO 850211	*-1.45E-03	8.01E-03
	850211 TO 850219	* 3.17E-03	5.94E-03
	850219 TO 850225	* 7.52E-03	9.84E-03
	850225 TO 850304	* 3.93E-03	1.01E-02
	850304 TO 850311	*-1.04E-02	8.79E-03
	850311 TO 850318	*-5.33E-03	7.57E-03
	850318 TO 850325	*-2.70E-03	8.86E-03
	850325 TO 850401	* 6.47E-04	9.60E-03
	850401 TO 850408	* 3.51E-03	6.79E-03
	850408 TO 850415	* 6.14E-03	8.08E-03
	850415 TO 850422	*-1.00E-02	1.06E-02
	850422 TO 850429	*-1.80E-03	1.00E-02
	850429 TO 850506	* 1.12E-02	1.12E-02
	850506 TO 850513	* 6.51E-03	8.52E-03
	850513 TO 850520	*-2.20E-03	9.71E-03
	850520 TO 850528	*-4.50E-03	9.44E-03
	850528 TO 850603	*-1.51E-03	1.09E-02
	850603 TO 850610	*-2.07E-03	1.46E-02
	850610 TO 850617	* 9.55E-03	9.55E-03
	850617 TO 850624	* 2.23E-03	8.16E-03
	850624 TO 850701	* 1.74E-03	6.64E-03
	850701 TO 850708	*-4.52E-03	9.06E-03
	850708 TO 850715	* 4.45E-04	7.60E-03
	850715 TO 850722	*-4.32E-03	1.09E-02
	850722 TO 850729	* 8.44E-03	8.44E-03
	850729 TO 850805	*-2.42E-03	1.11E-02
	850805 TO 850812	* 4.78E-03	8.44E-03
	850812 TO 850819	*-1.89E-03	7.79E-03
	850819 TO 850826	*-3.82E-03	1.01E-02
	850826 TO 850903	* 3.50E-03	1.01E-02
	850903 TO 850909	* 9.82E-04	1.19E-02
	850909 TO 850916	*-8.34E-03	1.14E-02

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#23	850916 TO 850923	* 2.32E-03	7.24E-03
	850923 TO 850930	*-2.65E-04	7.06E-03
	850930 TO 851007	*-1.11E-02	1.65E-02
	851007 TO 851014	*-1.13E-03	9.45E-03
	851014 TO 851021	* 3.70E-03	8.25E-03
	851021 TO 851028	* 7.67E-03	7.67E-03
	851028 TO 851104	*-6.26E-03	9.22E-03
	851104 TO 851111	* 1.30E-02	1.30E-02
	851111 TO 851118	* 6.86E-03	8.98E-03
	851118 TO 851125	* 9.75E-04	7.30E-03
	851125 TO 851203	* 5.97E-03	6.77E-03
	851203 TO 851209	*-2.11E-03	9.32E-03
	851209 TO 851216	* 7.82E-04	1.16E-02
	851216 TO 851223	* 1.17E-03	8.73E-03
	851223 TO 851230	*-3.81E-03	8.77E-03
#4	841231 TO 850107	* 9.12E-03	1.11E-02
	850107 TO 850114	* 2.53E-03	9.64E-03
	850114 TO 850121	*-2.20E-03	9.08E-03
	850121 TO 850128	*-3.98E-03	9.33E-03
	850128 TO 850204	*-1.05E-03	8.81E-03
	850204 TO 850211	*-6.17E-03	9.09E-03
	850211 TO 850219	* 1.44E-03	7.22E-03
	850219 TO 850225	* 1.22E-02	7.78E-03
	850225 TO 850304	* 3.62E-03	1.02E-02
	850304 TO 850311	* 1.63E-03	8.19E-03
	850311 TO 850318	* 5.07E-03	9.10E-03
	850318 TO 850325	* 9.31E-03	4.81E-03
	850325 TO 850401	* 6.38E-03	9.03E-03
	850401 TO 850408	* 9.73E-04	9.34E-03
	850408 TO 850415	* 1.30E-02	8.11E-03
	850415 TO 850422	*-1.03E-02	9.28E-03
	850422 TO 850429	* 3.44E-03	8.89E-03
	850429 TO 850506	*-6.72E-03	8.19E-03
	850506 TO 850513	* 0.00E+00	7.52E-03
	850513 TO 850520	* 2.81E-03	8.80E-03
	850520 TO 850528	*-4.53E-03	7.25E-03
	850528 TO 850603	*-9.77E-03	1.12E-02
	850603 TO 850610	*-1.07E-02	1.45E-02
	850610 TO 850617	*-3.70E-03	7.39E-03
	850617 TO 850624	* 4.15E-03	5.28E-03
	850624 TO 850701	*-7.50E-03	1.09E-02
	850701 TO 850708	* 7.78E-03	8.92E-03
	850708 TO 850715	*-1.01E-02	7.47E-03
	850715 TO 850722	*-1.51E-03	6.64E-03
	850722 TO 850729	*-2.31E-04	6.16E-03
	850729 TO 850805	*-4.33E-03	7.71E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#4	850805 TO 850812	*-2.84E-03	8.99E-03
	850812 TO 850819	*-7.56E-03	1.04E-02
	850819 TO 850826	* 4.32E-03	9.66E-03
	850826 TO 850903	* 5.31E-04	7.87E-03
	850903 TO 850909	* 4.37E-03	1.12E-02
	850909 TO 850916	*-1.05E-02	1.02E-02
	850916 TO 850923	* 3.28E-03	7.25E-03
	850923 TO 850930	* 1.86E-03	8.10E-03
	850930 TO 851007	* 1.40E-03	8.61E-03
	851007 TO 851014	* 6.69E-03	6.69E-03
	851014 TO 851021	* 7.98E-03	7.98E-03
	851021 TO 851028	* 4.67E-03	6.85E-03
	851028 TO 851104	* 0.00E+00	0.00E+00
	851104 TO 851111	*-2.96E-03	9.97E-03
	851111 TO 851118	*-6.16E-03	1.98E-02
	851118 TO 851125	* 9.10E-03	9.10E-03
	851125 TO 851203	* 5.99E-03	5.99E-03
	851203 TO 851209	* 0.00E+00	1.32E-02
	851209 TO 851216	*-9.65E-04	8.48E-03
	851216 TO 851223	*-5.01E-03	1.14E-02
	851223 TO 851230	* 5.34E-04	9.13E-03
#40	841231 TO 850107	* 1.72E-03	1.43E-02
	850107 TO 850114	* 4.03E-03	7.93E-03
	850114 TO 850121	*-7.80E-03	1.16E-02
	850121 TO 850128	*-4.09E-03	9.58E-03
	850128 TO 850204	*-1.32E-02	1.04E-02
	850204 TO 850211	* 2.66E-03	6.87E-03
	850211 TO 850219	* 5.83E-03	6.21E-03
	850219 TO 850225	* 8.66E-04	9.27E-03
	850225 TO 850304	*-2.47E-04	1.01E-02
	850304 TO 850311	* 8.04E-03	6.78E-03
	850311 TO 850318	* 2.00E-03	1.05E-02
	850318 TO 850325	*-6.49E-03	6.54E-03
	850325 TO 850401	* 1.74E-02	8.41E-03
	850401 TO 850408	* 2.99E-03	6.60E-03
	850408 TO 850415	*-4.92E-03	7.87E-03
	850415 TO 850422	*-1.46E-02	9.81E-03
	850422 TO 850429	*-4.21E-03	8.43E-03
	850429 TO 850506	*-5.61E-04	9.45E-03
	850506 TO 850513	*-8.14E-04	9.67E-03
	850513 TO 850520	*-3.36E-03	1.25E-02
	850520 TO 850528	* 3.84E-03	6.78E-03
	850528 TO 850603	* 3.92E-03	8.66E-03
	850603 TO 850610	* 1.30E-03	9.70E-03
	850610 TO 850617	* 1.55E-03	6.46E-03
	850617 TO 850624	*-2.75E-03	9.02E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#40	850624 TO 850701	* 8.76E-03	8.76E-03
	850701 TO 850708	*-5.89E-04	9.93E-03
	850708 TO 850715	*-1.09E-03	1.02E-02
	850715 TO 850722	* 2.43E-04	8.79E-03
	850722 TO 850729	* 2.30E-04	2.30E-04
	850729 TO 850805	* 1.40E-02	1.40E-02
	850805 TO 850812	*-2.63E-04	8.33E-03
	850812 TO 850819	* 1.01E-02	1.01E-02
	850819 TO 850826	* 7.38E-03	7.44E-03
	850826 TO 850903	*-1.66E-03	7.30E-03
	850903 TO 850909	*-1.39E-02	1.17E-02
	850909 TO 850916	*-1.34E-02	1.06E-02
	850916 TO 850923	*-5.69E-03	1.02E-02
	850923 TO 850930	* 4.20E-03	6.97E-03
	850930 TO 851007	*-7.48E-03	1.20E-02
	851007 TO 851014	*-8.70E-03	1.22E-02
	851014 TO 851021	*-3.62E-03	8.35E-03
	851021 TO 851028	*-4.35E-03	9.86E-03
	851028 TO 851104	* 2.32E-03	8.15E-03
	851104 TO 851111	*-4.39E-03	8.79E-03
	851111 TO 851118	*-1.66E-03	1.42E-02
	851118 TO 851125	*-2.42E-03	8.22E-03
	851125 TO 851203	* 6.00E-03	6.00E-03
	851203 TO 851209	* 4.39E-03	8.24E-03
	851209 TO 851216	*-1.96E-02	1.27E-02
	851216 TO 851223	* 2.87E-04	1.04E-02
	851223 TO 851230	*-7.66E-03	1.15E-02
#48	841231 TO 850107	* 3.07E-02	1.08E-02
	850107 TO 850114	* 4.96E-03	9.59E-03
	850114 TO 850121	*-1.11E-02	3.62E-02
	850121 TO 850128	*-9.78E-03	8.26E-03
	850128 TO 850204	*-3.65E-03	7.31E-03
	850204 TO 850211	* 7.62E-03	9.36E-03
	850211 TO 850219	* 6.43E-04	6.88E-03
	850219 TO 850225	* 7.35E-03	7.01E-03
	850225 TO 850304	* 4.24E-03	7.04E-03
	850304 TO 850311	* 6.09E-03	8.65E-03
	850311 TO 850318	* 6.60E-03	1.02E-02
	850318 TO 850325	* 2.14E-03	7.52E-03
	850325 TO 850401	*-7.39E-03	1.09E-02
	850401 TO 850408	* 2.57E-03	6.64E-03
	850408 TO 850415	*-5.69E-03	6.79E-03
	850415 TO 850422	* 1.15E-02	1.15E-02
	850422 TO 850429	*-1.64E-02	1.06E-02
	850429 TO 850506	* 2.11E-03	9.21E-03
	850506 TO 850513	*-1.04E-02	8.59E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#48	850521 TO 850528	* 2.44E-03	7.68E-03
	850528 TO 850603	*-2.39E-03	8.13E-03
	850603 TO 850610	*-1.23E-02	1.55E-02
	850610 TO 850617	*-4.91E-03	9.84E-03
	850617 TO 850624	* 7.09E-03	7.65E-03
	850624 TO 850701	* 4.53E-03	8.13E-03
	850701 TO 850708	* 7.18E-03	8.73E-03
	850708 TO 850715	*-9.47E-03	9.60E-03
	850715 TO 850722	* 1.10E-02	1.10E-02
	850722 TO 850729	* 1.15E-02	1.15E-02
	850729 TO 850805	* 2.53E-03	6.54E-03
	850805 TO 850812	* 3.33E-03	7.37E-03
	850812 TO 850819	*-4.74E-04	7.99E-03
	850819 TO 850826	*-1.03E-03	7.40E-03
	850826 TO 850903	*-5.29E-03	9.47E-03
	850903 TO 850909	*-4.81E-03	9.57E-03
	850909 TO 850916	*-5.49E-04	7.99E-03
	850916 TO 850923	*-4.09E-03	6.30E-03
	850923 TO 850930	* 6.59E-03	7.77E-03
	850930 TO 851007	*-3.53E-04	1.12E-02
	851007 TO 851014	* 4.53E-03	9.02E-03
	851014 TO 851021	*-6.18E-04	1.04E-02
	851021 TO 851028	*-3.27E-03	8.87E-03
	851028 TO 851104	* 2.45E-03	8.95E-03
	851104 TO 851111	*-7.89E-03	1.08E-02
	851111 TO 851118	* 6.90E-03	6.90E-03
	851118 TO 851125	*-2.57E-03	7.87E-03
	851125 TO 851203	*-5.19E-03	9.29E-03
	851203 TO 851209	* 4.43E-03	8.56E-03
	851209 TO 851216	* 2.75E-03	9.64E-03
	851216 TO 851223	* 8.98E-03	9.08E-03
	851223 TO 851230	*-1.34E-02	8.90E-03
#5	841231 TO 850107	*-2.37E-03	1.05E-02
	850107 TO 850114	* 2.84E-03	7.27E-03
	850114 TO 850121	* 1.04E-03	9.95E-03
	850121 TO 850128	*-4.00E-03	1.04E-02
	850128 TO 850204	*-2.36E-03	8.71E-03
	850204 TO 850211	*-1.37E-02	1.12E-02
	850211 TO 850219	* 4.44E-03	9.81E-03
	850219 TO 850225	* 8.47E-03	1.11E-02
	850225 TO 850304	* 6.48E-03	1.01E-02
	850304 TO 850311	*-4.89E-03	1.11E-02
	850311 TO 850318	* 0.00E+00	7.24E-03
	850318 TO 850325	* 9.88E-03	8.15E-03
	850325 TO 850401	*-8.35E-03	1.13E-02
	850401 TO 850408	*-7.28E-03	9.08E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#5	850408 TO 850415	*-1.51E-03	9.37E-03
	850415 TO 850422	* 3.60E-03	8.92E-03
	850422 TO 850429	*-5.14E-04	7.49E-03
	850429 TO 850506	* 2.02E-03	6.38E-03
	850506 TO 850513	*-4.26E-03	7.59E-03
	850513 TO 850520	*-2.80E-04	8.86E-03
	850520 TO 850528	*-9.42E-03	9.73E-03
	850528 TO 850603	* 2.09E-03	9.74E-03
	850603 TO 850610	* 5.49E-03	7.80E-03
	850610 TO 850617	* 3.27E-03	7.31E-03
	850617 TO 850624	* 5.73E-03	6.96E-03
	850624 TO 850701	* 3.73E-03	9.56E-03
	850701 TO 850708	*-1.56E-03	7.44E-03
	850708 TO 850715	* 5.26E-03	6.56E-03
	850715 TO 850722	* 1.53E-03	6.09E-03
	850722 TO 850729	* 7.32E-03	8.90E-03
	850729 TO 850805	*-1.24E-02	1.13E-02
	850805 TO 850812	*-6.03E-03	9.96E-03
	850812 TO 850819	*-4.60E-04	6.70E-03
	850819 TO 850826	*-2.18E-03	7.15E-03
	850826 TO 850903	* 1.42E-03	7.14E-03
	850903 TO 850909	* 3.40E-03	1.06E-02
	850909 TO 850916	*-4.25E-03	8.52E-03
	850916 TO 850923	*-2.19E-03	8.50E-03
	850923 TO 850930	*-3.74E-03	8.47E-03
	850930 TO 851007	*-4.35E-03	1.20E-02
	851007 TO 851014	* 4.98E-04	8.51E-03
	851014 TO 851021	*-6.07E-03	8.20E-03
	851021 TO 851028	*-6.65E-03	8.29E-03
	851028 TO 851104	*-8.14E-04	7.16E-03
	851104 TO 851111	*-2.17E-03	1.09E-02
	851111 TO 851118	*-1.15E-03	8.29E-03
	851118 TO 851125	*-3.92E-04	8.76E-03
	851125 TO 851203	*-3.96E-03	7.05E-03
	851203 TO 851209	*-1.02E-02	1.30E-02
	851209 TO 851216	* 1.77E-03	9.78E-03
	851216 TO 851223	* 5.63E-04	8.34E-03
	851223 TO 851230	* 1.17E-02	1.17E-02
#57	841231 TO 850107	* 5.70E-03	1.10E-02
	850107 TO 850114	*-3.72E-03	9.87E-03
	850114 TO 850121	* 6.60E-03	8.69E-03
	850121 TO 850128	* 1.60E-02	6.60E-03
	850128 TO 850204	*-8.59E-03	1.01E-02
	850204 TO 850211	* 5.46E-03	9.64E-03
	850211 TO 850219	* 2.92E-03	8.11E-03
	850219 TO 850225	* 5.41E-03	9.06E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#57	850225 TO 850304	* 6.12E-03	6.17E-03
	850304 TO 850311	*-4.09E-03	8.19E-03
	850311 TO 850318	*-5.78E-03	8.51E-03
	850318 TO 850325	*-7.29E-03	8.43E-03
	850325 TO 850401	*-5.20E-04	6.15E-03
	850401 TO 850408	* 7.17E-03	1.15E-02
	850408 TO 850415	*-6.49E-03	1.13E-02
	850415 TO 850422	* 0.00E+00	7.42E-03
	850422 TO 850429	*-7.59E-03	1.53E-02
	850429 TO 850506	*-2.21E-02	1.42E-02
	850506 TO 850513	* 7.40E-03	1.05E-02
	850513 TO 850520	*-3.86E-03	1.27E-02
	850520 TO 850528	* 4.42E-03	1.14E-02
	850528 TO 850603	*-1.03E-02	1.25E-02
	850603 TO 850610	*-9.83E-03	1.45E-02
	850610 TO 850617	* 1.53E-02	1.53E-02
	850617 TO 850624	*-7.76E-03	1.39E-02
	850624 TO 850701	*-1.96E-03	6.65E-03
	850701 TO 850708	*-5.30E-03	1.08E-02
	850708 TO 850715	* 3.84E-03	8.58E-03
	850715 TO 850722	* 1.19E-02	1.19E-02
	850722 TO 850729	* 9.65E-03	9.65E-02
	850729 TO 850805	* 1.90E-03	7.22E-03
	850805 TO 850812	*-4.18E-03	8.36E-03
	850812 TO 850819	*-5.62E-03	1.00E-02
	850819 TO 850826	*-3.40E-03	8.85E-03
	850826 TO 850903	* 1.23E-02	1.23E-02
	850903 TO 850909	* 8.74E-03	8.84E-03
	850909 TO 850916	*-6.15E-03	9.69E-03
	850916 TO 850923	* 4.95E-03	8.74E-03
	850923 TO 850930	* 2.20E-03	6.88E-03
	850930 TO 851007	* 5.56E-03	1.24E-02
	851007 TO 851014	*-2.41E-04	8.65E-03
	851014 TO 851021	* 4.44E-03	1.13E-02
	851021 TO 851028	*-1.23E-03	7.68E-03
	851028 TO 851104	*-2.91E-04	9.22E-03
	851104 TO 851111	* 3.11E-03	7.98E-03
	851111 TO 851118	*-4.07E-03	8.16E-03
	851118 TO 851125	* 6.75E-03	1.01E-02
	851125 TO 851203	*-1.04E-02	8.54E-03
	851203 TO 851209	* 6.03E-03	1.07E-02
	851209 TO 851216	* 8.83E-03	8.94E-03
	851216 TO 851223	* 6.24E-03	8.46E-03
	851223 TO 851230	* 7.20E-04	7.71E-03
#6	841231 TO 850107	* 6.09E-03	1.07E-02
	850107 TO 850114	* 9.04E-03	9.35E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#6	850114 TO 850121	*-3.84E-03	1.04E-02
	850121 TO 850128	* 3.01E-03	7.77E-03
	850128 TO 850204	* 2.65E-03	7.97E-03
	850204 TO 850211	*-3.81E-03	8.81E-03
	850211 TO 850219	* 1.31E-03	5.46E-03
	850219 TO 850225	* 1.11E-02	7.69E-03
	850225 TO 850304	*-6.22E-03	8.41E-03
	850304 TO 850311	* 6.89E-03	6.97E-03
	850311 TO 850318	* 2.19E-03	8.33E-03
	850318 TO 850325	* 9.74E-04	8.38E-03
	850325 TO 850401	*-5.79E-04	8.43E-03
	850401 TO 850408	*-7.04E-03	1.04E-02
	850408 TO 850415	*-2.09E-03	8.60E-03
	850415 TO 850422	*-1.17E-02	9.90E-03
	850422 TO 850429	* 4.45E-03	5.67E-03
	850429 TO 850506	*-2.37E-03	8.39E-03
	850506 TO 850513	*-3.43E-03	7.85E-03
	850513 TO 850520	*-2.10E-03	1.21E-02
	850520 TO 850528	*-5.38E-03	9.33E-03
	850528 TO 850603	*-5.39E-04	9.08E-03
	850603 TO 850610	*-9.48E-03	1.42E-02
	850610 TO 850617	*-6.43E-03	8.52E-03
	850617 TO 850624	*-8.24E-03	9.53E-03
	850624 TO 850701	* 1.87E-03	9.83E-03
	850701 TO 850708	* 8.10E-03	6.83E-03
	850708 TO 850715	* 5.77E-03	9.16E-03
	850715 TO 850722	* 3.29E-03	8.50E-03
	850722 TO 850723	* 9.91E-03	3.84E-02
	850723 TO 850729	*-4.23E-03	1.14E-02
	850729 TO 850805	* 2.31E-03	7.21E-03
	850805 TO 850812	* 8.83E-03	8.83E-03
	850812 TO 850819	* 5.78E-03	9.26E-03
	850819 TO 850826	* 5.84E-03	8.30E-03
	850826 TO 850903	* 3.70E-03	6.38E-03
	850903 TO 850909	* 7.10E-03	9.29E-03
	850909 TO 850916	* 5.29E-03	9.33E-03
	850916 TO 850923	* 0.00E+00	6.46E-03
	850923 TO 850930	* 1.31E-02	1.31E-02
	850930 TO 851007	*-8.93E-03	1.43E-02
	851007 TO 851014	*-5.35E-03	9.57E-03
	851014 TO 851021	* 2.88E-03	7.43E-03
	851021 TO 851028	*-7.83E-03	1.09E-02
	851028 TO 851104	*-4.62E-03	9.24E-03
	851104 TO 851111	* 8.97E-04	1.09E-02
	851111 TO 851118	*-7.29E-03	9.09E-03
	851118 TO 851125	* 7.15E-04	8.09E-03
	851125 TO 851203	*-1.18E-03	7.37E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#6	851203 TO 851209	*-6.24E-03	8.87E-03
	851209 TO 851216	*-2.26E-03	9.96E-03
	851216 TO 851223	* 1.79E-02	1.79E-02
	851223 TO 851230	* 7.31E-03	7.31E-03
#7	841231 TO 850107	*-5.49E-03	1.63E-02
	850107 TO 850114	* 1.18E-02	8.63E-03
	850114 TO 850121	* 4.01E-03	7.52E-03
	850121 TO 850128	*-1.49E-02	1.10E-02
	850128 TO 850204	*-1.55E-03	8.64E-03
	850204 TO 850211	*-6.43E-03	1.12E-02
	850211 TO 850219	*-3.18E-03	8.45E-03
	850219 TO 850225	*-5.97E-03	1.19E-02
	850304 TO 850311	*-2.66E-03	7.20E-03
	850311 TO 850318	*-2.26E-04	9.25E-03
	850318 TO 850325	*-2.75E-03	9.02E-03
	850325 TO 850401	*-8.13E-03	1.33E-02
	850401 TO 850408	*-1.33E-02	1.14E-02
	850408 TO 850415	*-9.35E-04	6.74E-03
	850415 TO 850422	* 9.31E-03	9.31E-03
	850422 TO 850429	*-1.97E-03	9.73E-03
	850429 TO 850506	* 1.20E-03	8.96E-03
	850506 TO 850513	*-2.32E-03	7.87E-03
	850513 TO 850520	*-1.76E-03	8.85E-03
	850520 TO 850528	* 0.00E+00	0.00E+00
	850528 TO 850603	*-7.31E-04	7.64E-03
	850603 TO 850610	* 6.47E-03	9.49E-03
	850610 TO 850617	*-5.82E-03	1.08E-02
	850617 TO 850624	*-4.89E-03	1.09E-02
	850624 TO 850701	*-2.43E-03	9.43E-03
	850701 TO 850708	* 3.21E-03	8.28E-03
	850708 TO 850715	4.53E-02	4.31E-02
	850715 TO 850722	*-5.77E-04	7.38E-03
	850722 TO 850729	*-2.96E-03	9.70E-03
	850729 TO 850805	* 5.20E-03	7.76E-03
	850805 TO 850812	* 1.28E-02	1.28E-02
	850819 TO 850826	*-2.33E-04	7.38E-03
	850826 TO 850903	*-1.33E-02	1.05E-02
	850903 TO 850909	* 1.74E-03	8.74E-03
	850909 TO 850916	* 9.80E-03	9.80E-03
	850916 TO 850923	*-5.66E-03	9.21E-03
	850923 TO 850930	*-7.26E-03	1.01E-02
	850930 TO 851007	* 1.06E-02	1.29E-02
	851007 TO 851014	* 5.11E-03	7.50E-03
	851014 TO 851021	* 2.22E-03	8.47E-03
	851021 TO 851028	*-4.90E-03	9.80E-03
	851028 TO 851104	* 3.45E-03	6.46E-03

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#7	851104 TO 851111	* 0.00E+00	9.45E-03
	851111 TO 851118	*-2.92E-04	9.24E-03
	851118 TO 851125	* 1.96E-03	1.03E-02
	851125 TO 851203	*-8.63E-03	7.23E-03
	851203 TO 851209	*-5.64E-04	9.50E-03
	851209 TO 851216	* 2.53E-03	7.91E-03
	851216 TO 851223	*-3.34E-03	9.88E-03
	851223 TO 851230	*-3.48E-03	1.03E-02
#8	841231 TO 850107	* 6.37E-03	9.91E-03
	850107 TO 850114	* 5.00E-03	8.30E-03
	850114 TO 850121	*-8.35E-04	8.73E-03
	850121 TO 850128	*-1.16E-02	8.85E-03
	850128 TO 850204	*-3.24E-03	7.41E-03
	850204 TO 850211	* 4.42E-03	8.54E-03
	850211 TO 850219	*-3.51E-03	9.31E-03
	850219 TO 850225	* 4.30E-03	8.06E-03
	850225 TO 850304	*-7.83E-03	1.06E-02
	850304 TO 850311	* 4.69E-03	7.51E-03
	850311 TO 850318	*-5.55E-03	9.04E-03
	850318 TO 850325	*-5.11E-03	7.53E-03
	850325 TO 850401	* 4.14E-03	8.15E-03
	850401 TO 850408	*-1.39E-02	1.17E-02
	850408 TO 850415	*-2.78E-03	8.51E-03
	850415 TO 850422	*-4.98E-03	8.10E-03
	850422 TO 850429	* 1.05E-02	1.05E-02
	850429 TO 850506	*-8.89E-03	1.11E-02
	850506 TO 850513	*-5.66E-03	6.44E-03
	850513 TO 850520	* 1.15E-02	1.15E-02
	850520 TO 850528	* 1.03E-02	1.03E-02
	850528 TO 850603	* 1.42E-03	7.17E-03
	850603 TO 850610	*-5.33E-03	1.07E-02
	850610 TO 850617	* 3.43E-03	5.37E-03
	850617 TO 850624	* 1.41E-02	1.41E-02
	850624 TO 850701	*-7.42E-03	9.42E-03
	850701 TO 850708	*-7.79E-03	8.58E-03
	850708 TO 850715	*-5.55E-03	1.07E-02
	850715 TO 850722	* 6.82E-03	6.86E-03
	850722 TO 850729	*-3.04E-03	8.06E-03
	850729 TO 850805	* 3.54E-03	9.08E-03
	850805 TO 850812	* 8.11E-03	8.68E-03
	850812 TO 850819	* 2.31E-03	8.44E-03
	850819 TO 850826	*-3.32E-03	8.81E-03
	850826 TO 850903	* 3.83E-03	7.54E-03
	850903 TO 850909	*-5.74E-03	1.13E-02
	850909 TO 850916	* 6.43E-03	9.04E-03
	850916 TO 850923	* 3.43E-03	1.01E-02

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#8	850923 TO 850930	* 3.62E-03	6.79E-03
	850930 TO 851007	*-1.88E-03	1.17E-02
	851007 TO 851014	* 2.98E-04	9.49E-03
	851014 TO 851021	*-3.88E-03	1.03E-02
	851021 TO 851028	*-9.38E-03	1.04E-02
	851028 TO 851104	* 9.19E-04	5.67E-03
	851104 TO 851111	* 7.13E-03	7.13E-03
	851111 TO 851118	* 0.00E+00	9.18E-03
	851118 TO 851125	*-7.46E-03	1.49E-02
	851125 TO 851203	* 2.22E-03	6.81E-03
	851203 TO 851209	*-1.12E-03	9.34E-03
	851209 TO 851216	*-9.97E-04	8.34E-03
	851216 TO 851223	*-1.13E-03	8.16E-03
	851223 TO 851230	*-5.93E-03	8.84E-03
#9	841231 TO 850107	*-5.26E-03	1.39E-02
	850114 TO 850121	* 1.19E-02	9.44E-03
	850121 TO 850128	* 1.09E-03	7.08E-03
	850128 TO 850204	* 8.15E-03	7.76E-03
	850204 TO 850211	*-5.75E-03	9.67E-03
	850211 TO 850219	*-4.04E-03	9.46E-03
	850219 TO 850225	* 5.95E-03	4.70E-03
	850225 TO 850304	* 1.01E-02	6.04E-03
	850304 TO 850311	*-7.65E-03	1.15E-02
	850311 TO 850318	* 1.32E-03	7.63E-03
	850318 TO 850325	* 5.01E-03	7.11E-03
	850325 TO 850401	* 2.88E-04	9.18E-03
	850401 TO 850408	* 3.38E-03	7.46E-03
	850408 TO 850415	*-5.97E-03	9.55E-03
	850415 TO 850422	* 6.08E-03	7.38E-03
	850422 TO 850429	* 1.64E-03	6.62E-03
	850429 TO 850506	*-9.40E-04	9.83E-03
	850506 TO 850513	* 1.59E-03	7.39E-03
	850513 TO 850520	*-4.91E-03	1.08E-02
	850520 TO 850528	*-7.79E-03	9.89E-03
	850528 TO 850603	*-1.11E-02	1.14E-02
	850603 TO 850610	* 3.95E-03	1.02E-02
	850610 TO 850617	* 2.32E-03	8.84E-03
	850617 TO 850624	*-7.15E-03	9.91E-03
	850624 TO 850701	*-3.76E-03	1.06E-02
	850701 TO 850708	*-1.16E-02	1.09E-02
	850708 TO 850715	* 4.36E-04	7.45E-03
	850715 TO 850722	* 2.98E-03	7.70E-03
	850722 TO 850729	*-4.60E-03	1.01E-02
	850729 TO 850805	*-1.82E-03	8.01E-03
	850805 TO 850812	*-1.18E-03	6.13E-03
	850812 TO 850819	*-8.15E-03	1.19E-02

* Denotes a result less than the detection limit 4.00E-02

TABLE A-5 (cont.)

Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#9	850819 TO 850826	* 0.00E+00	9.80E-03
	850826 TO 850903	*-7.10E-03	7.83E-03
	850903 TO 850909	* 3.15E-03	8.15E-03
	850909 TO 850916	* 2.46E-03	7.68E-03
	850916 TO 850923	*-8.38E-03	9.89E-03
	850923 TO 850930	* 1.44E-03	9.29E-03
	850930 TO 851007	*-3.40E-03	1.11E-02
	851007 TO 851014	*-3.34E-03	7.71E-03
	851014 TO 851021	* 7.22E-03	7.22E-03
	851021 TO 851028	* 0.00E+00	7.32E-03
	851028 TO 851104	*-8.75E-03	8.70E-03
	851104 TO 851111	*-1.75E-02	1.11E-02
	851111 TO 851118	*-1.72E-03	9.50E-03
	851118 TO 851125	*-1.97E-02	1.56E-02
	851125 TO 851203	* 0.00E+00	8.18E-03
	851203 TO 851209	* 6.06E-03	1.07E-02
	851209 TO 851216	*-5.73E-03	8.31E-03
	851216 TO 851223	* 3.72E-03	8.23E-03
	851223 TO 851230	* 2.98E-04	9.51E-03

AVERAGE RESULT (WITHOUT CONTROL) = 1.87E-05 (LOW = -2.21E-02, HIGH = 4.53E-02)
 1 POSITIVE RESULTS FOUND IN 568 SAMPLES

AVERAGE RESULT FOR CONTROL = -1.50E-03 (LOW = -1.97E-02, HIGH = 1.19E-02)
 0 POSITIVE RESULTS FOUND IN 51 SAMPLES

* Denotes a result less than the detection limit 4.00E-02

TABLE A-6
GROSS BETA IN WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#26	841219 TO 850123	* 1.60E+00	1.42E+00
	850123 TO 850221	* 2.52E+00	1.42E+00
	850221 TO 850320	* 1.47E+00	1.26E+00
	850320 TO 850418	* 5.50E-01	1.25E+00
	850418 TO 850522	* 2.35E+00	1.41E+00
	850522 TO 850620	* 9.84E-01	1.11E+00
	850717 TO 850821	* 2.03E-01	1.20E+00
	850821 TO 850918	* 7.63E-01	1.08E+00
	850918 TO 851016	* 3.21E-01	9.79E-01
	851016 TO 851120	* 3.02E-01	1.03E+00
	851120 TO 851218	* 3.55E+00	1.52E+00
#27	841219 TO 850123	8.06E+00	2.48E+00
	850123 TO 850221	* 2.65E+00	1.46E+00
	850221 TO 850320	6.57E+00	2.27E+00
	850320 TO 850418	4.92E+00	1.90E+00
	850418 TO 850522	* 2.78E+00	1.47E+00
	850522 TO 850620	* 1.35E+00	1.40E+00
	850620 TO 850717	* 3.86E+00	1.56E+00
	850717 TO 850821	* 2.54E+00	1.54E+00
	850821 TO 850918	5.61E+00	2.02E+00
	850918 TO 851016	* 6.20E-01	1.34E+00
	851016 TO 851120	* 3.49E+00	1.63E+00
	851120 TO 851218	* 3.24E+00	1.32E+00
#28	841219 TO 850123	* 1.01E+00	1.19E+00
	850123 TO 850221	* 1.66E+00	1.20E+00
	850221 TO 850320	* 3.70E+00	2.05E+00
	850320 TO 850418	* 2.16E+00	1.36E+00
	850418 TO 850522	* 1.34E+00	1.20E+00
	850522 TO 850620	* 7.65E-01	1.04E+00
	850620 TO 850717	* 9.39E-01	1.08E+00
	850717 TO 850821	4.41E+00	1.81E+00
	850821 TO 850918	* 2.97E+00	1.45E+00
	850918 TO 851017	* 1.13E+00	1.20E+00
	851017 TO 851120	* 3.53E+00	1.70E+00
	851120 TO 851218	* 1.33E+00	9.91E-01
#29	841219 TO 850123	* 3.45E+00	1.59E+00
	850123 TO 850221	* 1.35E+00	1.21E+00
	850221 TO 850320	* 1.83E+00	1.33E+00
	850320 TO 850418	* 2.09E+00	1.39E+00
	850418 TO 850522	* 3.75E-01	1.07E+00
	850522 TO 850620	* 1.15E+00	1.11E+00
	850620 TO 850717	* 3.35E+00	1.44E+00
	850717 TO 850821	* 1.67E+00	1.25E+00
	850821 TO 850918	* 1.13E+00	1.24E+00

* Denotes a result less than the detection limit 4.00E+00

TABLE A-6 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#29	850918 TO 851016	* 1.24E+00	1.23E+00
	851016 TO 851120	* 1.93E+00	1.31E+00
	851120 TO 851218	* 2.61E+00	1.43E+00
#72	850717 TO 850821	* 2.16E+00	1.28E+00
	850821 TO 850918	5.00E+00	1.87E+00
	850918 TO 851016	* 2.23E+00	1.51E+00
	851016 TO 851120	* 3.39E+00	1.69E+00
	851120 TO 851218	* 3.00E+00	1.28E+00
AVERAGE RESULT (WITHOUT CONTROL) = 2.65E+00 (LOW = 3.75E-01, HIGH = 8.06E+00)			
6 POSITIVE RESULTS FOUND IN 41 SAMPLES			
AVERAGE RESULT FOR CONTROL = 1.33E+00 (LOW = 2.03E-01, HIGH = 3.55E+00)			
0 POSITIVE RESULTS FOUND IN 11 SAMPLES			

* Denotes a result less than the detection limit 4.00E+00

TABLE A-7
TRITIUM IN WATER
 Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#26	841219 TO 850320	* 9.69E+01	2.14E+02
	850320 TO 850620	* 5.77E+00	2.83E+02
	850620 TO 850918	* 7.61E+01	2.77E+02
	850918 TO 851218	* 1.88E+02	2.21E+02
#27	841219 TO 850320	* 2.42E+02	2.19E+02
	850320 TO 850620	* 7.07E+01	2.86E+02
	850620 TO 850918	* 2.74E+02	2.85E+02
	850918 TO 851218	* 1.57E+02	2.20E+02
#28	841219 TO 850320	* 2.24E+02	2.18E+02
	850320 TO 850620	* 6.64E+01	2.86E+02
	850320 TO 850918	* 6.98E+01	2.78E+02
	850918 TO 851218	* 5.54E+01	2.16E+02
#29	841219 TO 850320	* 1.16E+02	2.14E+02
	850320 TO 850620	* 1.80E+01	2.84E+02
	850620 TO 850918	* 5.76E+01	2.78E+02
	850918 TO 851218	* 9.29E+01	2.17E+02
#31	850320 TO 850320	* 9.58E+01	2.13E+02
	850624 TO 850624	* -1.60E+02	2.72E+02
	850918 TO 850918	* 8.79E+01	2.75E+02
	851218 TO 851218	* 1.78E+02	2.20E+02
#32	850320 TO 850320	* 2.13E+02	2.17E+02
	850624 TO 850624	* -1.65E+02	2.72E+02
	850918 TO 850918	* 2.79E+01	2.73E+02
	851218 TO 851218	* -6.31E+01	2.11E+02
#52	850320 TO 850320	* 2.13E+02	2.17E+02
	850621 TO 850621	* -8.21E+01	2.75E+02
	850918 TO 850918	* 2.89E+02	2.83E+02
	851218 TO 851218	* 4.87E+01	2.15E+02
#72	850717 TO 850821	* 1.81E+02	2.83E+02
	850821 TO 850918	* -4.15E+01	2.73E+02
	851120 TO 851218	* 2.36E+02	2.22E+02
	850918 TO 851017	* 2.47E+02	2.24E+02

AVERAGE RESULT (WITHOUT CONTROL) = 9.72E+01 (LOW = -1.65E+02, HIGH = 2.89E+02)
 0 POSITIVE RESULTS FOUND IN 28 SAMPLES

AVERAGE RESULT FOR CONTROL = 9.17E+01 (LOW = 5.77E+00, HIGH = 1.88E+02)
 0 POSITIVE RESULTS FOUND IN 4 SAMPLES

* Denotes a result less than the detection limit 3.00E+02

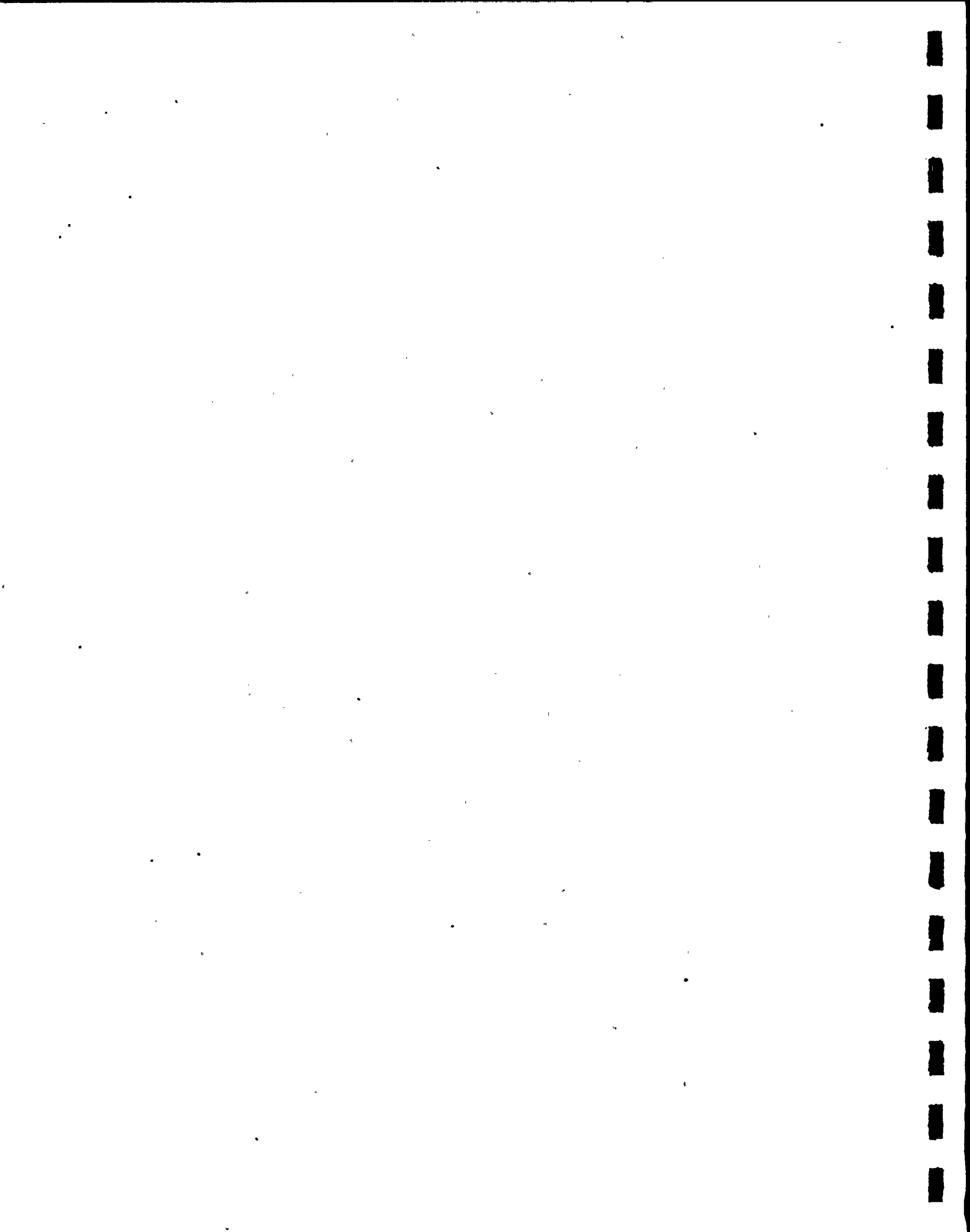


TABLE A-8
GAMMA SPECTROMETRY OF WATER

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#26	841219 TO 850123	LA-140	* 2.02E-01	2.98E+00
		CO-60	* 6.86E-01	1.59E+00
		FE-59	* 1.39E+00	3.22E+00
		ZN-65	*-3.51E-01	3.51E+00
		MN-54	*-1.35E-01	1.24E+00
		CO-58	* 1.67E+00	1.75E+00
		NB-95	* 8.69E-02	2.01E+00
		ZR-95	* 1.83E+00	2.81E+00
		CS-137	*-1.78E+00	1.70E+00
		CS-134	*-7.31E-02	1.67E+00
		BA-140	*-9.24E+00	1.70E+01
	850123 TO 850221	LA-140	* 1.49E+00	1.53E+00
		CO-60	* 4.75E-01	5.98E-01
		FE-59	* 8.12E-01	1.75E+00
		ZN-65	*-8.17E-02	1.52E+00
		MN-54	* 4.45E-01	6.54E-01
		CO-58	*-4.03E-01	8.77E-01
		NB-95	* 9.07E-02	1.05E+00
		ZR-95	* 1.17E+00	1.38E+00
		CS-137	*-3.45E-01	6.49E-01
		CS-134	*-8.56E-01	8.65E-01
		BA-140	*-1.01E+00	1.15E+01
	850221 TO 850320	LA-140	*-6.15E-02	5.63E+00
		CO-60	*-1.52E+00	1.69E+00
		FE-59	* 5.11E-01	4.90E+00
		ZN-65	*-3.01E+00	4.05E+00
		MN-54	*-1.96E+00	1.68E+00
		CO-58	*-7.31E-01	1.55E+00
		NB-95	* 1.73E+00	1.99E+00
		ZR-95	* 3.17E-01	2.77E+00
		CS-137	* 1.70E+00	9.47E-01
		CS-134	*-1.13E+00	1.96E+00
		BA-140	*-2.91E+01	2.87E+01
	850320 TO 850418	LA-140	* 1.69E-01	2.48E+00
		CO-60	* 6.76E-01	7.82E-01
		FE-59	* 3.84E+00	2.57E+00
		ZN-65	*-1.98E-01	2.56E+00
		MN-54	* 1.27E+00	1.32E+00
		CO-58	* 1.15E+00	8.72E-01
		NB-95	* 1.82E+00	1.15E+00
		ZR-95	*-4.22E-01	3.15E+00
		CS-137	* 9.29E-01	1.43E+00
		CS-134	* 1.47E+00	9.81E-01
		BA-140	*-5.47E+00	1.22E+01

* Denotes a result less than the detection limit

TABLE A-3 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#26	850418 TO 850522	LA-140	* 3.38E+00	2.14E+00
		CO-60	* 1.82E+00	1.29E+00
		FE-59	* 6.52E+00	3.39E+00
		ZN-65	* 3.10E+00	2.20E+00
		MN-54	*-1.88E+00	2.30E+00
		CO-58	*-2.59E+00	2.52E+00
		NB-95	*-1.94E+00	3.19E+00
		ZR-95	*-1.11E+00	3.04E+00
		CS-137	* 1.33E+00	1.33E+00
		CS-134	*-2.35E-01	2.20E+00
		BA-140	*-7.41E+00	1.95E+01
	850522 TO 850620	LA-140	* 2.00E+00	1.64E+00
		CO-60	* 1.13E+00	1.01E+00
		FE-59	* 2.77E+00	3.76E+00
		ZN-65	*-1.19E+00	3.79E+00
		MN-54	* 1.27E+00	1.32E+00
		CO-58	* 7.38E-01	1.29E+00
		NB-95	*-8.14E-01	2.57E+00
		ZR-95	*-9.81E-01	3.05E+00
		CS-137	* 6.64E-01	1.38E+00
		CS-134	*-2.44E-01	1.83E+00
		BA-140	*-3.79E+00	1.86E+01
	850717 TO 850821	LA-140	*-2.04E+00	0.00E+00
		CO-60	* 3.40E-01	2.15E+00
		FE-59	* 5.22E+00	3.01E+00
		ZN-65	* 4.27E+00	2.57E+00
		MN-54	*-7.95E-01	2.07E+00
		CO-58	*-3.97E+00	2.72E+00
		NB-95	*-6.46E-01	2.70E+00
		ZR-95	* 2.92E+00	3.02E+00
		CS-137	* 2.60E+00	1.59E+00
		CS-134	*-1.33E+00	2.18E+00
		BA-140	3.58E+01	1.33E+01
	850821 TO 850918	LA-140	* 9.71E-01	1.12E+00
		CO-60	* 2.38E+00	1.44E+00
		FE-59	* 4.55E+00	2.76E+00
		ZN-65	* 1.35E+00	2.94E+00
		MN-54	*-1.46E+00	1.70E+00
		CO-58	*-2.40E+00	1.73E+00
		NB-95	*-7.04E-01	2.23E+00
		ZR-95	* 2.74E-01	2.62E+00
		CS-137	* 1.24E+00	1.18E+00
		CS-134	* 1.11E+00	1.72E+00
		BA-140	* 5.31E-01	1.11E+01

*- Denotes a result less than the detection limit

TABLE A-3 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#26	850918 TO 851016	LA-140	*-4.28E+00	5.34E+00
		CO-60	*-1.08E+00	1.97E+00
		FE-59	*-1.01E+00	2.94E+00
		ZN-65	* 2.04E+00	3.02E+00
		MN-54	*-4.96E-01	1.54E+00
		CO-58	*-4.21E-01	1.22E+00
		NB-95	* 5.42E-01	1.38E+00
		ZR-95	*-1.54E+00	2.44E+00
		CS-137	*-2.61E-01	1.69E+00
		CS-134	*-1.65E+00	2.10E+00
		BA-140	* 5.43E+00	4.58E+00
	851016 TO 851120	LA-140	*-1.72E+01	1.82E+01
		CO-60	* 1.52E+00	1.15E+00
		FE-59	* 2.83E+00	3.65E+00
		ZN-65	* 2.72E+00	2.07E+00
		MN-54	* 1.10E+00	1.27E+00
		CO-58	* 9.91E-01	8.12E-01
		NB-95	*-2.73E+00	2.09E+00
		ZR-95	* 4.26E-01	3.03E+00
		CS-137	* 2.61E-01	1.17E+00
		CS-134	*-2.32E+00	2.04E+00
		BA-140	*-1.15E+01	1.72E+01
	851120 TO 851218	LA-140	*-4.56E+00	1.18E+01
		CO-60	* 2.92E-01	1.48E+00
		FE-59	*-2.38E+00	3.57E+00
		ZN-65	* 2.02E+00	1.65E+00
		MN-54	* 0.00E+00	1.23E+00
		CO-58	* 7.27E-01	1.07E+00
		NB-95	*-1.51E+00	1.73E+00
		ZR-95	*-2.01E+00	2.65E+00
		CS-137	*-1.42E+00	1.34E+00
		CS-134	*-5.05E-01	1.57E+00
		BA-140	* 3.40E+00	5.99E+00
#27	841219 TO 850123	LA-140	* 1.37E+00	3.17E+00
		CO-60	* 1.37E+00	1.04E+00
		FE-59	* 3.76E+00	3.76E+00
		ZN-65	* 1.75E-01	2.58E+00
		MN-54	* 2.03E+00	1.05E+00
		CO-58	*-2.28E-01	1.71E+00
		NB-95	*-1.74E-01	1.59E+00
		ZR-95	*-3.65E+00	2.86E+00
		CS-137	*-7.11E-01	1.46E+00
		CS-134	*-5.12E-01	1.59E+00
		BA-140	*-2.21E+01	2.06E+01

* Denotes a result less than the detection limit

TABLE A-2 (cont.)
Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#27	850123 TO 850221	LA-140	* 2.67E+00	1.42E+00
		CO-60	*-4.35E-01	9.52E-01
		FE-59	* 4.95E-01	1.67E+00
		ZN-65	* 7.17E-01	1.57E+00
		MN-54	* 3.60E-01	6.00E-01
		CO-58	*-6.63E-01	8.01E-01
		NB-95	*-1.11E-01	1.20E+00
		ZR-95	* 5.59E-01	1.48E+00
		CS-137	* 6.66E-01	6.79E-01
		CS-134	*-8.05E-01	7.33E-01
		BA-140	* 2.01E-01	1.10E+01
	850221 TO 850320	LA-140	* 1.87E+00	2.16E+00
		CO-60	* 6.88E-01	1.60E+00
		FE-59	* 5.99E+00	3.34E+00
		ZN-65	*-3.07E+00	3.99E+00
		MN-54	* 1.04E+00	1.19E+00
		CO-58	*-1.42E+00	2.28E+00
		NB-95	*-1.69E+00	2.53E+00
		ZR-95	*-2.76E+00	3.92E+00
		CS-137	* 5.34E-01	9.35E-01
		CS-134	* 2.21E+00	1.15E+00
		BA-140	* 1.05E+00	3.12E+01
	850320 TO 850418	LA-140	*-4.87E-01	2.20E+00
		CO-60	*-8.65E-01	1.84E+00
		FE-59	* 8.33E-01	1.18E+00
		ZN-65	* 5.79E-01	2.73E+00
		MN-54	*-1.53E+00	1.39E+00
		CO-58	* 8.03E-02	1.09E+00
		NB-95	*-4.44E-01	1.96E+00
		ZR-95	* 2.89E+00	2.56E+00
		CS-137	* 2.15E+00	1.32E+00
		CS-134	* 5.57E-01	1.92E+00
		BA-140	*-1.36E+01	1.55E+01
	850418 TO 850522	LA-140	* 2.10E+00	2.86E+00
		CO-60	* 1.08E+00	9.71E-01
		FE-59	* 2.18E+00	1.96E+00
		ZN-65	* 3.89E-01	3.73E+00
		MN-54	* 1.40E+00	1.33E+00
		CO-58	* 1.74E+00	1.54E+00
		NB-95	* 1.41E+00	2.40E+00
		ZR-95	*-9.95E-01	3.09E+00
		CS-137	*-9.13E-01	1.79E+00
		CS-134	*-5.59E-01	1.74E+00
		BA-140	* 6.42E+00	1.65E+01

* Denotes a result less than the detection limit

TABLE A-3 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#27	850522 TO 850620	LA-140	* 2.25E+00	1.70E+00
		CO-60	* 8.65E-01	8.67E-01
		FE-59	*-2.91E+00	3.22E+00
		ZN-65	* 1.74E+00	3.04E+00
		MN-54	*-3.65E-01	1.61E+00
		CO-58	* 3.20E-01	1.57E+00
		NB-95	*-1.59E+00	2.10E+00
		ZR-95	*-3.02E+00	3.16E+00
		CS-137	*-4.57E-01	1.27E+00
		CS-134	* 7.96E-02	1.84E+00
		BA-140	*-6.48E+00	1.18E+01
	850620 TO 850717	LA-140	*-2.68E+00	2.45E+00
		CO-60	* 7.23E-02	9.80E-01
		FE-59	* 1.51E+00	1.35E+00
		ZN-65	* 2.22E+00	2.31E+00
		MN-54	*-1.48E-01	1.11E+00
		CO-58	*-5.64E-02	1.29E+00
		NB-95	* 7.25E-01	1.07E+00
		ZR-95	* 0.00E+00	1.82E+00
		CS-137	* 2.17E-01	9.45E-01
		CS-134	*-1.07E-01	9.78E-01
		BA-140	*-2.29E+01	1.70E+01
	850717 TO 850821	LA-140	* 2.04E+00	1.67E+00
		CO-60	* 1.02E+00	1.89E+00
		FE-59	* 0.00E+00	4.20E+00
		ZN-65	*-1.20E+00	3.48E+00
		MN-54	* 1.28E+00	1.33E+00
		CO-58	*-5.93E-01	1.84E+00
		NB-95	*-1.74E+00	2.28E+00
		ZR-95	*-1.31E+00	3.10E+00
		CS-137	* 8.63E-01	1.67E+00
		CS-134	*-5.72E-01	1.77E+00
		BA-140	*-1.56E+01	1.68E+01
	850821 TO 850918	LA-140	*-5.08E-01	2.30E+00
		CO-60	* 1.35E+00	1.11E+00
		FE-59	* 2.12E+00	1.90E+00
		ZN-65	* 2.17E+00	3.21E+00
		MN-54	* 1.50E-01	1.43E+00
		CO-58	*-1.64E-01	2.15E+00
		NB-95	*-1.44E+00	1.91E+00
		ZR-95	*-3.22E+00	3.24E+00
		CS-137	* 1.99E-01	8.60E-01
		CS-134	*-3.26E-01	1.30E+00
		BA-140	* 1.12E+01	1.31E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#27	850918 TO 851016	LA-140	*-1.59E+00	4.13E+00
		CO-60	* 6.73E-01	7.78E-01
		FE-59	* 0.00E+00	3.52E+00
		ZN-65	*-3.80E-01	3.80E+00
		MN-54	* 6.53E-01	1.14E+00
		CO-58	*-1.29E+00	1.70E+00
		NB-95	*-2.35E+00	1.94E+00
		ZR-95	*-1.70E+00	2.95E+00
		CS-137	*-1.33E+00	1.99E+00
		CS-134	* 1.61E+00	1.02E+00
	851016 TO 851120	BA-140	* 5.97E+00	4.94E+00
		LA-140	*-6.90E+00	1.21E+01
		CO-60	* 2.94E-01	1.49E+00
		FE-59	* 3.74E+00	3.74E+00
		ZN-65	* 5.26E-01	2.67E+00
		MN-54	* 5.40E-01	1.38E+00
		CO-58	* 1.06E+00	1.63E+00
		NB-95	*-3.45E-01	1.54E+00
		ZR-95	*-1.43E+00	2.73E+00
		CS-137	* 1.13E+00	1.08E+00
	851120 TO 851218	CS-134	* 4.39E-01	1.46E+00
		BA-140	* 0.00E+00	1.45E+01
		LA-140	*-6.99E+00	1.23E+01
		CO-60	*-8.62E-01	1.83E+00
		FE-59	* 5.29E-01	2.49E+00
		ZN-65	* 9.35E-01	2.75E+00
		MN-54	*-2.50E+00	1.75E+00
		CO-58	* 7.21E-01	1.50E+00
		NB-95	* 0.00E+00	1.34E+00
		ZR-95	*-3.67E-01	2.75E+00
	841219 TO 850123	CS-137	* 2.61E+00	1.18E+00
		CS-134	*-7.88E-02	1.80E+00
		BA-140	*-3.63E+00	8.38E+00
		LA-140	*-3.42E+00	3.64E+00
		CO-60	*-8.67E-01	1.84E+00
		FE-59	*-4.39E-01	4.02E+00
		ZN-65	* 3.12E+00	2.21E+00
		MN-54	* 9.57E-01	1.23E+00
		CO-58	* 1.16E+00	1.79E+00
		NB-95	*-8.55E-01	2.03E+00
#28		ZR-95	*-9.99E-01	3.10E+00
		CS-137	* 2.61E-01	1.17E+00
		CS-134	* 5.59E-01	1.22E+00
		BA-140	* 1.38E+01	1.16E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#28	850123 TO 850221	LA-140	* 1.49E+00	1.76E+00
		CO-60	* 1.02E+00	8.14E-01
		FE-59	* 1.58E+00	2.14E+00
		ZN-65	*-1.19E-01	1.72E+00
		MN-54	*-1.18E-01	8.33E-01
		CO-58	*-9.49E-01	1.02E+00
		NB-95	*-1.48E+00	1.24E+00
		ZR-95	* 1.00E+00	1.58E+00
		CS-137	* 7.73E-01	7.49E-01
		CS-134	*-1.72E+00	1.04E+00
		BA-140	* 2.14E+01	1.15E+01
	850221 TO 850320	LA-140	*-7.10E+00	7.22E+00
		CO-60	*-4.35E-01	1.94E+00
		FE-59	* 5.10E+00	3.24E+00
		ZN-65	* 1.60E+00	1.61E+00
		MN-54	* 9.78E-01	1.26E+00
		CO-58	*-9.13E-02	2.08E+00
		NB-95	*-1.73E+00	2.33E+00
		ZR-95	* 2.06E+00	2.50E+00
		CS-137	* 5.88E-01	1.47E+00
		CS-134	* 4.03E-01	1.18E+00
		BA-140	* 2.22E+01	2.35E+01
	850320 TO 850418	LA-140	*-1.19E+00	2.49E+00
		CO-60	*-1.13E-01	1.84E+00
		FE-59	*-3.74E+00	4.16E+00
		ZN-65	*-9.62E-01	2.93E+00
		MN-54	* 1.44E-01	1.70E+00
		CO-58	*-2.68E+00	2.25E+00
		NB-95	* 2.00E+00	1.86E+00
		ZR-95	* 8.07E-01	3.27E+00
		CS-137	*-1.90E-01	1.67E+00
		CS-134	* 1.56E-01	1.85E+00
		BA-140	*-5.25E-01	1.40E+01
	850418 TO 850522	LA-140	*-1.03E+00	1.82E+00
		CO-60	* 4.90E-01	1.54E+00
		FE-59	*-5.90E-01	2.67E+00
		ZN-65	* 3.85E+00	2.34E+00
		MN-54	*-1.55E+00	1.78E+00
		CO-58	*-7.57E-01	1.89E+00
		NB-95	* 1.29E+00	1.48E+00
		ZR-95	* 2.60E+00	1.65E+00
		CS-137	*-2.37E-01	1.54E+00
		CS-134	* 1.61E+00	9.74E-01
		BA-140	* 3.60E+00	1.10E+01

* Denotes a result less than the detection limit

TABLE A-3 (cont.)
Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#28	850522 TO 850620	LA-140	*-3.34E+00	3.53E+00
		CO-60	*-1.25E+00	1.67E+00
		FE-59	*-4.34E+00	5.65E+00
		ZN-65	*-2.69E+00	4.29E+00
		MN-54	* 2.58E+00	1.23E+00
		CO-58	*-1.02E+00	2.23E+00
		NB-95	* 6.92E-01	2.24E+00
		ZR-95	* 4.16E+00	3.16E+00
		CS-137	*-3.04E+00	2.25E+00
		CS-134	*-1.56E-01	1.90E+00
		BA-140	*-5.18E+00	2.04E+01
	850620 TO 850717	LA-140	*-1.77E+00	2.53E+00
		CO-60	*-1.21E+00	1.66E+00
		FE-59	* 1.98E+00	3.07E+00
		ZN-65	*-2.48E+00	3.60E+00
		MN-54	* 6.31E-01	9.80E-01
		CO-58	* 1.11E-01	1.39E+00
		NB-95	* 1.83E+00	9.84E-01
		ZR-95	* 2.58E+00	2.19E+00
		CS-137	*-8.45E-01	1.29E+00
		CS-134	*-3.35E+00	1.91E+00
		BA-140	* 2.43E+01	9.83E+00
	850717 TO 850821	LA-140	* 7.45E-01	2.35E+00
		CO-60	* 2.94E-01	1.49E+00
		FE-59	*-1.97E+00	3.61E+00
		ZN-65	* 3.51E-01	3.64E+00
		MN-54	* 1.15E+00	1.19E+00
		CO-58	* 1.89E+00	1.47E+00
		NB-95	*-2.59E-01	1.94E+00
		ZR-95	*-2.60E+00	3.03E+00
		CS-137	*-2.96E-01	1.31E+00
		CS-134	*-7.31E-01	1.83E+00
		BA-140	* 1.93E+01	1.49E+01
	850821 TO 850918	LA-140	* 6.10E-01	8.62E-01
		CO-60	*-4.89E-01	1.27E+00
		FE-59	* 6.02E+00	3.03E+00
		ZN-65	* 2.09E+00	1.71E+00
		MN-54	* 1.34E+00	1.52E+00
		CO-58	* 2.94E-01	1.44E+00
		NB-95	* 9.76E-01	1.72E+00
		ZR-95	* 1.89E+00	2.17E+00
		CS-137	*-5.33E-01	1.69E+00
		CS-134	* 2.04E+00	1.10E+00
		BA-140	* 1.43E+01	1.23E+01

* Denotes a result less than the detection limit .

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#28	850918 TO 851017	LA-140	*-9.78E-01	2.54E+00
		CO-60	* 1.17E+00	9.56E-01
		FE-59	* 1.80E+00	1.47E+00
		ZN-65	* 3.33E+00	2.12E+00
		MN-54	*-8.43E-01	1.34E+00
		CO-58	* 3.82E-01	1.27E+00
		NB-95	* 9.74E-01	1.33E+00
		ZR-95	*-2.15E-01	1.97E+00
		CS-137	*-3.55E-01	1.52E+00
		CS-134	* 1.44E-01	1.38E+00
		BA-140	*-1.85E+00	7.28E+00
	851017 TO 851120	LA-140	*-4.81E+01	2.95E+01
		CO-60	* 1.02E+00	1.89E+00
		FE-59	* 1.12E+00	3.28E+00
		ZN-65	*-4.58E+00	3.71E+00
		MN-54	*-2.26E-01	1.69E+00
		CO-58	*-3.38E-01	1.51E+00
		NB-95	* 2.60E+00	1.91E+00
		ZR-95	* 3.34E+00	2.76E+00
		CS-137	* 1.33E-01	1.78E+00
		CS-134	*-2.37E+00	2.08E+00
		BA-140	* 1.80E+01	9.66E+00
	851120 TO 851218	LA-140	* 1.06E+01	9.53E+00
		CO-60	* 0.00E+00	2.29E+00
		FE-59	*-3.61E-01	3.31E+00
		ZN-65	* 5.75E-01	2.92E+00
		MN-54	*-5.84E-01	1.85E+00
		CO-58	*-9.60E-01	1.52E+00
		NB-95	*-2.20E-01	1.65E+00
		ZR-95	* 1.37E+00	2.03E+00
		CS-137	*-1.99E-01	1.49E+00
		CS-134	*-1.61E+00	1.88E+00
		BA-140	*-9.12E-01	6.82E+00
#29	841219 TO 850123	LA-140	*-1.57E+00	3.52E+00
		CO-60	* 3.40E-01	2.05E+00
		FE-59	*-2.62E+00	4.63E+00
		ZN-65	* 9.71E-01	3.43E+00
		MN-54	*-1.45E-01	1.66E+00
		CO-58	* 1.22E+00	1.61E+00
		NB-95	* 1.11E+00	2.35E+00
		ZR-95	* 3.21E+00	2.98E+00
		CS-137	*-6.33E-02	1.80E+00
		CS-134	* 7.05E-01	1.45E+00
		BA-140	*-1.26E+00	1.94E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#29	850123 TO 850221	LA-140	*-5.97E-01	1.67E+00
		CO-60	*-8.84E-01	7.65E-01
		FE-59	* 1.56E+00	1.62E+00
		ZN-65	*-2.08E+00	1.62E+00
		MN-54	* 1.65E-01	6.45E-01
		CO-58	*-1.13E+00	8.69E-01
		NB-95	* 2.03E-01	1.02E+00
		ZR-95	*-7.94E-01	1.45E+00
		CS-137	*-3.68E-01	6.60E-01
		CS-134	* 6.63E-01	5.89E-01
		BA-140	* 5.44E+00	1.07E+01
	850221 TO 850320	LA-140	*-9.27E+00	7.13E+00
		CO-60	*-1.71E+00	1.55E+00
		FE-59	* 5.60E+00	3.39E+00
		ZN-65	* 1.80E+00	3.88E+00
		MN-54	*-3.18E+00	2.36E+00
		CO-58	* 1.34E+00	1.78E+00
		NB-95	*-2.14E+00	2.91E+00
		ZR-95	*-6.98E+00	4.92E+00
		CS-137	* 1.01E+00	2.21E+00
		CS-134	* 1.66E+00	1.66E+00
		BA-140	* 5.38E+00	3.15E+01
	850320 TO 850418	LA-140	*-9.71E-01	4.39E+00
		CO-60	* 9.78E-02	1.44E+00
		FE-59	*-6.39E+00	4.46E+00
		ZN-65	*-8.69E-01	4.20E+00
		MN-54	* 1.68E+00	1.30E+00
		CO-58	*-6.61E-01	1.57E+00
		NB-95	* 1.14E+00	1.75E+00
		ZR-95	*-2.51E-01	3.30E+00
		CS-137	* 1.60E+00	1.18E+00
		CS-134	*-2.26E+00	1.84E+00
		BA-140	* 4.08E+00	1.04E+01
	850418 TO 850522	LA-140	* 2.02E+00	1.65E+00
		CO-60	*-1.58E+00	1.97E+00
		FE-59	* 2.23E-01	3.28E+00
		ZN-65	*-2.99E+00	4.48E+00
		MN-54	* 4.52E-01	1.51E+00
		CO-58	*-1.69E-01	1.55E+00
		NB-95	* 6.74E-01	2.33E+00
		ZR-95	*-1.31E+00	4.12E+00
		CS-137	* 5.98E-01	1.63E+00
		CS-134	* 9.80E-01	1.73E+00
		BA-140	* 1.03E+01	1.31E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#29	850522 TO 850620	LA-140	* 2.25E+00	1.70E+00
		CO-60	* 3.25E-01	1.53E+00
		FE-59	*-4.16E-01	3.81E+00
		ZN-65	* 1.54E+00	1.55E+00
		MN-54	* 8.76E-01	1.55E+00
		CO-58	*-8.81E-01	1.68E+00
		NB-95	*-7.09E-01	2.24E+00
		ZR-95	* 8.24E-01	2.75E+00
		CS-137	*-6.52E-02	1.34E+00
		CS-134	* 4.78E-01	1.59E+00
		BA-140	* 8.66E+00	6.15E+00
	850620 TO 850717	LA-140	*-1.24E+00	1.55E+00
		CO-60	*-1.70E+00	1.18E+00
		FE-59	* 2.26E+00	1.83E+00
		ZN-65	*-1.72E+00	2.01E+00
		MN-54	*-8.73E-01	9.54E-01
		CO-58	* 3.43E-02	7.95E-01
		NB-95	*-2.40E-01	1.02E+00
		ZR-95	*-1.24E+00	1.58E+00
		CS-137	*-5.27E-02	6.91E-01
		CS-134	* 9.76E-01	5.08E-01
		BA-140	*-6.00E-01	1.12E+01
	850717 TO 850821	LA-140	*-2.22E+00	2.60E+00
		CO-60	*-3.40E-01	2.00E+00
		FE-59	* 6.53E-01	4.13E+00
		ZN-65	*-4.27E+00	4.32E+00
		MN-54	* 1.45E-01	1.81E+00
		CO-58	*-3.25E+00	2.43E+00
		NB-95	* 2.31E+00	2.07E+00
		ZR-95	* 4.31E+00	3.27E+00
		CS-137	*-1.58E+00	2.30E+00
		CS-134	*-7.83E-01	1.80E+00
		BA-140	* 2.24E+01	1.86E+01
	850821 TO 850918	LA-140	*-2.03E+00	3.02E+00
		CO-60	*-1.35E+00	1.81E+00
		FE-59	*-2.97E+00	3.29E+00
		ZN-65	*-5.92E-01	2.43E+00
		MN-54	*-8.97E-01	1.20E+00
		CO-58	*-1.64E-01	1.50E+00
		NB-95	*-1.08E+00	1.97E+00
		ZR-95	*-5.59E-01	2.24E+00
		CS-137	* 4.65E-01	9.39E-01
		CS-134	* 2.12E+00	1.18E+00
		BA-140	* 1.01E+01	9.19E+00

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#29	850918 TO 851016	LA-140	*-2.27E+00	3.99E+00
		CO-60	* 6.73E-01	7.78E-01
		FE-59	* 6.57E+00	3.04E+00
		ZN-65	* 2.85E+00	3.45E+00
		MN-54	* 2.40E+00	1.53E+00
		CO-58	* 1.36E+00	1.30E+00
		NB-95	* 6.23E-01	1.70E+00
		ZR-95	*-1.94E+00	2.91E+00
		CS-137	* 2.65E+00	1.20E+00
		CS-134	*-1.45E+00	2.43E+00
	851016 TO 851120	BA-140	* 3.12E+00	7.36E+00
		LA-140	*-1.57E+01	1.67E+01
		CO-60	* 9.79E-02	1.44E+00
		FE-59	*-7.86E-01	3.85E+00
		ZN-65	*-4.56E+00	4.38E+00
		MN-54	* 2.02E-01	1.58E+00
		CO-58	* 1.29E+00	1.34E+00
		NB-95	* 6.88E-01	1.76E+00
		ZR-95	* 3.37E+00	1.88E+00
		CS-137	* 6.52E-01	1.47E+00
	851120 TO 851218	CS-134	* 1.75E+00	1.71E+00
		BA-140	* 0.00E+00	1.44E+01
		LA-140	* 1.35E+01	1.03E+01
		CO-60	* 2.92E-01	1.48E+00
		FE-59	* 2.87E+00	1.92E+00
		ZN-65	* 2.36E+00	1.79E+00
		MN-54	*-7.19E-01	1.37E+00
		CO-58	* 7.28E-01	1.08E+00
		NB-95	*-3.28E+00	2.10E+00
		ZR-95	* 3.36E-01	1.58E+00
	850320 TO 850320	CS-137	*-6.52E-01	1.24E+00
		CS-134	* 1.44E-01	1.38E+00
		BA-140	*-2.85E-01	6.50E+00
		LA-140	*-1.05E+00	4.75E+00
		CO-60	* 3.25E-01	1.53E+00
		FE-59	* 1.45E+00	3.16E+00
		ZN-65	*-2.12E+00	4.05E+00
		MN-54	* 7.30E-01	1.52E+00
		CO-58	* 1.92E+00	1.12E+00
		NB-95	* 7.96E-01	1.39E+00
#31	850320 TO 850320	ZR-95	* 4.12E-01	2.93E+00
		CS-137	*-3.26E-01	1.70E+00
		CS-134	* 1.59E-01	1.53E+00
		BA-140	* 9.16E+00	1.29E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#31	850624 TO 850624	LA-140	*-2.00E+00	2.83E+00
		CO-60	*-3.67E-01	3.59E-01
		FE-59	* 1.82E+00	4.83E-01
		ZN-65	*-2.24E-01	6.37E-01
		MN-54	* 7.49E-01	2.46E-01
		CO-58	*-5.16E-01	3.04E-01
		NB-95	*-2.34E-01	3.06E-01
		ZR-95	* 5.19E-01	4.34E-01
		CS-137	* 2.53E-02	2.87E-01
		CS-134	* 1.31E-01	3.08E-01
		BA-140	*-8.79E-01	1.45E+00
	850918 TO 850918	LA-140	* 1.66E+00	1.67E+00
		CO-60	*-9.73E-02	1.38E+00
		FE-59	*-4.51E+00	3.67E+00
		ZN-65	* 2.17E+00	2.95E+00
		MN-54	*-8.43E-01	1.34E+00
		CO-58	* 4.46E-01	9.72E-01
		NB-95	* 6.10E-02	8.28E-01
		ZR-95	* 9.68E-01	1.70E+00
		CS-137	* 2.96E-01	1.41E+00
		CS-134	* 1.58E+00	9.59E-01
		BA-140	* 6.99E-01	5.47E+00
	851218 TO 851218	LA-140	*-8.22E+00	1.07E+01
		CO-60	* 4.87E-01	1.53E+00
		FE-59	*-1.59E-01	2.25E+00
		ZN-65	*-1.35E+00	3.16E+00
		MN-54	*-1.64E+00	1.71E+00
		CO-58	* 1.85E+00	9.95E-01
		NB-95	* 6.55E-01	1.36E+00
		ZR-95	* 7.83E-01	1.70E+00
		CS-137	*-1.78E-01	1.33E+00
		CS-134	* 1.23E+00	1.28E+00
		BA-140	*-7.36E+00	8.25E+00
#32	850320 TO 850320	LA-140	*-6.71E+00	6.82E+00
		CO-60	*-5.87E-01	1.88E+00
		FE-59	* 5.62E-01	2.85E+00
		ZN-65	*-3.65E+00	3.71E+00
		MN-54	*-1.54E+00	1.77E+00
		CO-58	*-8.07E-01	1.54E+00
		NB-95	* 1.54E+00	1.47E+00
		ZR-95	* 2.63E+00	2.33E+00
		CS-137	* 9.48E-01	1.30E+00
		CS-134	* 7.29E-01	1.52E+00
		BA-140	* 1.01E+00	1.35E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#32	850624 TO 850624	LA-140	*-4.35E-01	2.05E+00
		CO-60	* 7.86E-02	2.63E-01
		FE-59	* 3.60E-02	4.80E-01
		ZN-65	*-1.72E-01	4.95E-01
		MN-54	*-1.61E-01	2.56E-01
		CO-58	*-1.51E-01	2.45E-01
		NB-95	*-3.54E-01	2.85E-01
		ZR-95	*-1.31E-01	4.22E-01
		CS-137	* 2.59E-01	2.32E-01
		CS-134	*-1.73E-01	2.78E-01
		BA-140	* 7.51E-01	1.12E+00
	850918 TO 850918	LA-140	*-1.50E+00	2.65E+00
		CO-60	* 1.75E+00	1.17E+00
		FE-59	* 7.53E-01	2.37E+00
		ZN-65	* 1.67E-01	2.45E+00
		MN-54	*-1.23E+00	1.75E+00
		CO-58	* 8.94E-01	1.38E+00
		NB-95	* 8.56E-01	1.32E+00
		ZR-95	* 7.54E-01	2.60E+00
		CS-137	* 1.60E+00	1.18E+00
		CS-134	* 7.91E-01	1.17E+00
		BA-140	* 3.74E+00	5.13E+00
	851218 TO 851218	LA-140	*-3.00E+00	1.35E+01
		CO-60	*-1.08E-01	1.40E+00
		FE-59	*-1.41E+00	2.99E+00
		ZN-65	* 3.37E+00	2.25E+00
		MN-54	* 7.84E-01	1.16E+00
		CO-58	* 1.87E+00	1.05E+00
		NB-95	* 7.88E-01	1.17E+00
		ZR-95	*-1.22E-01	2.79E+00
		CS-137	* 1.24E+00	1.18E+00
		CS-134	* 1.50E+00	1.43E+00
		BA-140	*-5.14E+00	7.31E+00
#52	850320 TO 850320	LA-140	*-1.07E+00	5.97E+00
		CO-60	* 5.66E-01	2.10E+00
		FE-59	* 2.67E+00	4.15E+00
		ZN-65	* 3.84E-01	4.80E+00
		MN-54	* 1.72E+00	9.93E-01
		CO-58	*-1.02E+00	2.09E+00
		NB-95	* 5.14E-01	2.09E+00
		ZR-95	* 0.00E+00	3.11E+00
		CS-137	*-3.10E+00	2.47E+00
		CS-134	*-1.87E+00	2.34E+00
		BA-140	*-1.01E+00	1.65E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#52	850621 TO 850621	LA-140	* 2.02E+00	5.33E+00
		CO-60	* 1.07E-01	2.32E-01
		FE-59	* 2.16E-01	4.00E-01
		ZN-65	*-6.11E-01	4.89E-01
		MN-54	*-1.65E-02	2.17E-01
		CO-58	* 3.19E-01	2.04E-01
		NB-95	*-2.73E-01	2.41E-01
		ZR-95	*-5.76E-03	3.66E-01
		CS-137	* 3.55E-02	2.17E-01
		CS-134	*-2.89E-02	2.43E-01
		BA-140	*-6.42E-01	1.29E+00
	850918 TO 850918	LA-140	*-2.06E+00	3.63E+00
		CO-60	*-1.72E+00	1.61E+00
		FE-59	* 8.42E-01	2.47E+00
		ZN-65	* 1.86E-01	2.52E+00
		MN-54	* 1.42E+00	9.00E-01
		CO-58	* 2.10E-01	9.91E-01
		NB-95	*-2.37E+00	2.09E+00
		ZR-95	* 9.48E-01	2.42E+00
		CS-137	*-5.87E-01	1.66E+00
		CS-134	* 1.73E+00	1.05E+00
		BA-140	* 4.89E+00	4.44E+00
	851218 TO 851218	LA-140	*-7.66E+00	1.35E+01
		CO-60	*-1.12E-01	1.59E+00
		FE-59	* 3.62E-01	3.47E+00
		ZN-65	*-1.34E+00	2.37E+00
		MN-54	* 7.31E-02	1.69E+00
		CO-58	* 1.33E+00	8.90E-01
		NB-95	* 1.76E+00	1.72E+00
		ZR-95	* 1.13E+00	1.97E+00
		CS-137	* 1.79E+00	1.32E+00
		CS-134	* 6.45E-01	1.65E+00
		BA-140	*-1.68E+01	1.04E+01
#72	850717 TO 850821	LA-140	*-1.96E+00	2.92E+00
		CO-60	* 1.52E+00	1.15E+00
		FE-59	*-1.31E+00	3.81E+00
		ZN-65	* 7.79E-01	3.82E+00
		MN-54	*-1.32E+00	1.74E+00
		CO-58	* 1.49E+00	9.93E-01
		NB-95	* 3.78E+00	1.69E+00
		ZR-95	*-1.42E+00	3.55E+00
		CS-137	* 3.26E-01	1.42E+00
		CS-134	* 2.40E-01	1.88E+00
		BA-140	*-6.46E-01	1.72E+01

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#72	850821 TO 850918	LA-140	*-1.18E+00	3.05E+00
		CO-60	* 9.69E-01	1.80E+00
		FE-59	*-6.68E-01	2.99E+00
		ZN-65	* 1.30E+00	2.82E+00
		MN-54	*-9.20E-01	1.46E+00
		CO-58	* 9.06E-01	1.75E+00
		NB-95	* 6.02E-01	1.05E+00
		ZR-95	*-3.54E-01	2.65E+00
		CS-137	*-1.69E+00	1.90E+00
		CS-134	* 0.00E+00	1.47E+00
		BA-140	*-2.50E-01	6.67E+00
	850918 TO 851016	LA-140	* 1.74E+00	2.01E+00
		CO-60	*-2.43E+00	2.01E+00
		FE-59	*-5.18E+00	3.62E+00
		ZN-65	*-2.17E+00	3.81E+00
		MN-54	* 3.25E-01	9.55E-01
		CO-58	* 1.80E+00	9.68E-01
		NB-95	* 6.82E-01	1.01E+00
		ZR-95	* 1.63E+00	1.87E+00
		CS-137	* 3.55E-01	1.62E+00
		CS-134	* 4.32E-01	1.44E+00
		BA-140	* 9.25E+00	4.28E+00
	851016 TO 851120	LA-140	* 8.61E+00	8.62E+00
		CO-60	*-3.25E-01	1.34E+00
		FE-59	* 3.49E+00	2.48E+00
		ZN-65	*-1.75E+00	4.16E+00
		MN-54	*-8.83E-01	1.81E+00
		CO-58	* 8.27E-01	1.72E+00
		NB-95	*-9.43E-01	2.10E+00
		ZR-95	* 1.56E+00	2.17E+00
		CS-137	* 1.37E+00	1.16E+00
		CS-134	* 9.58E-01	1.69E+00
		BA-140	* 9.00E+00	1.29E+01
	851120 TO 851218	LA-140	* 6.18E+00	7.15E+00
		CO-60	*-1.08E+00	1.78E+00
		FE-59	* 1.24E+00	2.69E+00
		ZN-65	* 1.87E+00	1.68E+00
		MN-54	*-9.27E-01	1.47E+00
		CO-58	* 1.30E+00	8.70E-01
		NB-95	* 9.33E-01	1.20E+00
		ZR-95	* 1.22E-01	2.83E+00
		CS-137	*-9.13E-01	1.59E+00
		CS-134	*-1.03E+00	1.62E+00
		BA-140	*-7.59E+00	8.64E+00

* Denotes a result less than the detection limit

TABLE A-8 (cont.)

Results in pCi/l

LOCATION COLLECTION PERIOD RESULT OVERALL ERROR

AVERAGE RESULT (WITHOUT CONTROL) = 1.90E-01 (LOW = -4.81E+01, HIGH = 2.43E+01)
0 POSITIVE RESULTS FOUND IN 583 SAMPLES

AVERAGE RESULT FOR CONTROL = -9.73E-02 (LOW = -2.91E+01, HIGH = 3.58E+01)
1 POSITIVE RESULTS FOUND IN 121 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE		AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
LA-140		-1.79E+00	-4.81E+01	1.35E+01	53	0
LA-140	(CONTROL)	-1.81E+00	-1.72E+01	3.38E+00	11	0
CO-60		-3.55E-02	-2.43E+00	1.75E+00	53	0
CO-60	(CONTROL)	6.11E-01	-1.52E+00	2.38E+00	11	0
FE-59		5.88E-01	-6.39E+00	6.57E+00	53	0
FE-59	(CONTROL)	2.28E+00	-2.38E+00	6.52E+00	11	0
ZN-65		-3.46E-02	-4.58E+00	3.85E+00	53	0
ZN-65	(CONTROL)	9.70E-01	-3.01E+00	4.27E+00	11	0
MN-54		7.16E-02	-3.18E+00	2.58E+00	53	0
MN-54	(CONTROL)	-2.40E-01	-1.96E+00	1.27E+00	11	0
CO-58		1.69E-01	-3.25E+00	1.92E+00	53	0
CO-58	(CONTROL)	-4.76E-01	-3.97E+00	1.67E+00	11	0
NB-95		1.16E-01	-3.28E+00	3.78E+00	53	0
NB-95	(CONTROL)	-3.70E-01	-2.73E+00	1.82E+00	11	0
ZR-95		1.77E-01	-6.98E+00	4.31E+00	53	0
ZR-95	(CONTROL)	7.95E-02	-2.01E+00	2.92E+00	11	0
CS-137		1.26E-01	-3.10E+00	2.65E+00	53	0
CS-137	(CONTROL)	4.47E-01	-1.78E+00	2.60E+00	11	0
CS-134		1.68E-01	-3.35E+00	2.21E+00	53	0
CS-134	(CONTROL)	-5.24E-01	-2.32E+00	1.47E+00	11	0
BA-140		2.54E+00	-2.29E+01	2.43E+01	53	0
BA-140	(CONTROL)	-2.03E+00	-2.91E+01	3.58E+01	11	1

* Denotes a result less than the detection limit

TABLE A-9
GAMMA SPECTROMETRY OF SOIL
Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#1	850528 TO 850528	CS-137	1.72E+02	2.42E+01
		CS-134	* 3.84E+01	1.65E+01
		TH-228DA	7.76E+02	6.14E+01
		RA-224DA	7.76E+02	6.14E+01
		RA226DA	5.80E+02	5.83E+01
		AC-228	7.02E+02	9.98E+01
		TL-208	2.52E+02	2.99E+01
		BI-212	* 4.01E+02	1.22E+02
		BI-214	5.42E+02	5.74E+01
		PB-212	7.69E+02	6.09E+01
		PB-214	5.80E+02	5.83E+01
		TH-232DA	7.69E+02	6.09E+01
#21	850528 TO 850528	CS-137	* 9.41E+00	1.16E+01
		CS-134	* 4.35E+01	1.31E+01
		TH-228DA	5.43E+02	4.76E+01
		RA-224DA	5.43E+02	4.76E+01
		RA226DA	4.07E+02	4.82E+01
		AC-228	4.81E+02	7.36E+01
		TL-208	1.56E+02	2.15E+01
		BI-212	* 2.08E+02	1.15E+02
		BI-214	3.84E+02	4.54E+01
		PB-212	5.38E+02	4.72E+01
		PB-214	4.07E+02	4.82E+01
		TH-232DA	5.38E+02	4.72E+01
#23	850528 TO 850528	CS-137	5.86E+02	5.38E+01
		CS-134	* 3.55E+01	1.76E+01
		TH-228DA	7.99E+02	6.58E+01
		RA-224DA	7.99E+02	6.58E+01
		RA226DA	5.88E+02	6.63E+01
		AC-228	7.61E+02	1.06E+02
		TL-208	2.23E+02	2.90E+01
		BI-212	* 4.52E+02	1.37E+02
		BI-214	4.96E+02	5.94E+01
		PB-212	7.93E+02	6.53E+01
		PB-214	5.88E+02	6.63E+01
		TH-232DA	7.93E+02	6.53E+01
#7	850528 TO 850528	CS-137	5.11E+02	4.63E+01
		CS-134	* 1.92E+01	1.62E+01
		TH-228DA	7.21E+02	5.81E+01
		RA-224DA	7.21E+02	5.81E+01
		RA226DA	4.79E+02	5.21E+01
		AC-228	6.87E+02	9.27E+01
		TL-208	1.98E+02	2.59E+01
		BI-212	* 4.45E+02	1.30E+02

* Denotes a result less than the detection limit

TABLE A-9 (cont.)

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#7	850528 TO 850528	BI-214	3.76E+02	4.84E+01
		PB-212	7.15E+02	5.76E+01
		PB-214	4.79E+02	5.21E+01
		TH-232DA	7.15E+02	5.76E+01
#9	850528 TO 850528	CS-137	* 4.87E+00	2.27E+01
		CS-134	* 2.14E+01	2.59E+01
		TH-228DA	6.31E+02	7.38E+01
		RA-224DA	6.31E+02	7.38E+01
		RA226DA	5.50E+02	7.04E+01
		AC-228	7.72E+02	1.31E+02
		TL-208	2.36E+02	3.52E+01
		BI-212	* 4.65E+02	1.90E+02
		BI-214	5.49E+02	7.30E+01
		PB-212	8.87E+02	8.61E+01
		PB-214	5.50E+02	7.04E+01
		TH-232DA	8.87E+02	8.61E+01

AVERAGE RESULT (WITHOUT CONTROL) = 4.92E+02 (LOW = 9.41E+00, HIGH = 7.99E+02)
 39 POSITIVE RESULTS FOUND IN 48 SAMPLES

AVERAGE RESULT FOR CONTROL = 5.15E+02 (LOW = 4.87E+00, HIGH = 8.87E+02)
 9 POSITIVE RESULTS FOUND IN 12 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	3.20E+02	9.41E+00	5.86E+02	4	3
CS-137 (CONTROL)	4.87E+00	4.87E+00	4.87E+00	1	0
CS-134	3.42E+01	1.92E+01	4.35E+01	4	0
CS-134 (CONTROL)	2.14E+01	2.14E+01	2.14E+01	1	0
TH-228D	7.10E+02	5.43E+02	7.99E+02	4	4
TH-228D (CONTROL)	6.31E+02	6.31E+02	6.31E+02	1	1
RA-224D	7.10E+02	5.43E+02	7.99E+02	4	4
RA-224D (CONTROL)	6.31E+02	6.31E+02	6.31E+02	1	1
RA226DA	5.14E+02	4.07E+02	5.88E+02	4	4
RA226DA (CONTROL)	5.50E+02	5.50E+02	5.50E+02	1	1
AC-228	6.58E+02	4.81E+02	7.61E+02	4	4
AC-228 (CONTROL)	7.72E+02	7.72E+02	7.72E+02	1	1
TL-208	2.07E+02	1.56E+02	2.52E+02	4	4
TL-208 (CONTROL)	2.36E+02	2.36E+02	2.36E+02	1	1

* Denotes a result less than the detection limit

TABLE A-9 (cont.)

--- SUMMARY OF RADIONUCLIDES (CONTINUED) ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
BI-212	3.77E+02	2.08E+02	4.52E+02	4	0
BI-212 (CONTROL)	4.65E+02	4.65E+02	4.65E+02	1	0
BI-214	4.50E+02	3.76E+02	5.42E+02	4	4
BI-214 (CONTROL)	5.49E+02	5.49E+02	5.49E+02	1	1
PB-212	7.04E+02	5.38E+02	7.93E+02	4	4
PB-212 (CONTROL)	8.87E+02	8.87E+02	8.87E+02	1	1
PB-214	5.14E+02	4.07E+02	5.88E+02	4	4
PB-214 (CONTROL)	5.50E+02	5.50E+02	5.50E+02	1	1
TH-232D	7.04E+02	5.38E+02	7.93E+02	4	4
TH-232D (CONTROL)	8.87E+02	8.87E+02	8.87E+02	1	1

* Denotes a result less than the detection limit

TABLE A-10
GAMMA SPECTROMETRY OF SEDIMENT BOTTOM

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#33	850416 TO 850416	CO-60	* 3.31E+01	1.79E+01
		CS-137	1.15E+02	2.61E+01
		CS-134	* 6.40E+01	2.15E+01
		RA-224DA	1.25E+03	5.21E+01
		RA226DA	8.29E+02	6.07E+01
	851010 TO 851010	CO-60	* 9.12E+00	1.82E+01
		CS-137	* 8.43E+01	2.02E+01
		CS-134	* 4.44E+01	1.80E+01
		RA-224DA	8.56E+02	6.76E+01
		RA226DA	5.78E+02	5.90E+01
#34	850416 TO 850416	CO-60	* 7.36E+01	1.98E+01
		CS-137	2.96E+02	3.29E+01
		CS-134	* 3.60E+01	1.86E+01
		RA-224DA	9.67E+02	4.49E+01
		RA226DA	6.95E+02	5.06E+01
	851010 TO 851010	CO-60	* 9.36E+01	2.04E+01
		CS-137	1.89E+03	1.30E+02
		CS-134	* 4.76E+01	1.69E+01
		RA-224DA	6.82E+02	5.86E+01
		RA226DA	5.74E+02	5.98E+01

AVERAGE RESULT (WITHOUT CONTROL) = 5.35E+02 (LOW = 3.60E+01, HIGH = 1.89E+03)
6 POSITIVE RESULTS FOUND IN 10 SAMPLES

AVERAGE RESULT FOR CONTROL = 3.86E+02 (LOW = 9.12E+00, HIGH = 1.25E+03)
5 POSITIVE RESULTS FOUND IN 10 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CO-60	8.36E+01	7.36E+01	9.36E+01	2	0
CO-60 (CONTROL)	2.11E+01	9.12E+00	3.31E+01	2	0
CS-137	1.09E+03	2.96E+02	1.89E+03	2	2
CS-137 (CONTROL)	9.97E+01	8.43E+01	1.15E+02	2	1
CS-134	4.18E+01	3.60E+01	4.76E+01	2	0
CS-134 (CONTROL)	5.42E+01	4.44E+01	6.40E+01	2	0
RA-224D	8.25E+02	6.82E+02	9.67E+02	2	2
RA-224D (CONTROL)	1.05E+03	8.56E+02	1.25E+03	2	2
RA226DA	6.35E+02	5.74E+02	6.95E+02	2	2
RA226DA (CONTROL)	7.04E+02	5.78E+02	8.29E+02	2	2

* Denotes a result less than the detection limit

TABLE A-11
GAMMA SPECTROMETRY OF FISH

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#30	850424 TO 850424	CO-60	*-2.33E+00	1.14E+01
		FE-59	*-1.83E+01	2.61E+01
		ZN-65	*-2.89E+01	3.15E+01
		MN-54	*-3.10E+00	9.80E+00
		CO-58	* 4.39E+00	9.91E+00
		CS-137	* 2.50E+00	7.89E+00
		CS-134	* 5.57E+00	1.08E+01
		CO-60	*-5.23E-01	7.40E+00
		FE-59	* 4.38E+00	2.26E+01
		ZN-65	*-2.35E+01	2.26E+01
		MN-54	* 6.37E+00	7.89E+00
		CO-58	*-1.68E+01	1.18E+01
		CS-137	* 9.19E+00	1.00E+01
		CS-134	* 3.53E+00	9.60E+00
		CO-60	*-1.65E+01	1.24E+01
		FE-59	*-1.74E+00	2.28E+01
		ZN-65	* 1.17E+01	2.26E+01
		MN-54	* 4.54E+00	8.78E+00
		CO-58	*-1.22E+01	1.01E+01
		CS-137	* 1.55E+01	8.42E+00
		CS-134	*-4.25E+00	1.09E+01
		CO-60	*-1.34E+01	1.95E+01
		FE-59	* 1.15E+01	3.01E+01
		ZN-65	*-2.49E+01	3.24E+01
		MN-54	* 2.32E+00	1.35E+01
		CO-58	* 1.15E+01	1.30E+01
		CS-137	*-3.02E+00	1.56E+01
		CS-134	* 1.33E+01	1.41E+01
	850916 TO 850916	CO-60	* 1.91E+01	9.90E+00
		FE-59	*-1.99E+01	2.90E+01
		ZN-65	* 5.48E+00	2.83E+01
		MN-54	*-5.53E+00	1.19E+01
		CO-58	* 2.24E+00	1.07E+01
		CS-137	* 1.09E+01	9.38E+00
		CS-134	* 4.69E+00	9.75E+00
	850920 TO 850920	CO-60	*-4.31E+00	1.49E+01
		FE-59	*-3.42E+01	2.67E+01
		ZN-65	* 4.62E+00	2.20E+01
		MN-54	*-2.54E+00	1.04E+01
		CO-58	* 1.48E+00	7.23E+00
		CS-137	* 1.05E+01	1.14E+01
		CS-134	*-1.21E+00	9.03E+00

* Denotes a result less than the detection limit

TABLE A-11 (cont.)

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#30	850916 TO 850916	CO-60	*-5.26E-01	1.31E+01
		FE-59	* 1.10E+01	2.58E+01
		ZN-65	* 1.10E+01	2.60E+01
		MN-54	* 3.21E+00	8.75E+00
		CO-58	*-6.35E+00	1.02E+01
		CS-137	* 3.07E+01	1.12E+01
		CS-134	* 8.67E+00	9.07E+00
	850920 TO 850920	CO-60	* 1.15E+01	7.00E+00
		FE-59	*-1.56E+01	2.27E+01
		ZN-65	*-7.23E+00	3.11E+01
		MN-54	* 3.19E+00	1.09E+01
		CO-58	*-9.06E+00	1.17E+01
		CS-137	* 1.48E+01	9.85E+00
		CS-134	* 6.67E+00	6.95E+00
	850426 TO 850426	CO-60	* 6.98E+00	9.49E+00
		FE-59	*-1.66E+01	2.60E+01
		ZN-65	* 9.22E-01	2.32E+01
		MN-54	* 7.96E+00	4.82E+00
		CO-58	*-8.45E+00	9.71E+00
		CS-137	* 3.71E+00	1.05E+01
		CS-134	* 7.62E+00	1.05E+01
		CO-60	*-5.67E+00	1.04E+01
		FE-59	*-2.78E+00	2.08E+01
		ZN-65	*-1.37E+01	2.39E+01
		MN-54	*-9.54E+00	9.97E+00
		CO-58	* 4.65E+00	8.21E+00
		CS-137	* 1.28E+01	1.21E+01
		CS-134	*-5.93E+00	1.03E+01
		CO-60	*-4.26E+00	1.45E+01
		FE-59	* 9.81E+00	2.04E+01
		ZN-65	* 1.04E+00	2.40E+01
		MN-54	*-9.29E+00	1.31E+01
		CO-58	*-8.20E-01	1.08E+01
		CS-137	* 1.05E+01	1.06E+01
		CS-134	* 2.69E+00	8.96E+00
		CO-60	* 2.07E+01	1.86E+01
		FE-59	* 2.01E+01	6.71E+01
		ZN-65	* 5.66E+01	4.02E+01
		MN-54	*-2.27E+01	3.40E+01
		CO-58	* 2.46E+01	2.56E+01
		CS-137	* 0.00E+00	3.96E+01
		CS-134	* 3.32E+01	2.94E+01

* Denotes a result less than the detection limit

TABLE A-11 (cont.)

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#38	850917 TO 850917	CO-60	* 9.72E+00	6.51E+00
		FE-59	* 2.34E+01	1.82E+01
		ZN-65	* 7.54E+00	2.61E+01
		MN-54	*-8.79E+00	1.08E+01
		CO-58	* 4.98E+00	9.62E+00
		CS-137	*-4.72E+00	1.23E+01
		CS-134	* 1.21E+01	6.30E+00
		CO-60	* 9.27E+00	1.01E+01
		FE-59	*-6.01E+01	3.21E+01
		ZN-65	* 4.35E+01	1.83E+01
		MN-54	*-9.25E+00	1.19E+01
		CO-58	* 0.00E+00	7.26E+00
		CS-137	* 1.74E+01	1.23E+01
		CS-134	* 6.54E+00	8.96E+00
	850919 TO 850919	CO-60	*-6.53E+00	1.15E+01
		FE-59	*-5.98E+00	1.86E+01
		ZN-65	*-8.74E-01	2.58E+01
		MN-54	*-6.46E+00	9.18E+00
		CO-58	* 5.63E+00	7.72E+00
		CS-137	* 1.26E+00	1.04E+01
		CS-134	* 6.76E+00	4.53E+00
		CO-60	* 1.23E+01	7.79E+00
		FE-59	*-6.20E+00	2.64E+01
		ZN-65	*-2.77E+01	3.11E+01
		MN-54	* 8.29E+00	9.39E+00
		CO-58	*-8.54E+00	9.98E+00
		CS-137	* 1.30E+01	9.10E+00
		CS-134	* 1.24E+01	9.10E+00
		CO-60	*-4.61E+00	1.08E+01
		FE-59	* 4.80E+00	2.29E+01
		ZN-65	* 2.90E+01	2.03E+01
		MN-54	*-2.72E+00	1.12E+01
		CO-58	*-5.98E+00	1.10E+01
		CS-137	* 1.84E+01	8.78E+00
		CS-134	* 1.72E+00	1.17E+01

AVERAGE RESULT (WITHOUT CONTROL) = -1.76E-01 (LOW = -3.42E+01, HIGH = 3.07E+01)
 0 POSITIVE RESULTS FOUND IN 56 SAMPLES

AVERAGE RESULT FOR CONTROL = 3.39E+00 (LOW = -6.01E+01, HIGH = 5.66E+01)
 0 POSITIVE RESULTS FOUND IN 63 SAMPLES

* Denotes a result less than the detection limit

TABLE A-11 (cont.)

Results in pCi/kg

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
----------	-------------------	--------	---------------

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE		AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CO-60		-8.74E-01	-1.65E+01	1.91E+01	8	0
CO-60	(CONTROL)	4.21E+00	-6.53E+00	2.07E+01	9	0
FE-59		-7.86E+00	-3.42E+01	1.15E+01	8	0
FE-59	(CONTROL)	-3.73E+00	-6.01E+01	2.34E+01	9	0
ZN-65		-6.47E+00	-2.89E+01	1.17E+01	8	0
ZN-65	(CONTROL)	1.07E+01	-2.77E+01	5.66E+01	9	0
MN-54		1.06E+00	-5.53E+00	6.37E+00	8	0
MN-54	(CONTROL)	-5.83E+00	-2.27E+01	8.29E+00	9	0
CO-58		-3.10E+00	-1.68E+01	1.15E+01	8	0
CO-58	(CONTROL)	1.79E+00	-8.54E+00	2.46E+01	9	0
CS-137		1.14E+01	-3.02E+00	3.07E+01	8	0
CS-137	(CONTROL)	8.04E+00	-4.72E+00	1.84E+01	9	0
CS-134		4.62E+00	-4.25E+00	1.33E+01	8	0
CS-134	(CONTROL)	8.57E+00	-5.93E+00	3.32E+01	9	0

* Denotes a result less than the detection limit

TABLE A-12
IODINE-131 IN RAW MILK

Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#35	850115 TO 850115	*-1.45E-01	1.37E-01
	850213 TO 850213	*-1.52E-01	1.48E-01
	850312 TO 850312	* 1.78E-01	1.30E-01
	850410 TO 850410	*-1.84E-01	1.96E-01
	850423 TO 850423	* 3.43E-01	1.64E-01
	850508 TO 850508	* 3.18E-02	1.22E-01
	850521 TO 850521	*-1.64E-02	1.38E-01
	850606 TO 850606	* 3.06E-01	1.63E-01
	850619 TO 850619	*-1.06E-01	1.37E-01
	850702 TO 850702	* 1.58E-01	1.21E-01
	850723 TO 850723	*-1.51E-01	1.02E-01
	850806 TO 850806	*-1.95E-01	1.66E-01
	850820 TO 850820	* 2.27E-02	1.01E-01
	850904 TO 850904	* 0.00E+00	1.27E-01
	850917 TO 850917	* 6.22E-03	1.07E-01
	851015 TO 851015	* 6.77E-02	7.50E-02
#36	851119 TO 851119	*-3.97E-02	1.40E-01
	851217 TO 851217	* 3.06E-02	1.38E-01
	850115 TO 850115	* 6.18E-02	1.38E-01
	850213 TO 850213	*-1.84E-01	1.41E-01
	850312 TO 850312	* 1.98E-01	1.30E-01
	850410 TO 850410	*-8.97E-02	1.99E-01
	850423 TO 850423	*-5.47E-02	1.32E-01
	850508 TO 850508	* 1.35E-01	1.52E-01
	850521 TO 850521	* 5.20E-01	1.80E-01
	850606 TO 850606	* 3.50E-01	2.30E-01
	850619 TO 850619	* 6.80E-02	1.40E-01
	850702 TO 850702	*-1.13E-01	2.59E-01
	850723 TO 850723	* 1.58E-01	1.49E-01
	850806 TO 850806	* 2.29E-02	1.72E-01
	850820 TO 850820	* 3.15E-02	1.07E-01
	850904 TO 850904	* 1.04E-01	1.46E-01
#37	850917 TO 850917	* 6.94E-02	1.01E-01
	851015 TO 851015	* 2.56E-02	7.58E-02
	851119 TO 851119	* 1.55E-01	1.44E-01
	851217 TO 851217	*-1.04E-01	1.52E-01
	850806 TO 850806	*-1.17E-01	1.53E-01
	850820 TO 850820	*-3.30E-02	1.23E-01
#40	850904 TO 850904	* 1.94E-01	1.56E-01
	850917 TO 850917	* 2.94E-02	4.96E-02
	851015 TO 851015	* 6.10E-02	6.90E-02
	851119 TO 851119	*-3.45E-02	1.36E-01
	851217 TO 851217	*-1.74E-01	2.30E-01

* Denotes a result less than the detection limit 1.00E+00

TABLE A-12 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	OVERALL ERROR
#40	850213 TO 850213	*-2.11E-01	1.52E-01
	850312 TO 850312	* 7.33E-02	1.28E-01
	850410 TO 850410	*-3.40E-02	1.82E-01
	850423 TO 850423	* 6.46E-02	1.40E-01
	850508 TO 850508	* 1.16E-01	1.54E-01
	850521 TO 850521	* 5.98E-01	2.18E-01
	850606 TO 850606	* 1.03E-01	1.76E-01
	850619 TO 850619	* 1.75E-01	1.32E-01
	850702 TO 850702	*-1.65E-01	1.58E-01
	850723 TO 850723	* 1.71E-01	1.47E-01
	850806 TO 850806	*-1.55E-02	1.80E-01
	850820 TO 850820	* 1.19E-01	1.14E-01
	850904 TO 850904	* 1.32E-01	1.01E-01
	850917 TO 850917	* 2.83E-02	1.07E-01
	851015 TO 851015	* 3.23E-02	7.50E-02
	851119 TO 851119	*-1.35E-01	1.19E-01
	851217 TO 851217	*-3.92E-01	2.51E-01
#9	850115 TO 850115	*-2.21E-01	1.72E-01
	850213 TO 850213	*-1.33E-01	1.55E-01
	850312 TO 850312	*-1.26E-01	1.64E-01
	850410 TO 850410	*-2.22E-02	2.43E-01
	850423 TO 850423	*-2.53E-02	1.66E-01
	850508 TO 850508	* 4.04E-01	1.65E-01
	850521 TO 850521	* 4.87E-01	1.95E-01
	850606 TO 850606	* 1.97E-02	1.77E-01
	850619 TO 850619	* 1.40E-01	1.90E-01
	850702 TO 850702	* 1.72E-01	1.36E-01
	850723 TO 850723	* 8.89E-02	1.36E-01
	850806 TO 850806	* 1.87E-01	3.07E-01
	850820 TO 850820	* 6.35E-02	9.44E-02
	850904 TO 850904	* 6.29E-02	1.04E-01
	850917 TO 850917	*-5.11E-01	1.53E-01
	851015 TO 851015	* 3.19E-02	7.72E-02
	851119 TO 851119	*-7.21E-02	1.34E-01
	851217 TO 851217	* 5.01E-02	1.97E-01

AVERAGE RESULT (WITHOUT CONTROL) = 3.36E-02 (LOW = -3.92E-01, HIGH = 5.98E-01)
 0 POSITIVE RESULTS FOUND IN 61 SAMPLES

AVERAGE RESULT FOR CONTROL = 3.31E-02 (LOW = -5.11E-01, HIGH = 4.87E-01)
 0 POSITIVE RESULTS FOUND IN 18 SAMPLES

* Denotes a result less than the detection limit 1.00E+00

TABLE A-13
GAMMA SPECTROMETRY OF RAW MILK

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#35	850115 TO 850115	LA-140	*-4.70E+00	6.96E+00
		CS-137	* 7.59E-02	3.03E+00
		CS-134	* 2.75E+00	3.04E+00
		BA-140	* 1.04E+00	1.23E+01
	850213 TO 850213	LA-140	*-3.65E+00	6.16E+00
		CS-137	*-3.06E+00	4.48E+00
		CS-134	*-1.11E+00	4.10E+00
		BA-140	* 7.70E-01	1.46E+01
	850312 TO 850312	LA-140	* 1.84E+00	3.89E+00
		CS-137	* 1.90E+00	2.86E+00
		CS-134	*-4.96E-01	3.08E+00
		BA-140	*-8.42E+00	1.20E+01
	850410 TO 850410	LA-140	* 7.36E-01	3.33E+00
		CS-137	* 2.77E+00	2.87E+00
		CS-134	*-1.35E+00	3.09E+00
		BA-140	*-5.99E+00	1.21E+01
	850423 TO 850423	LA-140	* 6.45E-01	4.34E+00
		CS-137	* 1.10E+00	3.03E+00
		CS-134	*-1.67E+00	3.35E+00
		BA-140	* 7.67E+00	1.16E+01
	850508 TO 850508	LA-140	*-3.94E+00	4.49E+00
		CS-137	* 1.12E+00	3.25E+00
		CS-134	* 5.72E-01	3.26E+00
		BA-140	* 1.79E+00	1.17E+01
	850521 TO 850521	LA-140	*-7.37E-01	4.49E+00
		CS-137	* 1.79E+00	3.26E+00
		CS-134	*-1.44E+00	3.46E+00
		BA-140	*-2.49E+00	1.28E+01
	850606 TO 850606	LA-140	* 2.79E+00	4.22E+00
		CS-137	*-2.62E+00	3.41E+00
		CS-134	* 3.02E+00	3.47E+00
		BA-140	*-9.92E+00	1.18E+01
	850619 TO 850619	LA-140	* 2.59E+00	5.90E+00
		CS-137	*-6.14E+00	4.85E+00
		CS-134	*-7.43E+00	5.32E+00
		BA-140	* 1.68E+01	1.88E+01
	850702 TO 850702	LA-140	*-1.18E+00	3.90E+00
		CS-137	*-1.24E+00	2.94E+00

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#35	850702 TO 850702	CS-134	* 1.67E+00	3.38E+00
		BA-140	* 3.27E+00	1.14E+01
	850723 TO 850723	LA-140	* 1.06E+00	4.10E+00
		CS-137	* 9.15E-01	2.79E+00
		CS-134	* 1.69E+00	2.91E+00
		BA-140	* 3.11E-01	1.27E+01
	850806 TO 850806	LA-140	* 1.26E+00	3.82E+00
		CS-137	* 3.38E+00	2.90E+00
		CS-134	* 9.01E-01	3.10E+00
		BA-140	* 1.01E+01	1.22E+01
	850820 TO 850820	LA-140	* 4.77E+00	3.36E+00
		CS-137	* 1.90E+00	2.86E+00
		CS-134	*-3.33E+00	3.09E+00
		BA-140	* 8.26E+00	1.17E+01
	850904 TO 850904	LA-140	*-3.49E+00	4.33E+00
		CS-137	* 1.54E+00	2.63E+00
		CS-134	*-1.49E-01	3.53E+00
		BA-140	* 4.82E+00	1.06E+01
	850917 TO 850917	LA-140	*-1.82E+00	4.42E+00
		CS-137	* 3.80E-01	2.87E+00
		CS-134	*-4.01E+00	3.22E+00
		BA-140	* 2.31E+01	1.13E+01
	851015 TO 851015	LA-140	* 1.13E+00	2.64E+00
		CS-137	*-2.05E+00	3.17E+00
		CS-134	* 2.70E-01	2.82E+00
		BA-140	* 1.24E+01	1.11E+01
	851119 TO 851119	LA-140	*-4.35E+00	4.25E+00
		CS-137	* 5.54E+00	2.62E+00
		CS-134	*-3.88E+00	3.39E+00
		BA-140	* 2.24E+00	1.24E+01
	851217 TO 851217	LA-140	*-3.31E+00	4.25E+00
		CS-137	* 2.96E+00	2.83E+00
		CS-134	*-3.11E+00	3.38E+00
		BA-140	* 1.40E+01	1.16E+01
#36	850115 TO 850115	LA-140	*-6.77E+00	6.41E+00
		CS-137	* 4.01E-01	2.91E+00
		CS-134	*-2.34E+00	3.40E+00
		BA-140	*-4.25E+00	1.25E+01

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#36	850213 TO 850213	LA-140	*-2.13E+00	5.95E+00
		CS-137	* 4.27E+00	3.63E+00
		CS-134	*-3.90E+00	4.51E+00
		BA-140	* 1.16E+01	1.59E+01
	850312 TO 850312	LA-140	* 1.74E+00	4.07E+00
		CS-137	* 2.81E-01	2.86E+00
		CS-134	*-1.14E+00	3.40E+00
		BA-140	* 4.62E+00	1.17E+01
	850410 TO 850410	LA-140	*-6.02E+00	4.36E+00
		CS-137	*-4.81E-01	3.17E+00
		CS-134	* 5.53E+00	3.07E+00
		BA-140	* 5.78E+00	1.14E+01
	850423 TO 850423	LA-140	* 1.36E+00	3.59E+00
		CS-137	* 6.42E-01	2.84E+00
		CS-134	* 4.91E+00	2.96E+00
		BA-140	* 1.35E+01	1.01E+01
	850508 TO 850508	LA-140	*-6.15E+00	6.09E+00
		CS-137	* 2.09E+00	4.27E+00
		CS-134	* 1.96E+00	4.56E+00
		BA-140	*-3.26E+00	1.88E+01
	850521 TO 850521	LA-140	*-1.02E+00	3.44E+00
		CS-137	*-5.32E-01	3.16E+00
		CS-134	*-2.48E+00	3.41E+00
		BA-140	* 4.61E+00	1.12E+01
	850606 TO 850606	LA-140	*-5.53E+00	4.56E+00
		CS-137	* 1.67E+00	3.02E+00
		CS-134	* 6.31E-01	3.41E+00
		BA-140	* 4.18E-01	1.12E+01
	850619 TO 850619	LA-140	* 1.22E+00	3.71E+00
		CS-137	* 4.56E+00	2.65E+00
		CS-134	* 6.31E-01	3.20E+00
		BA-140	* 1.12E+00	1.21E+01
	850702 TO 850702	LA-140	* 1.20E-01	5.55E+00
		CS-137	* 5.70E+00	4.45E+00
		CS-134	*-1.96E+00	5.12E+00
		BA-140	4.27E+01	1.80E+01
	850723 TO 850723	LA-140	* 2.66E+00	4.40E+00
		CS-137	* 2.28E-01	3.03E+00

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#36	850723 TO 850723	CS-134	*-4.51E-01	3.14E+00
		BA-140	* 1.32E+01	1.15E+01
	850806 TO 850806	LA-140	* 2.88E+00	4.36E+00
		CS-137	*-1.62E+00	3.46E+00
		CS-134	* 2.08E+00	3.08E+00
		BA-140	* 1.56E-01	1.20E+01
	850820 TO 850820	LA-140	*-2.42E+01	9.03E+00
		CS-137	* 6.09E+00	4.69E+00
		CS-134	* 8.06E-01	5.16E+00
		BA-140	*-1.57E+01	1.98E+01
	850904 TO 850904	LA-140	*-5.04E+00	6.32E+00
		CS-137	* 1.18E+00	3.04E+00
		CS-134	* 1.80E-01	3.06E+00
		BA-140	*-7.43E+00	1.35E+01
	850917 TO 850917	LA-140	*-3.06E-01	3.86E+00
		CS-137	* 3.41E+00	3.11E+00
		CS-134	* 1.96E+00	3.16E+00
		BA-140	*-8.05E+00	1.15E+01
	851015 TO 851015	LA-140	* 2.89E+00	2.61E+00
		CS-137	*-8.02E-02	3.04E+00
		CS-134	* 1.10E+00	3.46E+00
		BA-140	* 3.55E+00	1.08E+01
	851119 TO 851119	LA-140	* 2.03E-01	4.17E+00
		CS-137	*-1.04E+00	2.99E+00
		CS-134	*-7.15E-01	3.25E+00
		BA-140	* 5.96E-01	1.19E+01
	851217 TO 851217	LA-140	*-1.60E+00	3.91E+00
		CS-137	* 1.32E+00	2.67E+00
		CS-134	* 2.05E+00	2.61E+00
		BA-140	*-8.18E+00	1.18E+01
#37	850806 TO 850806	LA-140	*-8.18E+00	6.63E+00
		CS-137	*-2.29E+00	3.60E+00
		CS-134	*-1.09E+00	3.42E+00
		BA-140	* 8.44E+00	1.31E+01
	850820 TO 850820	LA-140	*-2.59E+00	6.34E+00
		CS-137	*-2.41E+00	3.27E+00
		CS-134	*-1.89E+00	3.14E+00
		BA-140	* 7.94E+00	1.26E+01

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#40	850423 TO 850423	CS-134	* 8.12E+00	4.40E+00
		BA-140	* 2.19E+01	1.77E+01
	850508 TO 850508	LA-140	*-3.94E+00	3.78E+00
		CS-137	* 1.94E+00	2.82E+00
		CS-134	* 4.96E-01	3.25E+00
		BA-140	* 9.11E+00	1.15E+01
	850521 TO 850521	LA-140	* 7.82E-01	4.06E+00
		CS-137	*-2.41E-01	3.09E+00
		CS-134	*-3.29E+00	3.69E+00
		BA-140	* 5.78E+00	1.11E+01
	850606 TO 850606	LA-140	*-2.53E+00	4.22E+00
		CS-137	*-3.49E+00	3.33E+00
		CS-134	* 4.20E+00	2.98E+00
		BA-140	* 6.67E+00	1.12E+01
	850619 TO 850619	LA-140	*-3.08E+00	4.00E+00
		CS-137	* 2.25E+00	2.86E+00
		CS-134	* 2.86E+00	3.27E+00
		BA-140	* 1.63E+00	1.12E+01
	850702 TO 850702	LA-140	*-6.08E+00	5.07E+00
		CS-137	*-2.16E+00	3.04E+00
		CS-134	* 5.95E-01	3.26E+00
		BA-140	* 1.59E+01	1.15E+01
	850723 TO 850723	LA-140	*-2.71E+00	4.08E+00
		CS-137	* 2.29E+00	2.90E+00
		CS-134	* 0.00E+00	3.23E+00
		BA-140	*-1.19E+00	1.15E+01
	850806 TO 850806	LA-140	* 3.65E+00	3.98E+00
		CS-137	* 6.42E-01	2.92E+00
		CS-134	*-3.29E+00	3.69E+00
		BA-140	* 5.66E+00	1.13E+01
	850820 TO 850820	LA-140	*-1.71E+00	4.19E+00
		CS-137	* 3.49E+00	2.81E+00
		CS-134	*-1.57E+00	3.55E+00
		BA-140	* 9.08E+00	1.16E+01
	850904 TO 850904	LA-140	* 9.00E+00	5.05E+00
		CS-137	* 2.81E-01	3.07E+00
		CS-134	* 4.29E-01	3.43E+00
		BA-140	* 7.74E-01	1.30E+01

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#37	850904 TO 850904	LA-140	*-1.99E-01	4.03E+00
		CS-137	* 2.41E-01	2.90E+00
		CS-134	* 3.96E+00	3.28E+00
		BA-140	* 6.24E+00	1.21E+01
	850917 TO 850917	LA-140	* 3.47E+00	5.49E+00
		CS-137	* 3.33E+00	2.80E+00
		CS-134	* 8.11E-01	3.34E+00
		BA-140	* 1.14E+01	1.20E+01
	851015 TO 851015	LA-140	*-2.94E+00	4.60E+00
		CS-137	* 6.03E+00	3.03E+00
		CS-134	*-3.43E+00	3.51E+00
		BA-140	* 2.98E-01	1.13E+01
	851119 TO 851119	LA-140	* 4.19E+00	5.16E+00
		CS-137	*-8.02E-01	3.33E+00
		CS-134	* 9.54E-01	3.16E+00
		BA-140	*-1.64E+01	1.32E+01
	851217 TO 851217	LA-140	* 6.63E-01	5.13E+00
		CS-137	* 2.09E+00	3.00E+00
		CS-134	* 4.34E+00	3.06E+00
		BA-140	* 1.73E+01	1.09E+01
#40	850115 TO 850115	LA-140	*-5.68E+00	9.44E+00
		CS-137	*-4.38E+00	4.60E+00
		CS-134	* 1.38E+00	4.26E+00
		BA-140	* 3.63E+00	1.86E+01
	850213 TO 850213	LA-140	*-1.15E+01	6.88E+00
		CS-137	* 5.60E+00	3.92E+00
		CS-134	*-4.78E+00	4.40E+00
		BA-140	*-4.43E+01	1.99E+01
	850312 TO 850312	LA-140	* 3.85E+00	5.23E+00
		CS-137	*-4.92E+00	4.56E+00
		CS-134	*-1.27E+00	4.78E+00
		BA-140	* 1.81E+00	1.84E+01
	850410 TO 850410	LA-140	* 5.82E+00	5.21E+00
		CS-137	* 7.65E+00	4.25E+00
		CS-134	*-3.80E+00	5.04E+00
		BA-140	* 1.55E+01	1.69E+01
	850423 TO 850423	LA-140	*-9.62E+00	6.19E+00
		CS-137	*-1.46E-01	4.61E+00

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#40	850917 TO 850917	LA-140	*-7.07E+00	7.27E+00
		CS-137	* 1.08E+00	3.18E+00
		CS-134	* 2.83E+00	3.46E+00
		BA-140	*. 8.63E+00	1.27E+01
	851015 TO 851015	LA-140	*-3.62E+00	4.02E+00
		CS-137	* 1.94E+00	2.99E+00
		CS-134	*-9.01E-01	3.22E+00
		BA-140	*-4.20E+00	1.21E+01
	851119 TO 851119	LA-140	*-1.15E+01	7.08E+00
		CS-137	*-4.18E-01	2.96E+00
		CS-134	* 9.47E-01	3.05E+00
		BA-140	*-1.09E+01	1.30E+01
	851217 TO 851217	LA-140	*-7.80E+00	5.65E+00
		CS-137	* 2.70E+00	2.77E+00
		CS-134	*-2.16E+00	3.16E+00
		BA-140	* 6.10E+00	1.11E+01
#9	850115 TO 850115	LA-140	*-3.14E-01	6.38E+00
		CS-137	* 6.73E+00	2.70E+00
		CS-134	* 2.18E+00	3.23E+00
		BA-140	*-5.73E+00	1.35E+01
	850213 TO 850213	LA-140	* 3.04E+00	5.84E+00
		CS-137	*.3.92E+00	4.28E+00
		CS-134	* 5.42E+00	4.57E+00
		BA-140	* 6.39E-01	1.64E+01
	850312 TO 850312	LA-140	*-3.30E+00	4.88E+00
		CS-137	* 1.25E-01	3.27E+00
		CS-134	* 3.32E+00	3.09E+00
		BA-140	*-1.44E+01	1.23E+01
	850410 TO 850410	LA-140	*-2.86E+00	4.48E+00
		CS-137	* 3.24E+00	3.20E+00
		CS-134	*-5.80E+00	3.72E+00
		BA-140	*-4.78E+00	1.24E+01
	850423 TO 850423	LA-140	* 7.90E-01	4.11E+00
		CS-137	*-4.16E-01	3.64E+00
		CS-134	* 3.96E-01	3.38E+00
		BA-140	* 6.63E+00	1.16E+01
	850508 TO 850508	LA-140	* 2.45E+00	3.27E+00
		CS-137	* 3.99E+00	3.15E+00

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#9	850508 TO 850508	CS-134	* 2.48E+00	3.24E+00
		BA-140	* 2.94E+00	1.18E+01
	850521 TO 850521	LA-140	* 2.35E+00	6.28E+00
		CS-137	*-4.29E+00	4.79E+00
		CS-134	*-5.30E+00	5.09E+00
		BA-140	*-5.92E+00	1.96E+01
	850606 TO 850606	LA-140	*-3.51E-01	5.65E+00
		CS-137	*-1.90E+00	4.81E+00
		CS-134	* 5.76E+00	4.56E+00
		BA-140	* 5.20E+00	1.82E+01
	850619 TO 850619	LA-140	*-4.51E+00	4.41E+00
		CS-137	*-5.11E+00	3.65E+00
		CS-134	* 5.95E-01	3.39E+00
		BA-140	* 3.55E+00	1.21E+01
	850702 TO 850702	LA-140	* 3.20E+00	3.49E+00
		CS-137	* 1.90E-01	2.90E+00
		CS-134	* 2.21E+00	3.12E+00
		BA-140	* 1.10E+01	1.05E+01
	850723 TO 850723	LA-140	* 2.38E-01	5.89E+00
		CS-137	* 1.90E+00	4.41E+00
		CS-134	*-1.67E+00	4.86E+00
		BA-140	* 1.78E+01	1.78E+01
	850806 TO 850806	LA-140	*-7.30E-01	5.94E+00
		CS-137	* 2.78E+00	4.45E+00
		CS-134	1.45E+01	4.06E+00
		BA-140	*-1.26E+01	1.78E+01
	850820 TO 850820	LA-140	*-5.91E+00	4.60E+00
		CS-137	* 2.70E+00	2.94E+00
		CS-134	* 1.78E+00	3.03E+00
		BA-140	*-4.49E+00	1.20E+01
	850904 TO 850904	LA-140	* 9.15E-01	3.82E+00
		CS-137	* 1.25E+00	3.12E+00
		CS-134	* 3.56E+00	2.97E+00
		BA-140	* 9.19E+00	1.24E+01
	850917 TO 850917	LA-140	*-1.93E+00	4.69E+00
		CS-137	* 2.54E+00	3.01E+00
		CS-134	* 1.19E+00	3.42E+00
		BA-140	*-4.33E+00	1.27E+01

* Denotes a result less than the detection limit

TABLE A-13 (cont.)

Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#9	851015 TO 851015	LA-140	*-8.83E-01	2.91E+00
		CS-137	*-3.74E-01	3.09E+00
		CS-134	* 1.83E+00	2.86E+00
		BA-140	* 0.00E+00	1.15E+01
	851119 TO 851119	LA-140	*-3.19E+00	4.64E+00
		CS-137	*-1.04E+00	2.54E+00
		CS-134	* 1.83E+00	2.66E+00
		BA-140	* 3.72E+00	9.80E+00
	851217 TO 851217	LA-140	* 3.96E+00	3.12E+00
		CS-137	* 7.90E-01	3.08E+00
		CS-134	*-1.93E+00	3.43E+00
		BA-140	* 3.56E+00	1.15E+01

AVERAGE RESULT (WITHOUT CONTROL) = 6.60E-01 (LOW = -4.43E+01, HIGH = 4.27E+01)
 1 POSITIVE RESULTS FOUND IN 244 SAMPLES

AVERAGE RESULT FOR CONTROL = 7.54E-01 (LOW = -1.44E+01, HIGH = 1.78E+01)
 1 POSITIVE RESULTS FOUND IN 72 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
LA-140	-1.89E+00	-2.42E+01	9.00E+00	61	0
LA-140 (CONTROL)	-3.91E-01	-5.91E+00	3.96E+00	18	0
CS-137	9.61E-01	-6.14E+00	7.65E+00	61	0
CS-137 (CONTROL)	9.46E-01	-5.11E+00	6.73E+00	18	0
CS-134	-6.23E-02	-7.43E+00	8.12E+00	61	0
CS-134 (CONTROL)	1.80E+00	-5.80E+00	1.45E+01	18	1
BA-140	3.63E+00	-4.43E+01	4.27E+01	61	1
BA-140 (CONTROL)	6.65E-01	-1.44E+01	1.78E+01	18	0

* Denotes a result less than the detection limit

TABLE A-14
GAMMA SPECTROMETRY OF ROOT CROP

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#37	850612 TO 850612	CS-137	* 9.89E+00	8.18E+00
		CS-134	*-1.54E+00	1.15E+01
		I-131	*-1.97E+01	1.28E+01
	850723 TO 850723	CS-137	*-4.84E+00	1.57E+01
		CS-134	* 1.10E+01	1.14E+01
		I-131	*-8.66E+00	1.79E+01
	850827 TO 850827	CS-137	* 5.84E+00	1.32E+01
		CS-134	*-1.27E+00	1.16E+01
		I-131	* 9.98E+00	1.96E+01
	850917 TO 850917	CS-137	*-9.77E+00	1.02E+01
		CS-134	* 3.03E+00	1.04E+01
		I-131	* 2.43E+00	1.40E+01
#9	850612 TO 850612	CS-137	*-1.15E+00	1.12E+01
		CS-134	*-1.50E+01	1.42E+01
		I-131	* 6.08E+00	8.93E+00
	850723 TO 850723	CS-137	*-2.88E+00	8.14E+00
		CS-134	* 4.71E+00	6.97E+00
		I-131	*-7.94E+00	1.19E+01
	850827 TO 850827	CS-137	*-2.09E+00	1.36E+01
		CS-134	* 6.27E+00	1.30E+01
		I-131	* 1.23E+01	1.68E+01
	850917 TO 850917	CS-137	* 0.00E+00	9.47E+00
		CS-134	* 6.81E+00	9.34E+00
		I-131	*-3.44E+00	1.42E+01

AVERAGE RESULT (WITHOUT CONTROL) = -3.01E-01 (LOW = -1.97E+01, HIGH = 1.10E+01)
0 POSITIVE RESULTS FOUND IN 12 SAMPLES

AVERAGE RESULT FOR CONTROL = 3.06E-01 (LOW = -1.50E+01, HIGH = 1.23E+01)
0 POSITIVE RESULTS FOUND IN 12 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	2.80E-01	-9.77E+00	9.89E+00	4	0
CS-137 (CONTROL)	-1.53E+00	-2.88E+00	0.00E+00	4	0
CS-134	2.81E+00	-1.54E+00	1.10E+01	4	0
CS-134 (CONTROL)	6.97E-01	-1.50E+01	6.81E+00	4	0

* Denotes a result less than the detection limit

TABLE A-14 (cont.)

--- SUMMARY OF RADIONUCLIDES (CONTINUED) ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
I-131	-3.99E+00	-1.97E+01	9.98E+00	4	0
I-131 (CONTROL)	1.75E+00	-7.94E+00	1.23E+01	4	0

* Denotes a result less than the detection limit

TABLE A-15
GAMMA SPECTROMETRY OF FRUIT

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#37	850612 TO 850612	CS-137	*-4.90E+00	1.22E+01
		CS-134	*-4.69E+00	1.48E+01
		I-131	* 1.33E+01	1.34E+01
	850723 TO 850723	CS-137	*-4.30E+00	9.47E+00
		CS-134	* 4.06E+00	9.53E+00
		I-131	* 2.17E+00	8.05E+00
	850827 TO 850827	CS-137	*-5.60E+00	8.41E+00
		CS-134	* 4.99E+00	8.80E+00
		I-131	* 1.06E+01	7.66E+00
	850917 TO 850917	CS-137	* 8.60E+00	7.11E+00
		CS-134	* 0.00E+00	8.35E+00
		I-131	* 1.04E+00	1.26E+01
#9	850612 TO 850612	CS-137	* 9.73E+00	1.21E+01
		CS-134	* 0.00E+00	1.21E+01
		I-131	* 2.71E+00	1.08E+01
	850723 TO 850723	CS-137	*-1.52E+01	9.16E+00
		CS-134	* 5.92E+00	4.49E+00
		I-131	* 1.71E+01	8.52E+00
	850827 TO 850827	CS-137	*-7.41E-01	8.77E+00
		CS-134	*-4.41E-01	1.01E+01
		I-131	*-1.04E+01	9.55E+00
	850917 TO 850917	CS-137	* 9.65E+00	1.21E+01
		CS-134	* 7.70E+00	5.84E+00
		I-131	* 6.01E+00	1.02E+01

AVERAGE RESULT (WITHOUT CONTROL) = 2.11E+00 (LOW = -5.60E+00, HIGH = 1.33E+01)
0 POSITIVE RESULTS FOUND IN 12 SAMPLES

AVERAGE RESULT FOR CONTROL = 2.67E+00 (LOW = -1.52E+01, HIGH = 1.71E+01)
0 POSITIVE RESULTS FOUND IN 12 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	-1.55E+00	-5.60E+00	8.60E+00	4	0
CS-137 (CONTROL)	8.60E-01	-1.52E+01	9.73E+00	4	0
CS-134	1.09E+00	-4.69E+00	4.99E+00	4	0
CS-134 (CONTROL)	3.29E+00	-4.41E-01	7.70E+00	4	0

* Denotes a result less than the detection limit

TABLE A-15 (cont.)

--- SUMMARY OF RADIONUCLIDES (CONTINUED) ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
I-131	6.78E+00	1.04E+00	1.33E+01	4	0
I-131 (CONTROL)	3.86E+00	-1.04E+01	1.71E+01	4	0

* Denotes a result less than the detection limit

TABLE A-16
GAMMA SPECTROMETRY OF VEGETABLE STOCK

Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	OVERALL ERROR
#37	850612 TO 850612	CS-137	* 4.82E+00	8.29E+00
		CS-134	*-2.81E+00	1.03E+01
		I-131	*-1.70E+00	1.54E+01
	850723 TO 850723	CS-137	* 1.27E+00	9.91E+00
		CS-134	* 1.31E+01	1.19E+01
		I-131	* 2.48E+00	1.61E+01
	850827 TO 850827	CS-137	* 4.18E+00	1.14E+01
		CS-134	* 5.55E+00	1.15E+01
		I-131	* 1.42E+01	1.80E+01
	850917 TO 850917	CS-137	* 1.37E+00	1.08E+01
		CS-134	*-9.29E+00	1.49E+01
		I-131	*-8.70E+00	1.95E+01
#9	850612 TO 850612	CS-137	*-6.14E-01	1.81E+01
		CS-134	* 0.00E+00	1.94E+01
		I-131	*-1.01E+01	1.64E+01
	850723 TO 850723	CS-137	* 3.81E+00	7.92E+00
		CS-134	*-6.37E+00	1.11E+01
		I-131	* 4.47E+00	1.57E+01
	850827 TO 850827	CS-137	*-1.21E+01	1.06E+01
		CS-134	* 1.51E+00	7.41E+00
		I-131	* 3.17E+00	7.00E+00
	850917 TO 850917	CS-137	* 1.13E+00	1.14E+01
		CS-134	* 7.25E+00	9.93E+00
		I-131	* 8.05E+00	1.44E+01

AVERAGE RESULT (WITHOUT CONTROL) = 2.04E+00 (LOW = -9.29E+00, HIGH = 1.42E+01)
0 POSITIVE RESULTS FOUND IN 12 SAMPLES

AVERAGE RESULT FOR CONTROL = 1.72E-02 (LOW = -1.21E+01, HIGH = 8.05E+00)
0 POSITIVE RESULTS FOUND IN 12 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	2.91E+00	1.27E+00	4.82E+00	4	0
CS-137 (CONTROL)	-1.94E+00	-1.21E+01	3.81E+00	4	0
CS-134	1.64E+00	-9.29E+00	1.31E+01	4	0
CS-134 (CONTROL)	5.97E-01	-6.37E+00	7.25E+00	4	0

* Denotes a result less than the detection limit

TABLE A-16 (cont.)

--- SUMMARY OF RADIONUCLIDES (CONTINUED) ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
I-131	1.57E+00	-8.70E+00	1.42E+01	4	0
I-131 (CONTROL)	1.40E+00	-1.01E+01	8.05E+00	4	0

* Denotes a result less than the detection limit

B1. SUPPLY SYSTEM ENVIRONMENTAL TLD QUALITY CONTROL PROGRAM

The Quality Control Program for the environmental TLD preparation, processing and evaluation is described in Figures B-1 and B-2. QA dosimeters, which are annealed along with the field dosimeters, stored in a lead container, exposed to 100 mR of cesium-137 gamma radiation and processed among the field dosimeters, serve as indicators that the annealing, exposure and evaluation of the field dosimeters were properly performed. If the QA dosimeter results are greater than $\pm 5\%$ (or 5mR) of the given exposure, an investigation into the source of the discrepancy is initiated. The number of QA dosimeters used during each processing is generally 10% of the number of field dosimeters.

Control dosimeters are used for each set of field dosimeters to monitor the contribution of the exposure received by the field TLDs while in transit to their field locations. The radiation background in the storage area is also monitored by a separate set of control dosimeters.

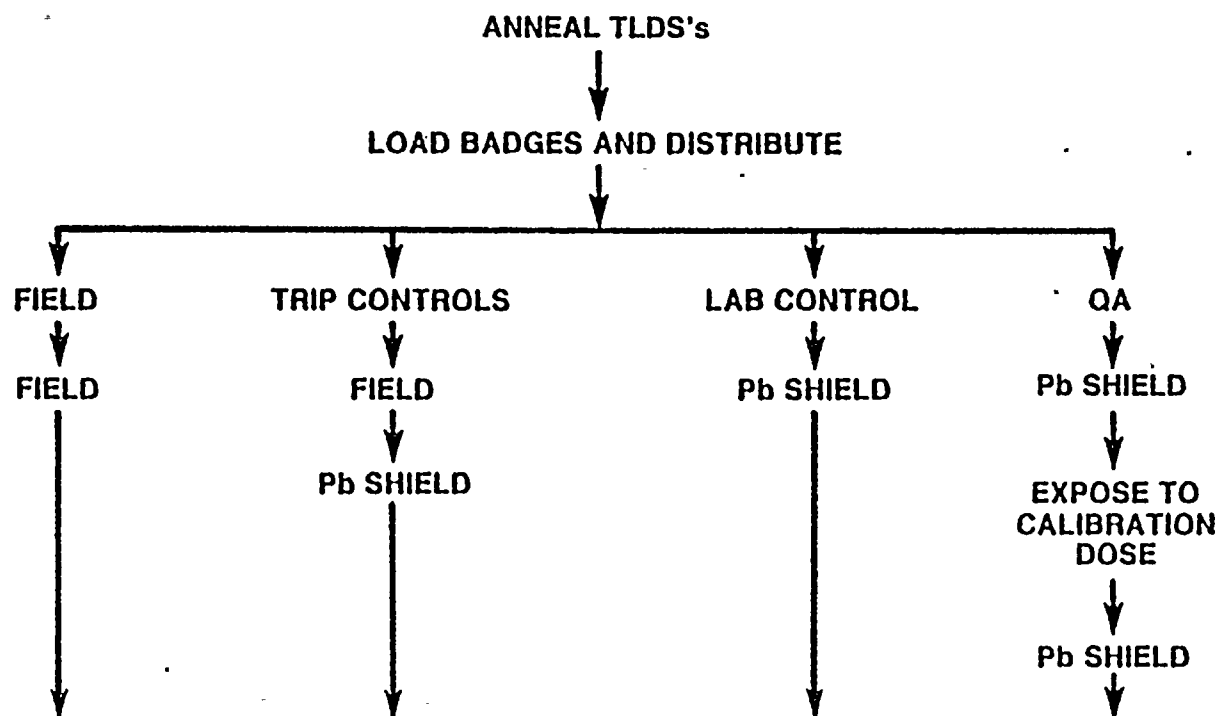
Because of problems encountered during the calibration and QA exposures for several runs in 1985, additional QA practices were begun. These practices included the use of a condenser R meter to verify each given exposure and the use of open audit dosimeters, which are given known environmental levels of exposure and processed with the field dosimeters to verify the accuracy of the environmental TLD evaluations. The results of the audit dosimeters processed along with field dosimeters during the Third and Fourth Quarter 1985 processings are given in Table B-1. The close agreement between the given audit exposures and the reported results indicates that dosimeter evaluation was performed without significant problems that might have affected the reported results.

An additional aspect of the Quality Control program is participation in intercomparison studies. Participation in the Eighth International Intercomparison of Environmental Dosimeters was begun in late 1985 and the results for that intercomparison are not expected until mid-1986. The results for the Seventh International Intercomparison of Environmental Dosimeters, were reported in the 1984 REMP Annual Report.¹²

TABLE B-1

ENVIRONMENTAL AUDIT DOSIMETER RESULTS
FOR THIRD AND FOURTH QUARTERS 1985

<u>Quarter</u>	<u>Dosimeter Number</u>	<u>Given Exposure (mR)</u>	<u>Reported Exposure (mR)</u>
3	593	25	24
	586	25	24
	597	50	48
	580	50	48
	531	Blank	0
4	720	25	26.1
	721	25	26.1
	722	Blank	0
	723	25	26.1
	724	Blank	0
	725	50	51.1
	726	50	51.1
	727	50	51.1
	728	100	102.3
	729	100	102.3



840440-3A
MAR 1986

FIGURE B-1
SUPPLY SYSTEM ENVIRONMENTAL TLD PREPARATION - USE CYCLE

B2. United States Testing Quality Control Program

To address the needs of the Supply System, UST-RD has implemented a Quality Control (QC) system based on statistical concepts, as described most recently by Currie in NUREG/CR-4007.

The goal of the UST-RD QC program is to demonstrate control of the analytical systems and the quality of analytical results. The primary criteria used by UST-RD to assess the effectiveness of the analytical systems are the:

- o Decision Limit (Lc)
- o Mean Blank Value (MBV)
- o Detection Limit (Ld)
- o Total Propagated Uncertainty (TPU)
- o Contractual Detection Limit (CL)
- o Allowed Uncertainty (AU)
- o Radiochemical Yield of QC Samples (BIAS)
- o Recovery of Constituent of Interest (YIELD)

The criteria above provide a means by which the acceptability of the analytical results and the QC samples, which accompany the Supply System samples through the radio-analytical system can be assessed.

The QC "spikes" are prepared in a separate QC laboratory and submitted to the analytical laboratory for addition to the appropriate matrix material and subsequent processing along with routine samples. The QC laboratory also prepares the yield monitors (tracers and stable carriers) using NBS traceable radioactivity standards, where feasible, and well established procedures.

QC sample results are control charted and compared to the internal QC limits derived from the Lc, MBV, and TPU concepts. The values for MBV, Lc and Ld have been measured and are accurately known for analyses

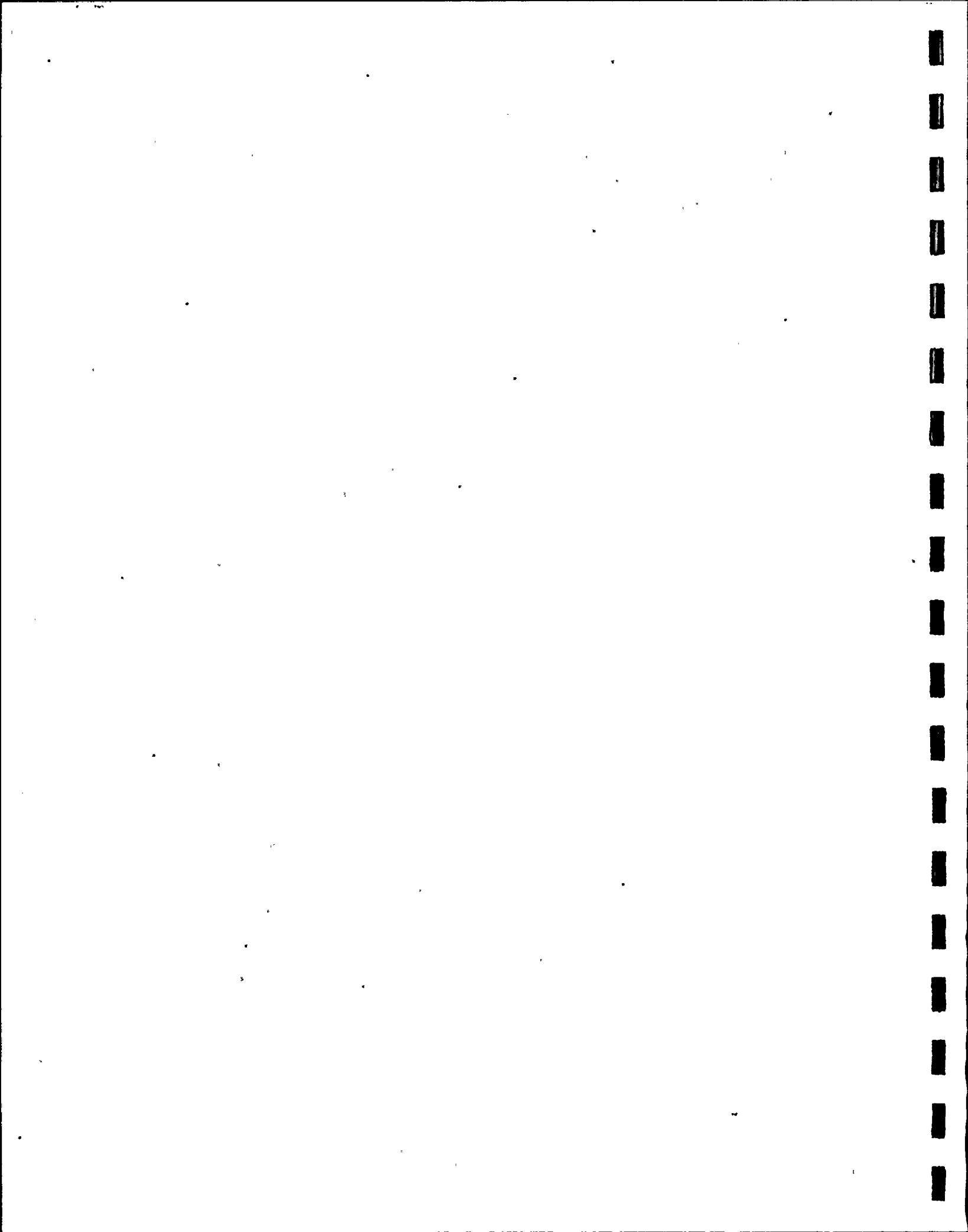
and matrices which are frequently requested. Comparison of TPU to AU indicates whether or not the analysis achieved the contractual specifications. When the number of spikes observed outside of the AU limits are approximately 5%, the analytical systems are considered to be in control. The quality of the QC data is a measure of the quality of the actual sample results. Analyses of replicate spiked samples are used as a check of the precision of the systems. The measure of the accuracy of the analytical systems is obtained by comparing the "found" value of the QC spikes to the "expected" value considering the AU limit at the activity level of the spikes. The TPU of the actual sample is compared to the AU limit at the analyzed activity level of the sample. The result of the comparison indicates whether or not a sample needs additional counting, re-work or a complete re-run.

Data review occurs (at a minimum) at two distinct points. The first is the evaluation by the data handler and the second is a review by laboratory supervision or technical personnel. At both of these steps, sample and QC data are compared to established criteria.

When nonconforming data (NCD) is detected, UST-RD reports the occurrence to the customer. The NCD is investigated and corrective actions are suggested by the appropriate laboratory supervisor and director and reviewed by the QA/QC Departments. The NCD is documented using a nonconforming data report which describes the reason(s) for the nonconformance and the corrective actions taken or planned to minimize recurrence in the future. Copies of the NCD report are forwarded to the director, supervisor, the technician involved and the customer.

Traceability of the sample data is ensured by using positive log-in and laboratory flow procedures. Customer turn-around-time requirements are addressed by manually scheduling the analyses. Positive control of the potential for cross contamination of the samples is provided by analyzing samples, which historically contain higher than environmental levels of activity, in laboratories that are separate from the low level laboratories.

General flow diagrams (Figures B3-B6) summarize some of the key elements in analyzing samples at United States Testing Company. Further details may be obtained by consulting these documents: Quality Assurance Manual - UST-RD-QA-7-80, Rev. 6; Quality Control Manual - UST-RD-QC-9-80, Rev. 3 and Counting Room Control Manual - UST-RD-CRC-10-85, Rev. 0.



QC Parameters For Data Evaluation

L_c = Decision Limit

L_D = Detection Limit

CL = Contractual Detection Limit

MBV = Mean Blank Value

AU = Allowed Uncertainty (Contractual)

TPU = Total Propagated Uncertainty (Calculated)

BIAS = Radiochemical Yield of QC Samples

YIELD = Recovery of Constituent of Interest

AL = Allowed Yield Limit Set by UST

$$TPU < AU$$

$$BLANK < L_c$$

$$Bias < 1 \pm AU$$

$$Yield > AL$$

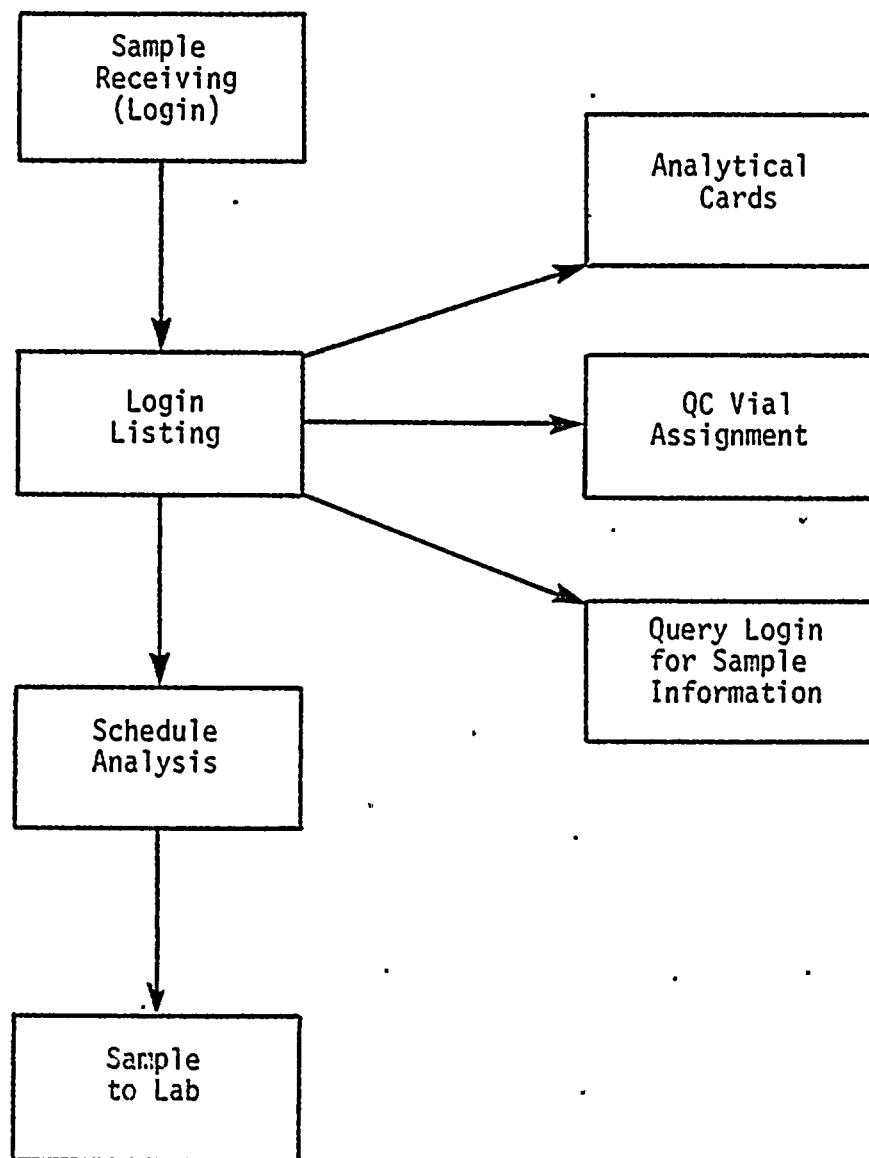
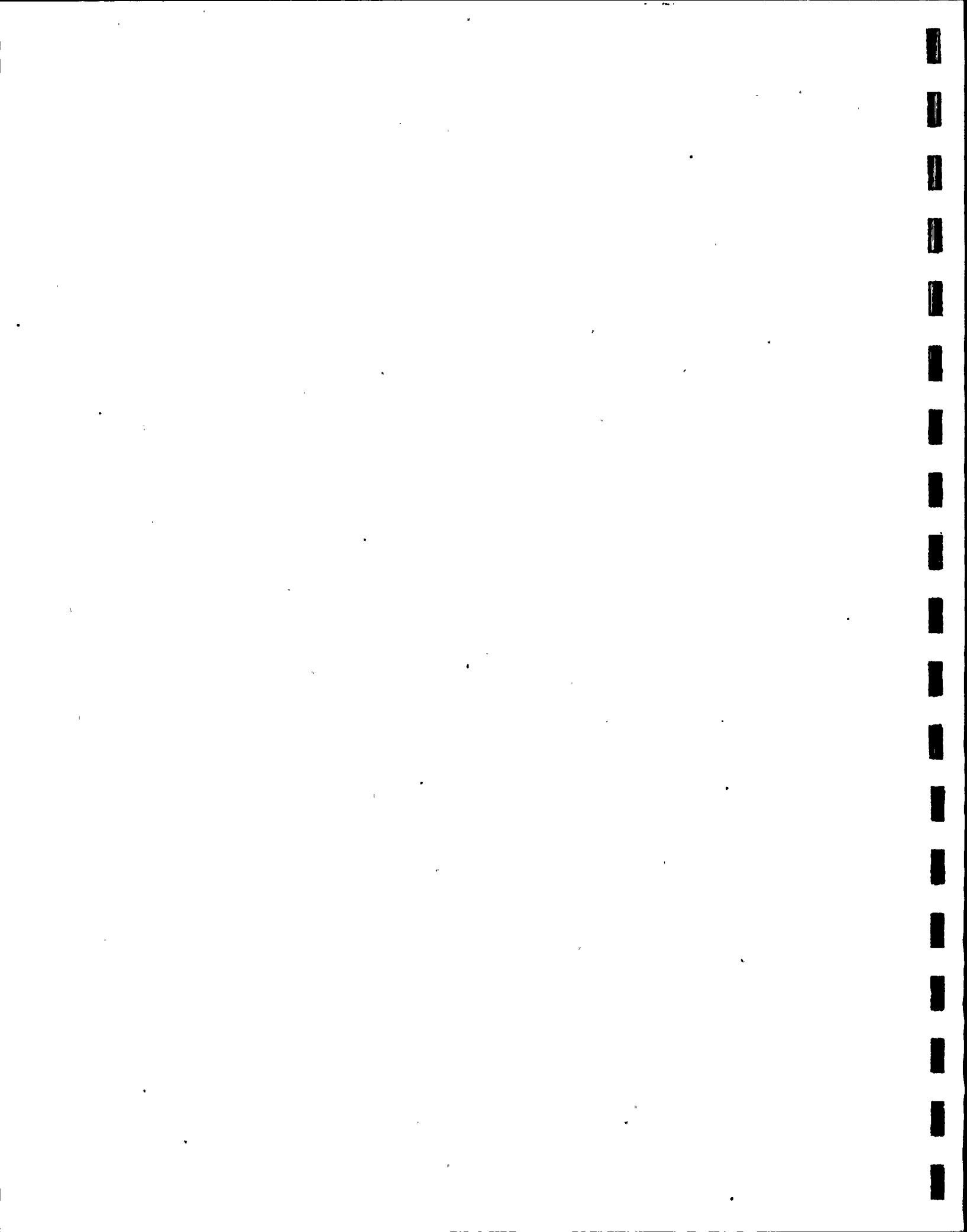


FIGURE B-3
SAMPLE RECEIVING



Sample Log-In, Sample Preparation
and Chemical Analysis



Counting



Preliminary Data Evaluation



Supervisory Data Evaluation



Final Report
Evaluation of Customer Feedback

FIGURE B-4

GENERAL WORK FLOW PLAN



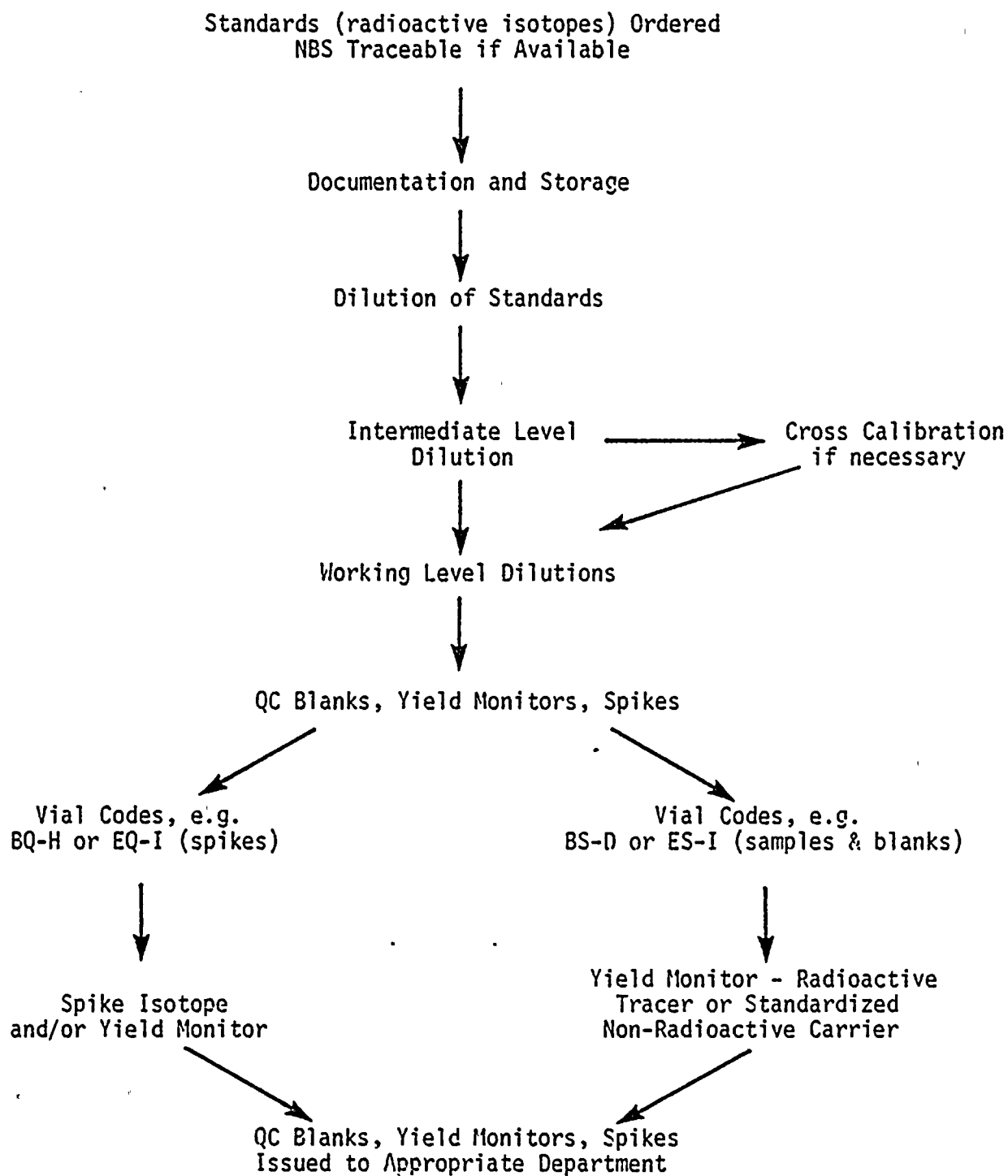


FIGURE B-5

PREPARATION OF BLANKS AND SPIKES

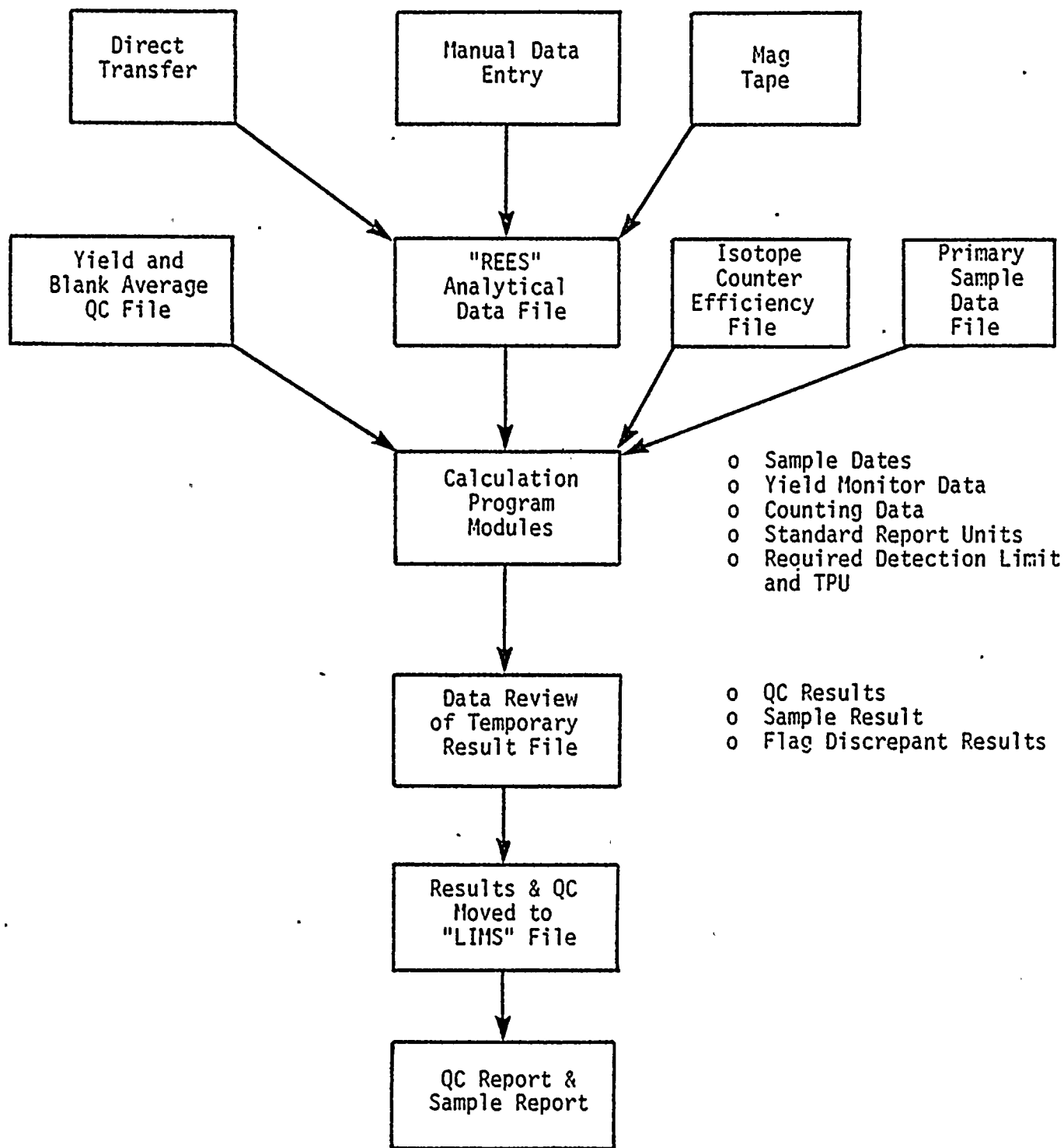


FIGURE B-6
DATA EVALUATION

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
ANNUAL QC REPORT
1986

Following, is a summary of the Quality Control data pertinent to Supply System samples for Environmental Radiochemical Analysis (ERA), for the 1st 2nd, 3rd and 4th quarters of 1985. The various classifications of QC data in this report are as follows:

<u>Isotope</u>	<u>Procedure</u>	<u>Matrix</u>	<u>Method of Determination</u>
^{131}I	I-131	Water (W)	Beta counting
^{131}I	I-131	Milk (M)	Beta counting
Gross Beta	BD	Water (W)	Beta counting
Gross Beta	BD	Filter (F)	Beta counting
^3H	H-3	Water (W)	Liquid Scintillation counting
^{131}I	I-131 CH	Charcoal Filter	Gamma Spectroscopy
Gamma Isotopes	Various	Various	Gamma Spectroscopy

Procedure I-131 Matrix W and M

The I-131-M blanks have been run with each sample batch since June. The results show that background levels are in control. Iodine-131 milk spikes have also been run and were generally within the allowed uncertainty limits. However, during the period of 2/4 - 2/6/85 three milk spikes were out of TPU limits. Investigation into the problem indicated inadequate mixing of the spike and milk matrix. Subsequent spikes were within limits.

There were no I-131 milk blanks run during the period of January 1, 1985 and June 20, 1985. The present policy is to require at least one blank to be analyzed with each batch of I-131 in milk determinations. The blanks which have been run with the milk samples since June 20, 1985, have shown no unusual activity with all samples well below contractual warning limits.

The I-131-W spikes and blanks were not run with each batch of samples after 9/5/85. The problem apparently resulted from misinterpretation of the general guideline of running 10% of the samples as QC samples. Since relatively few water samples are analyzed for I-131, the need for QC samples before a given number of samples had accumulated was not recognized by the technician. Currently a blank is run every time a sample is analyzed and I-131 spikes are run whenever provided by QC and are to be requested whenever a sample is to be analyzed for I-131. Radiochemical recoveries ranged from 89% to 105%, well within the uncertainty range expected. Spikes are presently analyzed for iodine-131 at no less than a quarterly frequency. As many as two sets of spikes will be analyzed each quarter in the future. The I-131 in water blanks were all below the UST-RD Lc. One water spike (analyzed February 7, 1985) was outside the TPU limits, well within the 5% allowed.

Procedure BD, Matrix F

The blanks in this category are a mixture of blank filters submitted by the Supply System and UST-RD in-house QC filters. There were a few unusually high blanks observed in December, however the blanks returned to previous levels in January 1986. Apparently this occurred during a period of severe air stagnation in the Tri-Cities. The investigation indicated that there was a general rise in background activities during this period throughout the counting room and discussions with staff members indicated that the phenomenon has been observed in past years during similar climate conditions. Although about 9 (20%) of the values were above Lc, it is felt that this analysis is in control since six of them occurred during the inversion. The analysis will be closely watched in 1986.

Procedure BD, Matrix W

All blanks were below Lc. The BD-W spikes were also within the AU limits.

Procedure H-3, Matrix W

The H-3 blanks are currently entered as cpm and are not subtracted from a mean background, whereas each spike (sample) is reported as a net dpm. Programming changes are underway to calculate spikes and blanks with the same activity units. All but ten of the background counts are less than the statistical Lc. The ten readings above Lc (5.2%) are not statistically significant, as one would expect 5% of the blanks to be greater than Lc.

The spikes determined at 4 dpm (96) indicated that UST is meeting current contractual limits. Approximately 4% of the determinations fall outside the AU limits, well within the statistical guidelines.

Procedure I-131, Matrix CH

All blank charcoal filters were well below the UST-RD Lc, indicating the counting process is in control. Yield and efficiency data pertinent to this analysis are covered in the gamma spectroscopy section and methodology.

Gamma Spectroscopy

The various gamma isotopes specified in the contract are all contained in the computerized isotope library. The isotope library includes information on the energy, branching ratios of various gamma nuclides, as well as the efficiency values for several different geometries. Initial calibrations were performed with a wide variety of nuclides selected to cover the energy range of the nuclides to be monitored. Check sources are used to monitor key parameters. The parameters routinely monitored include background, efficiency, resolution, and peak centroid. The control data are monitored closely to provide diagnostic information on the counting systems.

The final decision as to whether the data has been adversely affected often involves a number of considerations including, allowed uncertainty, contractual detection limits, etc.

Tables B-2 and B-3 contain a summary of the blank and spike quality control data discussed above.

TABLE B-2

SUMMARY OF 1985 BLANK QUALITY CONTROL DATA				
Procedure		Average	Blanks Greater	Average Chemical
<u>Matrix</u>	<u>N</u>	<u>Blank (dpm)</u>	<u>Than Lc (#/%)</u>	<u>Yield (%)</u>
I131-W	9	-0.131 \pm 0.499	0/0	77.0 \pm 8.8
I131-M	10	0.126 \pm 0.743	0/0	75.3 \pm 10.0
BD-W	32	0.155 \pm 0.630	0/0	N/A
H3-W	192	26 \pm 3.3	10/5.2	N/A
BD-F	45	1.06 \pm 0.45	9/20	N/A
I131-CH	54	0.122 \pm 2.86	0/0	N/A

TABLE B-3

SUMMARY OF 1985 SPIKE QUALITY CONTROL DATA				
Procedure		Radiochemical	Spike Out of	Average Chemical
<u>Matrix</u>	<u>N</u>	<u>Yield (dpm)</u>	<u>Limits (#/%)</u>	<u>Yield (%)</u>
I131-W	11	99.2 \pm 20.9	2/18	77.2 \pm 11.7
I131-M	9	85.4 \pm 18.4	3/33	70.6 \pm 11.2
BD-W	60	93.8 \pm 12.1	0/0	N/A
H3-W	150	94.0 \pm 21.8	7/4.7	N/A

UNITED STATES TESTING COMPANY, INC.
AND
ENVIRONMENTAL PROTECTION AGENCY
INTERLABORATORY COMPARISON OF ANALYTICAL RESULTS
FOR THE YEAR 1985

FOR THE WASHINGTON PUBLIC POWER SUPPLY SYSTEM
ANNUAL ENVIRONMENTAL REPORT

UST-RD participates in several Interlaboratory Comparison Programs, including the Department of Energy's Quality Assurance Program (QAP) and the Environmental Protection Agency's (EPA) Interlaboratory Comparison Program. The EPA prepares spiked samples and distributes them to radiochemistry laboratories who wish to participate in the interlaboratory intercomparison. Presented below are the 1985 results of the EPA program. In nearly all cases the analytical results are within one standard deviation of the expected (EPA provided) results. Those analyses which deviated by more than two standard deviations from the EPA results are footnoted with brief explanations. These results indicate that the analytical processes are in control.

TABLE B-4
EPA INTERLABORATORY COMPARISON OF ANALYTICAL RESULTS

<u>Medium - Water</u>				
Concentrations ^a				
<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST^{b,c}</u>	<u>EXPECTED^c</u>	<u>OTHER LABS^c</u>
Beta	Jan	17 ± 1 ^d	15 ± 5	17 ± 3
Beta	Mar	14 ± 2 ^d	15 ± 5	15 ± 3
Beta	May	16 ± 1	11 ± 5	12 ± 3
Beta	Jul	10 ± 1 ^d	8 ± 5	9 ± 3
Beta	Sep	9 ± 1 ^d	8 ± 5	8 ± 2
Beta	Nov	12 ± 1	13 ± 5	14 ± 3
GAMMA				
Cr-51	Feb	44 ± 5	48 ± 5	47 ± 9
Co-60		19 ± 1	20 ± 5	19 ± 3
Zn-65		57 ± 2	55 ± 5	56 ± 6
Ru-106		14 ± 2 ^f	25 ± 5	25 ± 7
Cs-134		31 ± 1	35 ± 5	33 ± 4
Cs-137		24 ± 1	25 ± 5	25 ± 3
Cr-51	Jun	46 ± 4	44 ± 5	48 ± 11
Co-60		15 ± 1	14 ± 5	15 ± 3
Zn-65		55 ± 1	47 ± 5	49 ± 6
Ru-106		56 ± 2	62 ± 5	58 ± 12
Cs-134		33 ± 1	35 ± 5	33 ± 4
Cs-137		21 ± 1	20 ± 5	21 ± 3
Cr-51	Oct	19 ± 6	21 ± 5	24 ± 11
Co-60		20 ± 1	20 ± 5	20 ± 2
Zn-65		20 ± 1	19 ± 5	20 ± 3
Ru-106		19 ± 3	20 ± 5	23 ± 2
Cs-134		17 ± 1	20 ± 5	19 ± 2
Cs-137		19 ± 1	20 ± 5	20 ± 2

TABLE B-4 (Cont'd)
EPA INTERLABORATORY COMPARISON OF ANALYTICAL RESULTS

Medium - Water (Cont'd)

<u>ISOTOPE</u>	<u>MONTH</u>	<u>Concentrations^a</u>		
		<u>UST^{b,c}</u>	<u>EXPECTED^c</u>	<u>OTHER LABS^c</u>
H-3	Feb	3427 ± 70	3796 ± 366	3916 ± 372
H-3	Apr	3635 ± 44	3559 ± 364	3534 ± 268
H-3	Jun	2340 ± 53	2416 ± 351	2399 ± 311
H-3	Aug	4607 ± 66	4480 ± 448	4422 ± 341
H-3	Oct	1930 ± 26	1974 ± 345	1984 ± 200
I-131	Apr	5 ± 3	8 ± 1	7 ± 1
I-131	Aug	32 ± 4	33 ± 6	32 ± 4
I-131	Dec	40 ± 4	45 ± 6	45 ± 6
Sr-89 Sr-90	Jan	7 ± 1 27 ± 1	3 ± 5 30 ± 2	6 ± 2 28 ± 3
Sr-89 Sr-90	May	35 ± 1 13 ± 1	39 ± 5 15 ± 2	36 ± 8 14 ± 3
Sr-89 Sr-90	Sep	16 ± 1 5 ± 1	20 ± 5 7 ± 2	19 ± 5 7 ± 1

TABLE B-4 (Cont'd)
EPA INTERLABORATORY COMPARISON OF ANALYTICAL RESULTS

Medium - Milk

Concentrations^a

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST^{b,c}</u>	<u>EXPECTED^c</u>	<u>OTHER LABS^c</u>
I-131	Mar	8 ± 1	9 ± 1.6	8 ± 2
Sr-89	Jun	8 ± 2	11 ± 5	10 ± 2
Sr-90		9 ± 1	11 ± 1	10 ± 2
I-131		13 ± 1	11 ± 6	12 ± 3
Cs-137		13 ± 1	11 ± 5	12 ± 2
Sr-89	Oct	42 ± 6	48 ± 5	48 ± 10
Sr-90		17 ± 1 ^h	26 ± 2	25 ± 4
I-131		48 ± 5	42 ± 6	41 ± 4
Cs-137		64 ± 2	56 ± 5	57 ± 3

Medium - Food

Concentrations^a

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST^{b,c}</u>	<u>EXPECTED^c</u>	<u>OTHER LABS^c</u>
Sr-89	Jan	41 ± 3	34 ± 5	25 ± 10
Sr-90		38 ± 2 ^e	26 ± 2	30 ± 9
I-131		38 ± 2	35 ± 6	36 ± 5
Cs-137		33 ± 1	29 ± 5	31 ± 4
Sr-89	Jul	34 ± 2	33 ± 5	25 ± 6
Sr-90		24 ± 3	26 ± 2	27 ± 6
I-131		51 ± 2 ^g	35 ± 6	37 ± 5
Cs-137		36 ± 4	29 ± 5	31 ± 3

Medium - Air Filters

Concentrations^a

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST^{b,c}</u>	<u>EXPECTED^c</u>	<u>OTHER LABS^c</u>
Alpha	Mar	9 ± 1	10 ± 5	11 ± 2
Beta		39 ± 1	36 ± 5	38 ± 6
Sr-90		14 ± 1	15 ± 2	15 ± 2
Cs-137		5 ± 1	6 ± 5	7 ± 2
Alpha	Aug	12 ± 1	13 ± 5	13 ± 3
Beta		50 ± 6	44 ± 5	48 ± 6
Sr-90		17 ± 3	18 ± 2	18 ± 2
Cs-137		7 ± 1	8 ± 5	9 ± 2

^aPicocuries per liter for water and milk, picocuries per sample for air, and picocuries per kilogram for food.

^bUnited States Testing Company, Inc., Richland, Washington.

^cAverage concentration plus or minus one sigma, based on range of values encountered.

^dOriginal calculations were made using Sr-Y-90 calibrations without absorber, which gave results of 11 ± 1 , 9 ± 1 , 6 ± 1 and 5 ± 1 pCi/L. Data listed here is calculated with Cs-137 with absorber calibrations.

^eReanalysis of this sample for strontium-90 confirmed this result.

^fCalculation parameters in the gamma spectra and pulse height analysis programs were checked for errors and none were found. The analysis results for Ru-106 in for following samples gave acceptable data. However, the Ru-106 calibration will be rechecked.

^gData was rechecked and no errors were found. Sample aliquots were counted on several different detectors and results on all detectors exhibited the high bias.

^hThe reason for the low strontium-90 result is under investigation.

WNP-2 EFFLUENTS AND DOSE ASSESSMENTS SUMMARY

C.1 INTRODUCTION

The Off-Site Dose Calculation Manual (ODCM) details the site specific information and methodologies used to predict concentrations of radioactive materials in the environment and subsequent radiation doses, based on effluent releases to the environment. The following is a summary of these assessed doses for 1985.

C.2 LIQUID EFFLUENTS

C.2.1 Liquid Source Terms

The radwaste liquid effluents from WNP-2 were released in a batch mode only. No continuous release of liquid effluent occurred during the report period. All liquid effluents from the radwaste building are recirculated in a vented hold-up tank at atmospheric pressure prior to sampling and discharge analysis being performed.

The LADTAP II computer runs were performed to calculate the doses using the assumptions listed in the ODCM. Table C-1 lists the liquid source terms used in the LADTAP II computer run.

C.2.2 Doses to Man: Liquid Pathways

Doses for the Maximum Individual, Average Individual, and the 50-Mile Population Dose estimates are listed in Tables C-2, C-3 and C-4, respectively. Technical Specification limits and the balance at yearend are listed in Table C-2, verifying compliance with Technical Specifications. The maximum exposed individual is assumed to be an adult whose

exposure pathways include potable water and fish consumption. The choice of the maximum exposed individual is based on the highest fish and water consumption rates shown by that age group and the fact that most of the dose obtained from the WNP-2 liquid effluent comes from these two pathways.

The design base doses listed in Table C-4 were calculated using design base source terms obtained from the GALE-Liquid computer code.

C.3. GASEOUS EFFLUENTS

C.3.1 Gaseous Source Terms

The gaseous source terms listed in Table C-5 were used in the annual GASPAR computer code for dose determinations. Sampling and analyses were performed in accordance with pertinent plant procedures. The gaseous effluents from WNP-2 were released in a continuous mode from three (3) release points.

- a. Main Plant Vent - mixed mode release
- b. Turbine Building - ground level release
- c. Radwaste Building - ground level release.

C.3.2 Dose to Man: Airborne Pathway

C.3.2.1 Site Boundary and Nearest Resident

WNP-2 gaseous effluents were released on a continuous basis. An annual GASPAR computer run was performed in order to calculate the doses at the 1.2 mile site boundary and at Taylor Flats (4.2 miles SE)*. Annual average atmospheric dispersion factors (X/Q) and deposition rates (D/Q) were obtained from the XOQDOQ computer code. Two sets of X/Q and D/Q values were used: one set for the mixed mode release and the other for the ground level releases.

The calculations at the 1.2 mile site boundary were used to verify compliance with Technical Specifications for air dose limits. The sector showing the highest X/Q value was used in the calculations, for the maximum individual.

Table C-6 summarizes the air dose estimates at the site boundary and the maximum organ dose to a member of the public located at Taylor Flats. The average individual doses from gaseous effluents are listed in Table C-7. Table C-8 lists the 50-mile population dose estimates, along with the preoperational population dose projections.

C.3.2.2 Exposure to the Public Within the 1.2 Mile Exclusion Area

There are five (5) special locations within the 1.2 mile exclusion area for which the access is not completely controlled by the Supply System. These areas are:

*The nearest residence; milk and garden produce are assumed at this location.

- a. Wye burial site - normally controlled by DOE
- b. The DOE railroad through the area
- c. The BPA Ashe Substation
- d. The WNP-2 Visitor Center
- e. WNP-1/4 parking lot and construction site

The WNP-2 Visitor Center was assumed to be the location with the highest potential for exposure to a member of the public due to its close proximity to the plant. Although the workers at the BPA Ashe Substation have a higher assumed occupancy (2000 hours/year versus 8 hours/year for the Visitor Center), they are not considered members of the public because they are "occupationally associated with the plant".

The ODCM assumes an eight (8) hour/year occupancy by a non-Supply System individual at the Visitor Center. In calculating the doses from the gaseous effluents, the GASPAR computer program used X/Q and D/Q values at a distance of 0.07 miles from the plant in the analysis. This resulted in an annual calculated air dose due to noble gases of $1.5\text{E-}02$ mrad for gamma and $9.5\text{E-}03$ mrad for beta. The maximum annual organ dose was $1.1\text{E-}02$ mrem to the teen lung, and the annual thyroid dose was $5.9\text{E-}03$ mrem.

TABLE C-1

WNP-2 1985 LIQUID EFFLUENTS - SOURCE TERMS

Nuclides Released	Unit	Annual
Strontium-89	Ci	7.1 E-05
Strontium-90	Ci	1.8 E-04
Cesium-134	Ci	7.5 E-05
Cesium-137	Ci	7.3 E-05
Iodine-131	Ci	6.9 E-05
Sodium-24	Ci	1.8 E-05
Cobalt-58	Ci	8.6 E-04
Cobalt-60	Ci	2.9 E-04
Iron-59	Ci	1.0 E-04
Zinc-65	Ci	6.9 E-04
Manganese-54	Ci	1.3 E-04
Chromium-51	Ci	1.7 E-03
Copper-64	Ci	6.5 E-03
Niobium-95	Ci	8.9 E-05
Molybdenum-99	Ci	6.8 E-05
Technetium-99m	Ci	8.8 E-05
Barium-lanthanum-140	Ci	2.4 E-04
Cerium-141	Ci	1.1 E-04
Cerium-144	Ci	4.8 E-04
Tritium	Ci	1.5 E+00
Iron-55	Ci	5.8 E-04
Arsenic-76	Ci	4.8 E-04

TABLE C-1 (Cont'd)

WNP-2 1985 LIQUID EFFLUENTS - SOURCE TERMS

Nuclides Released	Unit	Annual
Tungsten-187	Ci	6.4 E-05
Antimony-122	Ci	1.4 E-05
Antimony-124	Ci	3.0 E-06
Silver-110m	Ci	2.0 E-05
Zirconium-95	Ci	3.1 E-05
Total for Period (Above)	Ci	1.5 E+00

TABLE C-2

SUMMARY OF DOSES FROM 1985 LIQUID EFFLUENTS
MAXIMUM INDIVIDUAL^a

Location: Richland
 Exposure pathway - fishing, drinking, shoreline and food ingestion.

Age Group: Adult (An individual residing in Richland).

<u>Pathway</u>	<u>Annual 1985 Whole Body (mrem/yr)</u>	<u>Annual 1985 Maximum Organ. (mrem/yr)</u>
Drinking	2.7E-06	6.0E-06
Shoreline	6.3E-07	6.7E-07
Fishing	3.9E-03	7.3E-03
Boating	3.7E-09	3.7E-09
Swimming	3.0E-09	3.0E-09
Leafy Vegetables	4.8E-07	1.4E-06
Vegetables	2.9E-06	7.0E-06
Cow Milk	5.1E-05	7.4E-05
Meat	1.8E-07	5.0E-07
Total ^b :	4.0E-03	7.4E-03
Tech. Spec. Limits: (mrem/yr)	(3.0E+00)	(1.0E+01)
Balance to Year End: (mrem)	2.99E+00	9.99E+0

^aThe Maximum Individual is an adult assumed to reside in Richland, consume food grown in the Riverview area in Pasco, Washington, and fish at the WNP-2 slough area.

^bWNP-2 Semi-Annual Effluent Report - January 1 to June 30, 1985
 WNP-2 Semi-Annual Effluent Report - July 1 to December 31, 1985

TABLE C-3

AVERAGE INDIVIDUAL DOSES FROM 1985 LIQUID EFFLUENTS^a

<u>Pathway</u>	<u>Whole Body (mrem)</u>	<u>Max. Organ (mrem)</u>
Fish	9.8E-06	1.8E-05
Drinking Water	1.4E-06	3.6E-06
Shoreline	2.0E-08	2.5E-08
Swimming	3.3E-10	3.3E-10
Boating	1.9E-10	1.9E-10
Vegetables	4.0E-05	1.0E-04
Leafy Vegetables	3.2E-05	9.8E-05
Milk	2.2E-06	3.1E-06
Meat	<u>5.5E-07</u>	<u>1.3E-06</u>
Total ^b :	8.6E-05	2.2E-04

^aThe population doses divided by the 50-mile radius production population served.

^bWNP-2 Semi-Annual Effluent Report - January 1 to June 30, 1985
WNP-2 Semi-Annual Effluent Report - July 1 to December 31, 1985

TABLE C-4

50-MILE POPULATION DOSES FROM 1985 LIQUID EFFLUENTS^a

Pathway	ANNUAL 1985		DESIGN BASE ^b	
	Whole Body (man-rem)	Max. Body (man-rem)	Whole Body (man-rem)	Max. Body (man-rem)
Drinking Water	7.3E-05	1.5E-03	8.3E-04	3.4E-03
Shoreline	6.8E-06	7.9E-06	1.9E-04	2.2E-04
Fishing	5.0E-06	8.7E-06	5.4E-04	1.0E-03
Swimming	1.1E-07	1.1E-07	3.1E-06	3.1E-06
Boating	2.6E-08	2.6E-08	7.7E-07	7.7E-07
Vegetables	6.0E-05	1.5E-04	4.3E-04	6.2E-04
Leafy vegetables	4.8E-05	1.8E-04	2.7E-05	4.0E-05
Milk	3.7E-06	5.6E-06	2.7E-04	4.7E-04
Meat	8.9E-07	2.3E-06	5.7E-05	9.6E-05
Total	2.0E-04	1.86E-03	2.4E-03	5.9E-03

^aAll age groups combined.

^bBased on design base source terms (i.e., GALE Liquid Computer Code).

TABLE C-5

WNP-2 1985 GASEOUS EFFLUENTS-SOURCE TERMS

Nuclides Released	Unit	Reactor Building	Turbine Building	Radwaste Building
-------------------	------	------------------	------------------	-------------------

1. Fission gases

Krypton-85	Ci	1.6 E-01	3.1 E+00	1.7 E-01
Krypton-85m	Ci	4.7 E+00	8.8 E-01	6.7 E-01
Krypton-87	Ci	2.8 E+00	6.9 E+00	1.6 E+00
Krypton-88	Ci	8.0 E+00	8.7 E+00	2.3 E+00
Xenon-133	Ci	7.2 E+00	9.8 E+00	4.3 E+00
Xenon-135	Ci	5.3 E+00	6.4 E+00	5.0 E+00
Xenon-135m	Ci	1.1 E+00	4.9 E+00	3.7 E+00
Xenon-138	Ci	1.4 E+01	3.5 E+01	1.1 E+01
Xenon-131m	Ci	1.3 E+00	0.0 E+00	0.0 E+00
Xenon-133m	Ci	8.7 E+00	2.2 E+01	5.9 E+00
Argon-41	Ci	7.2 E-01	0.0 E+00	0.0 E+00
Xenon-137	Ci	0.0 E+00	0.0 E+00	1.7 E+00
Total for period	Ci	5.4 E+01	9.8 E+01	3.6 E+01

2. Iodines

Iodine-131	Ci	1.3 E-03	6.2 E-04	1.4 E-04
Iodine-133	Ci	9.6 E-03	4.4 E-03	1.0 E-03
Total for period	Ci	1.1 E-02	5.0 E-03	1.1 E-03

TABLE C-5 (Cont'd)

WNP-2 1985 GASEOUS EFFLUENTS-SOURCE TERMS

3. Particulates

Strontium-89	Ci	9.0 E-06	2.4 E-05	2.1 E-06
Strontium-90	Ci	6.3 E-06	4.4 E-05	4.8 E-06
Cesium-134	Ci	1.6 E-03	2.6 E-03	3.1 E-04
Cesium-137	Ci	1.4 E-03	2.4 E-03	2.8 E-04
Barium- Lanthanum-140	Ci	5.5 E-03	8.9 E-03	9.5 E-04
Molybdenum-99	Ci	1.5 E-02	1.1 E-02	1.0 E-03
Cerium-141	Ci	1.5 E-03	2.8 E-03	3.1 E-04
Cerium-144	Ci	6.1 E-03	1.1 E-02	1.3 E-03
Cobalt-58	Ci	8.1 E-03	2.5 E-03	2.8 E-04
Cobalt-60	Ci	1.9 E-03	2.7 E-03	6.0 E-04
Chromium-51	Ci	1.7 E-02	1.9 E-02	2.1 E-03
Zinc-65	Ci	1.5 E-02	5.8 E-03	6.4 E-04
Zirconium-95	Ci	2.3 E-03	4.0 E-03	4.3 E-04
Iron-59	Ci	2.7 E-03	5.5 E-03	7.5 E-04
Manganese-54	Ci	1.9 E-02	2.5 E-03	3.4 E-04
Total for period	Ci	9.7 E-02	8.1 E-02	9.3 E-03

4. Tritium	Ci	2.0 E+00	5.2 E+00	3.2 E-01
------------	----	----------	----------	----------

Total building release	Ci	5.6 E+01	1.0 E+02	3.6 E+01
---------------------------	----	----------	----------	----------

TABLE C-6

SUMMARY OF ORGAN AND AIR DOSES FROM WNP-2 1985 GASEOUS EFFLUENTSLocation: 1.2 miles ESE (site boundary)

	<u>Balance as of Year-End (mrad)</u>
<u>Beta air dose:</u> 2.1E-01 mrad/yr (20 mrad/yr) ^a	19.7 E+00
<u>Gamma air dose:</u> 3.2E-01 mrad/yr (10 mrad/yr) ^a	9.6 E+00

Location: 4.2 miles SE Taylor FlatsAge Group: Infant

Total
Max. Organ
Dose (mrem/yr)

3.3E-02 (1.5E+01)^aContributions to total maximum organ dose (mrem)^b:

Ground: 5.4E-03

Goat Milk: 2.7E-02

Inhalation: 1.1E-03

^aNumbers in parentheses represent Technical Specification limits.^bDose to the liver

TABLE C-7

AVERAGE INDIVIDUAL DOSES FROM 1985 GASEOUS EFFLUENTS^a

<u>Exposure Pathway</u>	<u>Whole Body (mrem)</u>	<u>Max. Organ (mrem)</u>
Plume	1.3E-04	5.1E-04
Ground	1.6E-04	1.8E-04
Inhalation	1.0E-04	1.5E-03
Vegetables	3.6E-06	7.1E-06
Cow Milk	1.1E-09	1.8E-09
Meat	<u>7.7E-10</u>	<u>1.3E-09</u>
TOTAL	3.9E-04	2.2E-03

^aThe projected population doses divided by the population for the 50-mile radius in the year 2000.

TABLE C-8

50-MILE POPULATION DOSES FROM 1985 GASEOUS EFFLUENT^a

Exposure Pathway	1985 DATA		DESIGN BASE DATA ^b	
	Whole Body (man-Rem)	Max. Organ (man-Rem)	Whole Body (man-Rem)	Max. Organ (man-Rem)
Plume	4.2E-02	1.7E-01	2.4E-01	6.9E-01
Ground	5.2E-02	6.2E-02	4.3E-02	5.1E-02
Inhalation	3.5E-02	5.0E-01	1.1E-02	1.3E+0
Vegetables	1.2E-03	2.4E-03	1.9E-02	2.7E+0
Cow Milk	3.6E-07	6.0E-07	9.2E-03	1.8E+0
Meat	<u>2.6E-07</u>	<u>4.3E-07</u>	<u>1.9E-03</u>	<u>6.9E-02</u>
TOTAL	1.3E-01	7.3E-01	3.2E-01	6.6E+0

^aAll age groups combined.^bBased on design base source terms.

DISTRIBUTION

No. of
Copies

No. of
Copies

OFFSITE:

Administrator, Region V
U. S. Nuclear Regulatory Commission
1450 Maria Lane, Suite 210
Walnut Creek, CA 94596-5368

(3) R. R. Mooney
Dept. of Social & Health Services
Radiation Control Section
Thurston Airdustrial Center
Bldg. 5, LE-13
Olympia, WA 98504

D. R. Elle
U. S. Department of Energy
Richland Operations Office
Federal Building
825 Jadwin Avenue
Richland, WA 99352

K. R. Price
Senior Research Scientist
Occupational & Env. Protection
Battelle, PNL
2400 Stevens Building
P. O. Box 999
Richland, WA 99352

R. L. Dirkes, Supervisor
Occupational & Env. Protection
Battelle, PNL
2400 Stevens Building
P. O. Box 999
Richland, WA 99352

(18) Document Control Desk
Nuclear Regulatory Commission
Washington, DC 20555

(3) William L. Fitch
Executive Secretary
EFSEC
Mail Stop PY-11
820 E. 5th Avenue
Olympia, WA 98504

(2) M. Lardy
United States Testing Co.
2800 George Washington Way
Richland, WA 99352

T. R. Strong
Washington State
Dept. of Social & Health Services
Airdustrial Park - Bldg. 6
Mail Stop LF-13
Olympia, WA 98504

R. D. Paris
Radiation Control Section
Oregon State Health Division
P. O. Box 231
Portland, OR 97207

E. Cowan
Environmental Protection Agency
Region X
1200 - 6th Avenue
Seattle, WA 98101

DISTRIBUTION

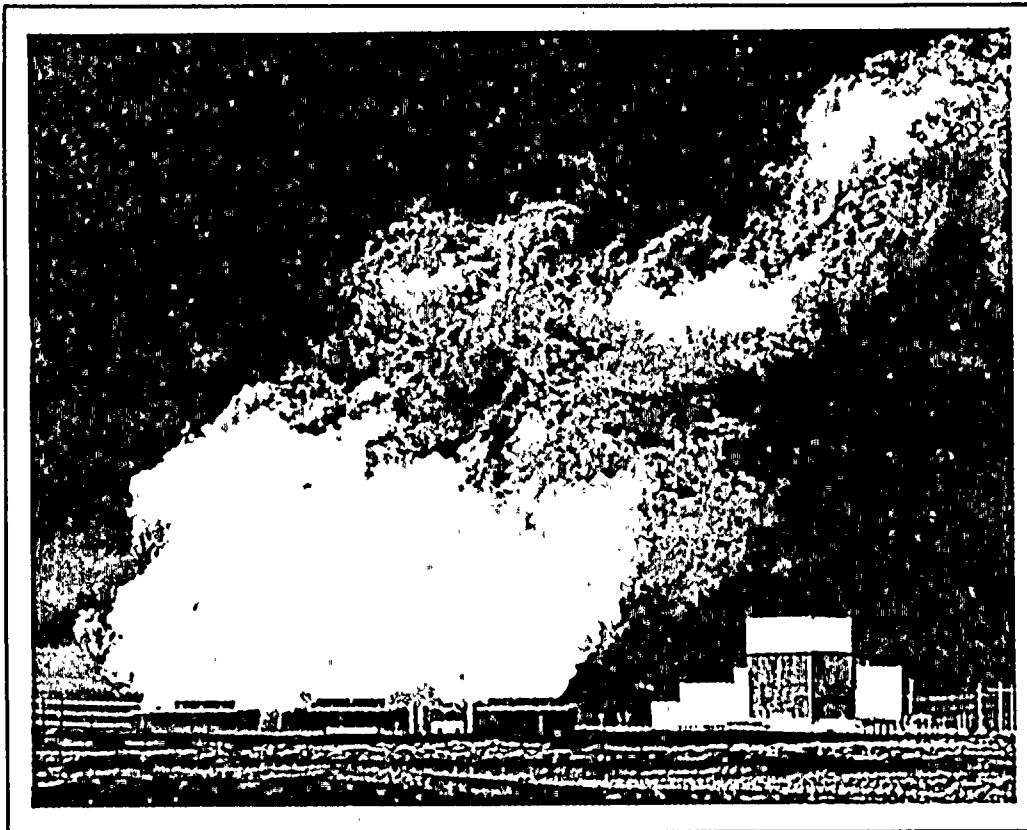
No. of
Copies

No. of
Copies

SUPPLY SYSTEM:

C. M. Powers WNP-2 Plant Manager Mail Drop 927S P. O. Box 968 Richland, WA 99352	R. A. Chitwood, Manager Emergency Planning and Environmental Programs Mail Drop 1020 P. O. Box 968 Richland, WA 99352
(3) R. G. Graybeal, Manager WNP-2 Health Physics/Chemistry Mail Drop 927S P. O. Box 968 Richland, WA 99352	D. E. Larson, Manager Radiological Programs Mail Drop 1020 P. O. Box 968 Richland, WA 99352
P. L. Powell, Manager WNP-2 Project Licensing Mail Drop 956B P. O. Box 968 Richland, WA 99352	WNP-2 Files Mail Drop 964Y P. O. Box 968 Richland, WA 99352
G. C. Sorensen, Manager Regulatory Programs Mail Drop 280 P. O. Box 968 Richland, WA 99352	Supply System Library Mail Drop 330 P. O. Box 968 Richland, WA 99352
C. VanHoff Senior State Liaison Mail Drop 280 P. O. Box 968 Richland, WA 99352	Environmental Programs Library Mail Drop 1020 P. O. Box 968 Richland, WA 99352
J. P. Chasse Sr. Env. Licensing Engineer Mail Drop 280 P. O. Box 968 Richland, WA 99352	T. E. Chapman Sr. Health Physicist Mail Drop 1020 P. O. Box 968 Richland, WA 99352

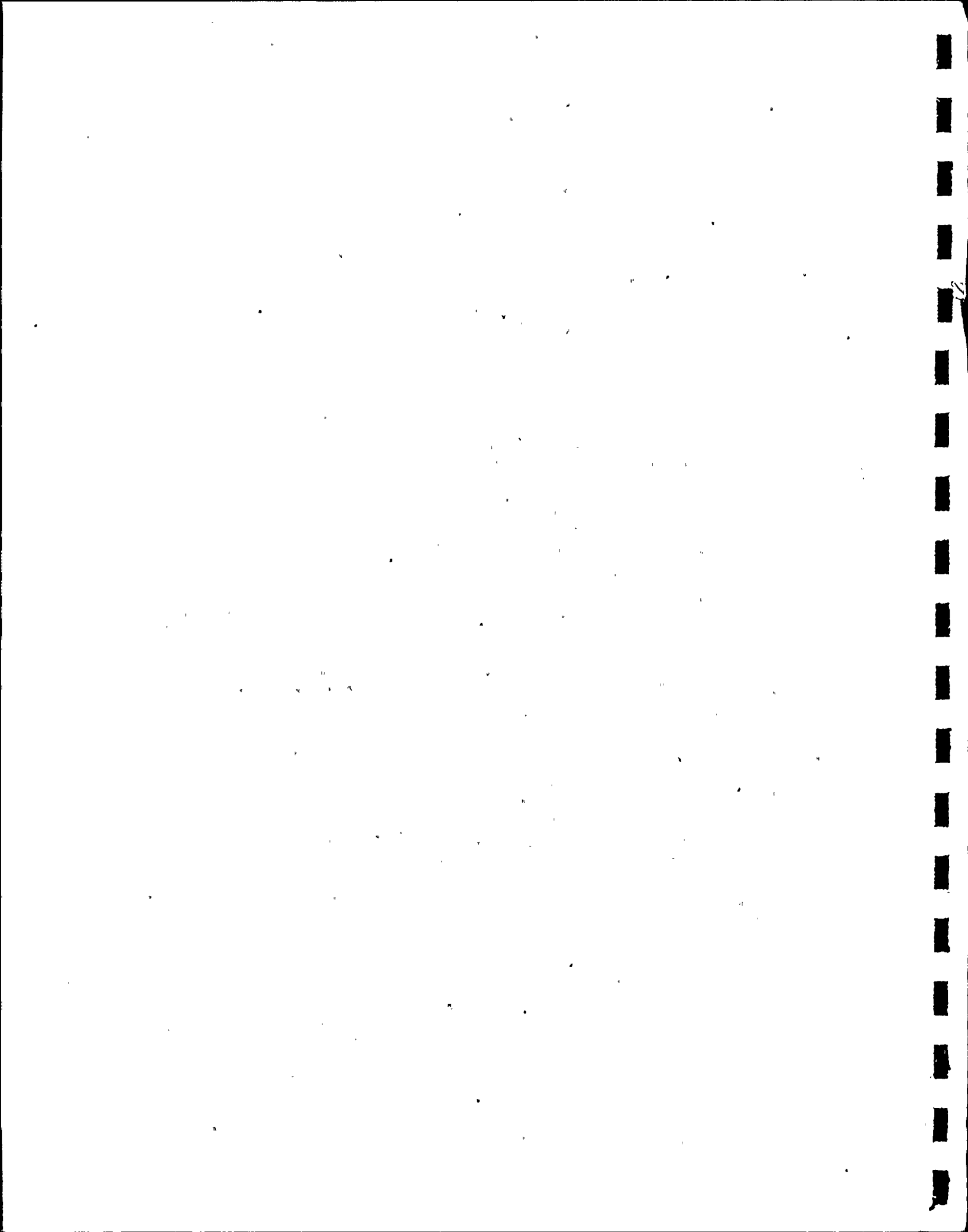
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM ANNUAL REPORT WNP-2



1984



WASHINGTON PUBLIC POWER
SUPPLY SYSTEM



1984
ANNUAL REPORT

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
NUCLEAR PLANT NUMBER 2

Prepared by:

J.K. Prince, REMP Technical Program Manager
Washington Public Power Supply System


M.M. Lardy, Laboratory Director
United States Testing, Richland Division

N.H. Hembree, Manager Quality Assurance
United States Testing, Richland Division

K.V. Miller, Supervisor Statistics and Programming
United States Testing, Richland Division



R.A. Chitwood, Manager
Emergency Preparedness and Environmental Programs, Supply System



V.H. Pettey, Vice President & General Manager
United States Testing, Richland Division

TABLE OF CONTENTS

<u>Section</u>	<u>Title</u>	<u>Page</u>
1.0	INTRODUCTION	1
1.1	Site and Station Description	1
1.2	Objectives	1
2.0	PROGRAM DESCRIPTION	2
3.0	SAMPLING METHODS AND ANALYTICAL PROCEDURES	17
3.1	Direct Radiation	17
3.2	Airborne Particulate/Air Iodine	17
3.3	Water	17
3.4	Soil	18
3.5	Shoreline Sediment	18
3.6	Fish	18
3.7	Milk	18
3.8	Garden Produce	18
3.9	Analytical Procedures (UST-RD)	19
4.0	SUMMARY AND DISCUSSION OF RESULTS	21
4.1	Direct Radiation	22
4.2	Airborne Particulate/Air Iodine	23
4.3	Water	23
4.4	Soil	24
4.5	Shoreline Sediments	24
4.6	Fish	24
4.7	Milk	24
4.8	Garden Produce	25
5.0	RADIOLOGICAL IMPACT	40
6.0	REFERENCES	40
Appendix A	Laboratory Quality Control	
Appendix B	Results	
Appendix C	WNP-2 Effluents and Dose Assessment	

LIST OF TABLES

<u>Section</u>	<u>Title</u>	<u>Page</u>
Table 2-1	Radiological Environmental Monitoring Program Plan	3
Table 2-2	REMP Sample Locations by Sector	6
Table 2-3	1984 Deviations	10
Table 2-4	1984 Land Use Census Within 5 Radial Miles of WNP-2	12
Table 2-5	Nearest Points of Interest Within 10 Mile Radius	13
Table 4-1	1984 Combined Summary of Data for WNP-2 REMP	26
Table 4-2	Data Summary, Preoperational vs. Operational	30
Table 4-3	Quarterly TLDs by Station, Preoperational vs. Operational	32
Table 4-4	Annual TLDs by Station, Preoperational vs. Operational	34
Table 4-5	1984 Yearly Average for Quarterly TLDs vs. Annual TLD by Station	37

LIST OF FIGURES

Figure 2-1	REMP Sample Locations Within 10 Mile Radius	14
Figure 2-2	REMP Sample Locations Beyond 10 Mile Radius	15
Figure 2-3	REMP Sample Area, Hanford Fire Zone Impact	16
Figure 4-1	Quarterly TLDs 1982-1984	38
Figure 4-2	Gross Beta in Air 1984	39

1.0 INTRODUCTION

The radiological environmental monitoring program for the Washington Public Power Supply System (Supply System) Nuclear Plant Number 2 (WNP-2) was initiated in March 1978. The preoperational program extended from March 1978 until initial criticality on January 19, 1984. This is the first annual operational report, covering the period January 19, 1984 through December 31, 1984. The report summarizes the results of measurements and analyses of data obtained from samples collected during this period.

The prime contractor for radiological analytical services, NUS Corporation, Radiological Laboratory, Pittsburgh, Pennsylvania, discontinued operations effective August 1984. Subsequent analyses were contracted to United States Testing Company, Inc., Richland Division, (UST-RD) Richland, Washington.

1.1 Site and Station Description

WNP-2 is located on property leased from the United States Department of Energy (DOE) within the Hanford Reservation in the south-eastern part of the State of Washington. WNP-2 is located on approximately 202 acres, 12 miles north of the center of Richland, Washington, the nearest incorporated community. The plant is approximately 3-1/4 miles west of the Columbia River.

The Supply System Hanford Site will eventually consist of one 1150 megawatt BWR (WNP-2) and one 1250 megawatt PWR (WNP-1). WNP-1 is currently scheduled for commercial operation in 1991. WNP-2 began loading fuel December 25, 1983 and was declared in commercial operation on December 13, 1984.

1.2 Objectives

United States Nuclear Regulatory Commission (USNRC) regulations require that nuclear power plants be designed, constructed, and operated to keep levels of radioactive material in effluents to unrestricted areas as low as reasonably achievable (ALARA) (10CFR50.34). To assure that these criteria are met, each license authorizing reactor operation includes technical specifications (10CFR50.36a) governing the release of radioactive effluents. In-plant monitoring is used to assure that these predetermined release limits are not exceeded. However, as a precaution against unexpected and undefined processes which might allow undue accumulation of radioactivity in any sector of man's environment, a program for monitoring the environs in the vicinity of the plant is also included.

Background levels of radioactivity at any one location are not constant but vary with time as influenced by external events such as cosmic ray bombardment, weapons test fallout, and seasonal variations.

These levels can vary spatially within relatively short distances reflecting variations in geological composition. Because of the spatical and temporal variations, evaluation of the radiological component of the plant site was initiated during the preoperational (construction) phase of the nuclear plant. This preoperational phase program of sampling and measuring radioactivity in various environmental media permitted a general characterization of radiation levels and concentrations in the vicinity environs prior to plant operation. The preoperational phase of the program also provided some indication of the degree of natural variability that may be experienced. The operational phase of the program obtains data which, when evaluated along with the data obtained during the preoperational phase, provides some indication of the radiological impact, if any, of plant operation.

2.0 PROGRAM DESCRIPTION

Seventy-three locations were included in the 1984 monitoring program. Sixty-nine indicator and two control station locations were within 27 kilometers (17 miles) of WNP-2. Two locations designated for control stations were greater than 40 kilometers (25 miles) from WNP-2. The number and location of monitoring stations was based on factors such as applicable regulations, population distribution, meterological conditions, access to station, security and future program integrity.

The Radiological Environmental Monitoring Program Plan is summarized in Table 2-1. Table 2-2 categorizes each sample station by location, sample media, and approximate distance and direction from WNP-2. Figures 2-1 and 2-2 graphically depict the sampling locations detailed in Tables 2-1 and 2-2. Deviations from the required sampling schedules specified in Table 2-1 periodically occur. The deviations experienced during the report period for WNP-2 are listed in Table 2-3. This table provides information relative to the location, date and cause of the problem that resulted in a deviation from the routine sample collection/analysis plan. Except as noted, most problems were resolved immediately, resulting in minimal impacts on the sampling program.

In addition to the collection and analysis of sample media as described in the program plan, an annual milk animal, vegetable garden, and residence survey was performed. This survey or land use census was designed to identify the nearest milk animal, garden and residence, or other activity of potential interest in the sampling program. Tables 2-4 and 2-5 summarize the information obtained during the August 1984 land use census.

Appendix A of this report is a compilation of the quality control programs of the various contract or service support organizations (Supply System, NUS Radiological Laboratory, UST-RD) for the 1984 report period. These programs include documentation of laboratory participation in interlaboratory comparison programs such as the Environmental Protection Agency's (EPA) Environmental Radioactivity Laboratory Intercomparisons Studies (Crosscheck) Program, The International Environmental Dosimeter Intercomparison Project and/or other equivalent interlaboratory comparison program(s).

TABLE 2-1

RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM PLAN

<u>Sample Type</u> ¹¹	<u>Sample Location Code</u> ¹	<u>Sampling and Collection Frequency</u> ¹	<u>Type and Frequency of Analysis</u> ¹
1. AIRBORNE			
a. Particulates and radioiodine (6/12)	1, 4-9, 21, 23, 40, 48, and 57	Continuous sampling Weekly collection	Particulate: Gross Beta ² , weekly; gamma isotopic ³ quarterly composite (by location)
2. DIRECT RADIATION			
a. TLD ⁴ (34/56)	1-9, 10-25, 40-47, 49-51, 53-56, 71-86	Quarterly, annually	Gamma, quarterly data review
b. PIC ¹¹ (0/3)	1, 21, and 23	Continuous recording, monthly tape exchange	Gamma, monthly data review
3. WATERBORNE			
a. Surface/ Drinking Water ⁶ (3/4)	26, 27, 28 and 29	Composite aliquots ⁵ monthly	Gamma isotopic ³ , Gross Beta; Tritium quarterly composite
b. Ground Water (2/3)	31, 32, and 52	Quarterly	Gamma isotopic ³ and tritium, quarterly
c. Sediment from shoreline (1/2)	33 and 34	Semiannually	Gamma isotopic ³
4. INGESTION			
a. Milk ⁷ (4/5)	9, 35, 36, 40, and 60	Semimonthly during grazing season, monthly at other times	Gamma isotopic ³ Iodine-131

TABLE 2-1 (Cont'd)

4.	<u>Sample Type</u> ⁽¹¹⁾	<u>Sample Location Code</u> ¹	<u>Sampling and Collection Frequency</u> ¹	<u>Type and Frequency of Analysis</u> ¹
	INGESTION (Cont'd)			
b.	Fish ⁸ (2/2)	30 and <u>38</u> , or 39	Seasonal or Semiannually	Gamma isotopic ³
c.	Garden Produce ⁹ (1/2)	37 and <u>9</u>	Monthly during growing season in the Riverview area of Pasco and a control near Grandview	Gamma isotopic ³

Sample locations are graphically depicted in Figures 2.0-1 and 2.0-2.

¹Deviations are permitted if samples are unobtainable due to hazardous conditions, seasonal availability, malfunction of automatic sampling equipment, or other legitimate reasons. All deviations will be documented in the Annual Radiological Environmental Monitoring Report. The underlined sample location designates a control station.

²Particulate sample filters will be analyzed for gross beta after at least 24-hour decay. If gross beta activity is greater than 10 times the mean of the control sample, gamma isotopic analysis should be performed on the individual sample.

³Gamma isotopic means identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents of the facility.

⁴TLD refers to thermoluminescent dosimeter. For purposes of WNP-2 REMP, a TLD is a phosphor card (32mm x 45mm x 0.5mm) with eight individual read-out areas (four main dosimeter areas and four back-up dosimeter areas) in each badge case. TLDs used in REMP meet the requirements of Regulatory Guide 4.13 (ANSI N545-1975), except for specified energy-dependence response. Correction factors are available for energy ranges with response outside of the specified tolerances. TLD stations 71-86 are special interest stations and are not included amongst the 34 routine TLD stations required by Plant Technical Specifications, Table 3.12-1. The code for TLD stations 71-76 was changed from 1S-16S to the current designation during the report period.

TABLE 2-1 (Cont'd)

⁵Composite (integrated grab) samples are collected with equipment which is capable of collecting an aliquot at time intervals which are short relative to the compositing period.

⁶Station 26, WNP-2 makeup water intake from the Columbia River is both an upstream surface water sample and drinking water control sample location. Station #28, 300 Area sample is both a downstream surface water sample and drinking water sample. Drinking water samples are not routinely analysed for I-131 from two week composite. Two week composite sample analysis is initiated when the dose calculated for the consumption of water is greater than 1 mrem per year maximum organ dose using ODCM methodology and parameters.

⁷Milk samples will be obtained from farms or individual milk animals which are located in sectors with high calculated annual average ground-level D/Qs and high dose potential. Routine milk samples are collected in areas of high dose potential instead of within 5km due to location of milk animals. If Cesium-134 or Cesium-137 is measured in an individual milk sample in excess of 30 pCi/l, then Strontium-90 analysis should be performed.

⁸There are no commercially important species in the Hanford reach of the Columbia River. Most recreationally important species in the area are anadromous, primarily salminoids. Four fish specimen will normally be collected by electroshock technique in the vicinity of the plant discharge (Station 30). If electroshocking produces insufficient fish samples, anadromous species may be obtained from a catch pond at Ringold Fish Hatchery (Station 39).

⁹Garden produce will routinely be obtained from farms or gardens using Columbia River water for irrigation. One sample of a root crop, leafy vegetable, and a fruit should be collected each sample period if available. The variety of the produce sample will be dependent on seasonal availability.

¹⁰Soil samples are collected to satisfy the requirements of the Site Certification Agreement (SCA), WNP-2.

¹¹The fraction in parentheses for each sample type indicates the ratio of Radiological Environmental Technical Specification (RETS) sample locations to total number of sample locations currently being monitored in the surveillance program.

TABLE 2-2

REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ¹	LOCATION	DISTANCE ³		SAMPLE TYPE ²
		MILES	METERS	
N (1)	52	0.10	161.	GW
	71	0.30	483.	TLD
	47	0.50	805.	TLD
	57	0.75	1201.	AP/AI
	18	1.10	1770.	TLD
	53	7.50	12068.	TLD
NNE (2)	72	0.40	644.	TLD
	2	1.80	2896.	TLD
	54	6.50	10459.	TLD
NE (3)	73	0.50	805.	TLD
	19	1.80	2896.	TLD
	48	4.30	6919.	AP/AI
	46	4.70	7562.	TLD
ENE (4)	74	0.40	644.	TLD
	21	1.50	2414.	AP/AI/SO/ TLD/PIC
	20	1.90	3057.	TLD
	11	3.10	4988.	TLD
	45	4.20	6758.	TLD
	44	5.70	9171.	TLD
	35	10.50	16895.	MI
	33	3.60	5792.	SE
	60	5.40	8689.	MI

TABLE 2-2 (Cont'd)

REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ¹	LOCATION	DISTANCE ³		SAMPLE TYPE ²
		MILES	METERS	
E (5)	75	0.40	644.	TLD
	31	1.1	1770.	GW
	32	1.2	1931.	GW
	22	2.10	3379.	TLD
	10	3.10	4988.	TLD
	26	3.20	5149.	PW
	27	3.20	5149.	DW
	43	5.70	9171.	TLD
	30	3.30	5311.	FI
	38	26.50	42649.	FI
ESE (6)	76	0.40	644.	TLD
	51	2.10	3379.	TLD
	23	3.00	4827.	AP/AI/SO/ TLD/PIC
	8	4.70	7562.	AP/AI/TLD
	42	5.60	9010.	TLD
	36	7.20	11585.	MI
	5	7.70	12389.	AP/AI/TLD
	34	3.50	5632	SE
SE (7)	77	0.50	805.	TLD
	24	1.90	3057.	TLD
	3	2.00	3218.	TLD
	41	5.80	9332.	TLD
	40	6.40	10298.	AP/AI/MI/TLD

TABLE 2-2 (Cont'd)

REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ¹	LOCATION	DISTANCE ³		SAMPLE TYPE ²
		MILES	METERS	
SSE (8)	78	0.70	1126.	TLD
	25	1.60	2574.	TLD
	55	7.00	11263.	TLD
	28	7.40	11907.	PW
	4	9.30	14964.	AI/AP/TLD
	29	11.00	17699.	PW
	37	16.00	25744.	GP
S (9)	79	0.70	1126.	TLD
	1	1.30	2092.	AP/AI/SO/ TLD/PIC
	6	7.70	12389.	AP/AI/TLD
SSW (10)	80	0.80	1287.	TLD
	50	1.20	1931.	TLD
	56	7.00	11263.	TLD
SSW (11)	81	0.74	1126.	TLD
	13	1.40	2253.	TLD
WSW (12)	82	0.50	805.	TLD
	14	1.40	2253.	TLD
	9 ⁵	30.00	48270.	AP/AI/MI/GP/ TLD/SO
W (13)	83	0.50	805.	TLD
	15	1.40	2253.	TLD

TABLE 2-2 (Cont'd)

REMP SAMPLE LOCATIONS BY SECTOR

SECTOR ¹	LOCATION	DISTANCE ³		SAMPLE TYPE ²
		MILES	METERS	
WNW (14)	84	0.50	805.	TLD
	16	1.40	2253.	TLD
	7	2.70	4344.	AP/AI/SO/TLD
NW (15)	85	0.50	805.	TLD
	49	1.20	1931.	TLD
NNW (16)	86	0.40	644.	TLD
	17	1.20	1931.	TLD
	12	6.10	9815.	TLD

1 The area in the vicinity of the WNP-2 plant is separated into 16 separate sectors for reporting purposes. The 16 sectors cover 360 degrees in equal 22.5 degree sections, beginning with Sector 1 (N) at 348.75 to 11.25 degrees continuing clockwise through Sector 16 (NNW).

2 Sample Type Key:

TLD - Thermoluminescent Dosimeter	MI - Milk
AP - Air Particulate	PW - Drinking/ Surface Water
AI - Air Iodine	GW - Ground Water
SO - Soil	DW - Discharge Water
SE - Sediment	GP - Garden Produce
FI - Fish	PIC - Pressurized Ion Chamber

3 Distances are estimated from map positions for each location as a radial distance from WNP-2 containment.

4 The Location #9 is for the Sunnyside-Grandview Control Area and is actually 3 separate stations within a few miles of each other (#9-A for TLD/AI/AP/SO, #9-B for GP, and #9-C for MI) all within 30-35 miles of WNP-2.

TABLE 2-3

1984 DEVIATIONS IN SAMPLING PROGRAM

<u>Sample Type</u>	<u>Location</u>	<u>Date</u>	<u>Problem</u>
TLD	1	8/14	Fire damaged. (On August 12, 1984, a range fire swept across a large portion of the Hanford Reservation area impacting the WNP-2, REMP (see Figure 2-3). All TLDs at locations visibly within the burn area were retrieved on 8/14. Replacement TLDs were also distributed on 8/14. Additional cross-check TLDs were placed at some non-affected locations.)
(Q & A)	13		
	15		
	17		
	18		
	19		
	20		
	25		
	49		
	50		
	78		
	79		
	80		
	83		
	85		
(Q & A)	46	9/05	TLD missing after field burning in the vicinity went out of control and reached the monitoring location.
Air			
(AP & AI)	23	2/6-2/13	Partial sample blown fuse in unit, new unit installed
	1	3/12-3/19	Partial sample, pump malfunction, new unit installed
	A11	3/19-3/26	Samples lost, no record of shipment to NUS
	40	3/26-4/2	Partial sample, construction work in vicinity causing intermittent power outage
	40	4/02-4/9	Same situation as 3/26-4/2
	23	4/23-4/30	Partial sample, blown fuse in unit, new unit installed
	23	4/30-5/7	Partial sample, blown fuse in unit, new unit installed
	23*	5/9-5/14	Partial sample, malfunctioning unit, new unit installed
	5	7/16-7/23	Partial sample, pump failure, new unit installed
	7	8/13-8/20	Partial sample, power outage, new unit installed
	9	8/27-9/4	Partial sample, pump failure, new unit installed
	57	8/27-9/4	Partial sample, pump failure, new unit installed
(AP)	1	9/04-9/10	Multiple filters due to heavy dust loading

*Due to recurring problem at Station 23, Bonneville Power Administration (BPA) was requested to investigate the power surge problem.

TABLE 2-3
1984 DEVIATIONS IN SAMPLING PROGRAM
(Continued)

<u>Sample Type</u>	<u>Location</u>	<u>Date</u>	<u>Problem</u>
(AP & AI)	7	10/01-10/08	Partial sample, pump failure, new unit installed
(AP)	1	10/22-10/29	Multiple filters due to heavy dust loading
(AP & AI)	48	11/26-12/3	Partial sample, power outage and pump failure, new unit installed
(AP & AI)	21	12/10-12/17	Partial sample, sampler unit malfunction, new unit installed
<u>Water**</u>	26	03/14	No sample, unit malfunction, unit repaired
	26	08/15	Partial sample, unit malfunction, unit repaired
<u>Milk</u>	35	04/03	Sample lost during analytical process
	9	09/05	No sample, producer out of town
	60	10/23	Partial sample, goat kicked milk bucket over spilling most of sample.
	60	11/14	No sample due to breeding of milkers.
	60	12/18	No sample due to breeding of milkers.

Key

Q = Quarterly

A = Annual

TLD = Thermoluminescent Dosimeter

AP = Air Particulate

AI = Air Iodine

**RETS, Table 3.12-1, footnote f, defines a composite water sample as one in which the quantity (aliquot) of liquid sampled is proportional to the quantity of flowing liquid. WNP-2 water samplers are integrated grab samplers, collecting aliquots at set time intervals without considerations for river or stream flow. Further evaluation will be conducted during 1985.

TABLE 2-4

1984 LAND USE CENSUS WITHIN 5 RADIAL MILES OF WNP-2

<u>Class of Observation</u>	<u>Direction*</u>	<u>Milage**(km)</u>	<u>Numbers</u>
Dairy Animals			
1) Cows	--	--	
2) Goats***	--	--	
Meat Animals			
1) Beef	ENE	4.0 (6.45)	100
	ENE	4.7 (7.58)	15
2) Sheep	--	--	
Vegetable Gardens (≥ 50 m ²)			
	ENE	4.0 (6.45)	
	E	4.8 (7.74)	
	ESE	4.7 (7.58)	
	ESE	4.8 (7.74)	

* Direction for each location is identified according to meteorological sectors (16 different, $22\frac{1}{2}^\circ$ compass sections with due north bisecting the 1st $22\frac{1}{2}^\circ$ sector).

** Distances are in miles (kilometers in parenthesis), radial distance from WNP-2 containment as estimated from map positions for each location.

*** Goat herd (6 animals) located in ENE sector at 5.4 miles (8.7 kilometers).

TABLE 2-5

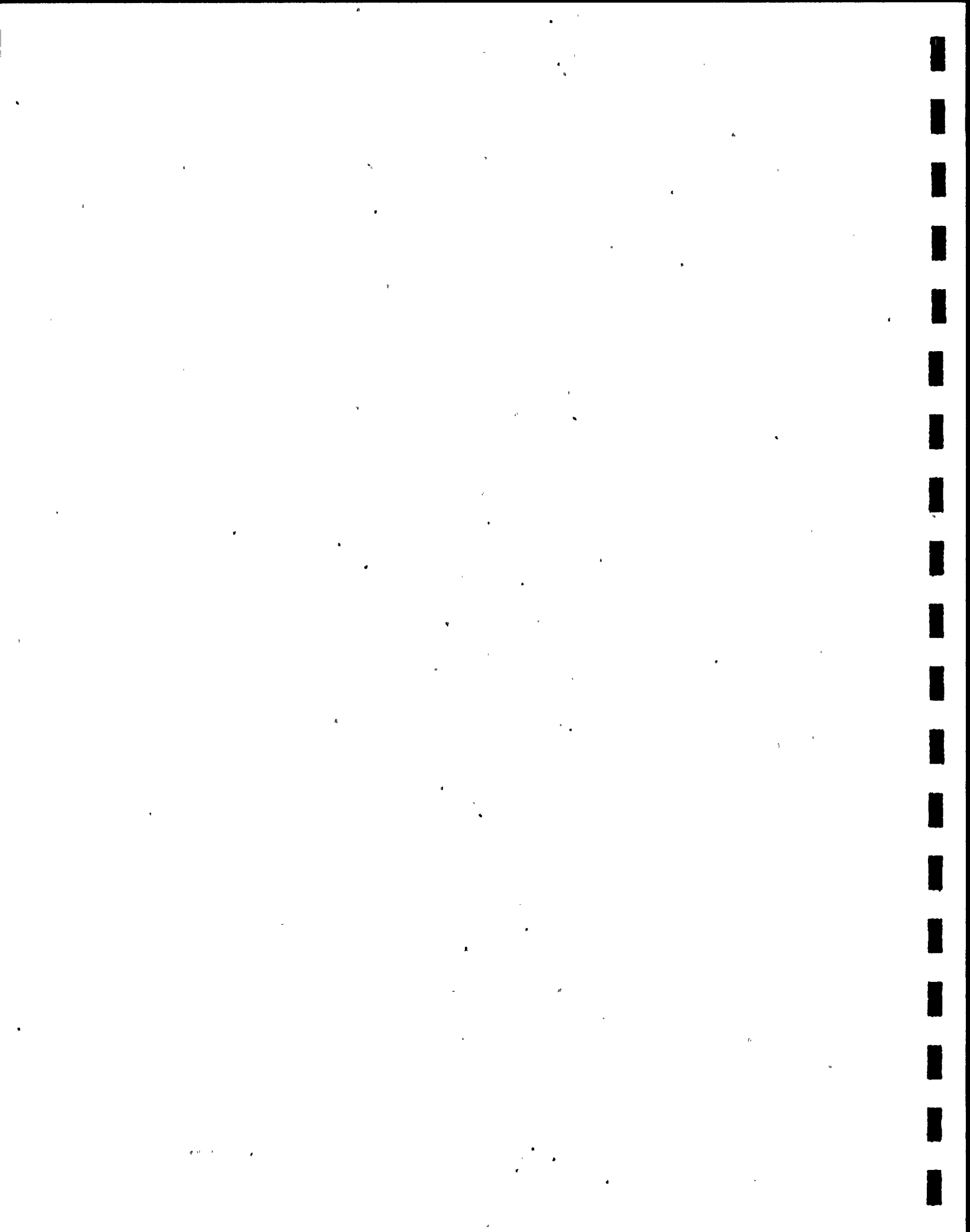
DISTANCES FROM WNP-2* TO NEAREST POINTS OF INTEREST WITHIN 10 MILE RADIUS

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NNW
Resident	7.6 (12.3)	6.0 (9.7)	4.4 (7.1)	4.0 (6.5)	4.3 (6.9)	4.2 (6.8)	4.8 (7.7)	7.5 (12.1)	9.5 (15.3)	7.5 (12.1)	--	--	--	--	--
Garden	8.0 (12.9)	8.0 (12.9)	5.5 (8.9)	4.0 (6.5)	4.8 (7.7)	4.7 (7.6)	6.0 (9.7)	7.5 (12.1)	9.6 (15.5)	7.5 (12.1)	--	--	--	--	--
Livestock	9.4 (15.2)	7.9 (12.7)	6.0 (9.7)	4.0 (6.5)	4.5 (7.3)	6.0 (9.7)	6.0 (9.7)	8.0 (12.9)	10.0 (16.1)	--	--	--	--	--	--
Dairy (Goats)	--	--	--	(5.4) (8.7)	--	7.3 (11.8)	9.7 (15.6)	--	--	--	--	--	--	--	--

*Distances are in miles (kilometers in parenthesis), radial distance from WNP-2 containment as estimated from map positions for each location.

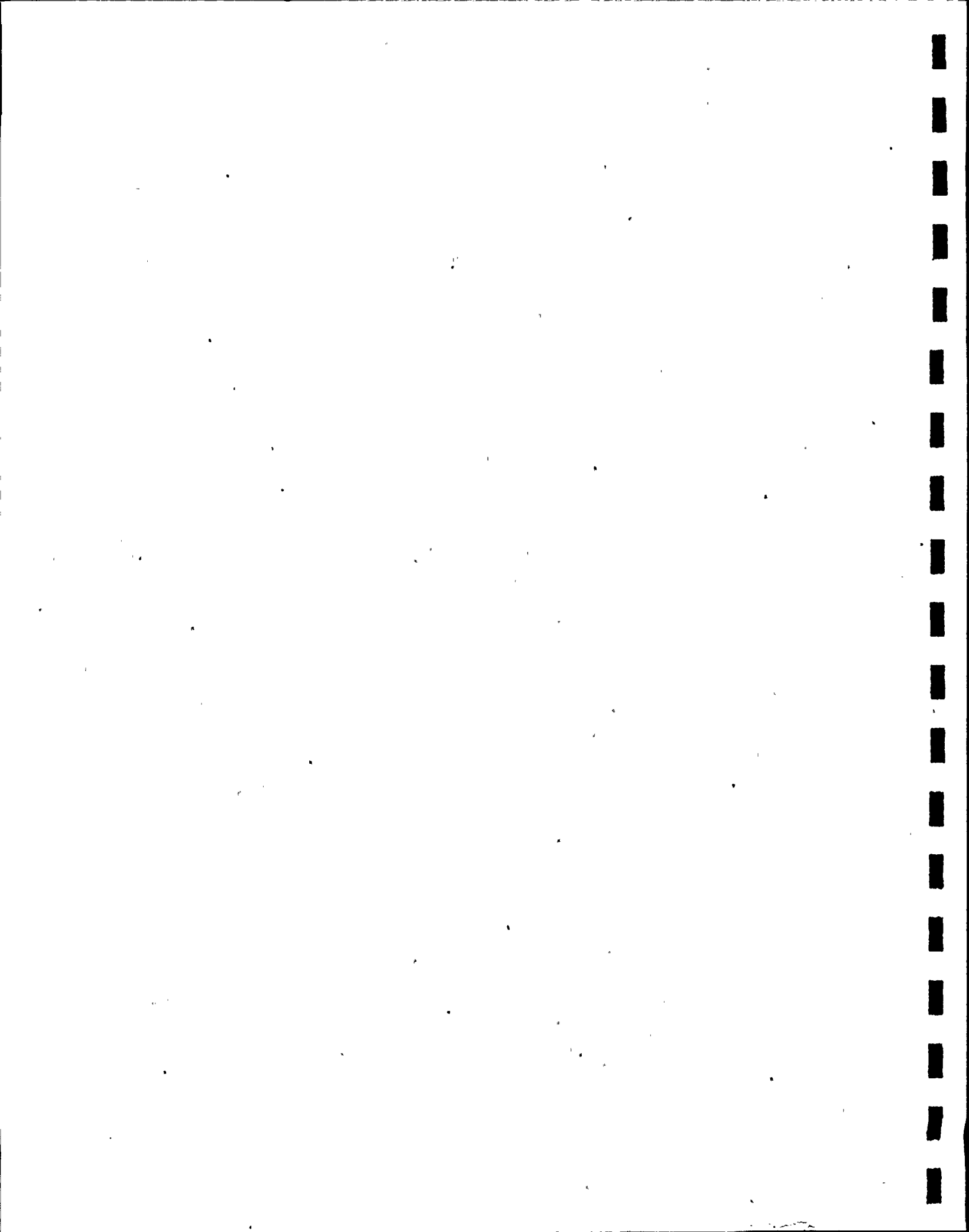
1984 Survey Information:

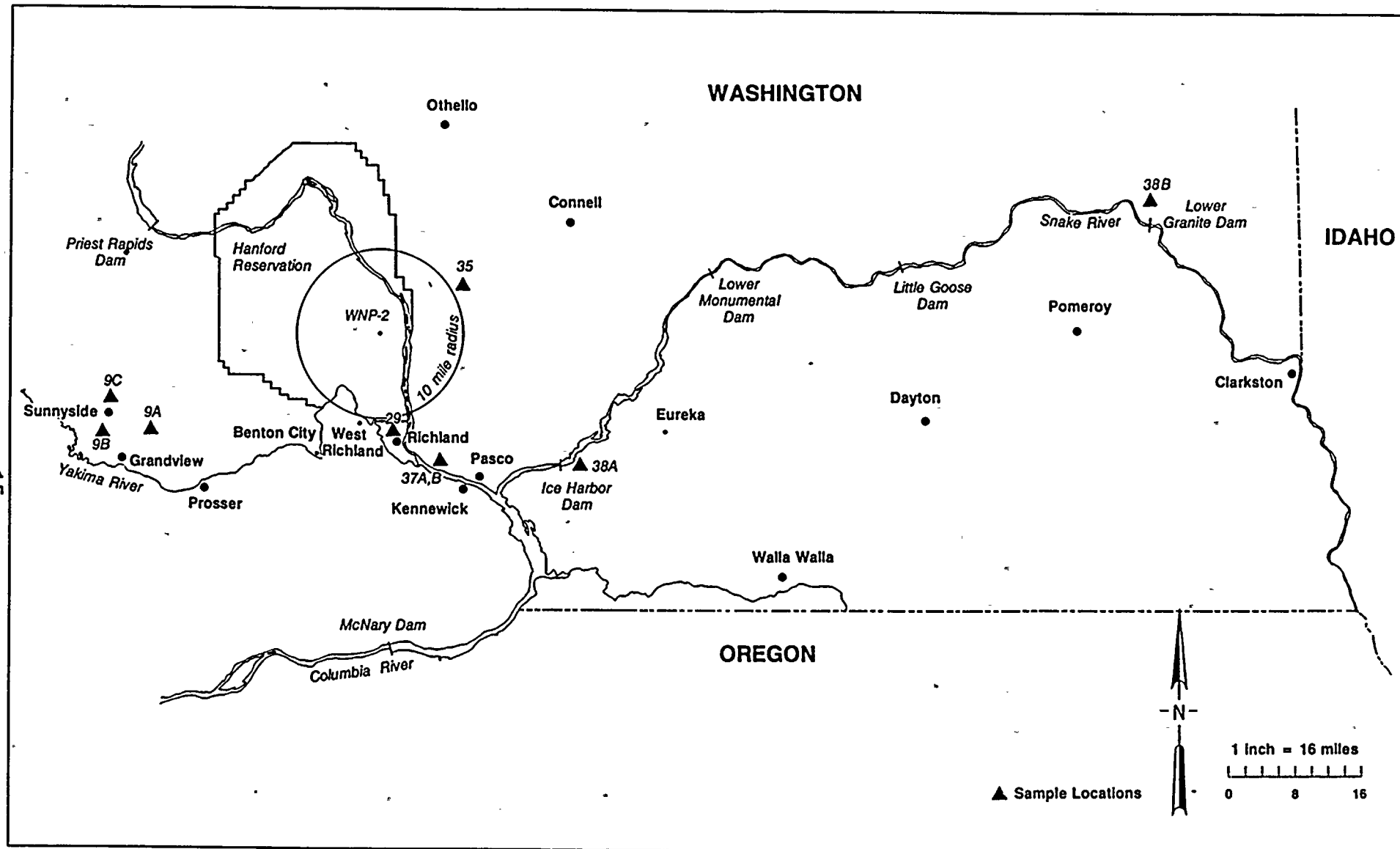
Door to door within five (5) miles, road survey to nearest point of interest within 5-10 miles.



822318.1
Rev. 3 (11/84)

FIGURE 2-1

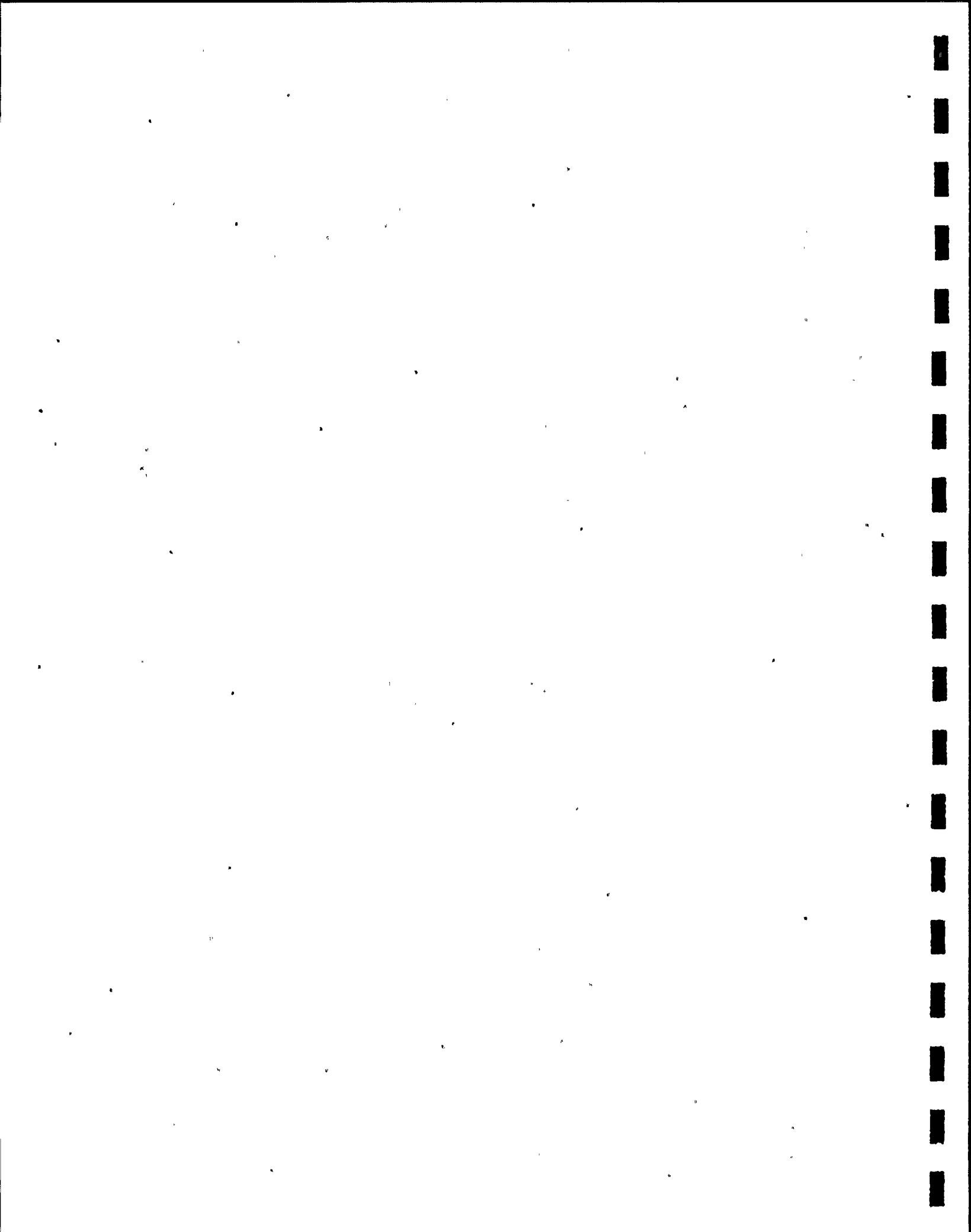


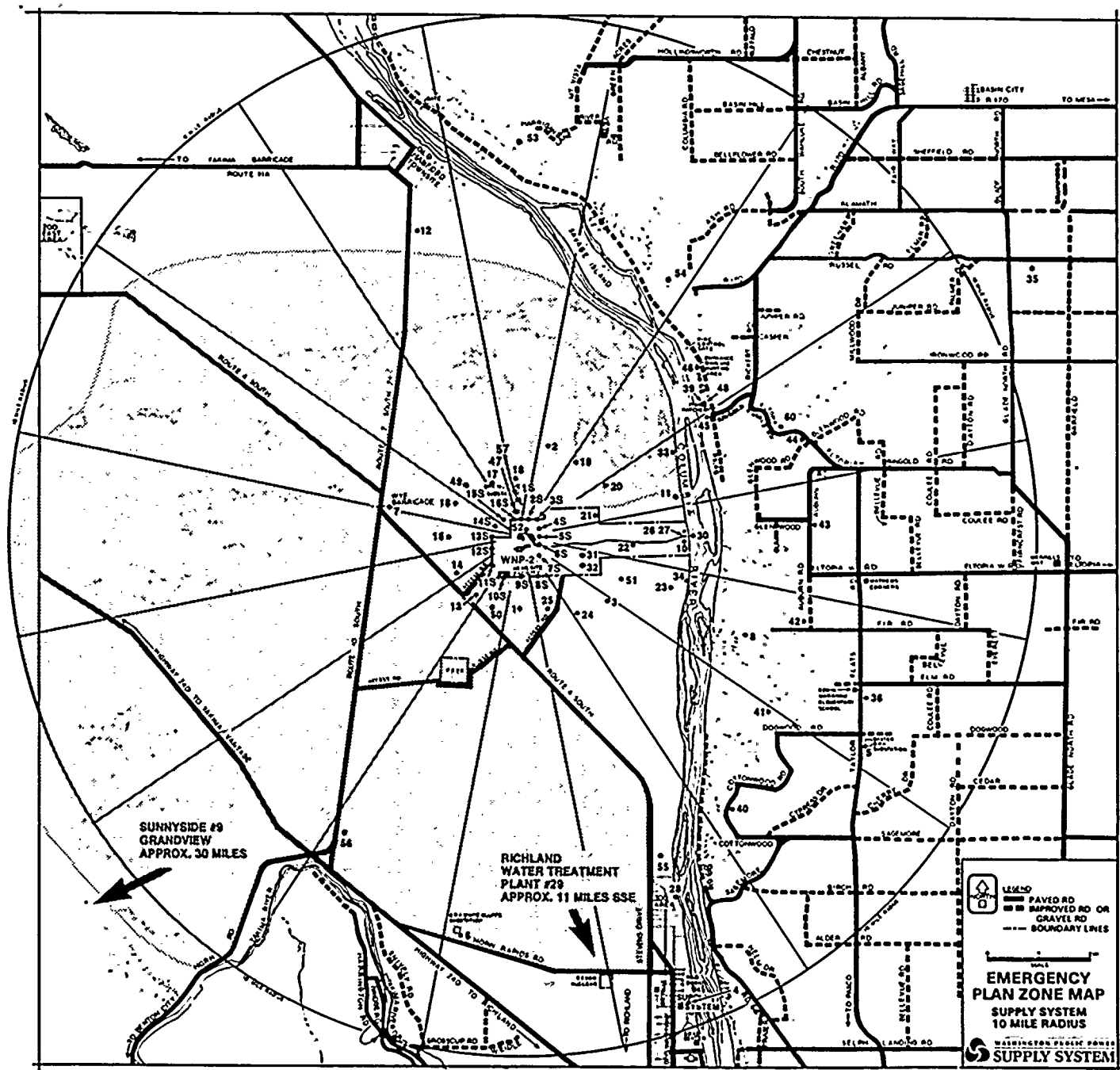


Radiological Environmental Monitoring Sample Locations Outside of 10-Mile Radius

822171 REV. 1 (3/84)

FIGURE 2-2





822318.1
Rev. 3 (11/84)

AREA BURNED BY AUGUST 1984 HANFORD FIRE (Within 10 mile radius)
RADIOLOGICAL ENVIRONMENTAL MONITORING SAMPLE LOCATIONS INSIDE OF 10 MILE RADIUS

FIGURE 2-3

3.0 SAMPLING METHODS AND ANALYTICAL PROCEDURES

To obtain meaningful and useful data from the radiological environmental monitoring program, sampling methods and procedures are required which provide samples of media that are representative of potential exposure pathways within the environs of the surrounding area. Samples must then be analyzed for the various radioactive components by standard radiochemical methods.

All program samples were collected by personnel from the Supply System's Support Services Directorate (SSD), Emergency Preparedness and Environmental Programs Department. Sample media requiring radiological analytical processing were shipped to NUS prior to August 15, 1984. Between August 15 and December 31, 1984 radioanalytical processing was conducted by UST-RD. TLDs for evaluation of direct radiation were evaluated in-house by the Supply System's Support Services Directorate, Radiological Programs and Standards Department, External Dosimetry Laboratory.

3.1 Direct Radiation

Thermoluminescent dosimeters (TLDs) were used to determine direct (ambient) radiation levels at fifty-six (56) monitoring locations. Two sets of TLD cards ($\text{CaSO}_4:\text{Dy}$ in a teflon matrix) were deployed at each selected location. One set of dosimeters was exchanged on a quarterly basis. The second set was exchanged on an annual basis. Care was taken to minimize possible in-transit exposure to the TLDs during transport between the field and laboratory.

3.2 Airborne Particulate/Air Iodine

Air particulate and air iodine (I-131) samples were obtained by use of portable, low volume constant flow rate sampling units at each of twelve (12) locations. Air particulates were collected by drawing air through a 47 millimeter diameter glass fiber filter. Air iodine was collected by drawing air through a 57 millimeter diameter TEDA impregnated charcoal cartridge. The particulate air filter and charcoal cartridge were placed in tandem, particulate filter first, in a holder that attaches to the air inlet of the sampler unit. The sampler units were placed in ventilated metal weather housings mounted on elevated platforms at each air sample location.

The air sampler units were run continuously with the filter and charcoal cartridge exchanged weekly for analysis. The total sample time for each filter and cartridge was recorded from the elapsed time indicator, then sample volume was calculated and recorded by the assigned personnel.

3.3 Water

The water sampling network consists of seven (7) sampling locations, four (4) for evaluation of surface/drinking water and three (3) for evaluation of ground water. The surface/drinking water stations were equipped with sequential sampling units that distribute a small aliquot of water from the monitored stream to two large collection bottles at prescribed inter-

vals during the sampling period. Monthly samples were taken from the composite water volumes at each location. Grab samples were collected quarterly from each of the ground water monitoring well sites.

3.4 Soil

Terrestrial soil samples were collected from five (5) locations once during 1984. Each sample was taken from an area of approximately one (1) square foot to a depth of approximately 1 inch. Vegetation and rocks were removed prior to sending the soil sample to the laboratory for analysis.

3.5 Shoreline Sediment

Two (2) shoreline sediment samples were collected twice during the report period. One sediment sampling location is approximately 2 miles (3 kilometers) upstream and one location is approximately 1 mile (2 kilometers) downstream of the liquid effluent discharge point. Samples were scooped from the shallow surface sediments just below the water's surface in areas of sediment deposition along the river shoreline.

3.6 Fish

Fish samples were collected from two locations, the Columbia River and the Snake River. Stations 30 and 39 were designators for fish collected from the Columbia River. Fish caught by electroshock technique from the Columbia River in the vicinity of the plant discharge were designated by indicator Station #30. Salmonoids were collected at the Ringold Fish Hatchery (#39) after failure to collect any of this species of game fish by electroshock technique in the Columbia River. Fish returning to the hatchery stream pass through the plant discharge area of the Columbia River. Control fish species were collected from the Snake River (Station 38).

3.7 Milk

Milk samples were collected monthly during the months of January, February, March, October, November and December, and semi-monthly the remainder of the report period. Routine sample collections at Stations 9, 35, 36 and 40 were made as indicated above. Sample collection at Station 60 began on September 5, 1984 after completion of the annual land use census. Station 60, comprised of a very small goat herd, proved to be an unreliable indicator source. Milk production at Station 60 ceased in November 1984.

3.8 Garden Produce

Collection of garden produce was monthly from May through September 1984. Each month food stuff representing a root crop, fruit and vegetable stock were collected as seasonally available. Location 9 designates the control area, an agriculturally productive valley approximately 30-40 miles from the plant in an area of minimal downwind deposition. Location 37 designates an area both in a predominant downwind direction and drawing irrigation water from a source potentially impacted by plant liquid effluent discharge.

3.9 Analytical Procedures (UST-RD)

3.9.1 Determination of Gross Beta Activity in Airborne Particulates

The filters are stored under cover for about one week before they are counted to allow for the decay of natural radioactivity collected on the filters. The filters are counted directly with beta counters.

3.9.2 Gamma Determination of I-131 Adsorbed on Charcoal

A direct count is made of the charcoal canister using a germanium detector. The gamma spectrometry data is transferred to the main computer for the final report.

The iodine-131 content is reported in units of picocuries per cubic meter of air, using appropriate calibration factors.

3.9.3 Measurement of Gamma-Ray Emitters

The water sample is well mixed, acidified, and evaporated down to a volume of approximately 100 milliliters. The sample is adjusted to 100 ml, 200 ml, or 500 ml with D.I. water. It is submitted to the counting room for counting with a germanium detector.

Dried soil/sediment is transferred to a tared marinelli beaker. The weight of the sample is determined and the sample is submitted to the counting room and the count is made with a germanium detector.

The edible portion of foodstuff is transferred to a tared container weighed and counted with a germanium detector.

The air filters are composited into a plastic bottle for counting with a germanium detector.

The milk sample is measured and transferred into a 500 ml marinelli beaker for counting with a germanium detector.

The charcoal cartridge is placed into a plastic bottle for counting with a germanium detector.

3.9.4 Processing Data From Gamma Ray Pulse Height Analyzers

Samples are prepared for direct counting in one of several standard counting geometries. The samples are then counted on a germanium detector for a period that will ensure meeting the specified detection limit. Reduction of gamma ray pulse height spectrum is accomplished using a Nuclear Data Systems ND6700 computer (ND) and ND software.

The pulse height analysis program for spectra obtained using germanium detection, analyzes the spectra by locating the peaks, determining the centroid values for the peaks, calculating their corresponding energies in KeV, the area for each peak, and the associated standard deviation. The areas of the peaks are calculated by summation of the number of counts in each channel of the peak without assuming a gaussian peak shape. The area of the peak is converted to activity units per sample units by applying efficiency factors determined by using NBS traceable standards corrected for the counting geometry and sample aliquot factor when needed.

3.9.5 Determination of Gross Beta Activity in Water (Total or Suspended and Dissolved Solids)

While the measured gross activity is not indicative of any specific nuclide, it provides an index to the radioactive contamination of the sample. The beta counting efficiency is based on a Cs-137 standard corrected for self-absorption. Samples are evaporated with HNO_3 and directly plancheted for counting. Hence, the chemical yield is taken as 100%.

3.9.6 Determination of Iodine-131 in Water by Solvent Extraction Method

Iodide ion is separated from interferences by oxidation to I_2 with NaNO_2 and extraction into CCl_4 from dilute acid media. The iodine is then reduced to iodide with $\text{Na}_2\text{S}_2\text{O}_3$, slurried onto a 1" planchet for counting. Radiochemical purity and concentration at sampling time are determined by decay counting. Chemical yields are normally about 89%. Iodine-131 is determined with low background gas flow beta proportional counters having background counts of <1.5 cpm. Isotopic purity can be determined by recounting the sample and checking for the proper decay of the I-131.

3.9.7 Determination of Tritium in Water Samples

Tritium in water is measured by a direct count of the distilled sample using a liquid scintillation spectrometer. After distillation, a sample of 8 milliliters is pipetted into 12 milliliters of scintillator solution. The mixture is transferred to the refrigerated sample changer of the liquid scintillation counter and is allowed to remain there for 24 hours before counting. This waiting period allows for temperature equilibrium to be reached and for the decay of light excitation within the plastic vials. The counting efficiency of each sample (including corrections for quenching) is determined by using the external standard technique. A quench curve is obtained by counting samples with known amounts of tritium and varying amounts of quenching material. The degree of quenching is determined using an external radioactive source and is correlated with the counting efficiency of the appropriate standard. When a sample is counted, its quench parameter is determined and compared to the quench curve to obtain the counting efficiency.

3.9.8 Determination of SR-89 and SR-90

Strontium is precipitated sequentially first as the nitrate, and then as the carbonate. The fuming nitric acid separation removes most of the other interfering ions and concentrated nitric precipitations removes calcium. Radioisotopes of barium, radium, and lead are co-precipitated with barium chromate. Iron and final traces of other fission products are separated by a hydroxide scavenge. Following a final carbonate precipitation, gravimetric yield and Strontium-89 and Strontium-90 activity are determined. Yttrium-90 is permitted to grow into equilibrium with the Strontium-90, then separated from the Strontium by successive hydroxide and oxalate precipitations. The oxalate is transferred to a counting dish, dried under a heat lamp, ignited to Yttrium Oxide, weighed for chemical recovery, and counted on a low background Beta Proportional Counter. Decay counts are made to check the purity of the Yttrium-90.

3.9.9 Determination of Iodine-131 in Milk by Batch Ion Exchange Method

Iodine-131 in milk is adsorbed onto the resin and removed from the resin using NaOCl. After reduction to I_2 by hydroxylamine hydrochloride, the iodine is extracted into carbon tetra-chloride. The I_2 is reduced to I^- , extracted into water and precipitated as palladous iodide. Chemical yield is determined gravimetrically, based upon the amount of iodine carrier added. The I-131 concentration is determined by counting the palladous iodide precipitate in a low background beta counter. The isotopic purity may be determined by performing a decay count on the sample and checking the radioactive decay of I-131.

4.0 SUMMARY AND DISCUSSION OF ANALYTICAL RESULTS

United States Testing Company, Inc., Richland Division (UST-RD) assumed responsibility for the Supply System's WNP-2 Radiological Monitoring Program in August 1984. UST-RD is responsible for providing input for the radiological portion of the 1984 Annual Report and has assumed the responsibility incorporating NUS generated data into this report. NUS and UST-RD results are discussed below and are tabulated in Appendix B.2 and B.3 respectively. The Supply System conducts an "in-house" program for the monitoring of direct radiation (TLD). TLD results are shown in Appendix B.1.

The analyses performed by UST-RD were conducted according to procedures and specifications in the Quality Assurance Manual (UST-RD-QA-7-80), the Quality Control Manual (UST-QC-RL-9-80), the Control through Statistics Manual (UST-RL-10-80), and the Procedure Manual (UST-RD-PM-9-80). The procedures and specifications followed by NUS for their portion of the analyses are as required in Section 5.0 of the NUS Environmental Services Division Quality Assurance Manual, and are detailed in the NUS Radiological Laboratory Work Instructions.

UST-RD Analytical methods have lower LLD's (Lower Limit of Detection) than the "a Priori" LLD requirements as outlined in Table 2 of the US NRC Branch Technical Position on Radiological Monitoring (November 1979, Revision 1).(1) Through contract with the Supply System, UST-RD measures H-3, Sr-90 and I-131 at LLD's of 500, 2 and 0.5 pCi/L respectively. UST-RD reports the actual calculated result (including negative values) with two sigma counting error and total propagated uncertainty (TPU). When the value of the calculated result falls below the two sigma overall error, an asterisk is printed on the report just left of the result. Because UST-RD's LLD's are lower than the NRC and contract requirements, many results will be reported as positive even though they are below contractually required LLD's.

For NUS data, the use of "LT" in the data tables is the equivalent of the less than symbol (<) and is consistent with the NUS Radiological Laboratory practice of data reporting. The number following the "LT" is a result of the lower limit of detection (LLD) calculation as defined in Appendix B.2. NUS analytical methods meet the "a priori" LLD requirements addressed in Table 2 of the USNRC Branch Technical Position on Radiological Monitoring (November 1979, Revision 1).(1)

Data from NUS and UST-RD analysis of individual samples are given in Tables A-M, Appendix B.2 and A-M, Appendix B.3, respectively. A summary of the results appears in Table 4-1 and includes combined NUS and UST-RD generated data. The averages in the summary table are based on concentrations above the LLD as defined and required in USNRC Branch Technical Position, Detection Capabilities for Environmental Sample Analysis. In Table 4-1, the fraction (f) of the total number of analyses where activity was detected follows in parentheses. Also given in parentheses are the minimum and maximum values above the LLD for data taken during the report period. The naturally occurring radionuclides which were detected are included in the data tables, but not in the summary table. A comparative summary of preoperational phase data versus 1984 operational data is presented in Table 4-2. To summarize the data for this table, all "less than (LT)" results were treated as the actual value of the number following the LT designator. A mean expressed as a LT value indicates that a LT value(s) was present in the data population for calculation of the mean.

4.1 Direct Radiation

Environmental radiation dose rates, primarily due to gamma rays, as determined by thermoluminescent dosimeters (TLDs) are presented in summary Tables 4-3 through 4-5. Naturally occurring sources, including radiations of cosmic origin, natural radioactive substances in the atmosphere and soil, as well as fallout radioactivity from atmospheric testing of nuclear weapons, results in a certain amount of the radiation (background radiation) being recorded at all locations. Statistically significant variations occur between geographical areas within the region as is indicated by the station to station variability in the TLD summary tables. Annual averages for quarterly TLD measurements ranged from 0.19 to 0.25 mrem/day (approximately 69 to 91 mrem/yr). This can be compared

to a mean annual dose due to natural radiation of 70 mrem/yr for the Hanford area.(4) Dose measurements in 1984 were, in general, less than those observed during the previous two years of preoperational data for all respective locations. Figure 4-1 graphically displays the average results for all stations per quarter for two years of preoperational monitoring and report period (1982 through 1984).

4.2 Airborne Particulate/Air Iodine

Gross beta analyses on air particulate samples are presented in Table A of Appendices B.2 and B.3. The average weekly results are plotted in Figure 4-2. A total of 592 analyses were performed; 543 from indicator locations and 49 from the control location. A dust storm occurred during the week of October 22nd, causing dust loading problems at stations 1 and 7. The filters at these stations were changed three times during that week. The range for the indicator and control locations was 0.0029 to 0.164 and 0.0039 to 0.0642 pCi/m³, respectively. The range of results for all stations from the preoperational period was 0.01 to 0.13 pCi/m³. This can be compared to the normal background range of 0.006 to 0.06 pCi/m³ from the Hanford Environs for all stations for 1983.(2) The high result of 0.164 pCi/m³ at Station #7 occurred during the dust storm period and was probably the result of higher dust load on the filter and/or the effect of the smaller sample size (smaller sample sizes raise the LLD).

The filters were composited on a quarterly basis and analyzed by gamma spectrometry. The data from these analyses are presented in Table B of appendices B.2 and B.3. The only radionuclide above the LLD was Be-7 which is of cosmic origin. Be-7 was detected in all but four samples.

Iodine-131 measurements were made on the charcoal cartridges from the air sample collectors. The number of measurements totaled 588, of which 539 were from indicator locations and 49 from the control location. All of the Iodine-131 results were below the LLD of 0.07 pCi/m³ and are listed in Table C of Appendices B.2 and B.3.

4.3 Water

Gross beta measurements were made on 42 water samples; 32 from indicator locations and 10 from the control location. Three of the 42 results were greater than the LLD, (4 pCi/L), the highest of which was 4.77 pCi/L. The range of results for all stations from the preoperational period was 1.9 to 22.0 pCi/L. This can be compared to the average of 3.7 ± 2.0 pCi/L from Hanford Surveillance Richland Raw Water samples from 1983.(2) The results are located in Table D, Appendices B.2 and B.3.

The tritium results on 32 water samples are shown in Table E of Appendices B.2 and B.3. Three results were greater than 500 pCi/L, (contractual LLD). The maximum result was 679 pCi/L from the control drinking water sample location. The highest tritium result was 850 pCi/L from a sample at the discharge location. All tritium results were below Plant Technical Specification limits and Washington State water quality standards.

Gamma spectrometry results were made on 54 water samples; 42 from indicator locations and 10 from the control location. In some cases (because of long decay times), it was necessary to calculate the lanthanum-140 result from the barium-140 concentration, assuming that transient equilibrium existed between the parent and lanthanum-140 in order to achieve the required LLD. All other radionuclide concentrations were less than their respective LLD. Table F of Appendices B.2 and B.3 contain the listings of individual radionuclide concentrations.

Two strontium-89 and 90 analyses in water were performed. One strontium-89 result was just above the LLD (NUS data, 0.9 pCi/L). The results are shown in Table G, Appendix B.3.

4.4 Soil

Soil samples were taken from the five specified locations and analyzed by gamma spectrometry. Cesium-137 was detected in two samples and the normal decay products of naturally occurring radionuclides* were found in all of the samples. The concentrations of cesium-137 and the naturally occurring radionuclides are consistent with previously reported values for the Hanford Environs⁽²⁾ and WNP-2 preoperational data. The concentrations of the naturally occurring radionuclides in the indicator samples were all lower than those found in the samples from the control location. The soil sample results are tabulated in Table H of Appendix B.2 and B.3.

4.5 Sediment

Gamma spectrometry analysis was performed on four sediment samples. Cesium-137 was detected in both indicator samples, with values of 230 and 457 pCi per kg and cobalt-60 was detected in the October indicator sample with a result of 129 pCi/kg. The range of cesium-137 results in sediment samples taken during the preoperational period was from 50 to 560 pCi/kg. Preoperational cobalt-60 results ranged from 150 to 610 pCi/kg. Distribution of cesium-137 and cobalt-60 contamination along the Columbia River in the vicinity of the Hanford Site has been identified as a result of past operations on the Hanford Reservation.⁽³⁾ Results from the sediment samples are shown in Table I, Appendix B.2 and Table G, Appendix B.3.

4.6 Fish

Twenty-five fish samples were analyzed by gamma spectrometry. All radionuclide concentrations, except for potassium-40,* were less than the LLD's of the respective radionuclides. The values from the analysis of the fish samples are presented in Table J, Appendix B.2 and Table H, Appendix B.3.

4.7 Milk

During the operational year, 72 milk samples were collected for iodine-131 and gamma spectrometry measurements. All of the iodine-131 values were at the LLD or below. The results are listed in Table K, Appendix B.2 and Table I, Appendix B.3.

The concentrations of cesium-134 and 137, and barium and lanthanum-140 were below their respective LLD's. In some cases, because of long decay time, the lanthanum-140 concentration was calculated from the barium-140 concentration, assuming that transient equilibrium existed between the parent and the daughter, to achieve the specified LLD.

The gamma spectrometry results are presented in Table L, Appendix B.2 and Table J, Appendix B.3.

4.8 Garden Produce

Garden produce samples are subdivided into three groups; root crops, fruit and vegetable stock. Root crops include carrots, onions, potatoes and beets. Vegetable stock is the consumable portion of the vegetable which grows above ground. Gamma spectrometry was performed on these samples and the concentration of all radionuclides, except for potassium-40,* were either below the respective LLD or were not detected. The results for NUS data are listed in Table M, Appendix B.2. UST-RD data for root crops, fruit samples and vegetable stock are shown in Appendix B.3 (Table K, Table L and Table M, respectively).

*The majority of the naturally occurring radioactivity found on earth is from natural, terrestrial sources. Virtually everything in the world contains trace quantities of radioactivity of terrestrial origin. At least twenty-two naturally occurring single or non-series primordial (i.e., of sufficiently long half-life to have survived in detectable quantities since the formation of the earth) radionuclides are known. Potassium-40 is one of these primordial radionuclides and quite possibly the most important. Since potassium is essential to life, potassium-40 is found in all living and formerly living things. It is present to some degree in essentially all environmental media, which makes it an excellent point of reference for the analytical process (8).

TABLE 4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY

		Name of Facility	Supply System	WHP-2	Docket No.	50-397		
Location of Facility		Hanford	Reporting Period		Jan. 16, 1984-Dec. 31, 1984			
Medium or Pathway Sampled Unit of Measurement	Type (Total Number of Analyses Performed)	Lower of Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b (Range)	Location with Highest Annual Mean		Control Locations Mean (f) ^b (Range)	Number of Nonroutine Reported Measurements ^c	
				Name Distance & Direction	Mean (f) ^b (Range)			
Air Particulate	Gross Beta:	0.01 pCi/m ³	0.0189(541/543)	Station #7	0.0227(51/51)	0.0158(49/49)		
	(592)		(0.0029-0.164)	2.7 miles WNW	(0.00505-0.164)	(0.0039-0.0642)		
	Gamma (48)							
	Cs-134	0.05 pCi/m ³	LLD			LLD		
	Cs-137	0.06 pCi/m ³	LLD			LLD		
Air Iodine	I-131(588)	0.07 pCi/m ³	LLD			LLD		
Water	Gross Beta	4 pCi/l	2.17(31/32)	Station #27	3.14(10/10)	1.64(9/10)		
	(42)		(-0.226-4.77)	3.20 miles E	(1.1-4.77)	(LLD-3.01)		
	Tritium (32)	500 pCi/l	290(13/27)	Station #27	743(212)	442(1/5)		
			(-516-850)	3.20 miles E	(635-850)	(205-679)		
	Gamma (54)							
	Mn-54	15 pCi/l	LLD			LLD		
	Fe-59	30 pCi/l	LLD			LLD		
	Co-58	15 pCi/l	LLD			LLD		
	Co-60	15 pCi/l	LLD			LLD		
	Zn-65	30 pCi/l	LLD			LLD		
	Zn-69	15 pCi/l	LLD			LLD		

TABLE 4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
(Continued)

		Name of Facility	Supply System	WNP-2	Docket No.	50-397		
Location of Facility		Hanford	Reporting Period		Jan. 16, 1984-Dec. 31, 1984			
Medium or Pathway Sampled Unit of Measurement	Type (Total Number of Analyses Performed)	Lower of Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b (Range)	Location with Highest Annual Mean		Control Locations Mean (f) ^b (Range)	Number of Nonroutine Reported Measurements ^c	
				Name Distance & Direction	Mean (f) ^b (Range)			
Water (Cont'd)	Nb-95	15 pCi/l	LLD			LLD		
	Cs-134	15 pCi/l	LLD			LLD		
	Cs-137	18 pCi/l	LLD			LLD		
	Ba-140	60 pCi/l	LLD			LLD		
	La-140	15 pCi/l	LLD			LLD		
Soil	Gamma (5)							
	Cs-134	150 pCi/kg	LLD			LLD		
	Cs-137	180 pCi/kg	395(2/5) (180-610)	Station #23 3 miles ESE	610(1/1)	LLD		
Sediment	Gamma (4)							
	Co-60		129(1/2)	Only one indicator location sampled for this medium		LLD		
	Cs-134	150 pCi/kg	LLD			LLD		
	Cs-137	180 pCi/kg	344(2/2) (230-457)			LLD		

TABLE 4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
(Continued)

		Name of Facility		Supply System	HNP-2	Docket No.	50-397	
		Location of Facility		Hanford		Reporting Period	Jan. 16, 1984-Dec. 31, 1984	
Medium or Pathway Sampled Unit of Measurement	Type (Total Number of Analyses Performed)	Lower of Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b (Range)	Location with Highest Annual Mean		Control Locations Mean (f) ^b (Range)	Number of Nonroutine Reported Measurements ^c	
				Name Distance & Direction	Mean (f) ^b (Range)			
Fish	Gamma (25)							
	Mn-54	130 pCi/kg	LLD			LLD		
	Fe-59	260 pCi/kg	LLD			LLD		
	Co-58	130 pCi/kg	LLD			LLD		
	Co-60	130 pCi/kg	LLD			LLD		
	Zn-65	260 pCi/kg	LLD			LLD		
	Cs-134	130 pCi/kg	LLD			LLD		
	Cs-137	150 pCi/kg	LLD			LLD		
Milk	I-131 (72)	1.0 pCi/l	LLD			LLD		
	Gamma							
	Cs-134	15 pCi/l	LLD			LLD		
	Cs-137	18 pCi/l	LLD			LLD		
	Ba-140	60 pCi/l	LLD			LLD		
	La-140	15 pCi/l	LLD			LLD		

TABLE 4-1

ENVIRONMENTAL RADIOLOGICAL MONITORING PROGRAM ANNUAL SUMMARY
(Continued)

Medium or Pathway Sampled Unit of Measurement	Name of Facility		Supply System	HNP-2	Docket No.	50-397	Control Locations Mean (f) ^b (Range)	Number of Nonroutine Reported Measurements ^c
	Location of Facility		Hanford	Reporting Period	Jan. 16, 1984-Dec. 31, 1984			
	Type (Total Number of Analyses Performed)	Lower of Limit of Detection ^a (LLD)	All Indicator Locations Mean (f) ^b (Range)	Location with Highest Annual Mean				
				Name Distance & Direction	Mean (f) ^b (Range)			
Roots	Gamma(8)							
	I-131	60 pCi/kg	LLD					
	Cs-134	60 pCi/kg	LLD					
	Cs-137	80 pCi/kg	LLD					
Fruit	Gamma (7)							
	I-131	60 pCi/kg	LLD					
	Cs-134	60 pCi/kg	LLD					
	Cs-137	80 pCi/kg	LLD					
Veg Stock	Gamma (11)							
	I-131	60 pCi/kg	LLD					
	Cs-134	60 pCi/kg	LLD					
	Cs-137	80 pCi/kg	LLD					

^aLLD is the lower limit of detection as defined and required in USNRC Branch Technical Position on "An Acceptable Radiological Environmental Monitoring Program", Rev. 1, Nov. 1979, Table of "Detection Capabilities for Environmental Sample Analysis".

^b(f) is the ratio of positive results above the LLD to the number of samples analyzed for the parameter of interest.

^cThere were no nonroutine reported measurements for the report period.

TABLE 4-2
DATA SUMMARY

Media/Analysis	PREOPERATIONAL				OPERATIONAL					
	Mean	(Range)			Mean	(Range)				
	All Stations/All Years				Indicator Stations**					
Air (pCi/m ³)										
Gross Beta	<	0.03	(<	0.01 -	0.13)	<	0.09	(0.005 -	0.164)	
Cs-134	<	0.01	(<	0.001 -	0.04)	<	0.001	(- 0.001 -	0.003)	
Cs-137	<	0.01	(<	0.001 -	0.04)	<	0.001	(- 0.001 -	0.001)	
I-131	<	0.05	(<	0.01 -	0.11)	<	0.02	(- 0.02 -	0.4)	
Water (pCi/l)										
B-140	<	50.5	(<	4.00 -	300.00)	<	6.8	(- 14.2 -	61.1)	
Gross Beta	<	2.8	(<	1.00 -	12.00)	<	2.2	(- 0.78 -	4.8)	
Cs-134	<	3.8	(<	1.00 -	12.00)	<	1.6	(- 5.41 -	7.0)	
Cs-137	<	7.8	(<	1.00 -	25.00)	<	1.6	(- 3.10 -	7.0)	
Co-58	<	4.8	(<	1.00 -	12.00)	<	5.4	(- 1.28 -	6.0)	
Co-60	<	4.6	(<	0.11 -	13.00)	<	1.8	(- 1.08 -	8.0)	
H-3	<	433.3	(<	80.00 -	800.00)	<	2.9	(- 5.16 -	850.0)	
Fe-59	<	12.1	(<	2.00 -	93.00)	<	3.7	(- 8.86 -	9.0)	
La-140	<	25.5	(<	3.00 -	160.00)	<	4.5	(- 64.80 -	13.0)	
Mn-54	<	4.2	(<	1.00 -	16.00)	<	1.6	(- 1.23 -	6.0)	
Nb-95	<	5.1	(<	1.50 -	29.00)	<	1.7	(- 2.00 -	6.0)	
Zn-65	<	8.0	(<	1.38 -	27.00)	<	3.8	(- 16.3 -	13.0)	
Zn-95	<	10.6	(<	2.00 -	63.00)	<	3.1	(- 3.09 -	12.0)	
Sediment (pCi/kg)										
Co-60	<	254.6	(<	150.00 -	610.00)	129.0				
Cs-134	<	112.0	(<	50.00 -	180.00)	<	72.7	(55.3 -	90.0)	
Cs-137	<	287.0	(<	50.00 -	560.00)	343.5		(230.0 -	457.0)	
Soil (pCi/kg)										
Cs-134	<	65.3	(<	20.00 -	1880.00)	<	110.0	(<	90.0 -	130.0)
Cs-137	<	380.3	(<	20.00 -	150.00)	<	214.0	(<	70.0 -	610.0)
Milk (pCi/l)										
Ba-140	<	105.5	(<	14.00 -	2000.00)	<	8.6	(- 38.5 -	30.0)	
Cs-134	<	3.5	(<	0.90 -	14.00)	<	2.5	(- 6.58 -	9.0)	
Cs-137	<	3.2	(0.02 -	9.00)	<	2.7	(- 7.40 -	11.0)		
La-140	<	34.0	(<	5.00 -	1000.00)	<	4.7	(- 17.0 -	13.0)	
I-131	<	0.5	(<	0.09 -	1.00)	<	0.1	(- 0.01 -	0.3)	

TABLE 4-2

DATA SUMMARY
(Continued)

Media/Analysis	PREOPERATIONAL			OPERATIONAL		
	Mean	(Range)		Mean	(Range)	
	All Stations/All Years			Indicator Stations**		
Fish (pCi/l)						
Cs-134	< 67.1	(< 6.00	- < 130.00)	< 72.4	(- 20.4	-< 70.0)
Cs-137	< 88.8	(< 10.00	- < 130.00)	< 74.3	(- 35.1	-< 80.0)
C-58	< 87.7	(< 9.00	- < 130.00)	< 37.2	(1.1	-< 80.0)
Co-60	< 80.6	(< 9.00	- < 130.00)	< 72.1	(- 18.4	-< 80.0)
Fe-59	< 135.2	(< 30.00	- < 260.00)	< 85.0	(- 34.6	-< 170.0)
Mn-54	< 86.3	(< 8.00	- < 130.00)	< 68.0	(- 10.3	-< 80.0)
Produce (pCi/l)						
Cs-134	< 49.1	(< 10.00	- < 140.00)	< 26.9	(- 24.8	-< 30.0)
Cs-137	< 69.8	(< 10.00	- < 140.00)	< 24.4	(- 2.21	-< 30.0)
I-131	< 105.6	(< 10.00	- < 1000.00)	< 32.4	(- 0.84	-< 30.0)
TLD* (mR/Day)						
Quarterly	0.24	(0.11	- 0.32)	0.22	(0.16	- 0.27)
Annual	0.24	(0.20	- 0.31)	0.22	(0.15	- 0.30)

* 1982-1983 TLD results for preoperational period.

**Refer to Table 4-1 for summary of data for control locations, operational period.

NOTE: For purposes of statistical evaluation of the data, all values were considered to be positive, thereby ensuring a conservative bias to the mean values.

TABLE 4-3

Quarterly TLD Data Summary
 Preoperational (1982-1983) Station Means vs. Operational (1984) Station Means
 (mrem/day $\pm 1\sigma$)

STATION	PREOPERATIONAL		OPERATIONAL*	
	Mean	Std. Dev.	Mean	Std. Dev.
1	0.2404	0.0258	0.2157	0.0115
2	0.2334	0.0221	0.2134	0.0126
3	0.2248	0.0246	0.2018	0.0146
4	0.2221	0.0347	0.1921	0.0160
5	0.2287	0.0226	0.1990	0.0089
6	0.2227	0.0203	0.2066	0.0182
7	0.2357	0.0235	0.2119	0.0138
8	0.2601	0.0194	0.2334	0.0167
9	0.2171	0.0246	0.2052	0.0127
10	0.2302	0.0189	0.2073	0.0120
11	0.2361	0.0180	0.2152	0.0103
12	0.2509	0.0221	0.2258	0.0140
13	0.2372	0.0197	0.2151	0.0161
14	0.2439	0.0291	0.2135	0.0121
15	0.2548	0.0240	0.2247	0.0139
16	0.2444	0.0199	0.2256	0.0145
17	0.2501	0.0243	0.2130	0.0205
18	0.2416	0.0177	0.2146	0.0136
19	0.2400	0.0200	0.2136	0.0141
20	0.2368	0.0196	0.2090	0.0127
21	0.2273	0.0199	0.1987	0.0098
22	0.2420	0.0224	0.2162	0.0118
23	0.2376	0.0169	0.2111	0.0095
24	0.2431	0.0181	0.2145	0.0130
25	0.2540	0.0193	0.2255	0.0146
40	0.2184	0.0179	0.2125	0.0077
41	0.2587	0.0220	0.2358	0.0083
42	0.2458	0.0212	0.2237	0.0139

TABLE 4-3

Quarterly TLD Data Summary
Preoperational (1982-1983) Station Means vs. Operational (1984) Station Means
(Continued)

<u>STATION</u>	<u>PREOPERATIONAL</u>		<u>OPERATIONAL*</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
43	0.2529	0.0195	0.2258	0.0139
44	0.2326	0.0173	0.2117	0.0140
45	0.2333	0.0192	0.2086	0.0129
46	0.2854	0.0234	0.2520	0.0123
47	0.2177	0.0173	0.1940	0.0093
49	0.2391	0.0151	0.2185	0.0149
50	0.2223	0.0082	0.2114	0.0181
51	0.2283	0.0146	0.2098	0.0109
53	0.2730	0.0196	0.2443	0.0133
54	0.2602	0.0117	0.2272	0.0104
55	0.2256	0.0085	0.2083	0.0091
56	0.2379	0.0102	0.2143	0.0126
71	0.2408	0.0199	0.2159	0.0146
72	0.2495	0.0133	0.2204	0.0144
73	0.2279	0.0144	0.2027	0.0117
74	0.2632	0.0153	0.2263	0.0145
75	0.2247	0.0157	0.1956	0.0099
76	0.2419	0.0124	0.2094	0.0130
77	0.2492	0.0118	0.2174	0.0133
78	0.2474	0.0139	0.2086	0.0114
79	0.2528	0.0233	0.2187	0.0136
80	0.2431	0.0127	0.2114	0.0184
81	0.2433	0.0240	0.2126	0.0102
82	0.2571	0.0181	0.2174	0.0087
83	0.2510	0.0138	0.2256	0.0163
84	0.2443	0.0157	0.2050	0.0108
85	0.2569	0.0176	0.2204	0.0201
86	0.2489	0.0136	0.2240	0.0148
A11	0.2401	0.0243	0.2149	0.0170

*Results obtained from the fire damaged/special TLDs, tabulated in data Table A, Appendix B.1, are not included in the statistical summary.

TABLE 4-4

Annual TLD Data Summary by Station
 Preoperational (1982-1983) vs. Operational Data
 (mrem/day $\pm 1\sigma$)

STATION	PREOPERATIONAL		OPERATIONAL	
	Mean	Std. Dev.	Mean	Std. Dev.
1	0.2521	0.0231	0.2325	0.0048
2	0.2301	0.0067	0.2226	0.0151
3	0.2297	0.0087	0.2069	0.0098
4	0.2397	0.0427	0.1966	0.0052
5	0.2396	0.0186	0.2025	0.0096
6	0.2243	0.0076	0.2089	0.0169
7	0.2341	0.0057	0.2262	0.0198
8	0.2647	0.0088	0.2326	0.0120
9	0.2186	0.0076	0.1971	0.0115
10	0.2312	0.0085	0.2148	0.0125
11	0.2346	0.0088	0.2146	0.0111
12	0.2553	0.0065	0.2345	0.0169
13	0.2376	0.0058	0.2241	0.0061
14	0.2339	0.0075	0.2201	0.0122
15	0.2598	0.0042	0.2388	0.0086
16	0.2486	0.0078	0.2253	0.0177
17	0.2426	0.0094	0.2320	0.0119
18	0.2523	0.0176	0.2322	0.0145
19	0.2346	0.0044	0.2275	0.0101
20	0.2367	0.0115	0.2229	0.0070
21	0.2246	0.0086	0.2052	0.0110
22	0.2368	0.0059	0.2203	0.0103
23	0.2338	0.0067	0.2199	0.0230
24	0.2373	0.0082	0.2222	0.0095
25	0.2547	0.0097	0.2419	0.0253
40	0.2097	0.0050	0.2099	0.0075
41	0.2635	0.0077	0.2327	0.0092
42	0.2351	0.0079	0.2206	0.0130
43	0.2417	0.0111	0.2232	0.0090
44	0.2370	0.0141	0.2105	0.0140

TABLE 4-4

Annual TLD Data Summary by Station
Preoperational (1982-1983) vs. Operational Data
(Continued)

<u>STATION</u>	<u>PREOPERATIONAL</u>		<u>OPERATIONAL</u>	
	<u>Mean</u>	<u>Std. Dev.</u>	<u>Mean</u>	<u>Std. Dev.</u>
45	0.2310	0.0099	0.2060	0.0078
46	0.2876	0.0088	0.2717	0.0085
47	0.2204	0.0161	0.2117	0.0312
49			0.2247	0.0130
50			0.2263	0.0141
51			0.2115	0.0142
53			0.2426	0.0091
54			0.2333	0.0133
55			0.2195	0.0216
56			0.2224	0.0170
71	0.2412	0.0121	0.2314	0.0216
72	0.2508	0.0095	0.2307	0.0193
73	0.2293	0.0065	0.2096	0.0172
74	0.2438	0.0056	0.2371	0.0146
75	0.2365	0.0053	0.2067	0.0263
76	0.2418	0.0100	0.2189	0.0220
77	0.2463	0.0110	0.2241	0.0102
78	0.2464	0.0189	0.2229	0.0169
79	0.2520	0.0065	0.2254	0.0140
80	0.2337	0.0253	0.1902	0.0381
81	0.2265	0.0074	0.2214	0.0170
82	0.2460	0.0144	0.2281	0.0274
83	0.2496	0.0108	0.2449	0.0268
84	0.2303	0.0102	0.2154	0.0068
85	0.2524	0.0072	0.2418	0.0089
86	0.2401	0.0075	0.2434	0.0181
All	0.2406	0.0179	0.2230	0.0203

NOTE: Stations 49-56, first monitored fourth quarter 1983.

TABLE 4-5

1984 Quarterly Mean vs. Annual TLD Data
(mrem/day $\pm 1\sigma$)

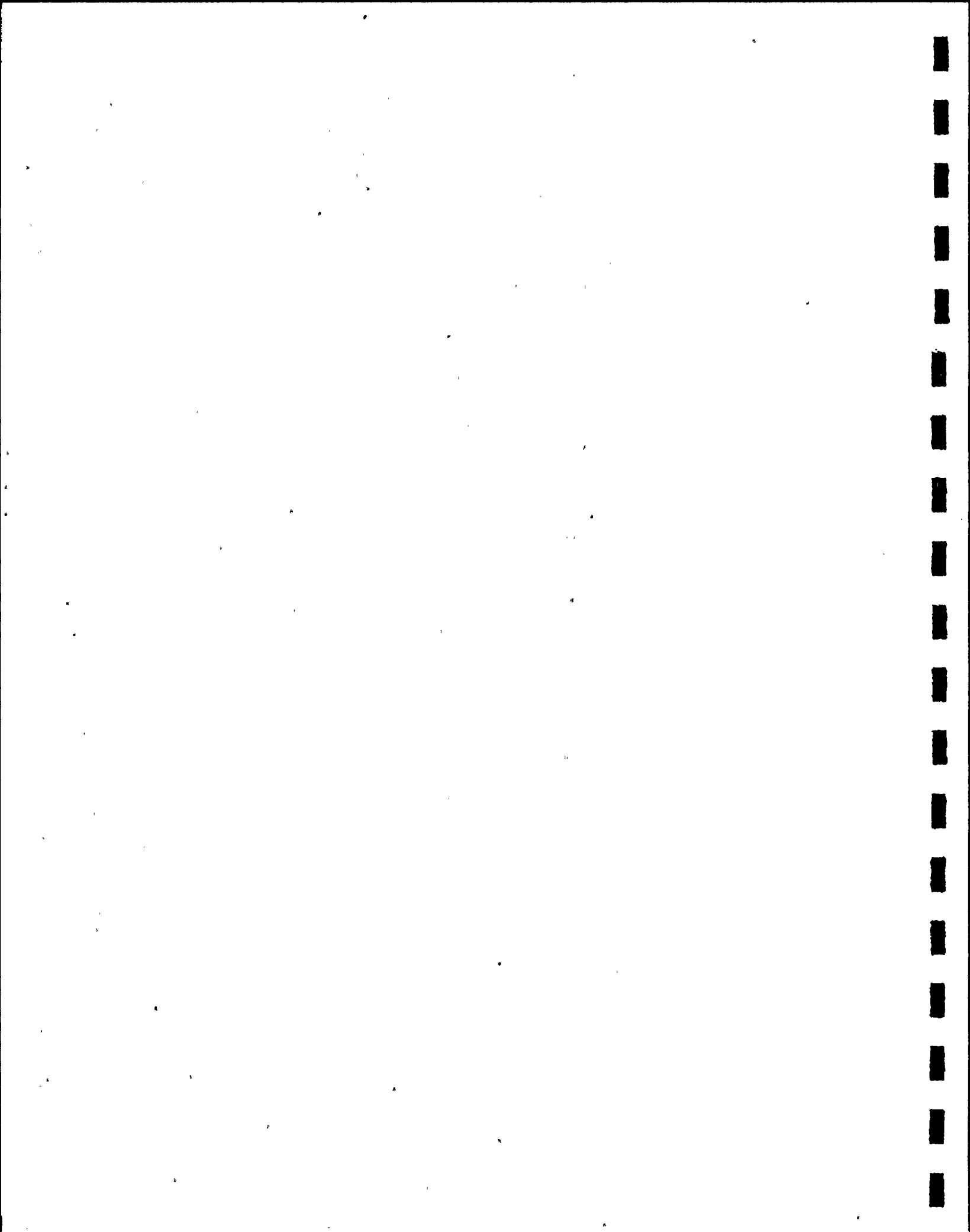
STATION	QUARTERLY TLDs*		ANNUAL TLDs	
	Mean	Std. Dev.	Mean	Std. Dev.
1	0.2157	0.0115	0.2325	0.0048
2	0.2134	0.0126	0.2226	0.0151
3	0.2018	0.0146	0.2069	0.0098
4	0.1921	0.0160	0.1966	0.0052
5	0.1990	0.0089	0.2025	0.0096
6	0.2066	0.0182	0.2089	0.0169
7	0.2119	0.0138	0.2262	0.0198
8	0.2334	0.0167	0.2326	0.0120
9	0.2052	0.0127	0.1971	0.0115
10	0.2073	0.0120	0.2148	0.0125
11	0.2152	0.0103	0.2146	0.0111
12	0.2258	0.0140	0.2345	0.0169
13	0.2151	0.0161	0.2241	0.0061
14	0.2135	0.0121	0.2201	0.0122
15	0.2247	0.0139	0.2388	0.0086
16	0.2256	0.0145	0.2253	0.0177
17	0.2130	0.0205	0.2320	0.0119
18	0.2146	0.0136	0.2322	0.0145
19	0.2136	0.0141	0.2275	0.0101
20	0.2090	0.0127	0.2229	0.0070
21	0.1987	0.0098	0.2052	0.0110
22	0.2162	0.0118	0.2203	0.0103
23	0.2111	0.0095	0.2199	0.0230
24	0.2145	0.0130	0.2222	0.0095
25	0.2255	0.0146	0.2419	0.0253
40	0.2125	0.0077	0.2099	0.0075
41	0.2358	0.0083	0.2327	0.0092
42	0.2237	0.0139	0.2206	0.0130
43	0.2258	0.0139	0.2232	0.0090
44	0.2117	0.0140	0.2105	0.0140
45	0.2086	0.0129	0.2060	0.0078

TABLE 4-5

1984 Quarterly Mean vs. Annual TLD Data
(Continued)

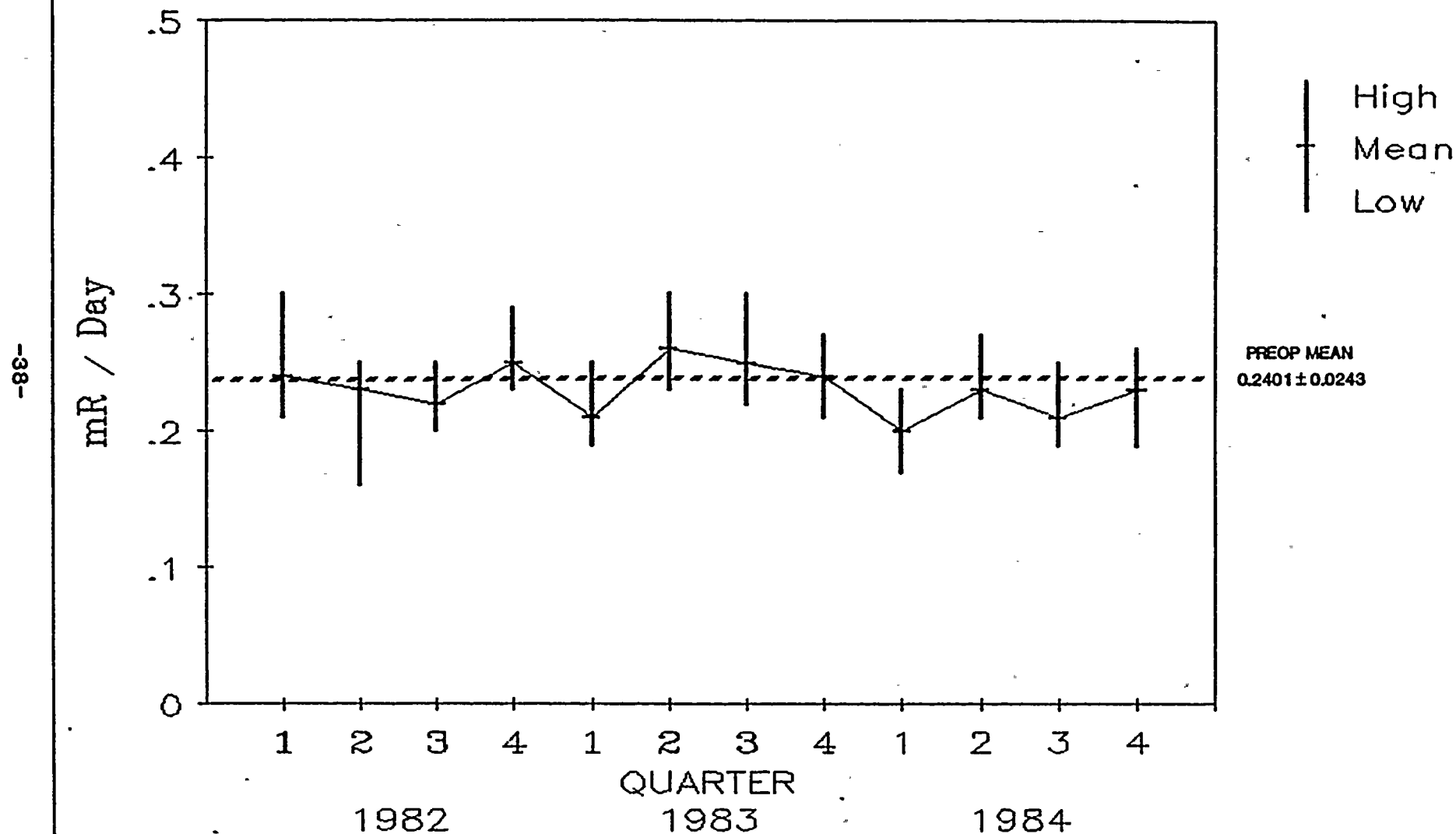
STATION	QUARTERLY TLDs*		ANNUAL TLDs	
	Mean	Std. Dev.	Mean	Std. Dev.
46	0.2520	0.0123	0.2717	0.0085
47	0.1940	0.0093	0.2117	0.0312
49	0.2185	0.0149	0.2247	0.0130
50	0.2114	0.0181	0.2263	0.0141
51	0.2098	0.0109	0.2115	0.0142
53	0.2443	0.0133	0.2426	0.0091
54	0.2272	0.0104	0.2333	0.0133
55	0.2083	0.0091	0.2195	0.0216
56	0.2143	0.0126	0.2224	0.0170
71	0.2159	0.0146	0.2314	0.0216
72	0.2204	0.0144	0.2307	0.0193
73	0.2027	0.0117	0.2096	0.0172
74	0.2263	0.0145	0.2371	0.0146
75	0.1956	0.0099	0.2067	0.0263
76	0.2094	0.0130	0.2189	0.0220
77	0.2174	0.0133	0.2241	0.0102
78	0.2086	0.0114	0.2229	0.0169
79	0.2187	0.0136	0.2254	0.0140
80	0.2114	0.0184	0.1902	0.0381
81	0.2126	0.0102	0.2214	0.0170
82	0.2174	0.0087	0.2281	0.0274
83	0.2256	0.0163	0.2449	0.0268
84	0.2050	0.0108	0.2154	0.0068
85	0.2204	0.0201	0.2418	0.0089
86	0.2240	0.0148	0.2434	0.0181
All	0.2149	0.0170	0.2230	0.0203

*Results from the fire damaged/special TLDs, tabulated in Table A, Appendix B.1, are not included in this statistical summary.



QUARTERLY TLDs

1982-1984

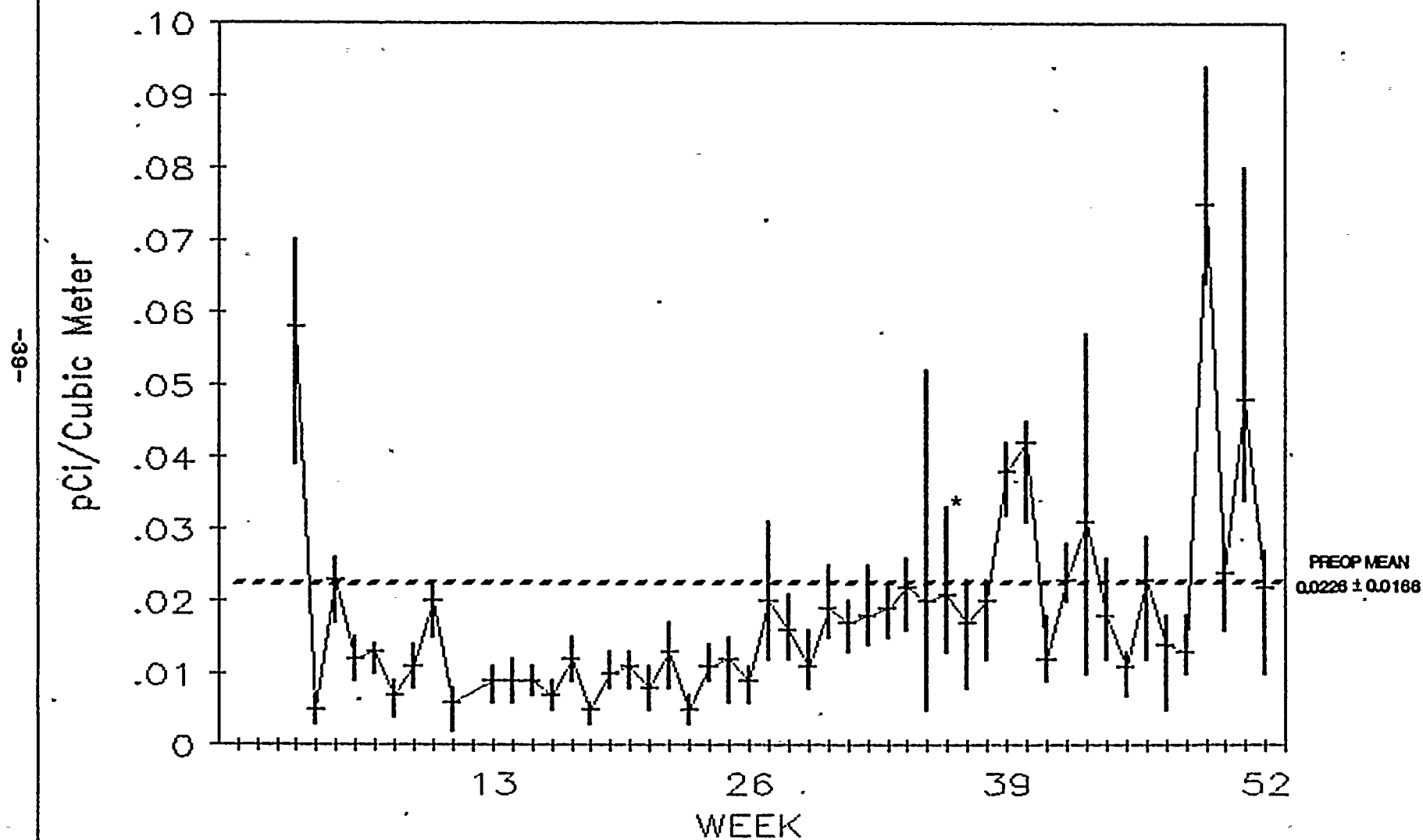


Graph depicts both indicator and control stations

FIGURE 4-1

GROSS BETA IN AIR

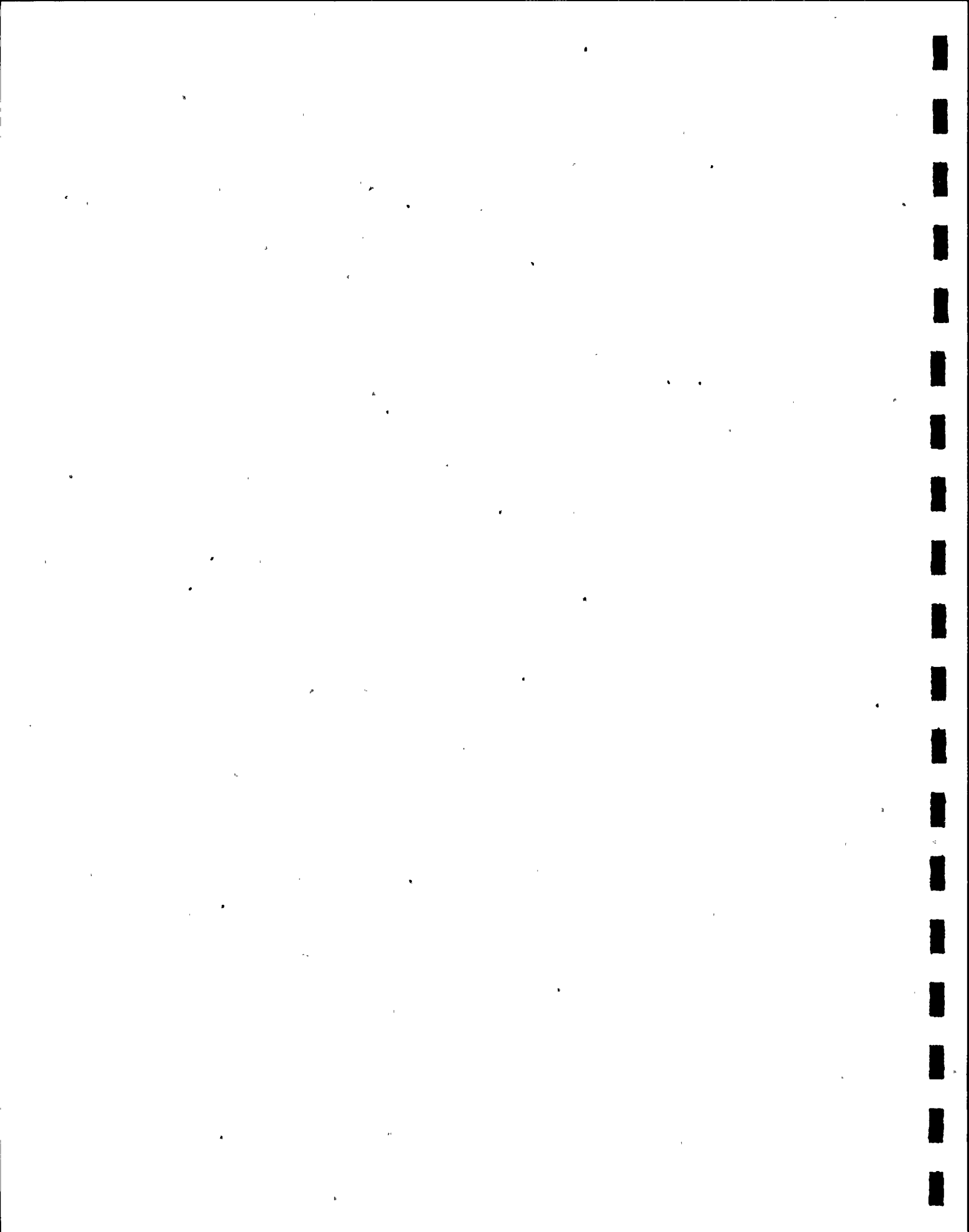
1984



* excludes atypical 0.164 pCi/m³ result

FIGURE 4-2

High/Low/Average



5.0 RADIOLOGICAL IMPACT

WNP-2 plant operations during 1984 resulted in the release of small quantities of radioactive material to the environment. The radiological impacts of these releases were assessed according to regulatory requirements and reported in the 1984 Semi-Annual Effluent Reports (5-7). A summary of effluent releases from WNP-2 during 1984 and associated dose estimates is included in Appendix C. The models used to calculate these dose estimates are conservative estimators (i.e., over-estimate) of the potential radiological impact.

The quantities of radioactive material released during 1984 operations were too small to be measured once dispersed into the environment. Therefore, the radiological impact, if any, due to plant operations as evaluated by direct measurement of dose rates or radionuclide concentration in environmental media was within the natural variability of radioactivity as established during the preoperational phase program.

6.0 REFERENCES

- 1 U.S. Nuclear Regulatory Commission, "An Acceptable Radiological Environmental Monitoring Program", Radiological Assessment Branch Technical Position (Regulatory Guide 4.8) November 1979, Rev. 1.
- 2 Battelle, Pacific Northwest Laboratory, "Environmental Surveillance at Hanford for CY1983" PNL-5038, May 1984.
- 3 Battelle, Pacific Northwest Laboratory, "Radiological Survey of Exposed Shorelines and Islands of the Columbia River Between Vernita and the Snake River Confluence" PNL-3127, April 1980.
- 4 U.S. EPA "National Radiation Exposure in the United States" ORP/SID 72-1, 1972.
- 5 WPPSS, "WNP-2 Offsite Dose Calculation Manual (ODCM)" 1983.
- 6 WNP-2 Semi-annual Effluent Report, January 1 to June 30, 1984, August 1984.
- 7 WNP-2 Semi-annual Effluent Report, July 1 to December 31, 1984, February 1985.
- 8 Kathren, R.L., Radioactivity in the Environment: Sources, Distribution, and Surveillance, 1984.

APPENDIX A

INDEX

- Section A.1 Supply System Quality Control for Environmental TLDs
- Section A.2 Summary of Quality Control Data for NUS Radiological Laboratory
1984
- Section A.3 UST-RD Quality Control Program 1984

Section A.1 Supply System Environmental TLD Summary of Quality Control Program

The attached figures and tables outline the quality control program conducted during 1984 by the Radiological Programs and Standards Department of the Supply System's Support Services Directorate. Examination of the QC checks and calibration data for the Teledyne Isotopes Thermoluminescence Dosimetry System, TLD 9100, indicated that the system was performing normally during the report period.

The quality control plan for handling of environmental TLDs is contained in the Radiological Program Instruction Manual. The environmental TLD evaluation process is depicted in Figure A-1a and b. Laboratory controls, trip controls and QC dosimeters are acquired for each group of field cycle dosimeters. The number of QC dosimeters is nominally 10% of the number of field dosimeters. QC dosimeters are interspersed among the field and control TLDs during the evaluation process and, if QC readouts are $\pm 5\%$ or 5 mR of their exposed values an investigation to identify the source of the discrepancy is initiated.

Table A-1 and A-2 summarizes the preliminary results of the Seventh International Intercomparison of Environmental Dosimeters (1984) with respect to all participants and the Supply System results.

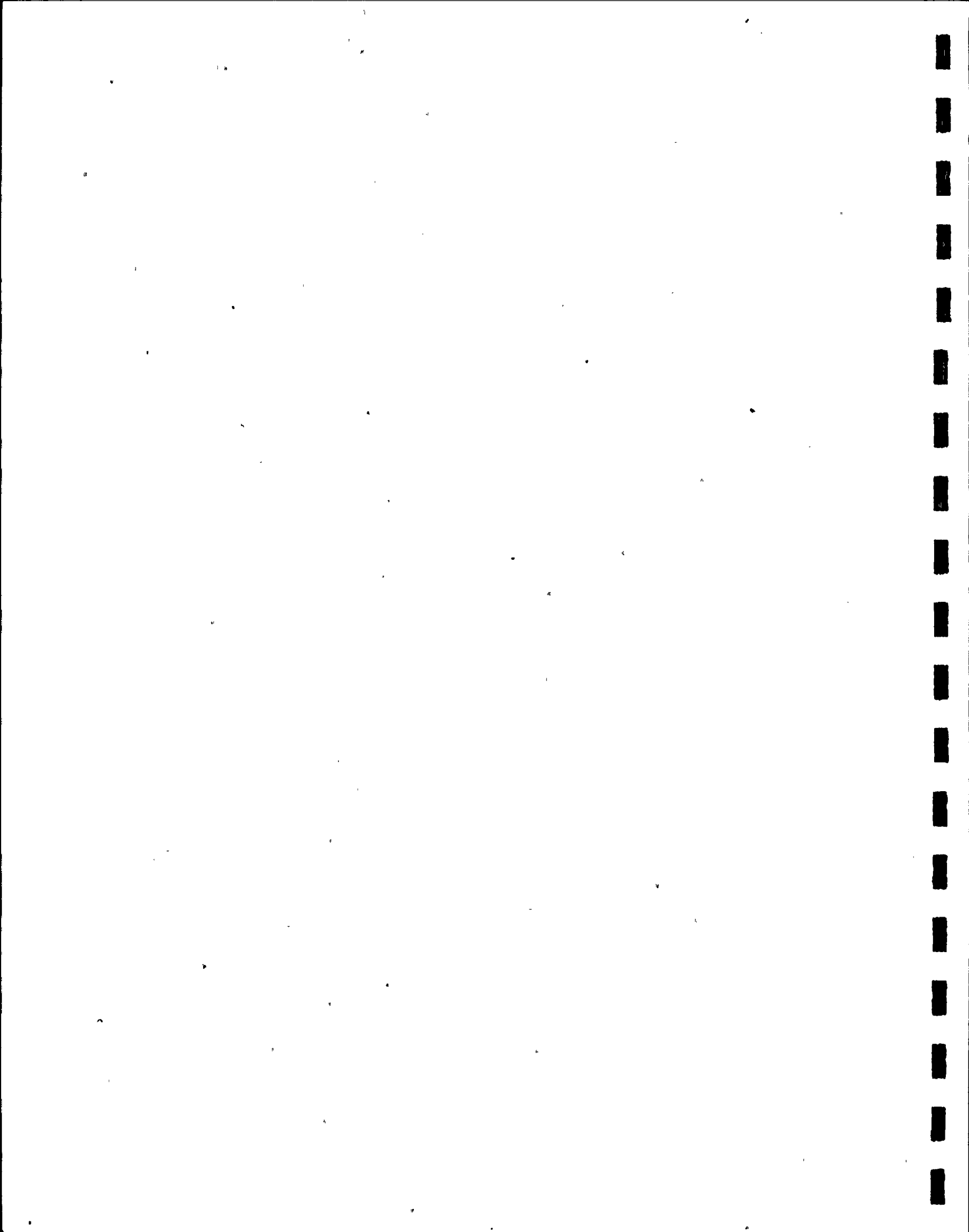


TABLE A-1

Summary of Seventh International Intercomparison
of Environmental Dosimeters Preliminary Report
All Participants

	<u>Mean</u>	<u>SD</u>	<u>%SD</u>	<u>N</u>	<u>Estimate</u>	<u>Uncertainty</u>
<u>LABORATORY EXPOSURES</u>						
<u>Cesium-137</u>						
All Dosimeters	73.0	11.1	15.2	185	75.0	3.8
<u>Cobalt-60</u>						
All Dosimeters ^a	77.9	13.8	17.7	184	79.9	4.0
Filtration						
100 mg cm ⁻¹	77.2	12.9	16.7	144		
100 mg cm ⁻¹	83.5	19.3	23.1	23		
Not Reported	75.7	11.1	14.7	17		
<u>FIELD EXPOSURE</u>						
All Dosimeters ^a	75.1	14.9	19.8	75.8		6.0
High Z Dosimeters w/o energy compensation	93.8	18.1	19.3	14		
Low Z and compensated High Z dosimeters	73.5	13.5	18.4	159		
Undetermined status	75.1	14.6	19.4	11		

^aOne outlier excluded.

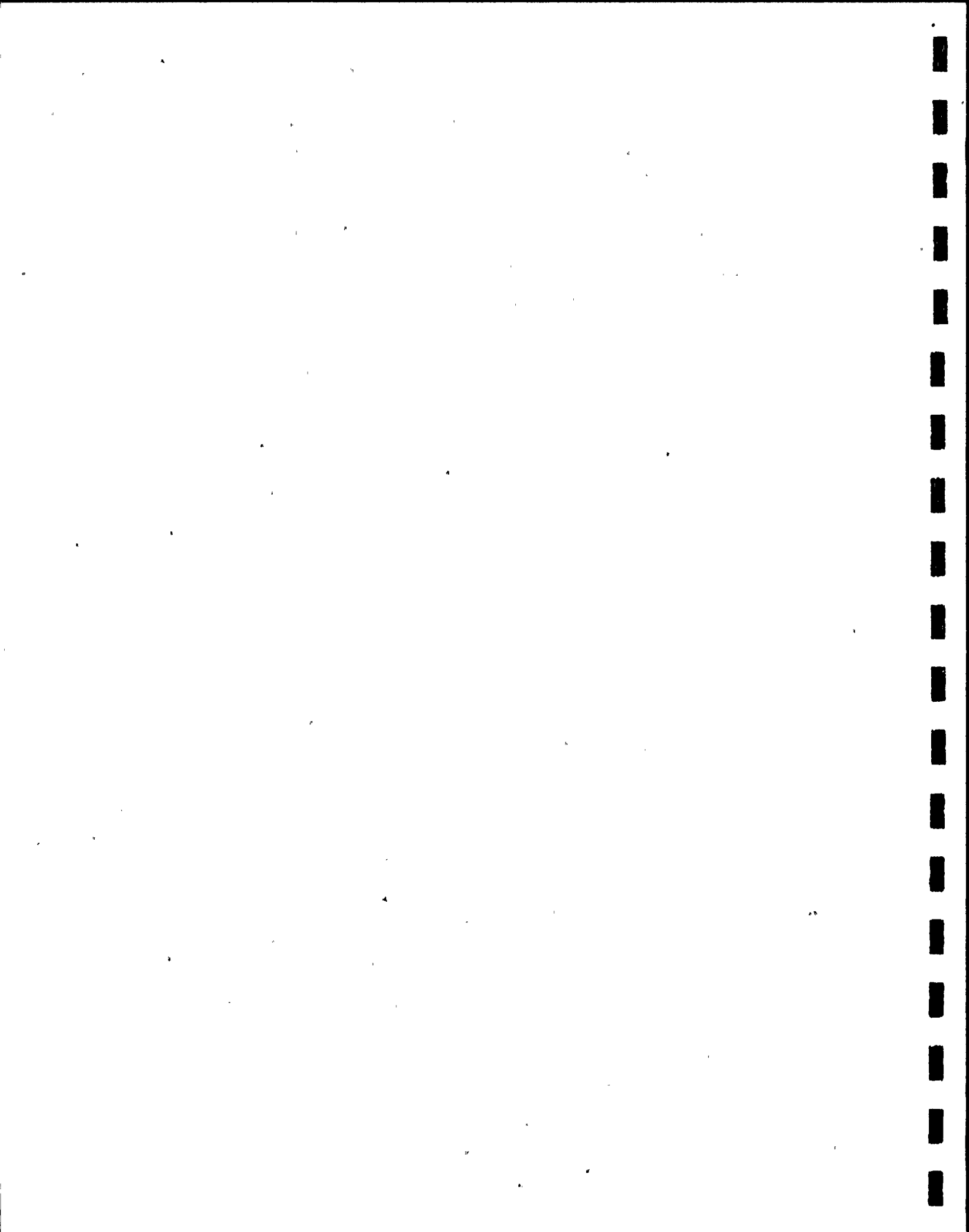


TABLE A-2

Summary of Seventh International Intercomparison
of Environmental Dosimeters Preliminary Report
Supply System 1984

I. Total Exposure Measured	Exposure (mR)	
Field Dosimeter 1	78.3	
Field Dosimeter 2	76.4	
Lab (Co-60) Dos. 1	82.5	
Lab (co-60) Dos. 2	84.9	
Lab (Cs-137) Dos. 1	78.7	
Lab (Cs-137) Dos. 2	79.7	
Control Dosimeter 1	15.1	
Control Dosimeter 2	17.3	
II. Estimated Exposures		Error (mR)
Participants Result		
Field Exposure	67.6	6.8
Lab (Co-60) Exp	67.5	5.3
Lab	63.0	4.3
Author's Results		
Field Exposure	67.7	
Lab (Co-60) Exp	67.5	
Lab (Cs-137) Exp	63.0	
III. Estimated Storage Exposure	1.4	
IV. Estimated Transit Exposure		
Participant's Results	8.4	2.7
Author's Results	8.3	

APPENDIX B

SUPPLY SYSTEM
ENVIRONMENTAL TLD PREPARATION-USE-EVALUATION CYCLE (RPI 4.12)

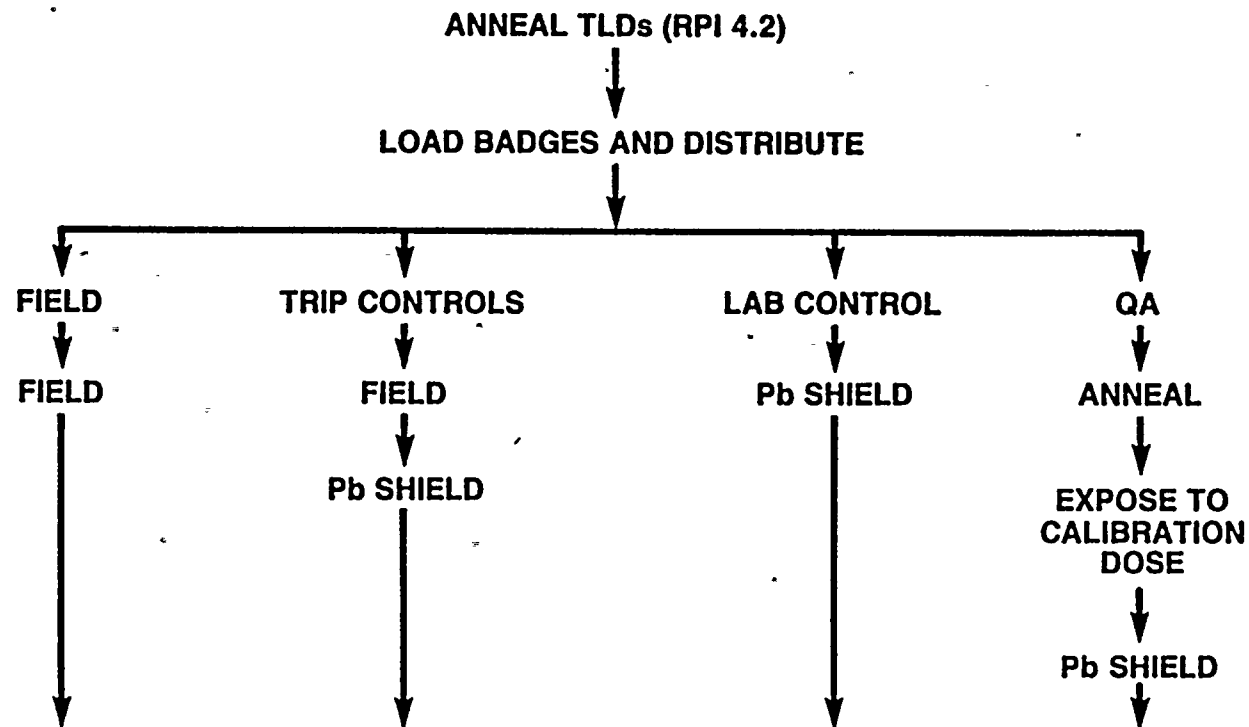


FIGURE A-1a

840440-3A
APRIL 1984

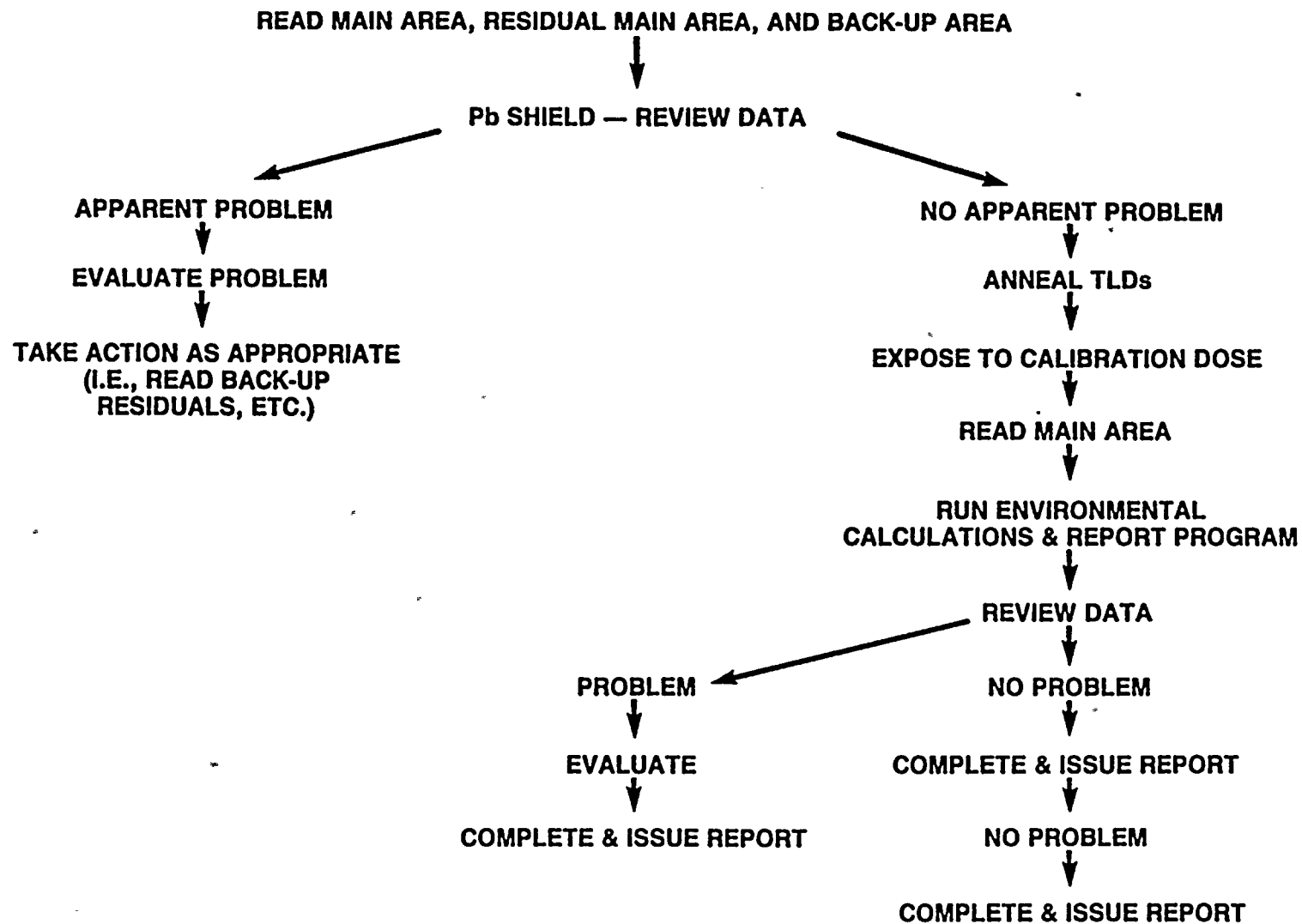
[illegible]***RADIOLOGICAL PROGRAMS INSTRUCTION 4.12**

FIGURE A-1b

840440-4A
APRIL 1984

READ MAIN AREA, RESIDUAL MAIN AREA, AND BACK-UP AREA



840440-4A
APRIL 1984

SUPPLY SYSTEM
ENVIRONMENTAL TLD PREPARATION-USE-EVALUATION CYCLE (RPI 4.12)

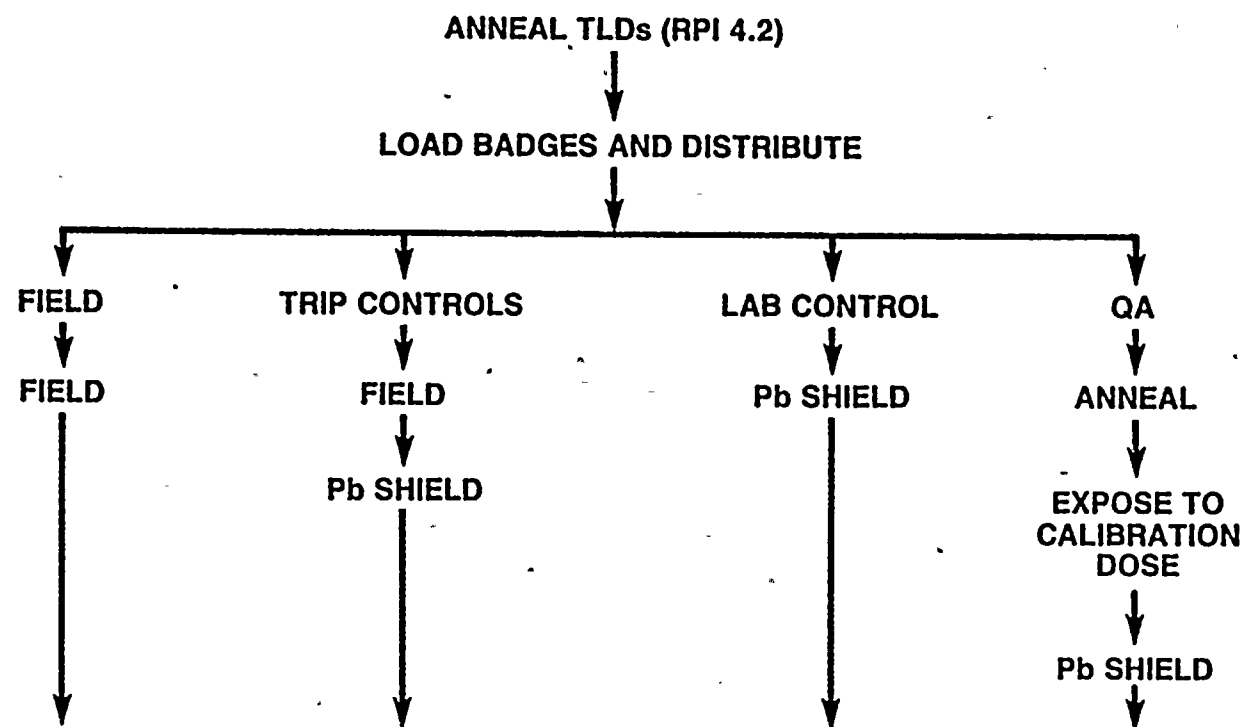
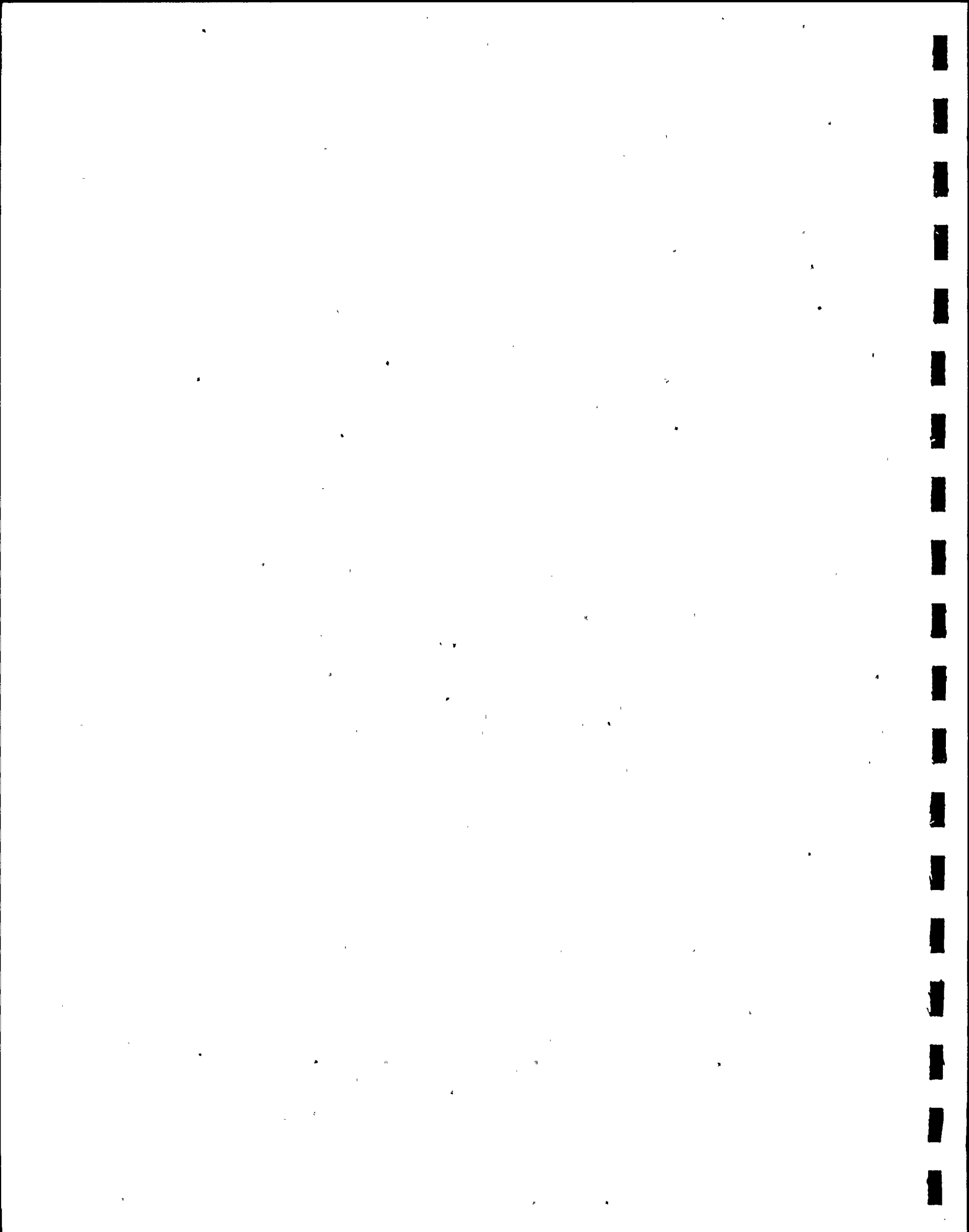


FIGURE A-1a

840440-3A
APRIL 1984



SUMMARY OF QUALITY CONTROL DATA
FOR
THE NUS RADIOLOGICAL LABORATORY
1984

NUS Corporation
Environmental Services Division
910 Clopper Road
Gaithersburg, Maryland 20878

February 1985

NUS RADIOLOGICAL LABORATORY
QUALITY ASSURANCE PROGRAM

I. NUS RADIOLOGICAL LABORATORY QUALITY ASSURANCE PROGRAM

- A. Introduction
- B. Laboratory Analysis for Quality Assurance

II. NUS RADIOLOGICAL LABORATORY INTERNAL QUALITY ASSURANCE PROGRAM

- A. Gross Alpha Analysis
 - 1. Air Particulate
 - a. duplicate analysis
 - 2. Water
 - a. duplicate analysis
 - b. blinds and references
 - 3. Sediment
 - a. duplicate analysis
- B. Gross Beta Analysis
 - 1. Air Particulate
 - a. duplicate analysis
 - b. blinds and references
 - 2. Water
 - a. duplicate analysis
 - b. blinds and references
 - 3. Milk
 - a. duplicate analysis
 - 4. Sediment
 - a. duplicate analysis
- C. Gamma Analysis
 - 1. Air Particulate
 - a. duplicate analysis
 - b. blanks and references
 - 2. Milk
 - a. duplicate analysis
 - 3. Water
 - a. duplicate analysis

- 4. Solids
 - a. duplicate analysis
- D. Iodine-131
 - 1. Charcoal Cartridges
 - a. duplicate analysis
 - b. blanks and references
 - 2. Milk
 - a. duplicate analysis
 - b. blanks and references
 - 3. Water
 - a. duplicate analysis
 - b. blanks and references
- E. Radium
 - 1. Water
 - a. duplicate analysis
- F. Strontium
 - 1. Milk
 - a. duplicate analysis
 - 2. Water
 - a. duplicate analysis
 - 3. Soil
 - a. duplicate analysis
- G. Tritium
 - 1. Water
 - a. duplicate analysis
 - b. blinds and references
 - 2. Urine
 - a. duplicate analysis
- H. Direct Radiation
 - 1. TLDs
 - a. duplicate analysis

III. EPA INTERCOMPARISON PROGRAM

- A. Gross Alpha Analysis
 - 1. Water
- B. Gross Beta Analysis
 - 1. Water
- C. Gamma Analysis
 - 1. Water
- D. Iodine-131
 - 1. Milk
 - 2. Water
- E. Tritium
 - 1. Water
 - 2. Urine
- F. Uranium
 - 1. Water
- G. Radionuclides in Air Filters
- H. Radionuclides in Food
- I. EPA "blind" analysis (water)

IV. REPORTING OF ANALYTICAL RESULTS

V. PERFORMANCE CHECK SUMMARY

- A. High Resolution Gamma Spectrometry System
- B. Gas-Proportional Counters
- C. Packard Liquid Scintillation Counter

VI. CHEMICAL RECOVERY DETERMINATION

- A. Methods
- B. Results

SECTION I

NUS RADIOLOGICAL LABORATORY QUALITY ASSURANCE PROGRAM

A. Introduction

This document contains a summary of quality control data collected in 1984 by the Radiological Laboratory of NUS Corporation. This laboratory ceased operation in 1984 and this represents the final report of such QA data. Examination of final performance checks and calibration data for the various counting systems indicated that systems were performing normally up to closure and there were no deleterious effects on the quality of sample analyses by closure activities. Compilation of some types of QC data ceased prior to final shutdown. Not all statistical analyses of such data, therefore, carry through to the same dates.

The quality assurance program of the NUS Radiological Laboratory is briefly described below.

Information on each incoming sample is entered in a permanent log book. A sample number is assigned to each sample at the time of receipt. This sample number uniquely identifies each sample.

Laboratory counting instruments are calibrated, using radionuclide standards obtained from the National Bureau of Standards, the EPA, and reliable commercial suppliers, such as Amersham-Searle. Calibration of counting instruments is maintained by regular counting of radioactive reference sources. Background counting rates are measured regularly on all counting instruments. Additional performance checks for the gamma-ray scintillation spectrometer include regular checks and adjustment, when necessary, of energy calibration.

Blank samples are processed, with each group of samples analyzed for specific radionuclides, using radiochemical separation procedures, as a check for possible cross-contamination. Blind, spiked (known quantities of radioactivity added), and replicate samples are processed to determine analytical precision and accuracy.

B. Laboratory Analysis for Quality Assurance

The quality assurance procedures employed in the conduct of radiological monitoring programs by the Environmental Services Division Radiological Laboratory are as required in Section 5.0 of the NUS Environmental Services Division Quality Assurance Manual and detailed in the NUS Radiological Laboratory Work Instructions. These procedures include the requirement for (1) laboratory analysis of samples distributed by appropriate government or other standards-maintaining agencies in a laboratory intercomparison program, (2) analysis in duplicate of a fraction of the clients' environmental samples.

The NUS Radiological Laboratory also participates in the U.S. Environmental Protection Agency Radioactivity Intercomparison Studies (Cross-check) Program. These results will be included within this report as available.

SECTION II

A-1

GROSS ALPHA ON AIR PARTICULATE FILTER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID	Analysis Date	Result 1	Result 2
		$\pm 2s$ (E-03 pCi/m ³)	$\pm 2s$ (E-03 pCi/m ³)
032060/61	01/12/84	3.9 \pm 2.0	3.1 \pm 2.0
034040/41	02/15/84	1.5 \pm 1.2	LT 1.3
035200/01	03/13/84	2.7 \pm 1.3	1.7 \pm 1.3
030920/21	03/15/84	2.1 \pm 1.8	LT 2
034120/21	03/15/84	7.0 \pm 2.2	4.2 \pm 1.8

LT = Less Than

A-2

GROSS ALPHA IN WATER
(Page 1 of 3)

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 + 2s (pCi/l)	Result #2 + 2s (pCi/l)
027560/61	09/01/83	LT 3	LT 3
030180/81	11/23/83	48 \pm 20	46 \pm 20
029800/01	11/28/83	LT 4	LT 4
029460/61	12/06/83	3.1 \pm 2.0	4.9 \pm 2.8
031120/21	12/30/83	LT 0.9	0.7 \pm 0.7
031680/81	12/30/84	2.2 \pm 1.2	1.1 \pm 1.0
031140/41	01/01/84	LT 1.3	1.2 \pm 1.2
031160/61	01/03/84	LT 1.7	LT 1.7
031880/81	01/03/84	LT 3	LT 3
027540/41	01/06/84	LT 2	LT 2
030960/61	01/06/84	LT 4	LT 4
031060/61	01/06/84	1.6 \pm 1.5	1.6 \pm 1.5
032220/21	01/07/84	LT 1.8	LT 1.7
031260/61	01/08/84	LT 1.0	LT 1.6
032380/81	01/09/84	5.7 \pm 2.3	7.7 \pm 2.7
032360/61	01/10/84	LT 1.2	LT 1.0
031040/41	01/12/84	LT 4	LT 2
032180/81	01/17/84	3.0 \pm 1.9	2.1 \pm 1.7
029260/61	01/22/84	LT 3	LT 3
031180/81	02/07/84	0.80 \pm 0.79	LT 1.1
031080/81	02/09/84	LT 1.8	1.8 \pm 1.4

LT = Less Than

A-2

GROSS ALPHA IN WATER
(Page 2 of 3)

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
031100/01	02/09/84	2.3 ± 2.2	LT 3
031520/21	02/09/84	LT 2	LT 2
032560/61	02/09/84	LT 1.4	LT 1.4
032440/41	02/15/84	3.0 ± 1.4	3.6 ± 1.4
032740/41	02/15/84	LT 4	LT 5
031240/41	02/16/84	LT 1.0	LT 1.0
032240/41	02/16/84	1.2 ± 1.1	LT 1.5
032980/81	02/16/84	30 ± 15	23 ± 14
030800/01	02/20/84	LT 1.3	LT 1.3
033200/01	02/21/84	LT 1.4	LT 1.4
033480/81	02/22/84	41 ± 8	31 ± 8
030720/21	02/23/84	LT 0.9	LT 1.4
030980/81	02/24/84	12 ± 8	14 ± 11
032920/21	02/27/84	1.7 ± 1.1	2.3 ± 1.2
033780/81	02/27/84	LT 3	LT 3
032860/61	03/03/84	LT 3	LT 3
032540/41	03/06/84	9.8 ± 4.1	7.4 ± 3.8
032940/41	03/06/84	3.4 ± 1.9	3.0 ± 1.8
034100/01	03/06/84	270 ± 70	170 ± 60

LT = Less Than

A-2

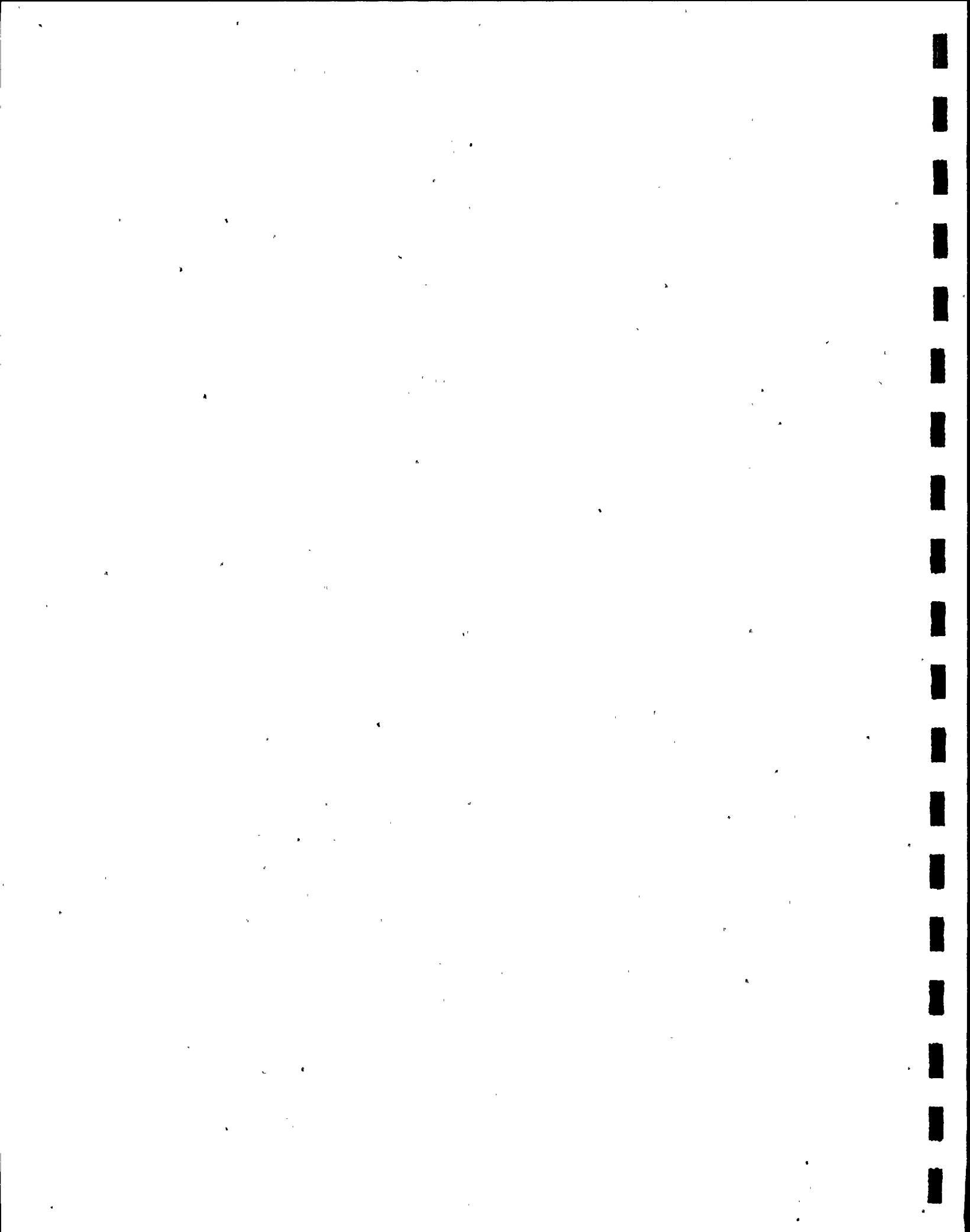
GROSS ALPHA IN WATER
(Page 3 of 3)

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 $\pm 2s$ (pCi/l)	Result #2 $\pm 2s$ (pCi/l)
034160/61	03/06/84	LT 6	LT 6
032660/61	03/08/84	2.7 \pm 1.8	LT 2
032680/81	03/12/84	15 \pm 2	17 \pm 2
034460/61	03/12/84	1000 \pm 100	1000 \pm 100
033600/01	03/14/84	LT 2	LT 2
035680/81	04/04/84	23 \pm 9	23 \pm 9
035760/61	04/11/84	1.8 \pm 0.9	3.2 \pm 1.1
035920/21	04/11/84	LT 1.0	LT 1.0
035840/41	04/12/84	6.9 \pm 3.0	8.9 \pm 3.2
035960/61	04/16/84	3.0 \pm 1.8	3.1 \pm 1.4
037080/01	05/25/84	LT 1.5	LT 1.5
037100/01	06/01/84	LT 15	LT 20
037120/21	06/01/84	LT 5	LT 5
037240/01	06/14/84	LT 23	LT 24
037620/21	06/19/84	LT 4	LT 2
038100/01	06/20/84	LT 1.5	LT 1.5
038880/81	09/01/84	LT 6	LT 6
039420/21	09/01/84	LT 1.6	LT 1.3
038900/01	09/02/84	LT 1.3	1.2 \pm 1.0
038860/01	09/05/84	0.81 \pm 0.66	LT 0.9

LT = Less Than



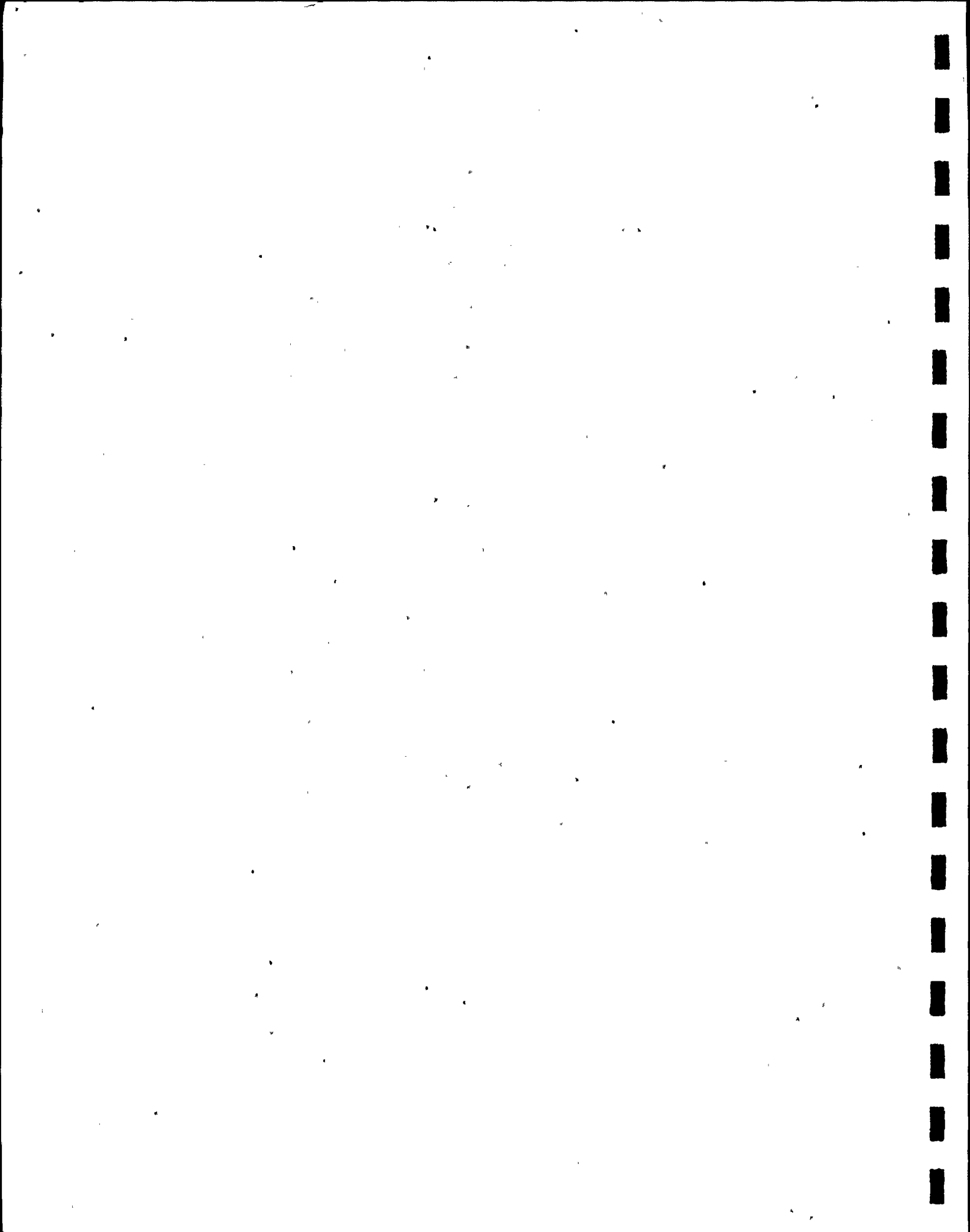
A-2

GROSS ALPHA IN WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

BLINDS AND REFERENCE STANDARDS

NUS ID#	Analysis Date	Expected Result $\pm 2s$ (pCi/l)	Reported Result $\pm 2s$ (pCi/l)
028047	01/03/84	140 \pm 50	140 \pm 20
	01/20/84	28 \pm 10	29 \pm 3
	02/08/84	56 \pm 21	61 \pm 7
	02/14/84	84 \pm 31	91 \pm 10
	02/15/84	110 \pm 40	120 \pm 20
	02/24/84	140 \pm 50	150 \pm 20
	02/24/84	28 \pm 10	25 \pm 3
	02/27/84	110 \pm 40	130 \pm 20
	03/05/84	140 \pm 52	120 \pm 20
	03/05/84	110 \pm 40	98 \pm 10
	03/13/84	140 \pm 52	150 \pm 20
	03/13/84	140 \pm 52	150 \pm 20
	04/09/84	56 \pm 21	64 \pm 7



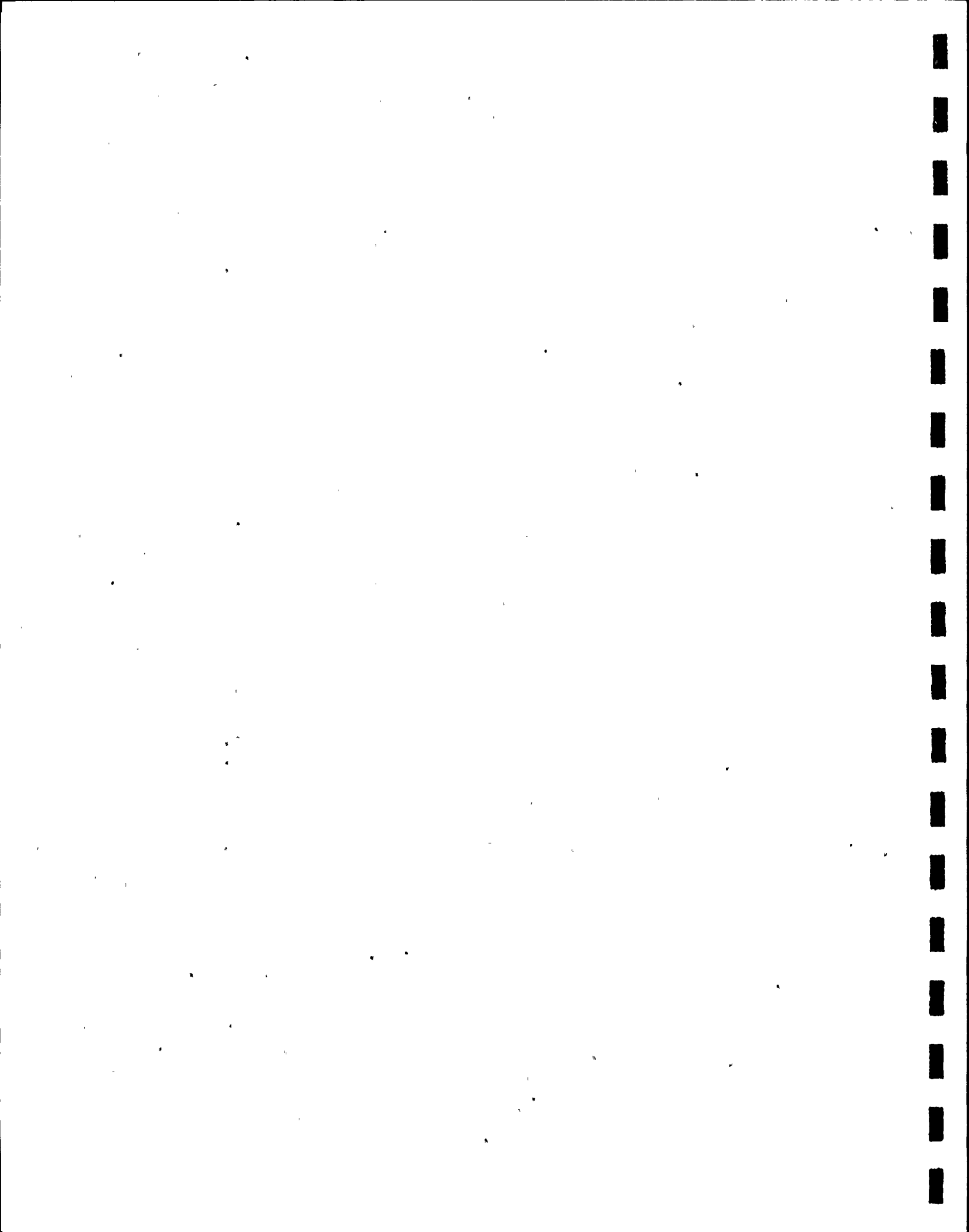
A-3

GROSS ALPHA IN SEDIMENT

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID	Analysis Date	Result 1	Result 2
		$\pm 2s$ (pCi/g (dry))	$\pm 2s$ (pCi/g (dry))
038220/21	07/03/84	13 \pm 5	21 \pm 6



GROSS BETA ON AIR PARTICULATE FILTER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1	Result #2
		$\pm 2S$ (E-03 pCi/m ³)	$\pm 2S$ (E-03 pCi/m ³)
031920/21	01/11/84	32 \pm 4	28 \pm 4
032060/61	01/12/84	12 \pm 4	12 \pm 4
032200/01	01/16/84	27 \pm 6	27 \pm 6
032480/81	01/17/84	14 \pm 4	12 \pm 4
032780/81	01/21/84	41 \pm 5	40 \pm 4
032820/21	01/24/84	38 \pm 5	38 \pm 4
033100/01	01/25/84	31 \pm 6	30 \pm 5
033500/01	01/28/84	26 \pm 4	26 \pm 4
033620/21	01/28/84	25 \pm 4	27 \pm 4
033700/01	01/28/84	30 \pm 5	31 \pm 5
033840/41	02/15/84	31 \pm 6	27 \pm 6
033860/61	02/15/84	34 \pm 4	39 \pm 9
033900/01	02/15/84	21 \pm 11	30 \pm 6
033940/41	02/15/84	5.6 \pm 2.1	5.5 \pm 3.9
034040/41	02/15/84	5.6 \pm 3.3	6.3 \pm 5.8
034540/41	02/22/84	11 \pm 2	9.8 \pm 1.9
034580/81	02/22/84	12 \pm 2	12 \pm 2
034660/61	02/27/84	24 \pm 4	25 \pm 4
034400/01	02/29/84	17 \pm 3	21 \pm 3

LT = Less Than

GROSS BETA ON AIR PARTICULATE FILTER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1	Result #2
		$\pm 2S$ (E-03 pCi/m ³)	$\pm 2S$ (E-03 pCi/m ³)
034700/01	03/06/84	7.2 \pm 1.8	7.6 \pm 1.8
034920/21	03/13/84	8.3 \pm 2.6	8.2 \pm 2.7
035180/81	03/13/84	10 \pm 2	11 \pm 2
035200/01	03/13/84	13 \pm 3	13 \pm 3
035240/41	03/20/84	23 \pm 5	19 \pm 5
035420/21	03/20/84	LT 7	LT 6
035460/61	03/27/84	8.1 \pm 4.8	11 \pm 5
035500/01	03/27/84	19 \pm 6	19 \pm 6
035540/41	03/27/84	15 \pm 3	14 \pm 3
035560/61	03/27/84	14 \pm 2	16 \pm 2
035640/41	03/27/84	22 \pm 4	23 \pm 4
035480/81	03/28/84	4.9 \pm 1.8	4.8 \pm 1.9
035700/01	03/28/84	5.1 \pm 2.0	3.3 \pm 1.8
035720/21	03/28/84	5.7 \pm 1.4	6.8 \pm 1.4
035800/01	04/04/84	16 \pm 3	17 \pm 3
036360/61	04/17/84	LT 3	LT 3
036540/41	05/08/84	9.9 \pm 5.7	17 \pm 6
036640/41	05/08/84	7.6 \pm 4.5	9.5 \pm 4.4
036860/61	05/15/84	10 \pm 5	6.2 \pm 4.7

LT = Less Than

GROSS BETA ON AIR PARTICULATE FILTER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1	Result #2
		$\pm 2S$ (E-03 pCi/m ³)	$\pm 2S$ (E-03 pCi/m ³)
036660/61	05/08/84	18 \pm 3	18 \pm 3
036760/61	05/15/84	6.6 \pm 2.0	6.0 \pm 2.1
036740/41	05/16/84	10 \pm 4	4.9 \pm 4.0
036900/01	05/25/84	12 \pm 2	14 \pm 2
037040/01	05/25/84	19 \pm 4	21 \pm 4
037180/81	06/04/84	9.3 \pm 2.3	9.4 \pm 2.3
037220/21	06/07/84	3.9 \pm 1.9	3.3 \pm 1.8
037360/61	06/07/84	10 \pm 2	9.2 \pm 2.3
037500/01	06/05/84	13 \pm 4	10 \pm 4
037640/41	06/08/84	9.1 \pm 2.9	7.6 \pm 2.4
037700/01	06/08/84	13 \pm 5	10 \pm 5
037980/81	06/13/84	15 \pm 5	16 \pm 5
038140/41	06/20/84	23 \pm 4	19 \pm 3
038240/41	06/27/84	12 \pm 2	14 \pm 3
038320/01	06/28/84	14 \pm 4	16 \pm 4
038280/81	06/28/84	6.0 \pm 1.9	6.3 \pm 1.9
038440/41	07/02/84	11 \pm 2	13 \pm 2
038480/81	07/04/84	16 \pm 3	18 \pm 3
038620/21	07/09/84	8.6 \pm 2.1	8.5 \pm 2.3

LT = Less Than

GROSS BETA ON AIR PARTICULATE FILTER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1	Result #2
		\pm 2S (E-03 pCi/m ³)	\pm 2S (E-03 pCi/m ³)
038780/81	07/12/84	82 \pm 18	72 \pm 17 ^a
038800/01	07/14/84	14 \pm 2	12 \pm 2
038820/21	07/14/84	25 \pm 4	18 \pm 3
038940/41	07/20/84	15 \pm 3	11 \pm 3
039180/81	07/31/84	19 \pm 5	19 \pm 5
039280/81	08/06/84	18 \pm 3	15 \pm 3
039320/21	08/07/84	23 \pm 4	20 \pm 4
039360/61	08/24/84	18 \pm 3	19 \pm 3
039380/81	08/24/84	24 \pm 5	22 \pm 5

a) Units are pCi/filter. No volume was available.

LT = Less Than

GROSS BETA IN WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID	Analysis Date	Result 1 $\pm 2s$ (pCi/l)	Result 2 $\pm 2s$ (pCi/l)
030180/81	11/23/83	35 \pm 13	46 \pm 12
029800/01	11/28/83	3.7 \pm 2.4	4.9 \pm 2.5
029460/61	12/06/83	4.3 \pm 2.5	3.6 \pm 2.5
031220/21	12/16/83	LT 3	LT 2
031880/81	01/03/84	LT 3	LT 3
032440/41	02/15/84	3.0 \pm 1.4	3.6 \pm 1.4
032980/81	02/16/84	100 \pm 10	110 \pm 20
030800/01	02/20/84	LT 1.7	LT 1.7
025240/41	02/21/84	7.6 \pm 1.7	6.9 \pm 1.6
033200/01	02/21/84	LT 1.7	1.7 \pm 1.1
033480/81	02/22/84	32 \pm 6	29 \pm 6
033520/21	02/27/84	1.9 \pm 1.3	LT 1.7
033780/81	02/27/84	2.8 \pm 2.2	4.2 \pm 2.3
032860/61	03/03/84	LT 4	LT 4
032540/41	03/06/84	4.4 \pm 2.8	3.1 \pm 2.8
032840/41	03/06/84	3.9 \pm 1.4	2.6 \pm 1.4
034100/01	03/06/84	170 \pm 40	160 \pm 20
034160/61	03/06/84	LT 5	LT 5
031380/81	03/08/84	11 \pm 2	12 \pm 2
032620/21	03/09/84	5.8 \pm 1.4	3.2 \pm 1.3

LT = Less Than

GROSS BETA IN WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID	Analysis Date	Result 1 \pm 2s (pCi/l)	Result 2 \pm 2s (pCi/l)
031800/01	03/21/84	LT 1.8	LT 2
035680/81	04/04/84	39 \pm 6	43 \pm 7
035760/61	04/11/84	7.4 \pm 1.4	8.1 \pm 1.4
035920/21	04/11/84	2.2 \pm 1.1	2.2 \pm 1.1
035840/41	04/12/84	11 \pm 3	13 \pm 3
035960/61	04/16/84	LT 4	3.0 \pm 2.6
037080/81	05/25/84	6.3 \pm 1.4	5.1 \pm 1.3
037100/01	06/01/84	LT 8	8.9 \pm 5.5
037120/21	06/01/84	24 \pm 6	18 \pm 5
037280/81	06/08/84	2.1 \pm 1.2	2.1 \pm 1.1
037240/41	06/14/84	LT 11	LT 11
037620/21	06/19/84	1.9 \pm 1.5	1.6 \pm 1.4
037840/41	06/19/84	3.6 \pm 1.4	3.5 \pm 1.4
038100/01	06/20/84	2.3 \pm 1.3	2.6 \pm 1.3
038300/01	07/04/84	4.9 \pm 2.3	5.8 \pm 2.4
038880/81	09/01/84	4.7 \pm 3.0	2.9 \pm 2.9
039420/21	09/01/84	1.7 \pm 1.4	1.9 \pm 1.3
038900/01	09/02/84	LT 4	4.2 \pm 2.6
038860/61	09/05/84	3.8 \pm 1.3	3.9 \pm 1.3

LT = Less Than

B-2

GROSS BETA IN WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

BLINDS AND REFERENCE STANDARDS

NUS ID#	Analysis Date	Expected Result $\pm 2s$ (pCi/l)	Reported Result $\pm 2s$ (pCi/l)
028047	01/07/84	38 ± 15 (1)	38 ± 4
	01/20/84	7.7 ± 2.8	8.3 ± 1.5
	02/09/84	16 ± 6	14 ± 2
	02/14/84	23 ± 9	31 ± 4
	02/24/84	7.7 ± 2.8	5.1 ± 1.4
	02/28/84	31 ± 12	31 ± 4
	02/28/84	31 ± 12	31 ± 4
	02/28/84	38 ± 15	51 ± 6
	03/05/84	35 ± 13	51 ± 6
	03/05/84	31 ± 12	23 ± 3
	03/13/84	38 ± 15	47 ± 5
	03/13/84	38 ± 15	32 ± 4
	04/09/84	16 ± 6	22 ± 3

- (1) Error determined by poisson statistics, EPA-600/7-77-088, p62.
- (2) During the investigation of anomalous data, gamma spectrometric analysis of the stock reference standard used in 1984 indicated that the true activity of the beta component should have been 1.46 times the original value used to calculate the "expected result". This table now reflects the correct "expected results".

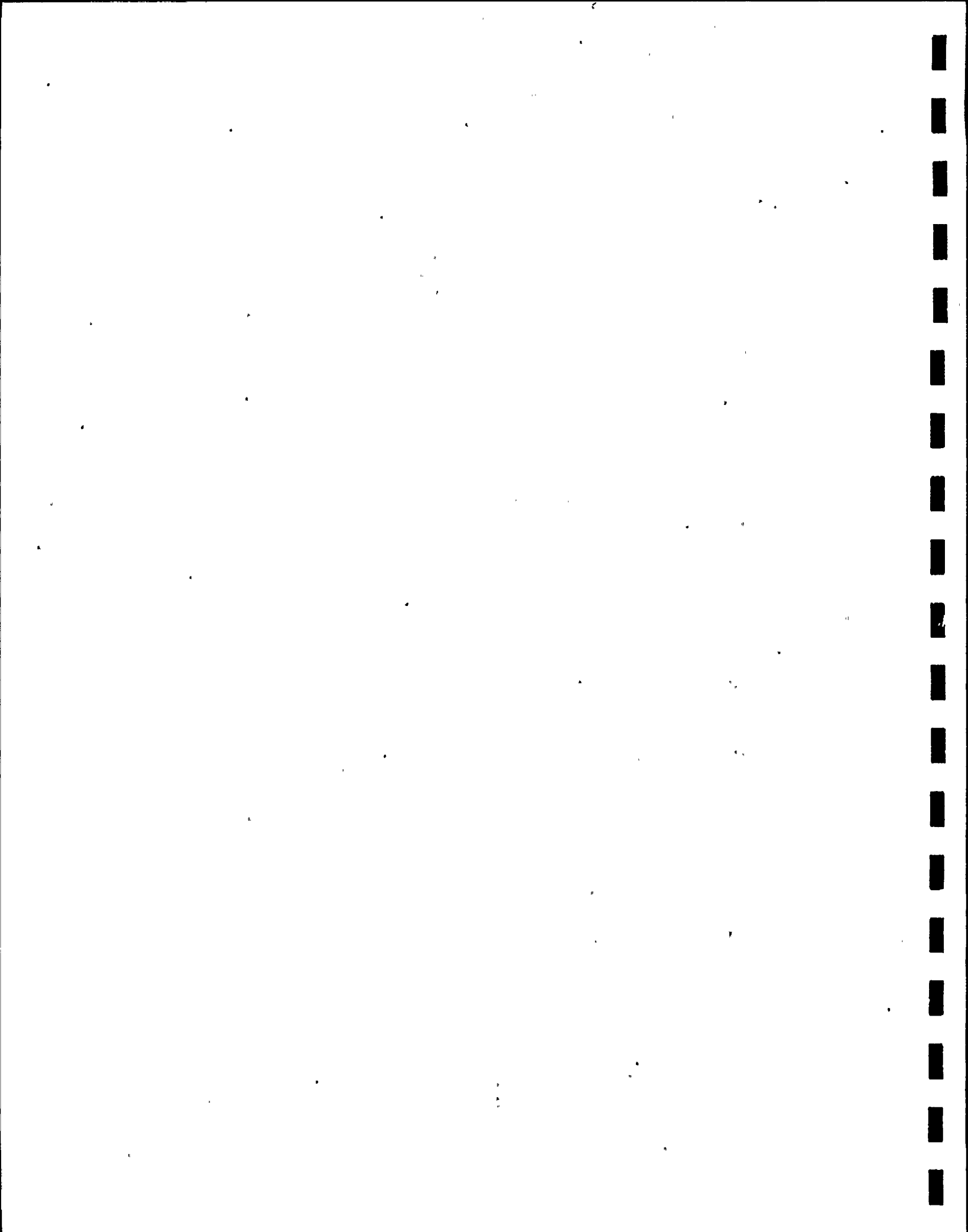
B-3

GROSS BETA IN MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID	Analysis Date	Result 1	Result 2
		$\pm 2s$ (pCi/l)	$\pm 2s$ (pCi/l)
036420/21	08/30/84	29 \pm 7	26 \pm 7
037440/41	08/30/84	21 \pm 7	19 \pm 7
038840/41	08/30/84	35 \pm 7	36 \pm 7
039040/41	08/30/84	31 \pm 7	31 \pm 7



B-4

GROSS BETA IN SEDIMENT

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID	Analysis Date	Result 1 \pm 2s (pCi/g(dry))	Result 2 \pm 2s (pCi/(dry))
038220/21	07/03/84	19 \pm 2	21 \pm 3

GAMMA SPECTROMETRY OF AIR PARTICULATE FILTER (COMPOSITE)

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis	Nuclides	Result #1	Result #2
	Date		$\pm 2s$ (E-03 pCi/m ³)	$\pm 2s$ (E-03 pCi/m ³)
032140/41	12/15/83	Cs-137	28 \pm 8	18 \pm 7
029900/01	01/17/84	Co-60	LT 13	LT 9
		Cs-137	LT 8	LT 8
033920/21	02/06/84	Be-7	47 \pm 25	LT 60
		Ce-144	LT 10	LT 19
		Cs-134	LT 2	LT 3
		Cs-137	LT 3	LT 5
		Nb-95	LT 4	LT 6
		Zr-95	LT 6	LT 9
034120/21	02/08/84	Be-7	52 \pm 12	44 \pm 12
		Ce-144	LT 4	LT 4
		Cs-134	LT 1.1	LT 1.2
		Cs-137	LT 1.4	LT 1.3
		Nb-95	LT 1.8	LT 1.9
		Zr-95	LT 3	LT 3

LT = Less Than

GAMMA SPECTROMETRY OF AIR PARTICULATE FILTER (COMPOSITE)

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1	Result #2
			$\pm 2s$ (E-03 pCi/m ³)	$\pm 2s$ (E-03 pCi/m ³)
036520/21	04/16/84	Be-7	LT 60	LT 60
		Ce-144	LT 20	LT 20
		Cs-134	LT 5	LT 5
		Cs-137	LT 4	LT 5
		Nb-95	LT 6	LT 6
		Zr-95	LT 10	LT 8
036620/21	04/20/84	Be-7	61 \pm 13	56 \pm 13
		Ce-144	LT 5	LT 5
		Cs-134	LT 1.4	LT 1.2
		Cs-137	LT 1.3	LT 1.3
		Nb-95	LT 1.4	LT 1.6
		Zr-95	LT 3	LT 3
036720/21	04/26/84	Be-7	92 \pm 26	68 \pm 27
		Ce-144	LT 10	LT 13
		Cs-134	LT 3	LT 4
		Cs-137	LT 2	LT 4
		Nb-95	LT 4	LT 4
		Zr-95	LT 5	LT 11

LT = Less Than

GAMMA SPECTROMETRY OF AIR PARTICULATE FILTER (COMPOSITE)

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1	Result #2
			$\pm 2s$ (E-03 pCi/m ³)	$\pm 2s$ (E-03 pCi/m ³)
038980/81	07/23/84	Be-7	57 \pm 12	64 \pm 12
		Ce-144	LT 4	LT 4
		Cs-134	LT 0.9	LT 0.9
		Cs-137	LT 1.0	LT 0.9
		Nb-95	LT 0.8	LT 1.1
		Zr-95	LT 1.7	LT 2
039100/01	07/27/84	Be-7	58 \pm 17	49 \pm 17
		Ce-144	LT 6	LT 6
		Cs-134	LT 1.7	LT 2
		Cs-137	LT 1.6	LT 1.8
		Nb-95	LT 1.9	LT 3
		Zr-95	LT 3	LT 5

LT = Less Than

C-1

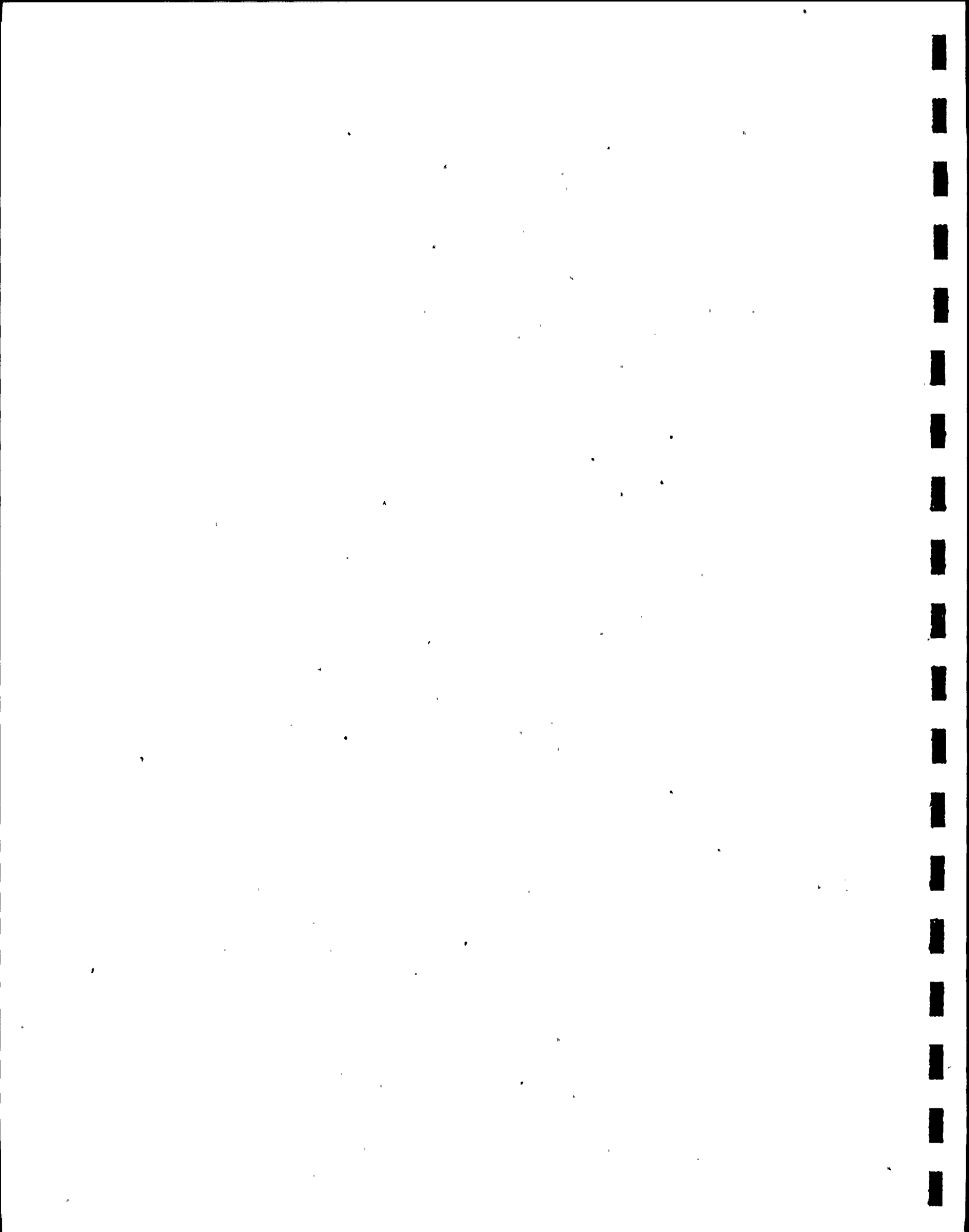
GAMMA SPECTROMETRY OF AIR PARTICULATE FILTER

NUS Radiological Laboratory
Internal Quality Control Program
1984

BLANKS AND REFERENCES STANDARDS

NUS ID#	Analysis Date	Nuclides	Expected Result	Reported Result
			$\pm 2s$ (E-03 pCi/filter)	$\pm 2s$ (E-03 pCi/filter)
033929	02/06/84	Be-7	0	LT 180
		Ce-144	0	LT 80
		Cs-134	0	LT 17
		Cs-137	0	LT 17
		Nb-95	0	LT 20
		Zr-95	0	LT 40
033999	02/06/84	Be-7	0	LT 120
		Ce-144	0	LT 40
		Cs-134	0	LT 10
		Cs-137	0	LT 10
		Nb-95	0	LT 17
		Zr-95	0	LT 30

LT - Less Than



GAMMA SPECTROMETRY OF MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
032340/41	12/24/83	Ba-140	LT 16	LT 10
		Co-58	LT 4	LT 3
		Co-60	LT 4	LT 3
		Cs-134	LT 3	LT 2
		Cs-137	LT 4	LT 3
		Fe-59	LT 10	LT 8
		La-140	LT 7	LT 5
		Mn-54	LT 4	LT 3
		Nb-95	LT 4	LT 3
		Zn-65	LT 9	LT 6
		Zr-95	LT 7	LT 4
		K-40	1500 ± 200	1300 ± 200
032280/81	01/02/84	Ba-140	LT 30	LT 30
		Cs-134	LT 4	LT 4
		Cs-137	LT 5	LT 5
		K-40	1400 ± 200	1400 ± 200
		La-140	LT 15	LT 16
033300/01	01/18/84	Ba-140	LT 20	LT 18
		Cs-134	LT 6	LT 5
		Cs-137	LT 7	LT 5
		La-140	LT 11	LT 9
		K-40	1400 ± 200	1400 ± 200

LT = Less Than

GAMMA SPECTROMETRY OF MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
033460/61	01/18/84	Ba-140	LT 20	LT 20
		Cs-134	LT 7	LT 6
		Cs-137	LT 8	LT 7
		La-140	LT 12	LT 10
		K-40	1400 ± 200	1500 ± 200
030640/41	01/30/84	Ba-140	LT 1200	LT 1200
		Cs-134	LT 3	LT 3
		Cs-137	LT 3	LT 4
		La-140	LT 500	LT 700
		K-40	1200 ± 200	1300 ± 200
035580/81	03/23/84	Ba-140	LT 15	LT 9
		Co-58	LT 4	LT 3
		Co-60	LT 5	LT 3
		Cs-134	LT 4	LT 2
		Cs-137	LT 5	LT 2
		Fe-59	LT 11	LT 6
		La-140	LT 6	LT 5
		Mn-54	LT 4	LT 2
		Nb-95	LT 4	LT 3
		Zn-65	LT 11	LT 6
		Zr-95	LT 8	LT 4
		K-40	1500 ± 200	1600 ± 200

LT = Less Than

GAMMA SPECTROMETRY OF MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 $\pm 2s$ (pCi/l)	Result #2 $\pm 2s$ (pCi/l)
036140/41	04/09/84	Co-60	4.3 ± 2.7	LT 11
		Cs-137	17 ± 2	17 ± 6
036180/81	04/10/84	Ba-140	LT 14	LT 20
		Cs-134	LT 4	LT 5
		Cs-137	LT 4	LT 6
		La-140	LT 6	LT 10
		K-40	1300 ± 200	1400 ± 200
036420/21	04/15/84	Ba-140	LT 11	LT 11
		Co-58	LT 4	LT 4
		Co-60	LT 5	LT 5
		Cs-134	LT 4	LT 4
		Cs-137	LT 4	LT 4
		Fe-59	LT 10	LT 10
		La-140	LT 5	LT 5
		Mn-54	LT 4	LT 4
		Nb-95	LT 4	LT 4
		Zn-65	LT 10	LT 11
		Zr-95	LT 7	LT 7
		K-40	1300 ± 200	1300 ± 200

LT = Less Than

GAMMA SPECTROMETRY OF MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 \pm 2s (pCi/l)	Result #2 \pm 2s (pCi/l)
038420/21	06/28/84	Ba-140	LT 30	LT 20
		Cs-134	LT 9	LT 8
		Cs-137	LT 11	LT 9
		La-140	LT 12	LT 9
		K-40	1500 \pm 200	1800 \pm 200
038840/41	07/13/84	Ba-140	LT 14	LT 13
		Co-58	LT 5	LT 4
		Co-60	LT 5	LT 4
		Cs-134	LT 5	LT 3
		Cs-137	LT 5	LT 4
		Fe-59	LT 12	LT 10
		La-140	LT 6	LT 6
		Mn-54	LT 5	LT 4
		Nb-95	LT 5	LT 4
		Zn-65	LT 13	LT 10
		Zr-95	LT 9	LT 7
		K-40	1200 \pm 200	1200 \pm 200

LT = Less Than

GAMMA SPECTROMETRY OF MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 + 2s (pCi/l)	Result #2 + 2s (pCi/l)
039040/41	07/31/84 ⁽¹⁾	Ba-140 ⁽²⁾	LT 12	LT 14
		Co-58	LT 4	LT 4
		Co-60	LT 4	LT 4
		Cs-134	LT 3	LT 3
		Cs-137	LT 4	LT 4
		Fe-59	LT 10	LT 10
		La-140	LT 7	LT 7
		Mn-54	LT 4	LT 4
		Nb-95	LT 4	LT 4
		Zn-65	LT 10	LT 10
		Zr-95	LT 7	LT 7
		K-40	1400 + 200	1400 + 200

(1) Analysis date for result No. 2 was 08/01/84.

(2) LT = Less Than

GAMMA SPECTROMETRY OF MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 + 2s (pCi/l)	Result #2 + 2s (pCi/l)
038060/61	06/14/84	Ba-140	LT 30	LT 12
		Cs-134	LT 11	LT 4
		Cs-137	LT 14	LT 5
		La-140	LT 14	LT 6
		K-40	1900 \pm 200	2000 \pm 200
037780/81	06/08/84	Ba-140	LT 16	LT 30
		Cs-134	LT 4	LT 6
		Cs-137	LT 5	LT 8
		La-140	LT 7	LT 12
		K-40	1700 \pm 200	1600 \pm 200
037760/61	06/04/84	Ba-140	LT 12	LT 12
		Co-58	LT 4	LT 4
		Co-60	LT 5	LT 5
		Cs-134	LT 3	LT 3
		Cs-137	LT 4	LT 4
		Fe-59	LT 10	LT 9
		La-140	LT 6	LT 6
		Mn-54	LT 4	LT 4
		Nb-95	LT 4	LT 4
		Zn-65	LT 10	LT 10
		Zr-95	LT 7	LT 7
		K-40	1300 \pm 200	1300 \pm 200

LT = Less Than

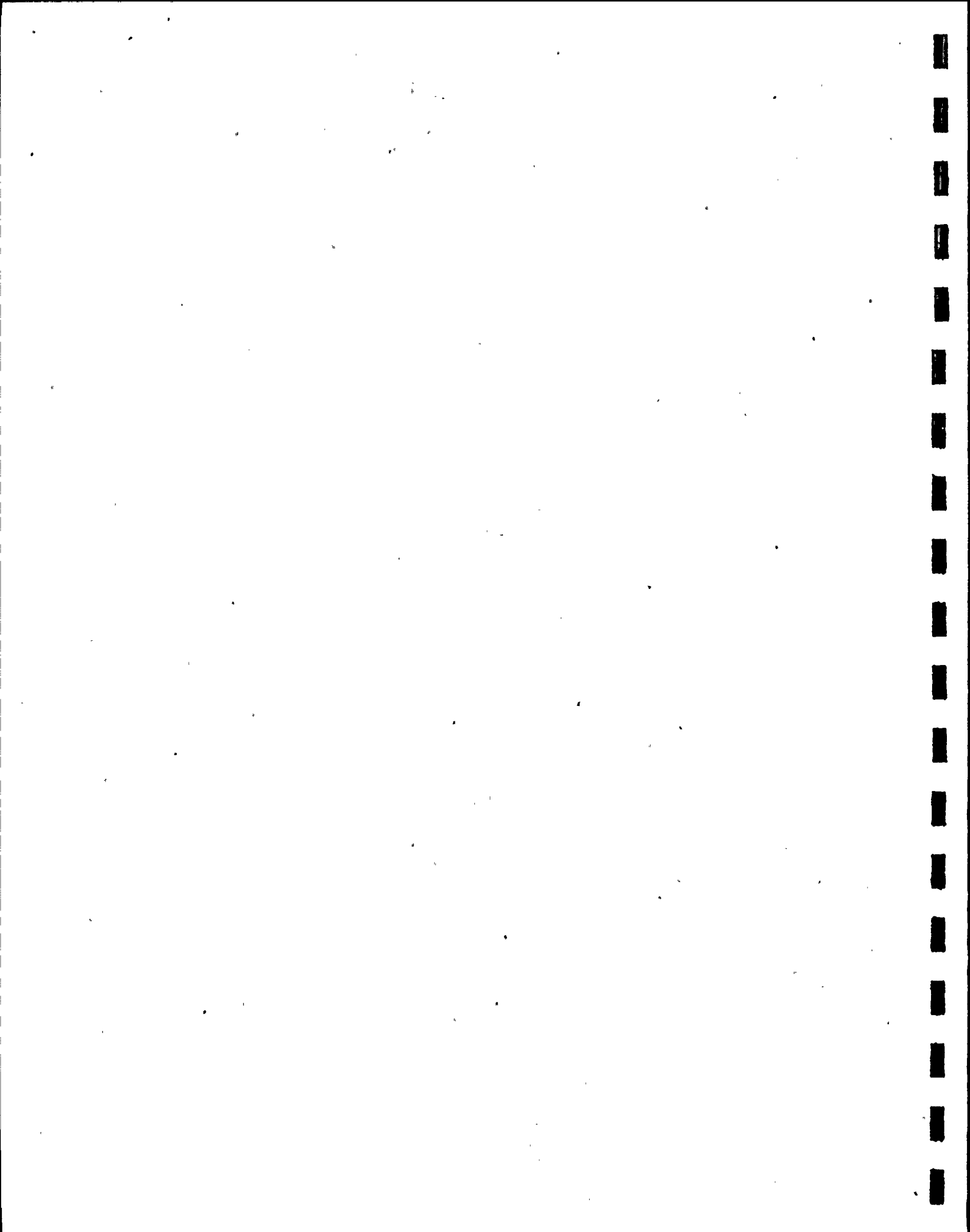
GAMMA SPECTROMETRY OF MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 $\pm 2s$ (pCi/l)	Result #2 $\pm 2s$ (pCi/l)
037400/01	06/08/84	Ba-140	LT 13	LT 30
		Cs-134	LT 3	LT 3
		Cs-137	LT 4	LT 4
		La-140	LT 7	LT 15
		K-40	1400 \pm 200	1200 \pm 200
037440/41	05/29/84	Ba-140	LT 15	LT 18
		Co-58	LT 4	LT 4
		Co-60	LT 5	LT 4
		Cs-134	LT 4	LT 3
		Cs-137	LT 4	LT 4
		Fe-59	LT 11	LT 10
		La-140	LT 8	LT 10
		Mn-54	LT 4	LT 4
		Nb-95	LT 4	LT 4
		Zn-65	LT 11	LT 9
		Zr-95	LT 8	LT 7
		K-40	1300 \pm 200	1300 \pm 200

LT = Less Than



GAMMA SPECTROMETRY OF WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
032840/41	01/10/84	Ba-140	LT 20	LT 20
		Co-58	LT 6	LT 6
		Co-60	LT 7	LT 7
		Cs-134	LT 6	LT 6
		Cs-137	LT 6	LT 6
		Fe-59	LT 13	LT 13
		La-140	LT 15	LT 15
		Mn-54	LT 6	LT 6
		Nb-95	LT 6	LT 6
		Zn-65	LT 13	LT 13
		Zr-95	LT 12	LT 12
032320/21	01/13/84	Ba-140	LT 50	LT 50
		Co-58	LT 6	LT 6
		Co-60	LT 6	LT 6
		Cs-134	LT 5	LT 5
		Cs-137	LT 5	LT 5
		Fe-59	LT 15	LT 15
		La-140	LT 30	LT 30
		Mn-54	LT 5	LT 5
		Nb-95	LT 6	LT 6
		Zn-65	LT 12	LT 12
		Zr-95	LT 10	LT 10
031380/81	01/30/84	Ba-140	LT 500	LT 200
		Co-58	LT 6	LT 6
		Co-60	LT 4	LT 3
		Cs-134	LT 3	LT 3
		Cs-137	LT 3	LT 3
		Fe-59	LT 20	LT 17
		La-140	LT 300	LT 130
		Mn-54	LT 4	LT 4
		Nb-95	LT 7	LT 6
		Zn-65	LT 9	LT 8
		Zr-95	LT 12	LT 11

LT = Less Than

GAMMA SPECTROMETRY OF WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
033520/21	02/03/84	Ba-140	LT 30	LT 30
		Co-58	LT 4	LT 4
		Co-60	LT 4	LT 4
		Cs-134	LT 3	LT 3
		Cs-137	LT 3	LT 3
		Fe-59	LT 8	LT 8
		La-140	LT 13	LT 13
		Mn-54	LT 3	LT 3
		Zn-65	LT 7	LT 7
		Zr-95	LT 6	LT 6
		Nb-95	LT 4	LT 4
033720/21	02/07/84	Ba-140	LT 500	LT 800
		Co-58	LT 3	LT 5
		Co-60	LT 1.9	LT 2
		Cs-134	LT 1.6	LT 2
		Cs-137	LT 1.5	LT 2
		Fe-59	LT 12	LT 15
		La-140	LT 300	LT 400
		Mn-54	LT 2	LT 3
		Nb-95	LT 4	LT 5
		Zn-65	LT 4	LT 6
		Zr-95	LT 7	LT 10
034160/61	02/07/84	Ba-140	LT 15	LT 15
		Co-58	LT 4	LT 3
		Co-60	LT 4	LT 4
		Cs-134	LT 4	LT 4
		Cs-137	LT 4	LT 4
		Fe-59	LT 9	LT 8
		La-140	LT 8	LT 8
		Mn-54	LT 4	LT 4
		Nb-95	LT 4	LT 3
		Zn-65	LT 9	LT 8
		Zr-95	LT 7	LT 7

LT = Less Than

GAMMA SPECTROMETRY OF WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
029520/21	02/10/84	Ba-140	LT 1400	LT 1100
		Co-58	LT 5	LT 5
		Co-60	LT 3	LT 2
		Cs-134	LT 3	LT 2
		Cs-137	LT 2	LT 1.9
		Fe-59	LT 20	LT 18
		La-140	LT 700	LT 800
		Mn-54	LT 3	LT 2
		Nb-95	LT 6	LT 5
		Zn-65	LT 6	LT 6
		Zr-95	LT 11	LT 11
034600/01	02/17/84	Ba-140	LT 20	LT 20
		Co-58	LT 5	LT 3
		Co-60	LT 5	LT 3
		Cs-134	LT 4	LT 3
		Cs-137	LT 5	LT 3
		Fe-59	LT 11	LT 7
		La-140	LT 14	LT 11
		Mn-54	LT 5	LT 3
		Nb-95	LT 5	LT 3
		Zn-65	LT 10	LT 6
		Zr-95	LT 8	LT 6
034640/41	02/22/84	Ba-140	LT 9	LT 8
		Co-58	LT 3	LT 2
		Co-60	LT 4	LT 3
		Cs-134	LT 2	LT 2
		Cs-137	LT 3	LT 2
		Fe-59	LT 6	LT 5
		La-140	LT 4	LT 5
		Mn-54	LT 3	LT 2
		Nb-95	LT 3	LT 2
		Zn-65	LT 6	LT 5
		Zr-95	LT 5	LT 4

LT = Less Than

GAMMA SPECTROMETRY OF WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 + 2s (pCi/l)	Result #2 + 2s (pCi/l)
034840/41	03/03/84	Ba-140	LT 7	LT 4
		Co-58	LT 2	LT 1.1
		Co-60	LT 2	LT 1.1
		Cs-134	LT 2	LT 1.1
		Cs-137	LT 2	1.1 + 0.6
		Fe-59	LT 4	LT 2
		La-140	LT 4	LT 1.9
		Mn-54	LT 2	LT 1.0
		Nb-95	LT 2	LT 1.1
		Zn-65	LT 5	LT 2
		Zr-95	LT 4	LT 1.8
035820/21	04/02/84	Ba-140	LT 11	LT 6
		Co-58	LT 4	LT 1.5
		Co-60	LT 5	LT 2
		Cs-134	LT 4	LT 1.7
		Cs-137	LT 4	LT 1.6
		Fe-59	LT 8	LT 3
		La-140	LT 7	LT 4
		Mn-54	LT 4	LT 1.5
		Nb-95	LT 4	LT 1.7
		Zn-65	LT 8	LT 4
		Zr-95	LT 7	LT 3
037280/81	05/15/84	Ba-140	LT 20	LT 20
		Co-58	LT 6	LT 6
		Co-60	LT 8	LT 8
		Cs-134	LT 7	LT 7
		Cs-137	LT 7	LT 7
		Fe-59	LT 14	LT 14
		La-140	LT 13	LT 13
		Mn-54	LT 6	LT 6
		Nb-95	LT 6	LT 6
		Zn-65	LT 13	LT 13
		Zr-95	LT 12	LT 12

LT = Less Than

GAMMA SPECTROMETRY OF WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 + 2s (pCi/l)	Result #2 + 2s (pCi/l)
037620/21	05/30/84	Ba-140	LT 8	LT 17
		Co-58	LT 2	LT 5
		Co-60	LT 2	LT 4
		Cs-134	LT 1.8	LT 4
		Cs-137	LT 1.9	LT 4
		Fe-59	LT 4	LT 10
		La-140	LT 5	LT 11
		Mn-54	LT 1.8	LT 4
		Nb-95	LT 2	LT 4
		Zn-65	LT 4	LT 11
		Zr-95	LT 4	LT 8
037840/41	06/05/84	Ba-140	LT 7	LT 9
		Co-58	LT 2	LT 3
		Co-60	LT 2	LT 3
		Cs-134	LT 2	LT 3
		Cs-137	LT 2	LT 3
		Fe-59	LT 4	LT 6
		La-140	LT 4	LT 5
		Mn-54	LT 2	LT 3
		Nb-95	LT 2	LT 3
		Zn-65	LT 5	LT 6
		Zr-95	LT 4	LT 5
038100/01	06/19/84	Ba-140	LT 8	LT 10
		Co-58	LT 2	LT 3
		Co-60	LT 3	LT 3
		Cs-134	LT 2	LT 2
		Cs-137	LT 2	LT 3
		Fe-59	LT 5	LT 6
		La-140	LT 5	LT 5
		Mn-54	LT 2	LT 3
		Nb-95	LT 2	LT 3
		Zn-65	LT 5	LT 5
		Zr-95	LT 4	LT 5

LT = Less Than

GAMMA SPECTROMETRY OF WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
038160/61	06/23/84	Ba-140	LT 9	LT 10
		Co-58	LT 3	LT 3
		Co-60	LT 3	LT 3
		Cs-134	LT 2	LT 3
		Cs-137	LT 3	LT 2
		Fe-59	LT 6	LT 5
		La-140	LT 5	LT 7
		Mn-54	LT 3	LT 3
		Nb-95	LT 3	LT 3
		Zn-65	LT 5	LT 6
		Zr-95	LT 5	LT 5
038300/01	06/26/84	Ba-140	LT 5	LT 9
		Co-58	LT 1.5	LT 2
		Co-60	LT 1.7	LT 3
		Cs-134	LT 1.4	LT 2
		Cs-137	LT 1.4	LT 2
		Fe-59	LT 3	LT 5
		La-140	LT 3	LT 5
		Mn-54	LT 1.5	LT 2
		Nb-95	LT 1.5	LT 2
		Zn-65	LT 4	LT 5
		Zr-95	LT 3	LT 4
038860/61	07/14/84	Ba-140	LT 8	LT 7
		Co-58	LT 3	LT 2
		Co-60	LT 3	LT 2
		Cs-134	LT 2	LT 1.8
		Cs-137	LT 3	LT 2
		Fe-59	LT 6	LT 4
		La-140	LT 5	LT 4
		Mn-54	LT 2	LT 1.8
		Nb-95	LT 3	LT 2
		Zn-65	LT 6	LT 5
		Zr-95	LT 5	LT 3

LT = Less Than

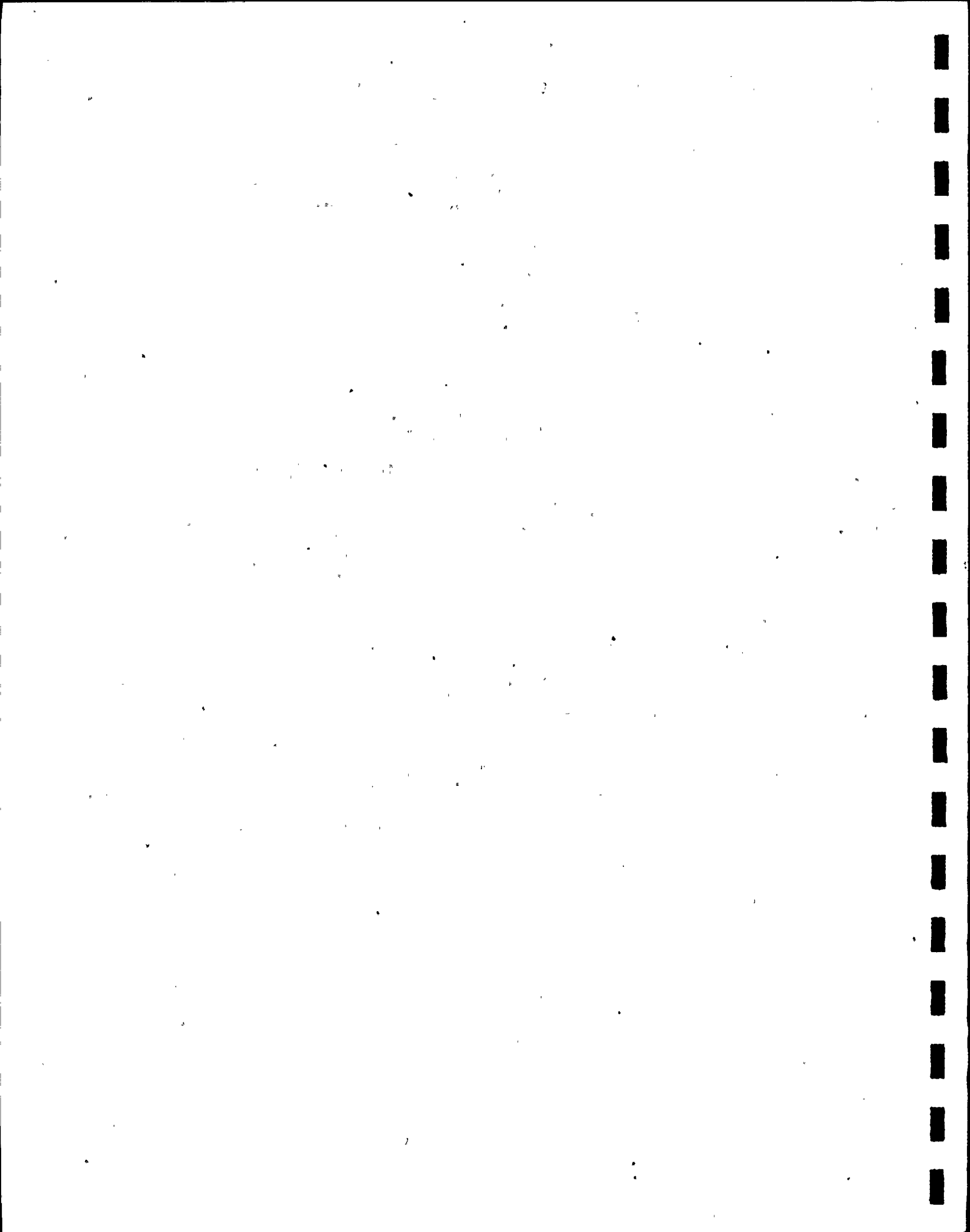
GAMMA SPECTROMETRY OF WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
038880/81	07/27/84	Ba-140	LT 4	LT 14
		Co-58	LT 0.8	LT 2
		Co-60	LT 0.9	LT 3
		Cs-134	LT 0.7	LT 2
		Cs-137	LT 0.7	LT 2
		Fe-59	LT 1.7	LT 5
		La-140	LT 3.0	LT 6
		Mn-54	LT 0.8	LT 2
		Nb-95	LT 0.9	LT 2
		Zn-65	LT 1.6	LT 5
		Zr-95	LT 1.5	LT 5
038900/01	07/26/84	Be-7	17 ± 9	24 ± 6
		Ba-140	LT 1.8	LT 7
		Co-58	LT 1.7	LT 1.5
		Co-60	LT 1.6	LT 1.4
		Cs-134	LT 1.6	LT 1.3
		Cs-137	LT 4	LT 1.3
		Fe-59	LT 4	LT 3
		La-140	LT 1.7	LT 4
		Mn-54	LT 1.8	LT 1.3
		Nb-95	LT 4	LT 1.6
		Zn-65	LT 3	LT 3
039420/21	08/21/84	Ba-140	LT 12	LT 13
		Co-58	LT 3	LT 3
		Co-60	LT 3	LT 3
		Cs-134	LT 2	LT 2
		Cs-137	LT 2	LT 2
		Fe-59	LT 5	LT 6
		La-140	LT 7	LT 7
		Mn-54	LT 2	LT 2
		Nb-95	LT 3	LT 3
		Zn-65	LT 5	LT 6
		Zr-95	LT 5	LT 5

LT = Less Than



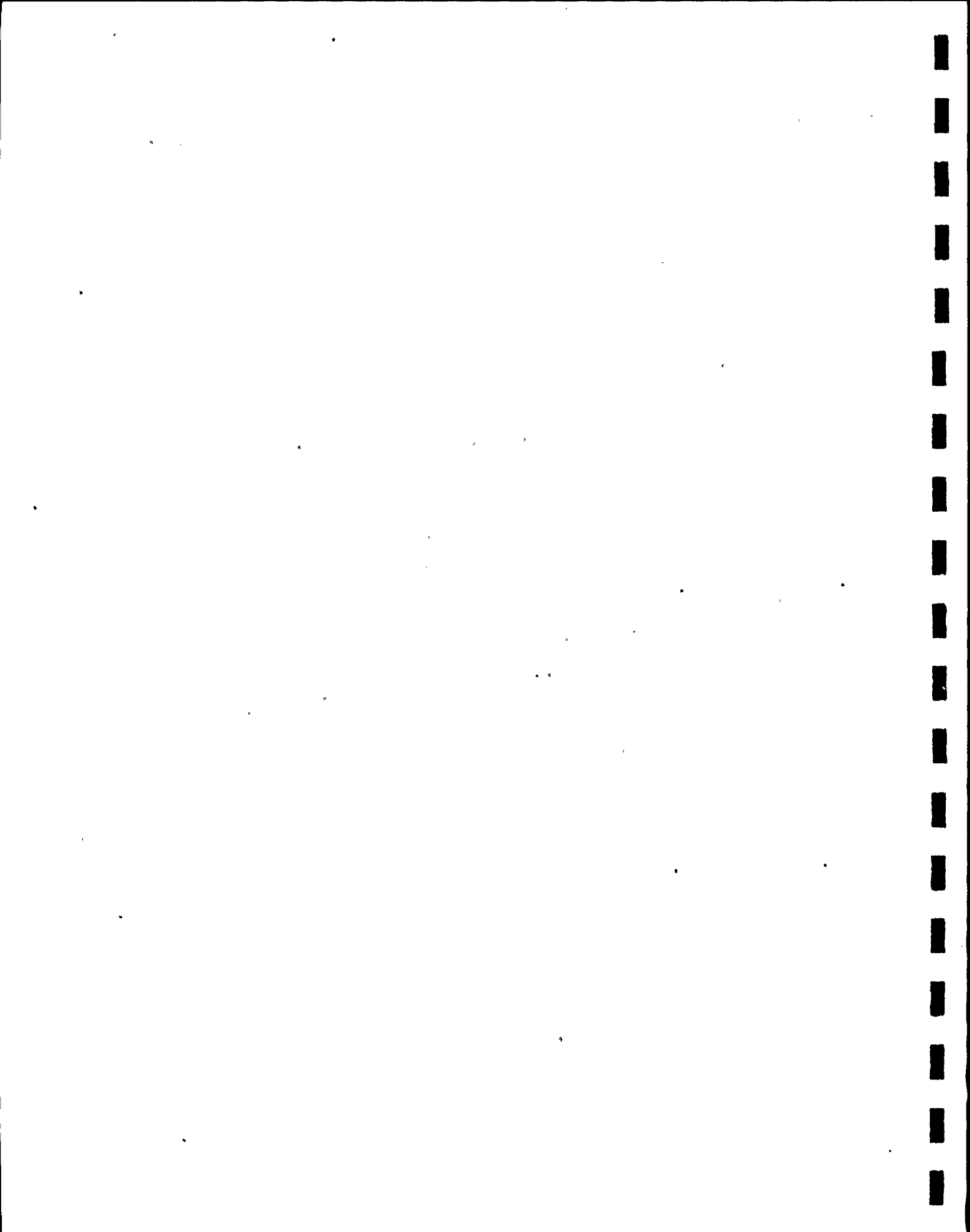
C-3

GAMMA SPECTROMETRY OF WATER
Internal Quality Control Program
1984

SPIKES OR BLIND ANALYSIS

Analysis Date	Nuclides	Expected Result $\pm 2s$ (pCi/l)	Reported Result $\pm 2s$ (pCi/l)
------------------	----------	-------------------------------------	-------------------------------------

LT = Less Than



GAMMA SPECTROMETRY OF SOLIDS

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 + 2s (pCi/kg(dry))	Result #2 + 2s (pCi/kg(dry))
034240/41	03/14/84	Ra-226	2500 \pm 600	2300 \pm 600
034800/01	03/14/84	Cs-134 Cs-137 K-40	LT 90 LT 100 2600 \pm 1000	LT 70 LT 110 2000 \pm 200
034880/81	03/20/84	Ra-226	3000 \pm 400	3000 \pm 500
034960/61	03/20/84	Ra-226	1400 \pm 300	1500 \pm 500
034180/81	03/21/84	Ra-226 U-235	15000 \pm 2000 1200 \pm 200	16000 \pm 2000 1200 \pm 200
034220/21	03/22/84	Ra-226	23000 \pm 3000	21000 \pm 3000
034900/01	03/22/84	Ra-226	7600 \pm 800	7500 \pm 800
034940/41	03/26/84	Ra-226	3000 \pm 600	2500 \pm 500
035120/21	03/26/84	Ra-226 U-235	23000 \pm 3000 1700 \pm 800	23000 \pm 3000 1300 \pm 800
034340/41	03/27/84	Ra-226 U-235	44000 \pm 5000 LT 3000	43000 \pm 5000 2100 \pm 1600
034200/01	03/29/84	Ra-226	450 \pm 150	550 \pm 160
034980/81	03/29/84	Ra-226	5600 \pm 700	6100 \pm 700
035140/41	03/29/84	Ra-226 U-235	61000 \pm 7000 4600 \pm 2200	61000 \pm 7000 5100 \pm 2200

LT= Less Than

GAMMA SPECTROMETRY OF SOLIDS

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/kg(dry))	Result #2 ± 2s (pCi/kg(dry))
034260/61	04/04/84	Ra-226	63000 ± 7000	65000 ± 7000
035040/41	04/04/84	Ra-226	27000 ± 3000	28000 ± 3000
		U-235	2100 ± 1400	2800 ± 1300
035100/01	04/04/84	Ra-226	55000 ± 6000	58000 ± 6000
		U-235	5700 ± 1600	6800 ± 1900
038120/21 ⁽¹⁾	06/16/84	Ba-140:	Less Than 70	Less Than 60
		Co-58:	Less Than 20	Less Than 19
		Co-60:	Less Than 20	Less Than 20
		Cs-134:	Less Than 20	Less Than 18
		Cs-137:	Less Than 20	Less Than 20
		Fe-59:	Less Than 40	Less Than 40
		La-140:	Less Than 30	Less Than 40
		Mn-54:	Less Than 20	Less Than 19
		Nb-95:	Less Than 20	Less Than 18
		Zn-65:	Less Than 50	Less Than 50
		Zr-95:	Less Than 40	Less Than 30
		K-40:	340 ± 180	280 ± 150
		I-131:	Less Than 30	Less Than 30

⁽¹⁾ Units for 038120/21 are ± 2s (pCi/g(dry)).

C-4

(Page 3 of 6)

GAMMA SPECTROMETRY OF SOLIDS

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/kg(dry))	Result #2 ± 2s (pCi/kg(dry))
038220/21	07/11/84	Ac-228:	860 ± 290	740 ± 310
		Ba-140:	Less Than 800	Less Than 800
		Bi-212:	1000 ± 900	ND
		Bi-214:	1200 ± 200	960 ± 190
		Co-58:	Less Than 130	Less Than 140
		Co-60:	Less Than 150	Less Than 130
		Cs-134:	Less Than 140	Less Than 150
		Cs-137:	Less Than 150	Less Than 140
		Fe-59:	Less Than 400	Less Than 300
		K-40:	12000 ± 2000	10000 ± 2000
		La-140:	Less Than 500	Less Than 400
		Mn-54:	Less Than 150	Less Than 120
		Nb-95:	Less Than 150	Less Than 150
		Pb-212:	890 ± 190	770 ± 170
		Pb-214:	980 ± 170	1100 ± 200
		Ra-226:	1100 ± 200	1000 ± 200
		Tl-208:	950 ± 260	910 ± 240
		Zn-65:	Less Than 400	Less Than 300
		Zr-95:	Less Than 300	Less Than 300

LT = Less Than
ND = Not Detected

GAMMA SPECTROMETRY OF SOLIDS

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 $\pm 2s$ (pCi/kg(wet))	Result #2 $\pm 2s$ (pCi/kg(wet))
031400/01	12/27/83	Co-58	LT 70	LT 90
		Co-60	LT 60	LT 70
		Cs-134	LT 50	LT 50
		Cs-137	LT 50	LT 50
		Fe-59	LT 150	LT 170
		Mn-54	LT 50	LT 60
		Zn-65	LT 110	LT 140
		K-40	1100 \pm 400	LT 900
033560/61	01/31/84	Co-58	LT 70	LT 60
		Co-60	LT 60	LT 70
		Cs-134	LT 70	LT 60
		Cs-137	LT 70	LT 70
		Fe-59	LT 140	LT 190
		Mn-54	LT 60	LT 60
		Zn-65	LT 110	LT 160
		K-40	LT 1000	LT 900

LT = Less Than

GAMMA SPECTROMETRY OF SOLIDS

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 ± 2s (pCi/kg(wet))	Result #2 ± 2s (pCi/kg(wet))
037580/81	05/25/84	Cs-134	LT 20	LT 30
		Cs-137	LT 30	LT 40
		I-131	LT 30	LT 30
		K-40	5300 ± 700	5700 ± 700
037560/61	05/29/84	Co-58	LT 50	LT 50
		Co-60	LT 70	LT 80
		Cs-134	LT 50	LT 40
		Cs-137	LT 70	LT 50
		Fe-59	LT 140	LT 140
		Zn-65	LT 170	LT 120
		K-40	2500 ± 900	2800 ± 800
039440/41	08/16/84	Cs-134	LT 6	LT 13
		Cs-137	LT 7	LT 14
		I-131	LT 9	LT 20
		K-40	1400 ± 200	1300 ± 200
039460/61	08/24/84	Cs-134	LT 18	LT 13
		Cs-137	LT 20	LT 18
		I-131	LT 40	LT 40
		K-40	5600 ± 600	5600 ± 600

LT = Less Than

GAMMA SPECTROMETRY OF SOLIDS

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclides	Result #1 + 2s (pCi/kg(wet))	Result #2 + 2s (pCi/kg(wet))
039120/21	07/27/84 ⁽¹⁾	Cs-134 ⁽²⁾	LT 6	LT 20
		Cs-137	LT 6	LT 30
		I-131	LT 8	LT 40
		K-40	2300 \pm 300	2600 \pm 300
039140/41	08/02/84	Co-58	LT 50	LT 80
		Co-60	LT 110	LT 90
		Cs-134	LT 60	LT 60
		Cs-137	LT 80	LT 70
		Fe-59	LT 190	LT 190
		Mn-54	LT 50	LT 70
		Zn-65	LT 180	LT 200
		K-40	2900 \pm 900	3700 \pm 1100

(1) Date analyzed for Result No. 2 is 08/01/84.

(2) LT = Less Than

IODINE-131 IN CHARCOAL CARTRIDGES

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 $\pm 2s$ (pCi/ m ³)	Result #2 $\pm 2s$ (pCi/ m ³)
031840/41	12/02/83	LT 0.04	LT 0.019
032400/01	12/21/83	LT 0.03	LT 0.05
032420/21	12/22/83	LT 0.07	LT 0.06
032500/01	12/23/83	LT 0.06	LT 0.04
032800/01	01/07/84	LT 0.03	LT 0.06
032900/01	01/07/84	LT 0.05	LT 0.03
032960/61	01/09/84	LT 0.05	LT 0.07
033000/01	01/10/84	LT 0.07	LT 0.03
032880/81	01/11/84	LT 0.013	LT 0.016
033260/61	01/12/84	LT 0.04	LT 0.03
033280/81	01/12/84	LT 0.05	LT 0.02
033320/21	01/13/84	LT 0.014	LT 0.017
033340/41	01/13/84	LT 0.04	LT 0.07
033580/81	01/20/84	LT 0.04	LT 0.02
033640/41	01/23/84	LT 0.03	LT 0.05
033680/81	01/25/84	LT 0.06	LT 0.07
033740/41	01/27/84	LT 0.03	LT 0.05
033760/61	01/27/84	LT 19 (pCi/filter)	LT 13 (pCi/filter)
033820/21	01/30/84	LT 0.013	LT 0.019
034020/21	02/02/84	LT 0.02	LT 0.02
034140/41	02/07/84	LT 0.04	LT 0.06
034520/21	02/17/84	LT 0.006	LT 0.011
034620/21	02/22/84	LT 0.05	LT 0.05

LT = Less Than

IODINE-131 IN CHARCOAL CARTRIDGES

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 $\pm 2s$ (pCi/ m ³)	Result #2 $\pm 2s$ (pCi/ m ³)
034680/81	02/22/84	LT 0.05	LT 0.06
034740/41	02/23/84	LT 0.05	LT 0.04
034760/61	02/24/84	LT 0.03	LT 0.03
034780/81	02/24/84	LT 0.06	LT 0.05
034820/21	02/24/84	LT 0.04	LT 0.04
035320/21	03/06/84	LT 0.03	LT 0.03
035340/41	03/06/84	LT 0.05	LT 0.02
035400/01	03/08/84	LT 0.03	LT 0.03
035520/21	03/16/84	LT 0.03	LT 0.03
035780/81	03/23/84	LT 0.03	LT 0.07
035940/41	03/30/84	LT 0.018	LT 0.017
035980/81	04/03/84	LT 0.05	LT 0.03
036000/01	04/03/84	LT 0.06	LT 0.03
036160/61	04/05/84	LT 0.016	LT 0.013
036200/01	04/10/84	LT 0.07	LT 0.07
036460/61	04/16/84	LT 0.05	LT 0.03
036480/81	04/16/84	0.11 \pm 0.03	0.10 \pm 0.03
036500/01	04/17/84	LT 0.05	LT 0.03
036560/61	04/18/84	LT 0.016	LT 0.012
036580/81	04/18/84	LT 0.02	LT 0.02
036700/01	04/25/84	LT 0.02	LT 0.013
036880/81	05/01/84	LT 0.04	LT 0.06
037000/01	05/03/84	LT 0.02	LT 0.019
037060/61	05/04/84	LT 0.05	LT 0.04

LT = Less Than

IODINE-131 IN CHARCOAL CARTRIDGES

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 ± 2s (pCi/ m ³)	Result #2 ± 2s (pCi/ m ³)
037260/61	05/11/84	LT 0.05 ⁽¹⁾	LT 0.011
037300/01	05/15/84	LT 0.04	LT 0.03
037420/21	05/23/84	LT 0.02	LT 0.017
037480/81	05/23/84	LT 0.06	LT 0.07
037540/41	05/25/84	LT 0.04	LT 0.017
037660/61 ⁽²⁾	05/25/84	LT 0.02	LT 0.04
037680/81	05/29/84	LT 0.02	LT 0.010
037740/41	05/31/84	LT 0.014	LT 0.018
037720/21	06/04/84	LT 0.04	LT 0.02
037860/61	06/06/84	LT 0.02	LT 0.04
037940/41	06/07/84	LT 0.4	LT 0.4
037960/61	06/08/84	LT 0.016	LT 0.016
038000/01	06/11/84	LT 0.05	LT 0.03
038040/41	06/14/84	LT 0.03	LT 0.03
038080/81	06/15/84	LT 0.015	LT 0.018
038260/61	06/21/84	LT 0.02	LT 0.02
038340/41	06/26/84	LT 0.05	LT 0.04
038400/01 ⁽³⁾	06/28/84	LT 0.03	LT 0.03

(1) LT = Less Than

(2) Date of analysis for result No. 2 is 05/29/84.

(3) Date of analysis for result No. 2 is 06/29/84.

IODINE-131 IN CHARCOAL CARTRIDGES

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 $\pm 2s$ (pCi/ m ³)	Result #2 $\pm 2s$ (pCi/ m ³)
038460/61	07/02/84	LT 0.02 ⁽¹⁾	LT 0.04
038500/01	07/06/84	LT 0.014	LT 0.017
038600/01	07/06/84	LT 0.02	LT 0.012
038640/41 ⁽²⁾	07/06/84	LT 0.05	LT 0.05
038700/01 ⁽³⁾	07/09/84	LT 0.03	LT 0.012
038760/61	07/11/84	LT 0.04	LT 0.03
038920/21 ⁽⁴⁾	07/20/84	LT 0.03	LT 0.04
038960/61 ⁽⁴⁾	07/20/84	LT 0.013	LT 0.019
039020/21	07/24/84	LT 0.04	LT 0.05
039060/61 ⁽⁵⁾	07/26/84	LT 0.018	LT 0.010
039080/81 ⁽⁶⁾	07/27/84	LT 0.03	LT 0.03
039160/61	07/30/84	LT 0.04	LT 0.05
039260/61	08/03/84	LT 0.017	LT 0.02
039300/01	08/06/84	LT 0.06	LT 0.05

(1) LT = Less Than

(2) Date of analysis for result No. 2 is 07/09/84.

(3) Date of analysis for result No. 2 is 07/10/84.

(4) Date of analysis for result No. 2 is 07/23/84.

(5) Date of analysis for result No. 2 is 07/27/84.

(6) Date of analysis for result No. 2 is 07/30/84.

D-1

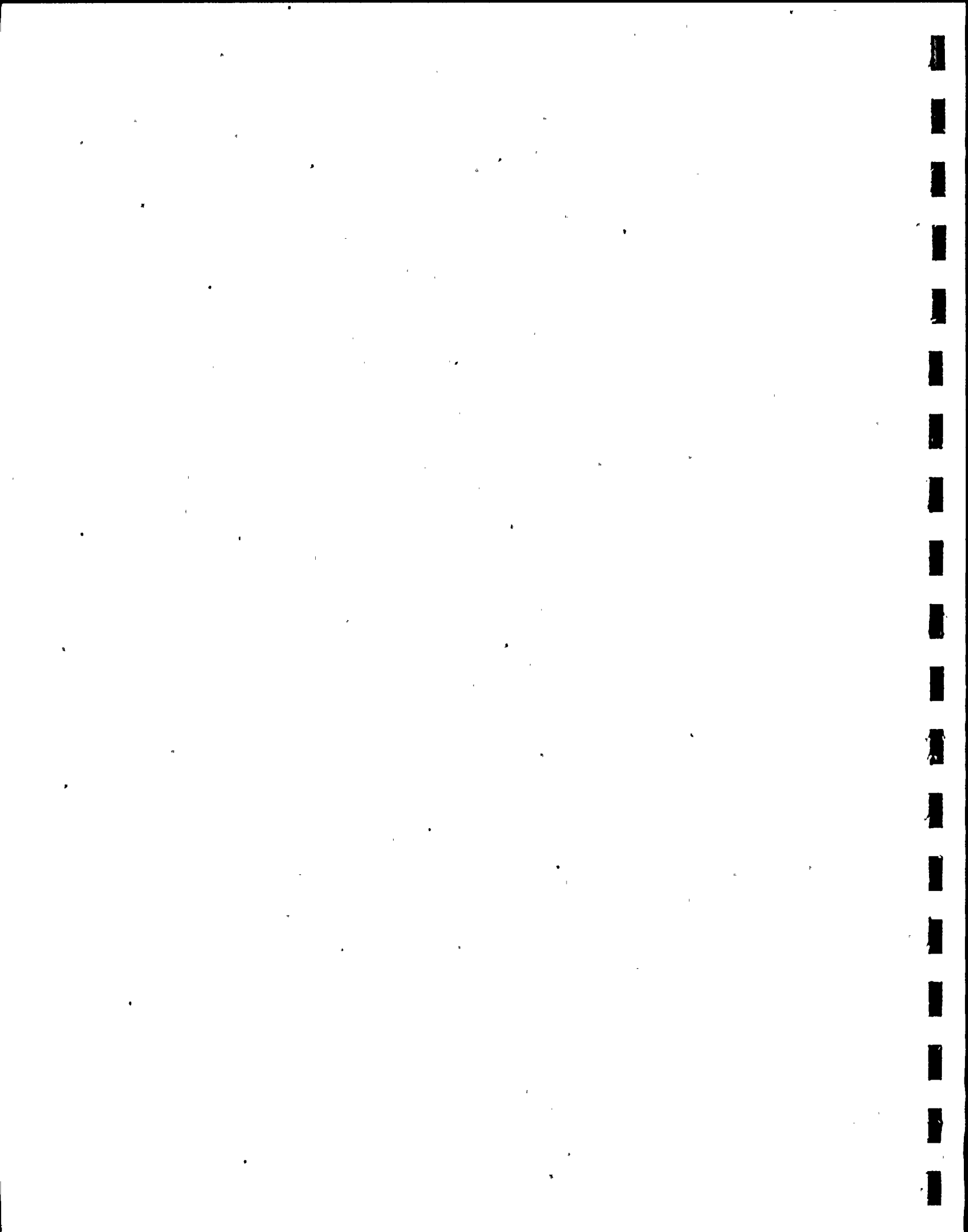
IODINE-131 IN CHARCOAL CARTRIDGES

NUS Radiological Laboratory
Internal Quality Control Program
1984

BLANKS AND REFERENCES STANDARDS

NUS ID#	Analysis Date	Expected Result <u>±</u> 2s (pCi/filter)	Reported Result <u>±</u> 2s (pCi/filter)
031775	12/01/83	0	LT 8

LT = Less Than



D-2

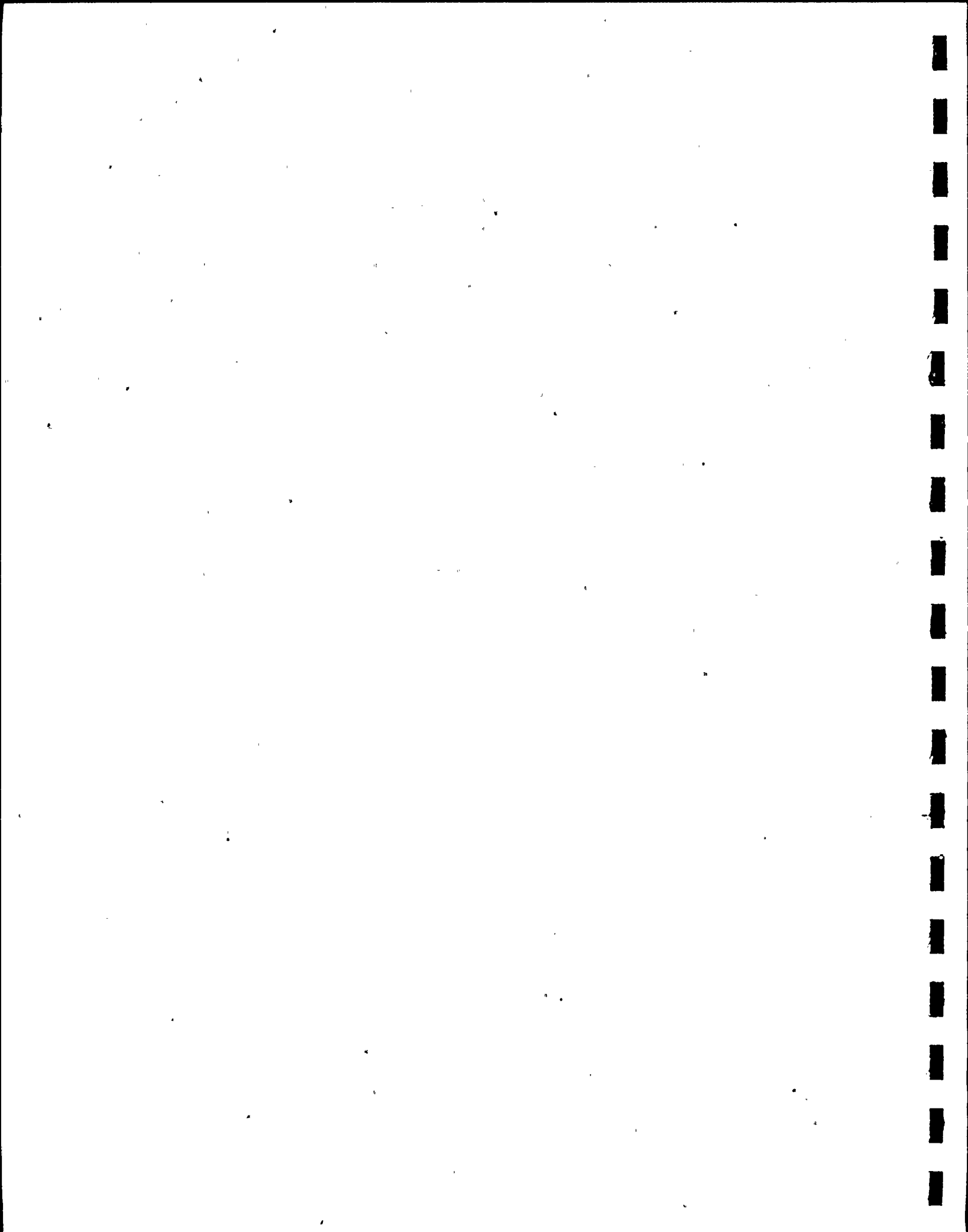
IODINE-131 IN MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Results #1 \pm 2s (pCi/l)	Results #2 \pm 2s (pCi/l)
033300/01	01/16/84	LT 0.6	LT 0.9
033460/61	01/20/84	LT 0.12	LT 0.13
035220/21	03/05/84	LT 0.19	LT 0.17
036140/41	04/09/84	1.6 ± 0.2	1.3 ± 0.2
036180/81	04/09/84	LT 0.14	LT 0.15
036420/21	04/24/84	LT 0.08	LT 0.10
037400/01	05/20/84	LT 0.3	LT 0.17
039040/41	08/06/84	LT 0.07	LT 0.09

LT = Less Than



D-3

IODINE-131 IN WATER

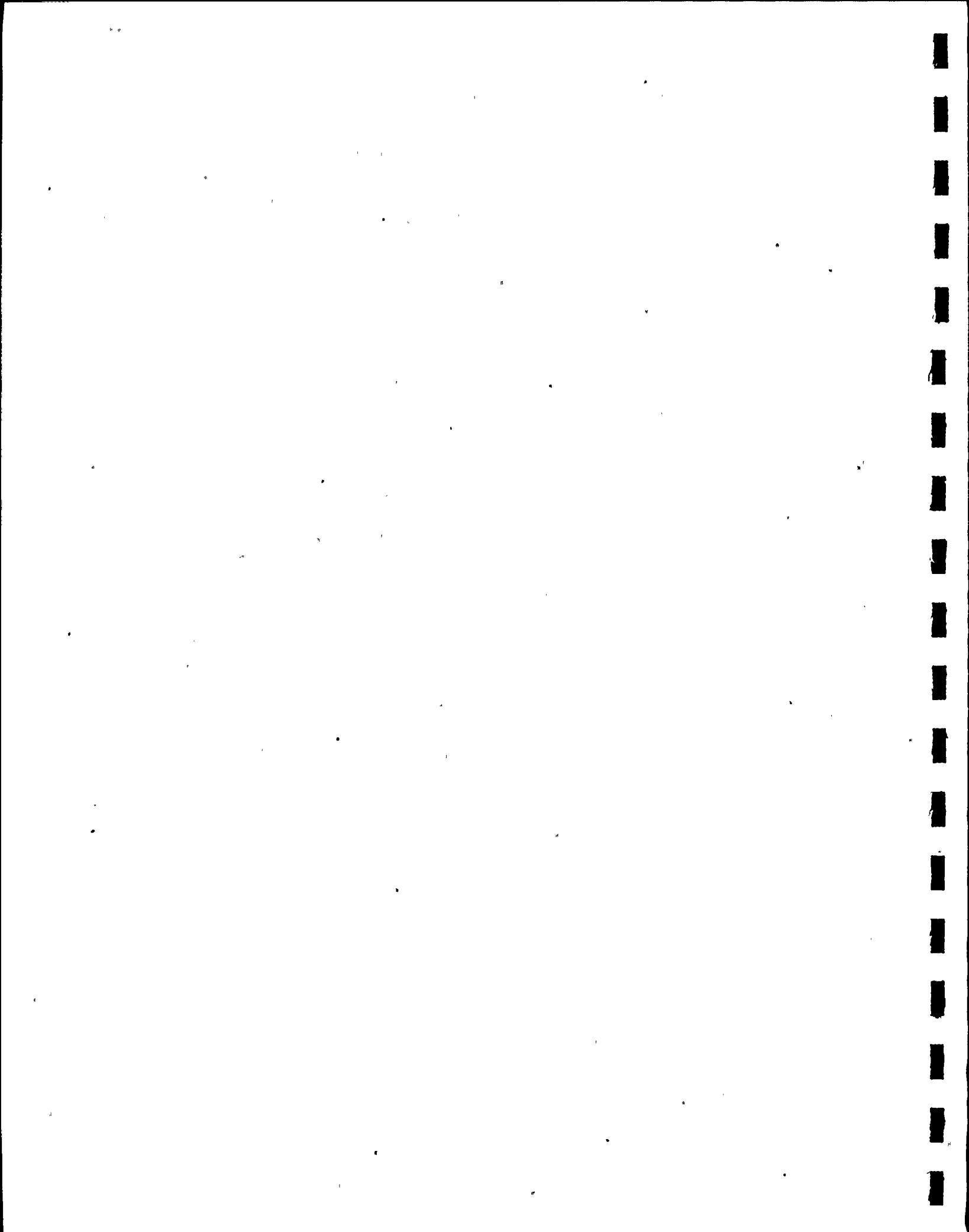
NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
030200/01	10/24/83	LT 0.08 ⁽¹⁾	LT 0.08
032620/21	12/31/83	LT 0.10	LT 0.4
033600/01	01/24/84	LT 0.3	LT 0.2
034640/41	02/02/84	LT 0.3	LT 0.2
036100/01	04/09/84	LT 0.13	LT 0.15
038580/81	07/14/84	LT 0.05	LT 0.07
038880/81	07/24/84	LT 0.09	LT 0.17
039420/21 ⁽²⁾	08/18/84	LT 0.05	LT 0.3

(1) LT = Less Than

(2) Date of analysis for result No. 2 is 08/24/84.



D-3

IODINE-131 IN WATER

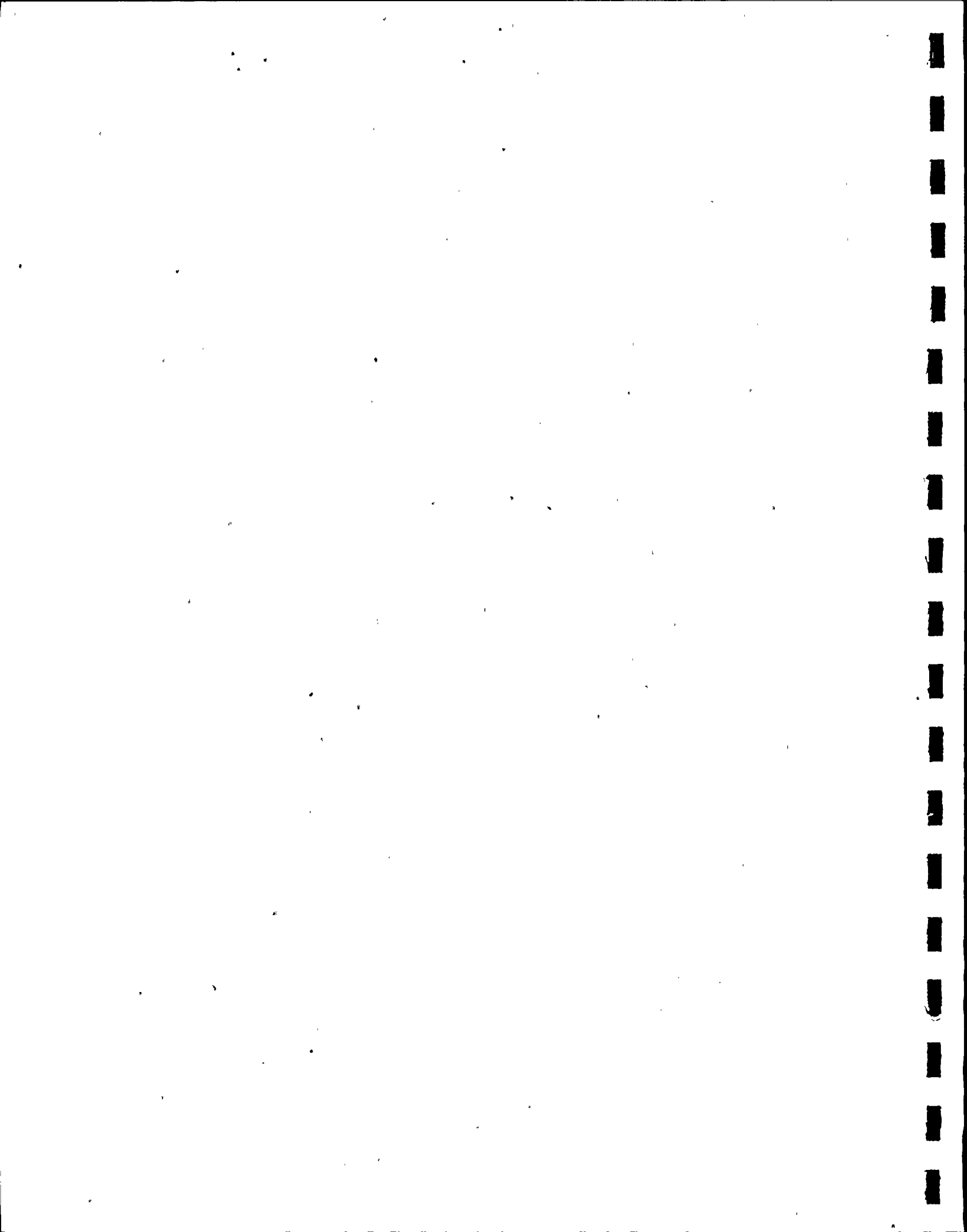
NUS Radiological Laboratory
Internal Quality Control Program
1984

BLANKS AND REFERENCE STANDARDS

NUS ID#	Analysis Date	Expected Result $\pm 2s$ (pCi/l)	Reported Result $\pm 2s$ (pCi/l)
032242	01/03/84	0	LT 0.3 (1)
	01/04/84	0	LT 0.3
	01/05/84	0	LT 0.3
	01/08/84	17 ± 6	13 ± 2
	01/08/84	17 ± 6	13 ± 2
	01/09/84	17 ± 6	18 ± 2
	01/09/84	0	LT 0.13
	01/10/84	17 ± 6	14 ± 2
	01/11/84	17 ± 6	14 ± 2
	01/11/84	17 ± 6	16 ± 2
	01/12/84	17 ± 6	15 ± 2
	01/12/84	0	LT 0.2
	01/13/84	0	LT 0.5
	01/13/84	0	LT 0.2
	01/18/84	0	LT 0.2
	01/19/84	0	LT 0.5
	01/21/84	0	LT 0.4
	01/22/84	0	LT 0.2
	01/22/84	0	1.7 ± 0.2 (2)
	01/22/84	32 ± 12	27 ± 3

(1) LT = Less Than

(2) This sample was counted on counter 45. Occasional false positive values were being observed at this time because of variations in the backgrounds of the ten detectors. The overall problem was corrected by using individual backgrounds for each detector and other operational precautions. Had this been a true sample (and not a reference standard) it would have been subject to an immediate recount to confirm the positive value.



E-1

RADIUM IN WATER

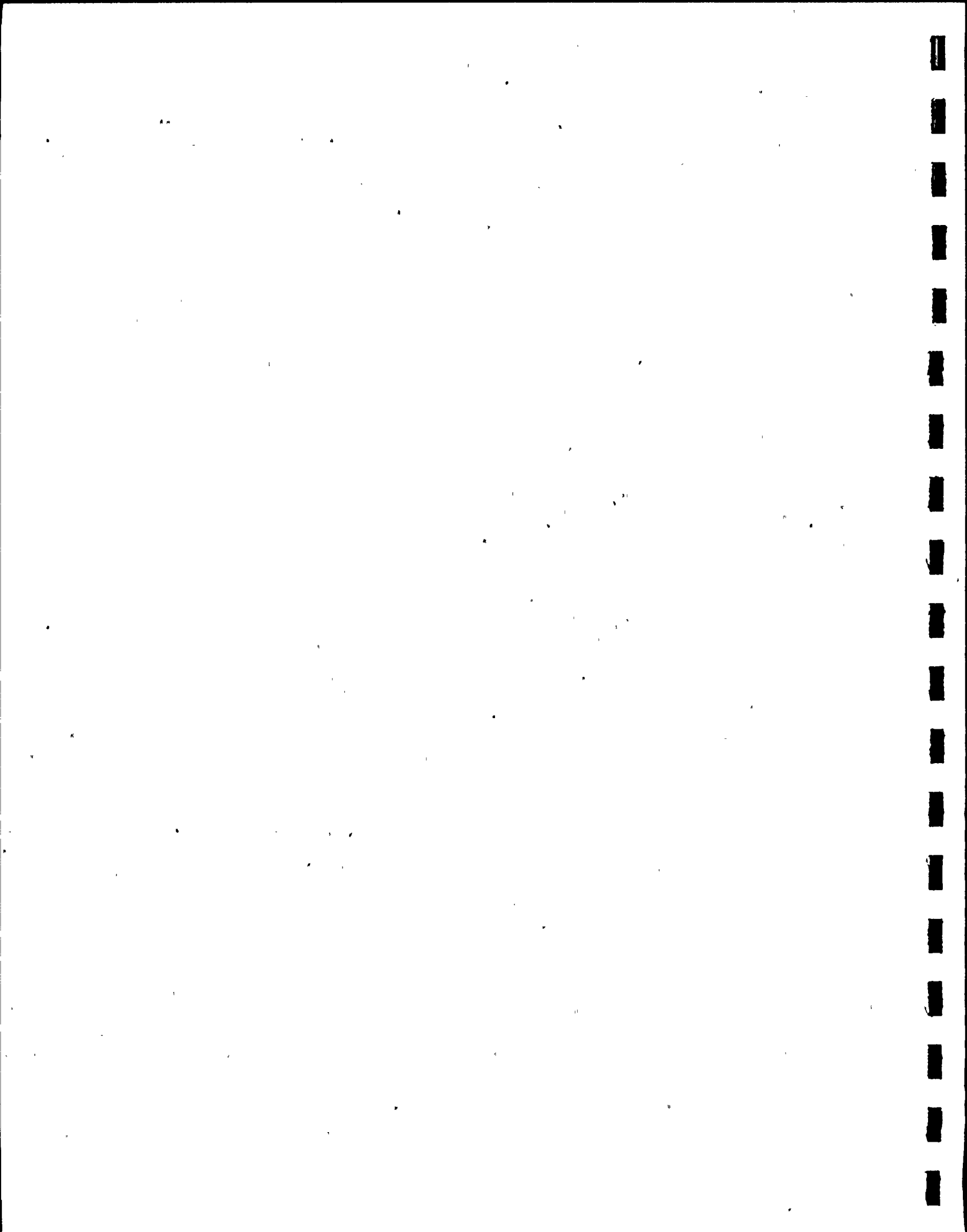
NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclide	Result #1 + 2s (pCi/l)	Result #2 + 2s (pCi/l)
034100/01	07/16/84	Ra-226	LT 4 ⁽¹⁾	LT 5
037100/01	05/22/84	Ra-226	LT 1.4	LT 1.4
033480/81	03/19/84	Ra-226	LT 8	LT 5
035680/81	06/29/84	Ra-226	LT 1.1	LT 1.0
035960/61	07/23/84	Ra-226	0.79 + 0.22	2.3 + 0.4 ⁽²⁾
035840/41	06/15/84	Ra-226	0.33 + 0.20	LT 0.19
028260/61	07/23/84	Ra-226	0.64 + 0.23	1.2 + 0.3 ⁽²⁾
037120/21	05/22/84	Ra-226	1.9 + 1.2	2.2 + 1.2
026780/81	07/16/84	Ra-226	LT 0.4	1.9 + 1.7
030860/61	02/27/84	Ra-226	25 + 6	29 + 7
034360/61	04/20/84	Ra-226	4.9 + 0.7	7.6 + 0.8 ⁽²⁾

(1) LT = LESS THAN

(2) Results do not overlap. Although a final definite cause could not be determined, it was believed that the problem was due to inconsistent results in the chemical yield determination. Errors in the chemical yield are not reflected in the quoted counting error. For samples counted by coincidence methods, a background interference was also recognized. A planned investigation into this and the related problem of poor results on intercomparison samples and spikes could not be pursued to completion due to the decision to close the laboratory.



F-1

STRONTIUM IN MILK

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclide	Result #1 ± 2s (pCi/l)	Result #2 ± 2s (pCi/l)
027980/81	09/14/84	Sr-89	LT 160	LT 300
		Sr-90	LT 1.2	LT 2
035220/21	05/03/84	Sr-89	LT 0.6	LT 0.5
		Sr-90	0.47 ± 0.43	1.1 ± 0.5
032280/81	08/21/84	Sr-89	LT 20	LT 30
		Sr-90	1.4 ± 0.8	LT 1.5
037780/81	08/29/84	Sr-89	LT 4	LT 4
		Sr-90	LT 0.9	LT 1.1
032340/41	09/12/84	Sr-89	LT 40	LT 30
		Sr-90	LT 1.2	LT 1.0

LT = Less Than

F-2

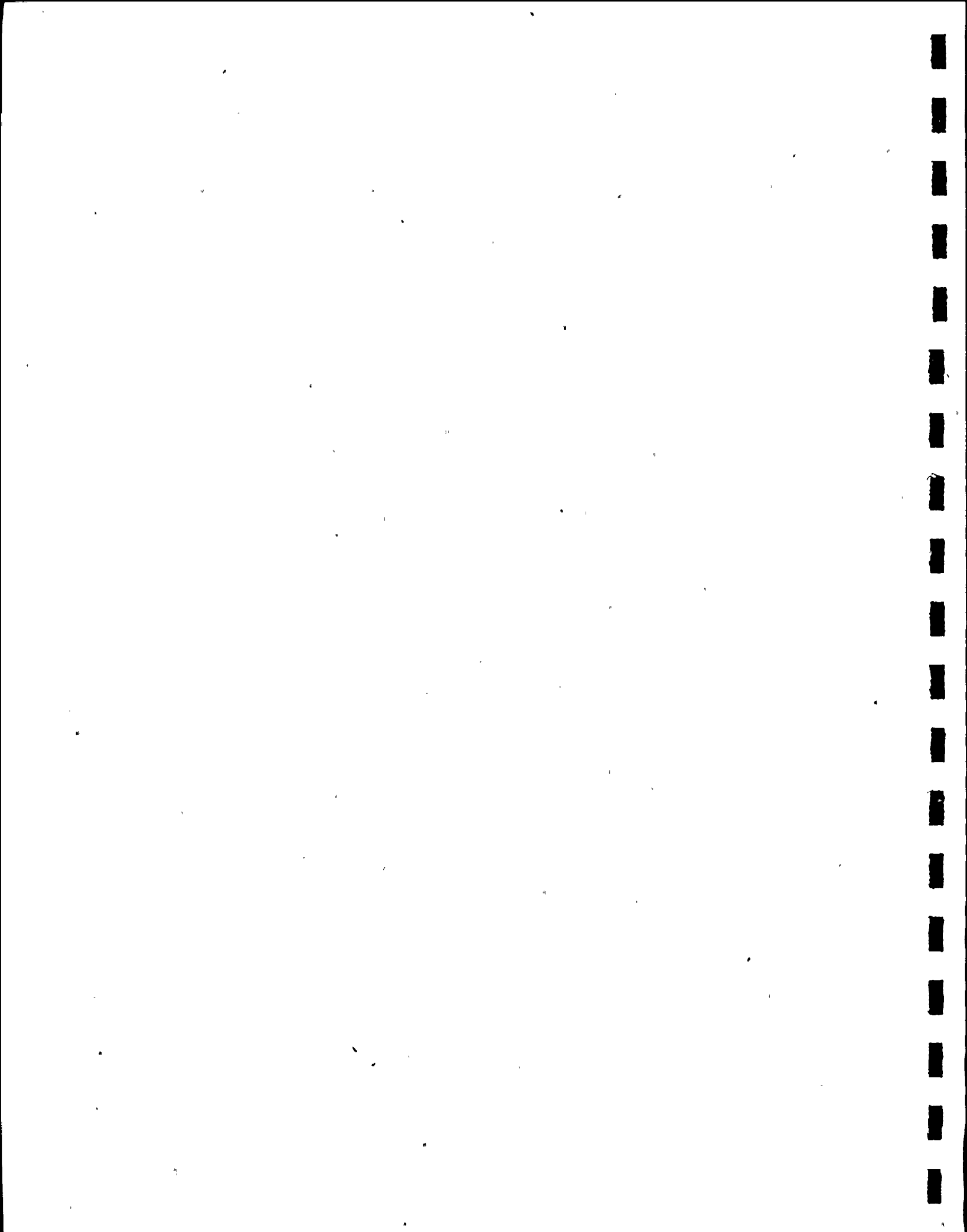
STRONTIUM IN WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclide	Result #1 + 2s (pCi/l)	Result #2 + 2s (pCi/l)
037840/41	08/23/84	Sr-89	LT 2	LT 3
		Sr-90	LT 1.0	LT 1.1
028780/81	08/30/84	Sr-89	LT 300	LT 300
		Sr-90	LT 3	LT 3

LT = LESS THAN



F-3

STRONTIUM IN SOIL

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Nuclide	Result #1	Result #2
			\pm 2s (pCi/g(dry))	\pm 2s (pCi/g(dry))
025620/21	08/21/84	Sr-89	LT 40	LT 80
		Sr-90	LT 0.8	LT 0.16
031020/21	08/21/84	Sr-89	LT 5	LT 6
		Sr-90	LT 0.12	LT 0.14

G-1

TRITIUM IN WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID #	Analysis Date	Result #1 \pm 2s (pCi/l)	Result #2 \pm 2s (pCi/l)
029660/61	10/30/83	LT 300	LT 300
033200/01	01/18/84	3200 \pm 400	2900 \pm 300
035620/21	04/25/84	LT 300	LT 300
033420/21	05/07/84	LT 300	LT 300
035660/61	05/14/84	LT 300	LT 300
034600/01	05/29/84	LT 300	LT 300
033600/01	06/12/84	140 \pm 80	87 \pm 83
038860/81	09/12/84	LT 300	LT 300

LT = Less Than

G-1

TRITIUM IN WATER

NUS Radiological Laboratory
Internal Quality Control Program
1984

BLINDS AND REFERENCE STANDARDS

NUS Code	Analysis Date	Expected Result $\pm 2s$ (pCi/l)	Reported Result $\pm 2s$ (pCi/l)
8BAA	01/14/84	650 \pm 240	590 \pm 180
	01/18/84	650 \pm 240	550 \pm 180
	01/27/84	650 \pm 240	730 \pm 90
	01/27/84	650 \pm 240	LT 120 (1)
	02/02/84	650 \pm 240	630 \pm 80
	02/06/84	650 \pm 240	780 \pm 190
	02/08/84	650 \pm 240	100 \pm 80 (1)
	02/13/84	650 \pm 240	650 \pm 190
	02/13/84	650 \pm 240	680 \pm 170
	02/21/84	650 \pm 240	710 \pm 70

LT = Less Than

- (1) Investigation indicated that the counter was functioning correctly during the counting sequences for these samples and that the backgrounds for the counting sets were typical. The reference standard has been shown to be correct by multiple historical analyses. Therefore, it was presumed that the analysts simply failed to add the stock reference aliquot to the blank matrix prior to analysis.

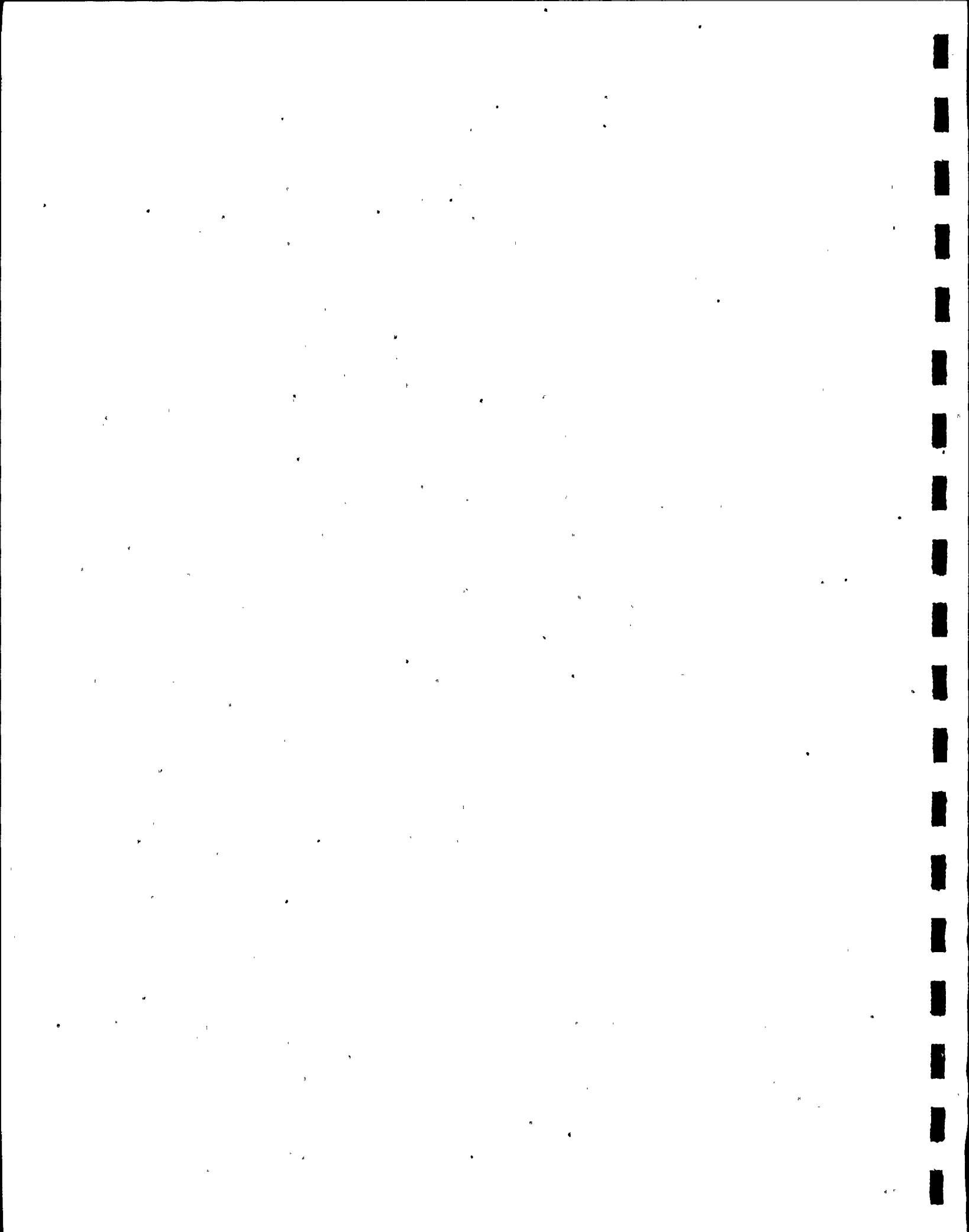
G-2

TRITIUM IN URINE

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

Analysis Date	Result #1 $\pm 2s$ (pCi/l)	Result #2 $\pm 2s$ (pCi/l)
06/15/83	4000 \pm 1900	2400 \pm 1600



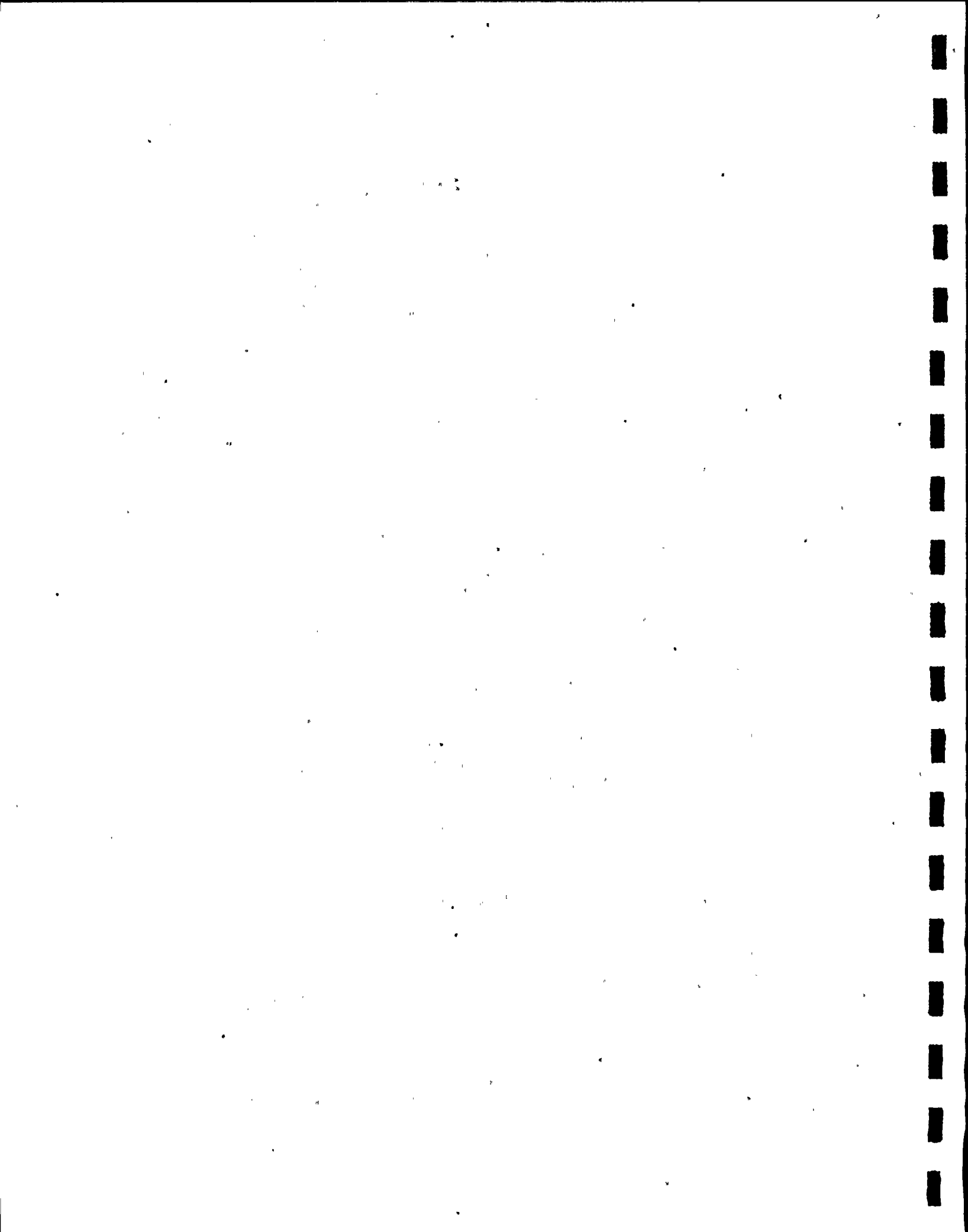
H-1

Direct Radiation
(Thermoluminescent Dosimetry)

NUS Radiological Laboratory
Internal Quality Control Program
1984

DUPLICATE ANALYSIS

NUS ID#	Analysis Date	Result #1 + 2s (mR/day)	Result #2 + 2s (mR/day)
033120/21	01/10/84	0.39 ± 0.07	0.35 ± 0.08
033140/41	01/10/84	0.22 ± 0.03	0.22 ± 0.03
033220/21	01/10/84	0.20 ± 0.04	0.23 ± 0.04
033180/01	01/10/84	0.24 ± 0.02	0.22 ± 0.02
033360/61	01/13/84	0.25 ± 0.04	0.27 ± 0.04
033380/81	01/13/84	0.23 ± 0.01	0.22 ± 0.03
033400/01	01/13/84	0.28 ± 0.03	0.30 ± 0.05
033800/01	01/27/84	0.19 ± 0.04	0.17 ± 0.02
034060/61	02/02/84	0.18 ± 0.03	0.17 ± 0.03
034080/81	02/02/84	0.18 ± 0.03	0.18 ± 0.05
035260/61	03/02/84	0.16 ± 0.03	0.18 ± 0.04
035860/61	03/28/84	0.12 ± 0.05	0.14 ± 0.06
035880/81	03/28/84	0.18 ± 0.06	0.21 ± 0.07
036280/81	05/09/84	0.29 ± 0.04	0.29 ± 0.04
036920/21	05/02/84	0.21 ± 0.04	0.22 ± 0.03
036940/41	05/02/84	0.22 ± 0.04	0.22 ± 0.03
037020/21	05/15/84	0.19 ± 0.03	0.19 ± 0.05
037800/01	06/01/84	0.28 ± 0.06	0.29 ± 0.07
038360/61	06/27/84	0.21 ± 0.04	0.20 ± 0.04
038540/41	07/05/84	0.27 ± 0.03	0.23 ± 0.02
038560/61	07/05/84	0.28 ± 0.03	0.28 ± 0.04
038660/61	07/09/84	0.21 ± 0.03	0.23 ± 0.03
038680/81	07/09/84	0.21 ± 0.04	0.21 ± 0.05
039580/81	08/29/84	0.26 ± 0.04	0.25 ± 0.03
039600/01	08/29/84	0.33 ± 0.09	0.23 ± 0.03
039620/21	08/30/84	0.22 ± 0.02	0.24 ± 0.01



SECTION III

A-1

GROSS ALPHA IN WATER

USEPA INTERCOMPARISON PROGRAM 1984

Collection Date	EPA Results $\pm 1s$ (pCi/l)	NUS Results $\pm 1s$ (pCi/l)
01/20/84	10 ± 5	11 ± 0
03/18/84	5 ± 5	$6.9 \pm 0.2^{(1)}$

(1) The EPA mistakenly listed the NUS 01/20/84 data in the 03/18/84 EPA report.
The results that appear here are correct.

GROSS BETA IN WATER

USEPA INTERCOMPARISON PROGRAM 1984

Collection Date	EPA Results \pm 1s (pCi/l)	NUS Results \pm 1s (pCi/l)
01/20/84	12 \pm 5	14 \pm 1
03/18/84	20 \pm 5	15 \pm 2(1)

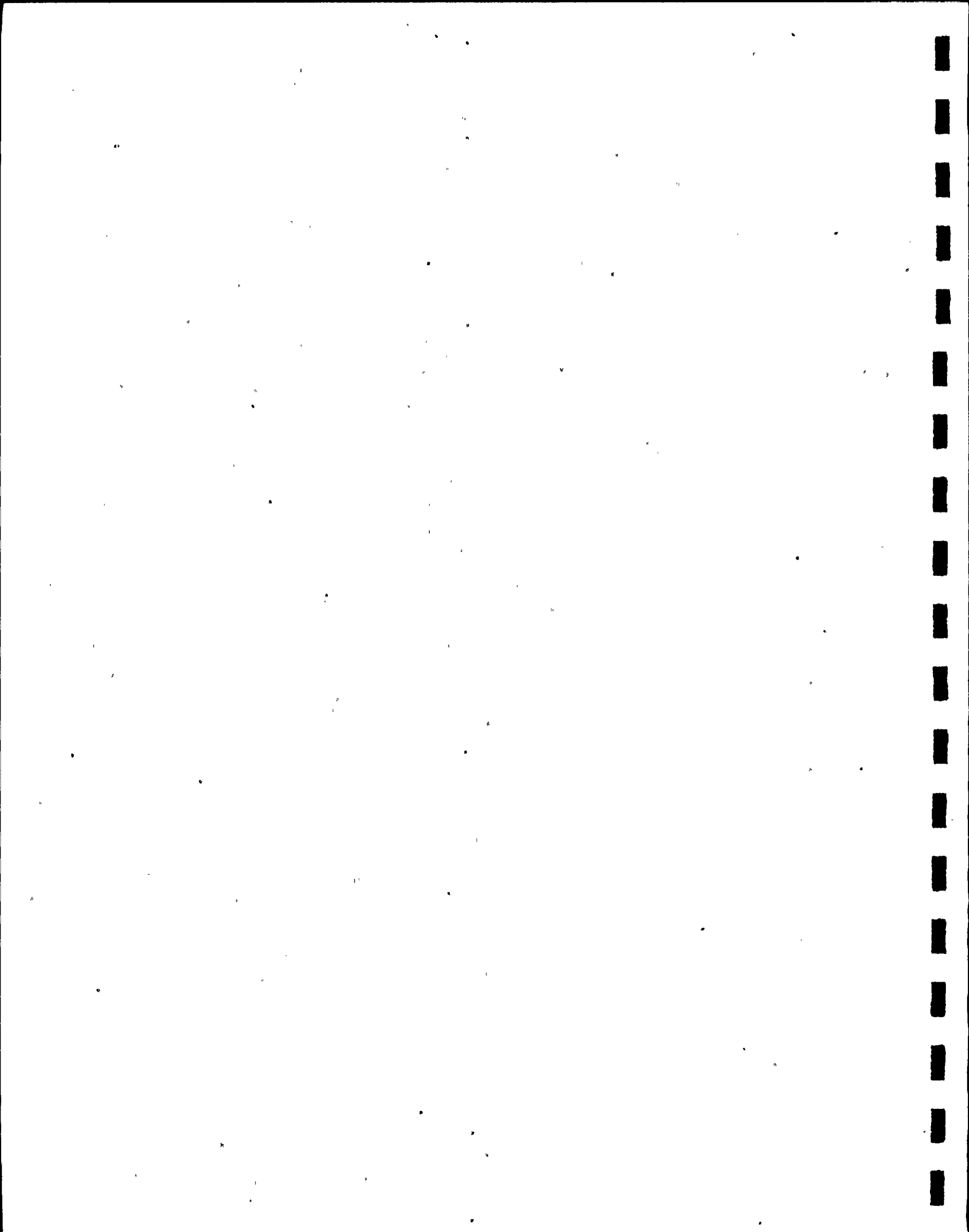
(1) The EPA mistakenly listed the NUS 01/20/84 data in the 03/18/84 EPA report.
The results that appear here are correct.

C-1

GAMMA SPECTROMETRY OF WATER
USEPA INTERCOMPARISON PROGRAM 1984

Collection Date	Nuclide	EPA Results $\pm 1s$ (pCi/l)	NUS Results $\pm 1s$ (pCi/l)
02/03/84	Cr-51	40 ± 5	LT 47 ⁽¹⁾⁽²⁾
	Co-60	10 ± 5	9.9 ± 0.2 ⁽¹⁾
	Zn-65	50 ± 5	48 ± 2 ⁽¹⁾
	Ru-106	61 ± 5	60 ± 14 ⁽¹⁾
	Cs-134	31 ± 5	26 ± 1 ⁽¹⁾
	Cs-137	16 ± 5	15 ± 1 ⁽¹⁾
06/01/84	Cr-51	66 ± 8.7	69 ± 3
	Co-60	31 ± 8.7	30 ± 1
	Zn-65	63 ± 8.7	62 ± 4
	Ru-106	29 ± 8.7	41 ± 9
	Cs-134	47 ± 8.7	43 ± 2
	Cs-137	37 ± 8.7	37 ± 2

- (1) Results that were submitted to the EPA were calculated with an incorrect conversion factor (0.125).
The results that appear in this table are correct (conversion factor = 1)
- (2) LT = Less Than



D-1

IODINE IN MILK

USEPA INTERCOMPARISON PROGRAM 1983

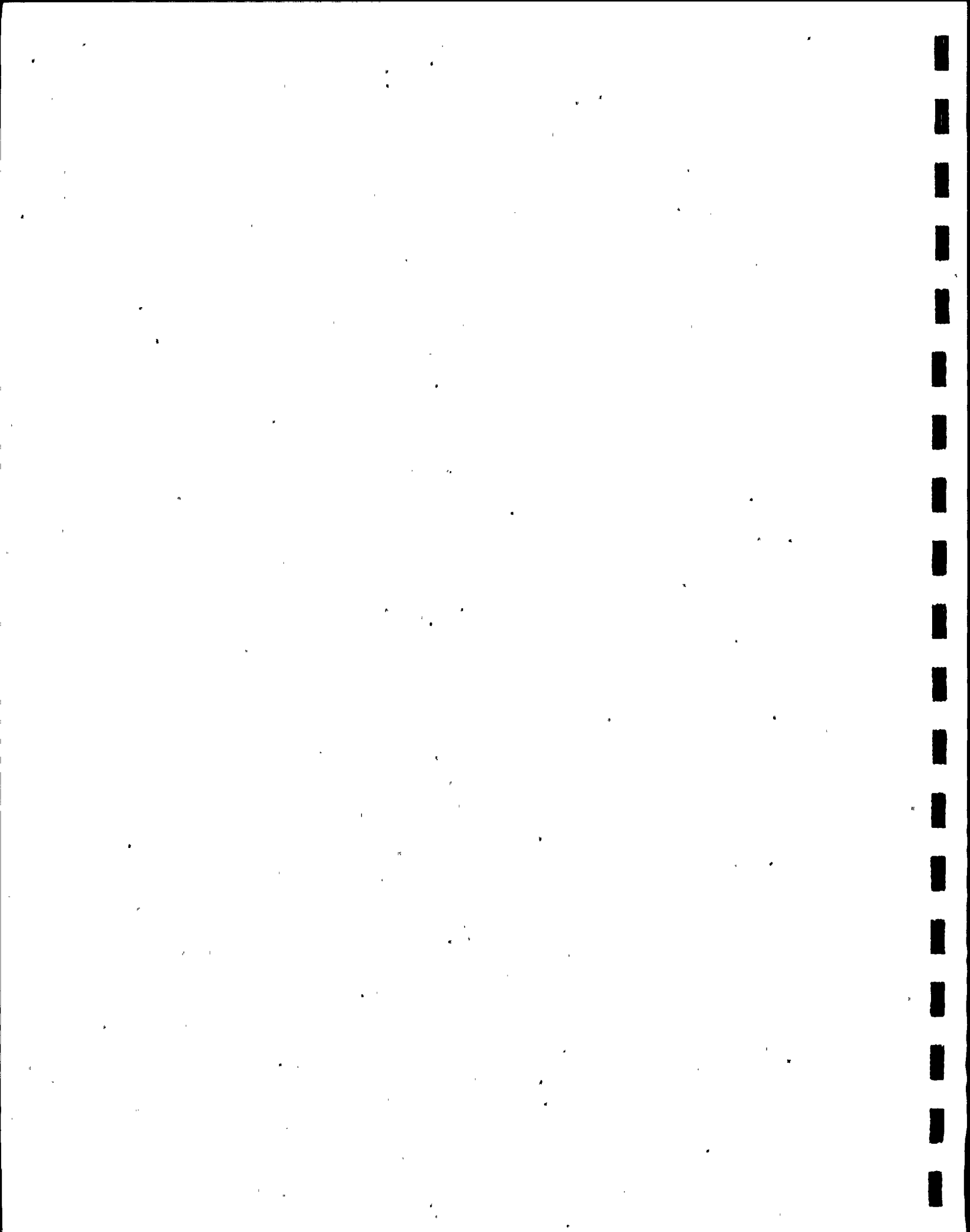
Collection Date	EPA Results \pm 1s (pCi/l)	NUS Results \pm 1s (pCi/l)
03/02/84	6.0 \pm 0.9	5.0 \pm 1.0

D-2

IODINE-131 IN WATER

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results \pm 1s (pCi/l)	NUS Results \pm 1s (pCi/l)
04/06/84	6.0 \pm 0.5	5.0 \pm 0.3

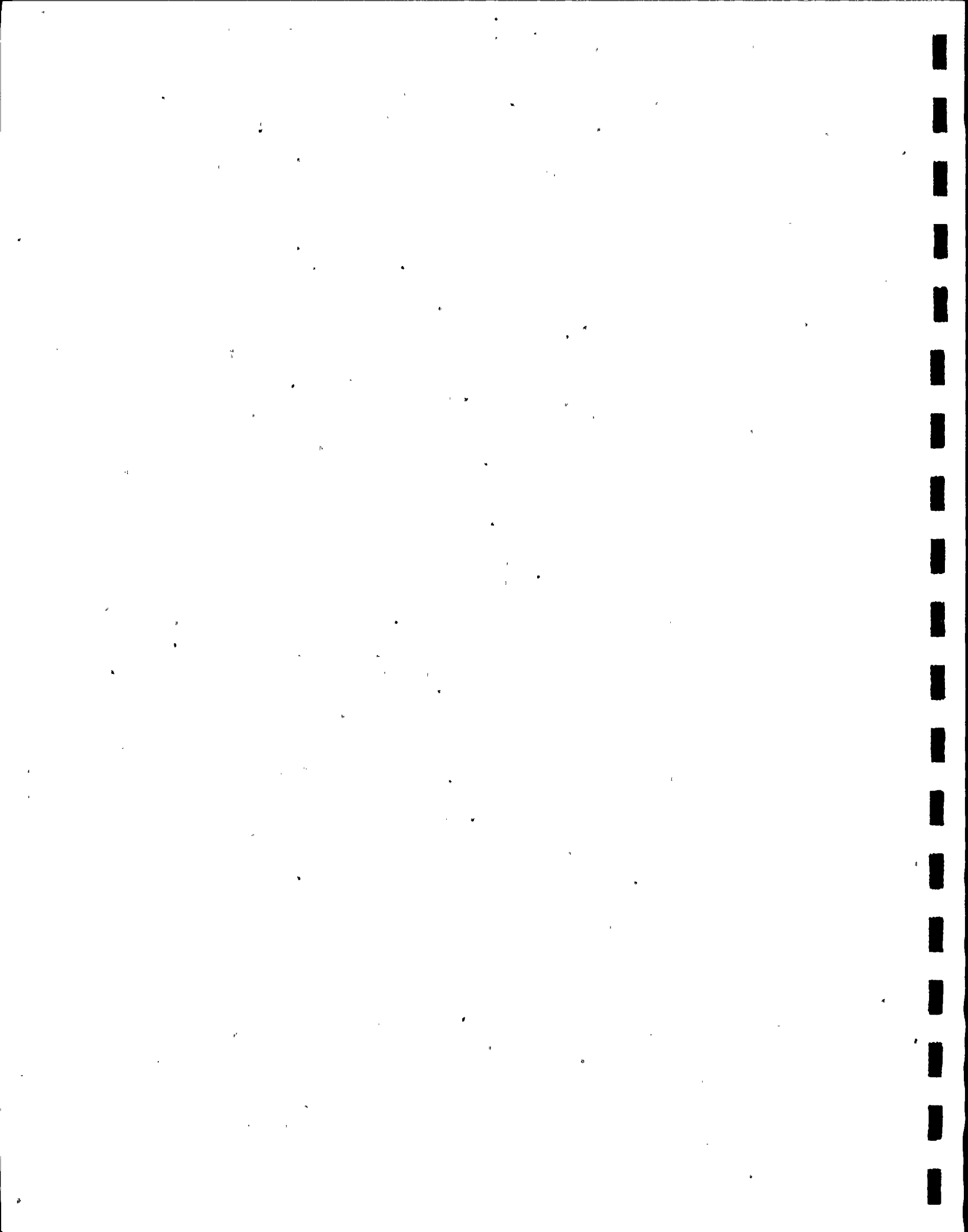


E-1

TRITIUM IN WATER

USEPA INTERCOMPARISON PROGRAM 1984

Collection Date	EPA Results \pm 1s (pCi/l)	NUS Results \pm 1s (pCi/l)
02/10/84	2383 \pm 351	1933 \pm 115
04/13/84	3508 \pm 364	3367 \pm 58

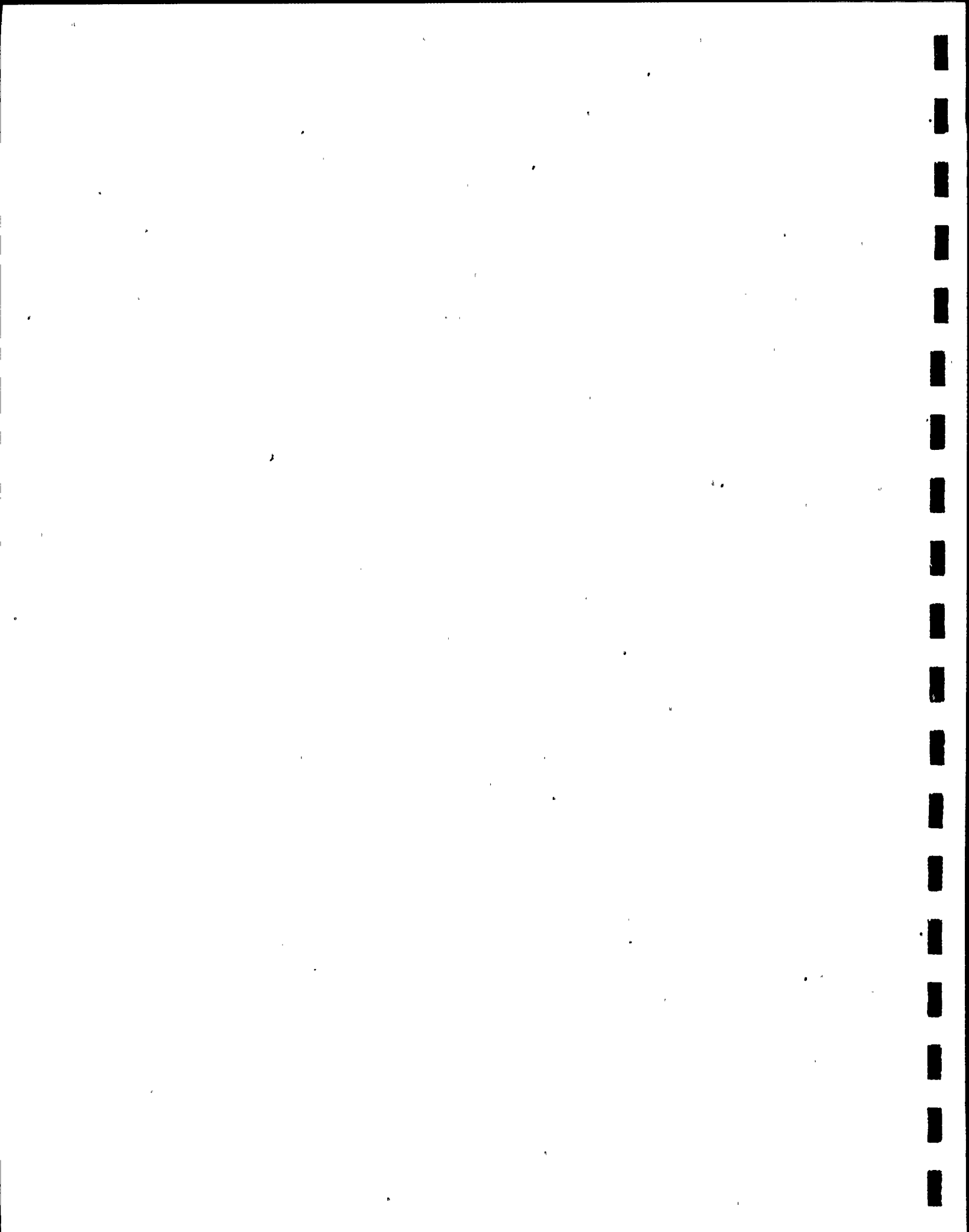


E-2

TRITIUM IN URINE

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results \pm 1s (pCi/l)	NUS Results \pm 1s (pCi/l)
04/27/84	4496 \pm 372	4600 \pm 140



F-1

URANIUM IN WATER

USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	EPA Results \pm 1s (pCi/l)	NUS Results \pm 1s (pCi/l)
02/17/84	15 \pm 6	15 \pm 1

G-1

RADIONUCLIDES ON AIR FILTER
USEPA INTERCOMPARISON PROGRAM 1983

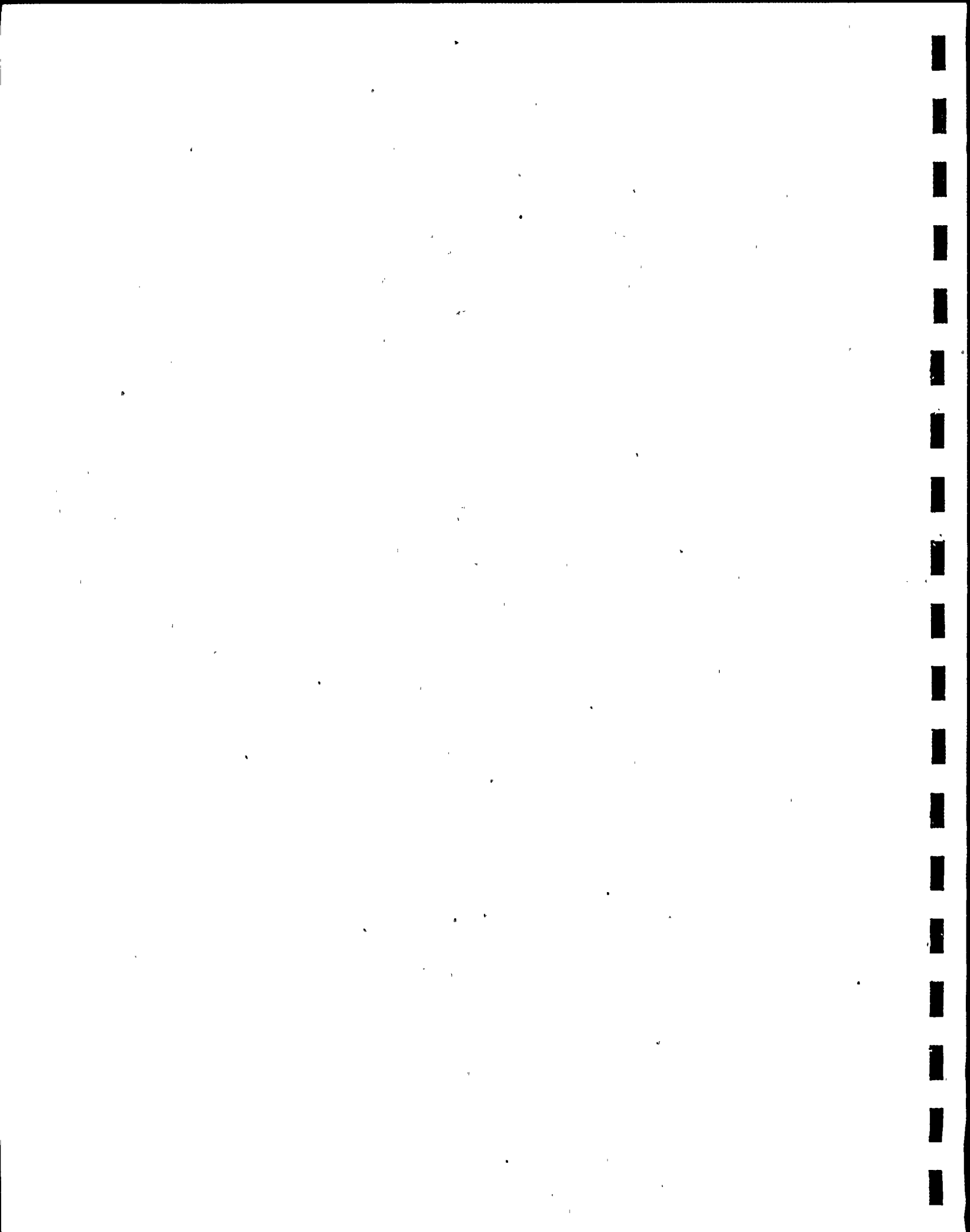
Collection Date	Radionuclide	EPA Value $\pm 1s$ (pCi/filter)	NUS Value $\pm 1s$ (pCi/filter)
08/24/84	Cs-137	15 ± 8.7	12 ± 1

H-1

RADIONUCLIDES IN FOOD

USEPA INTERCOMPARISON PROGRAM 1984

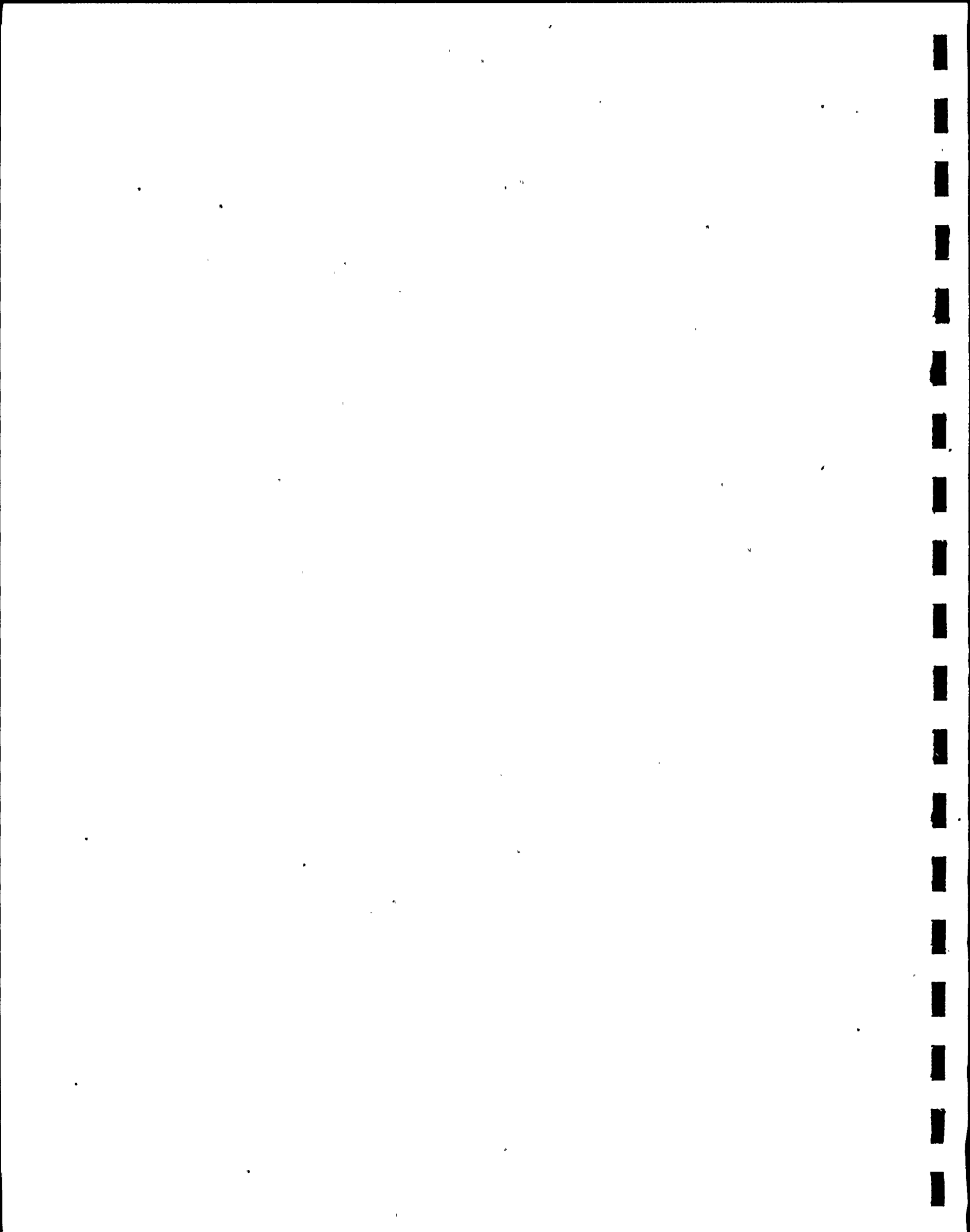
Collection Date	Nuclide	EPA Results $\pm 1s$ (pCi/l)	NUS Results $\pm 1s$ (pCi/l)
01/27/84	I-131	20 ± 6	18 ± 4
	Cs-137	20 ± 5	21 ± 1
	K-40	2720 ± 136	3054 ± 117



EPA "Blind" Analysis (water)
USEPA INTERCOMPARISON PROGRAM 1983

Collection Date	Nuclide	EPA Results \pm 1s (pCi/l)	NUS Results \pm 1s (pCi/l)
04/22/84	Alpha	35 \pm 15.2	36 \pm 1
	Beta	147 \pm 12.7 ⁽¹⁾	127 \pm 6
	Co-60	30 \pm 8.7	31 \pm 1
	Cs-134	30 \pm 8.7	28 \pm 2
	Cs-137	26 \pm 8.7	24 \pm 3

(1) This result is under investigation by the EPA due to a negative bias obtained from the participating laboratories' results.



SECTION IV

REPORTING OF ANALYTICAL RESULTS

In the tables presenting analytical measurements, the calculated value is reported with the two sigma counting error (2s) derived from a statistical analysis of both the sample and background count rates. The precision of the results is influenced by the size of the sample, the background count rate, and the method used to round off the value obtained to reflect the degree of significance of the results. For analytical results obtained from gamma spectral analysis, the precision is also influenced by the composition and concentrations of the radionuclides in the sample, the size of the sample, and the assumptions used in selecting the radionuclides to be quantitatively determined. The two sigma error for the net counting rate is:

$$2s = 2 \left(\frac{R_s}{t_s} + \frac{R_b}{t_b} \right)^{1/2}$$

Where:

R_s = sample counting rate

R_b = background counting rate

t_s = sample counting time

t_b = background counting time

If the measurements on the samples are not statistically significant (i.e., the two sigma count error is equal to or greater than the net measured value), then the radioactivity concentrations in the samples are considered not detected.

Results reported as less than ("LT") are below the lower limit of detection (LLD). The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95 percent probability with only 5 percent probability of falsely concluding that blank observation represents a "real" signal.

For a particular measurement system (that may include radiochemical separation):

$$LLD = \frac{4.66s_b}{E \times V \times 2.22 \times Y \times \exp(-\lambda \Delta t)}$$

where:

LLD is the lower limit of detection as defined above (as pCi per unit mass or volume)

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute)

E is the counting efficiency (as counts per disintegration)

V is the sample size (in units of mass or volume)

2.22 is the number of disintegrations per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

λ is the radioactive-decay constant for the particular radionuclide

Δt is the elapsed time between the end of sample collection and counting

The following are definitions or descriptions of statistical terms used in the reporting and analysis of environmental monitoring results.

Precision relates to the reproducibility of measurements within a set, that is, to the scatter or dispersion of a set about its central value.

Measures of the Central Value of a Set. Mean (or Average or Arithmetic Mean) is the sum $\sum_{i=1}^n X_i$ of the values of individual results divided by the number of results in the set. The mean is given by:

$$\bar{X} = (X_1 + X_2 + \dots + X_n) / n = \sum_{i=1}^n X_i / n$$

Measures of Precision with a Set. Standard Deviation is the square root of the quantity (sum of squares of deviations of individual results from the mean, divided by one less than the number of results in the set). The standard deviation, s , is given by:

$$s = \sqrt{\sum_{i=1}^n (X_i - \bar{X})^2 / (n-1)}$$

Standard deviation has the same units as the measurement. It becomes a more reliable expression of precision as n becomes larger. When the measurements are independent and normally distributed, the most useful statistics are the mean for the central value and the standard deviation for the dispersion.

Note: In the USEPA Intercomparison Program, the standard deviation given by EPA is for the expected laboratory result from three analyses. The standard deviation given by NUS is the standard deviation from the mean of three reported values.

Relative Standard Deviation is the standard deviation expressed as a fraction of the mean, s/\bar{X} . It is sometimes multiplied by 100 and expressed as a percentage.

Range is the difference in magnitude between the largest and the smallest results in a set. Instead of a single value, the actual limits are sometimes expressed (minimum value/maximum value).

Section V - Part A

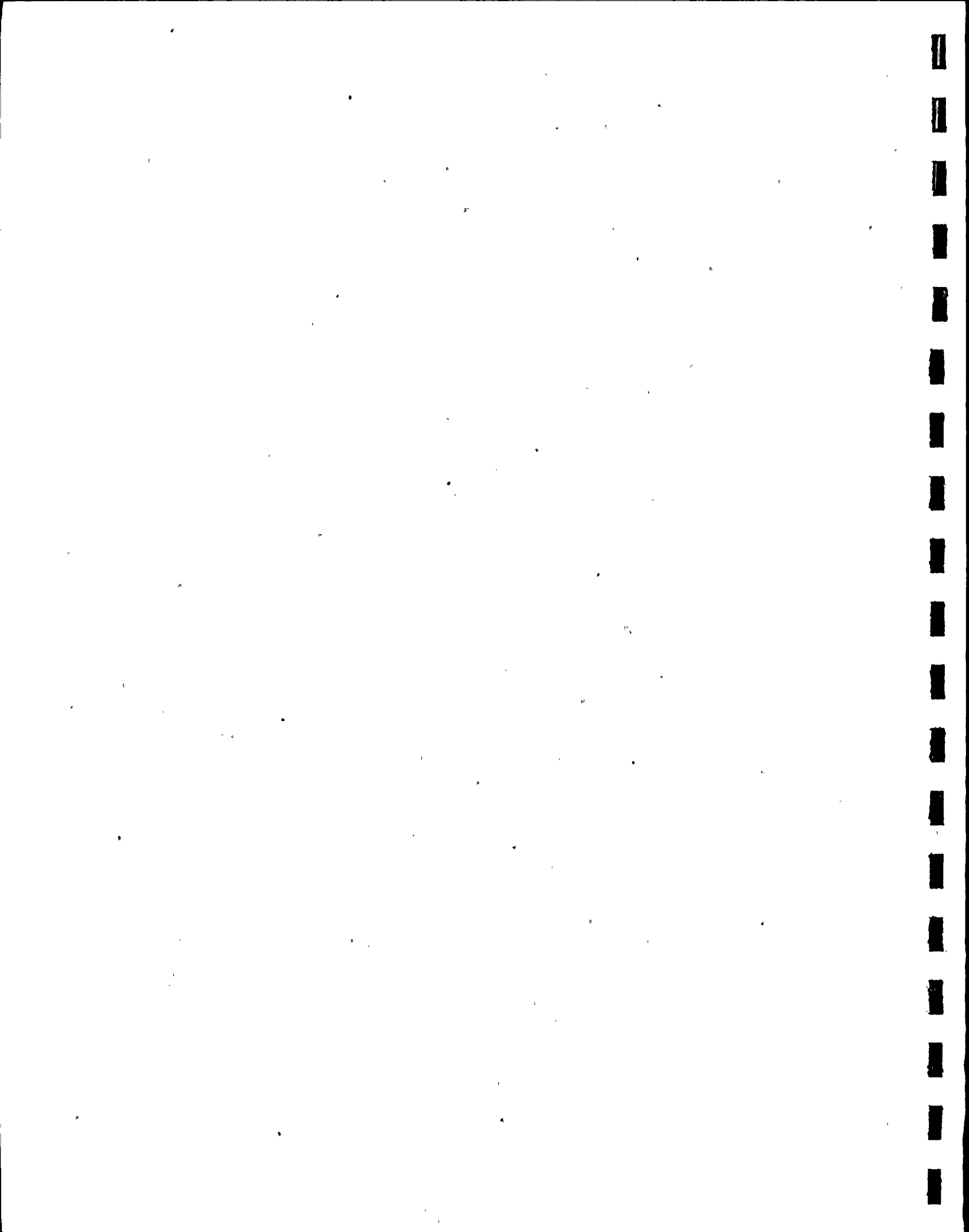
Performance Check Summary

High Resolution Gamma Spectrometry System

Period Covered: 1-January-84 to 30-September-84

Detection System	No. of Measurements	Efficiency ⁽¹⁾ Checks	Background ⁽²⁾	Energy Calibration ⁽³⁾	
				Slope	Offset
01	27	1324 \pm 135	129 \pm 61	.4996 \pm .0005	.3882 \pm .5901 ⁽⁴⁾
02	37	1626 \pm 182	108 \pm 91	.5002 \pm .0018	.4631 \pm .2280
03	43	1563 \pm 168	114 \pm 75	.5002 \pm .0012	.0985 \pm .3883
04	38	1751 \pm 194	250 \pm 117	.5002 \pm .0012	-.6357 \pm .4430
05	32	1535 \pm 159	155 \pm 102	.5000 \pm .0011	-.2510 \pm .5414
06	21	1538 \pm 178	333 \pm 221	.4997 \pm .0121	.1656 \pm 1.3369 ⁽⁵⁾

1. Efficiency Control Limits are ± 3 standard deviations of cumulative average. Errors shown are 3 standard deviations of the reported averages.
2. Overnight (54,000 seconds), empty shield backgrounds are counted once per week on each detector. One peak is traced for each system to observe long term trends. The peak tracked for system #1 is from K-40. The peak tracked for other systems is from Pb-212. Errors shown are 3 standard deviations of the reported averages.
3. Energy calibration Control Limits are 1.0 for offset and .500 \pm .001 for slope. Errors shown are 3 standard deviations of the reported averages.
4. Detector 1 taken out on sevice.
5. Compiled from monthly averages through May 31, 1984. This detector had several gain adjustments as a result of failures in the support electronics. This resulted in higher apparent variations in the energy calibration parameters when averaged over the entire year. In actual fact this detector was as stable as any of the others between gain adjustments.



Section V - Part B

Performance Check Summary

Gas-Proportional Counters

Period Covered: 1-January-84 to 30-September-84

Counter Number	No. of Measurements	Control Limits	Efficiency AVG \pm 2s
42	Alpha 47	$.243 \pm .018$	$.239 \pm .018$ (1)
	55	$.267 \pm .018$	$.266 \pm .016$ (2)
	Beta 108	$.407 \pm .014$	$.407 \pm .011$
43	Alpha 116	$.269 \pm .019$	$.272 \pm .012$ (3)
	Beta 116	$.395 \pm .014$	$.401 \pm .014$ (3)
44	Alpha 22	$.299 \pm .024$	$.306 \pm .025$
	Beta 21	$.422 \pm .021$	$.411 \pm .016$
	Alpha 7	$.209 \pm .020$	$.211 \pm .008$ (4)
	Beta 7	$.381 \pm .015$	$.382 \pm .010$ (4)
45	Alpha 47	$.239 \pm .027$	$.240 \pm .021$ (5)
	Beta 59	$.389 \pm .044$	$.386 \pm .027$

1. Control limit based on 1983 data.
2. New control limits established after window replacement.
3. New control limits based on January 1984 data.
4. New control limits established after replacement of window with one of greater surface density.
5. New control limits based on January 1984 data. One outlier has been excluded from the annual average. Plans to establish separate control charts for each of the ten detectors were dropped with the decision to close the Radiological Laboratory.

Section V - Part C

Performance Check Summary

Packard Liquid Scintillation Counter

Period Covered 1-January-84 to 30-September-84

Counter Number	No. of Measurements	Tritium Control Limits	Tritium Efficiency $\bar{x} \pm 1s$	
52	22	.616 \pm .004	.616 \pm .005	(1)
53	31	.611 \pm .004	.610 \pm .003	

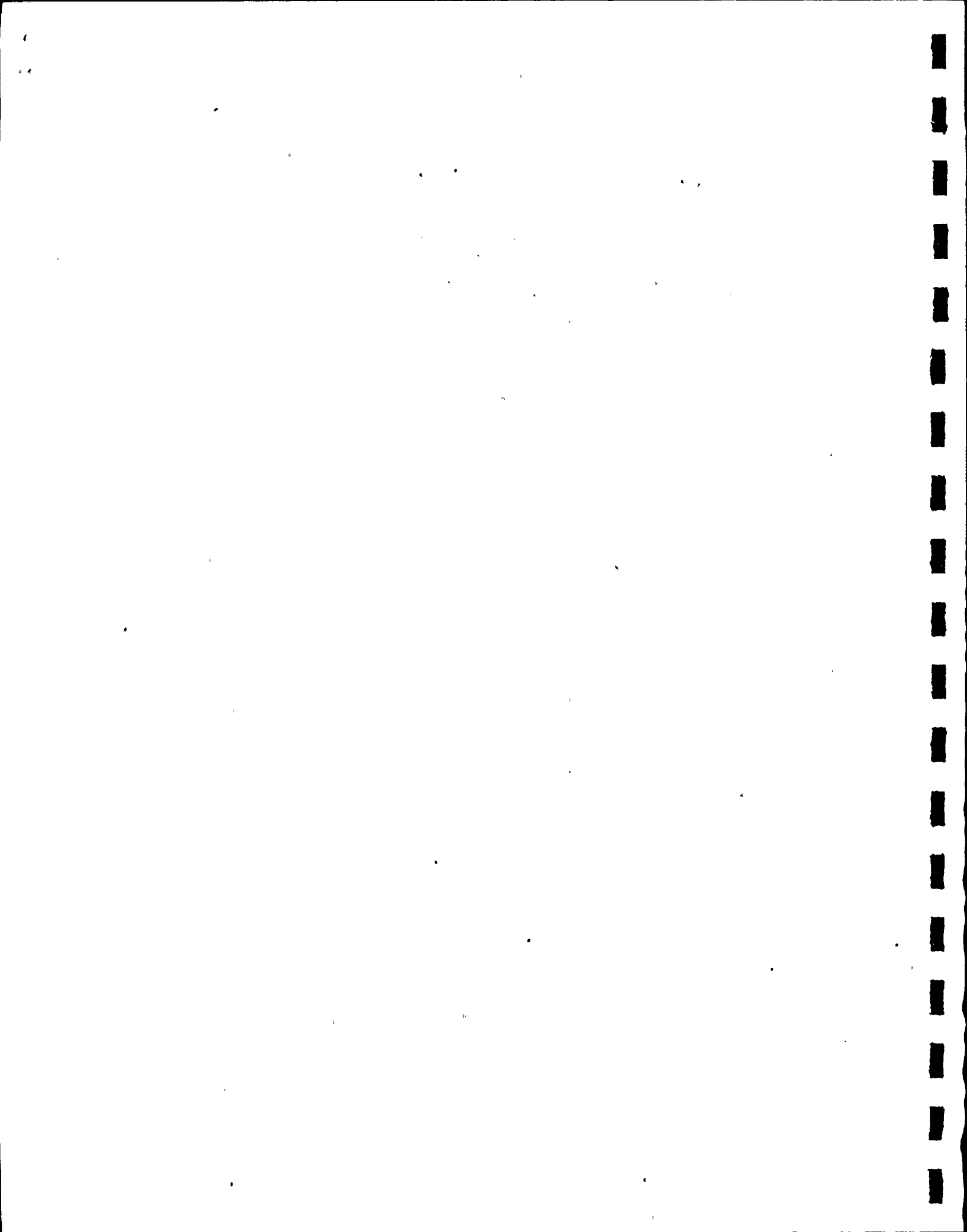
1. Counter 52 was serviced as a result of erratic background counts due to increased noise in electronics. The unit was out of service during part of 1984 while the problem was being solved.

Section VI-A

Chemical Recovery Determination

Methods

Chemical recovery data was compiled only for the analysis of I-131 during 1984. The yield for this analysis is based on a gravimetric determination using a standardized stable iodide carrier precipitated as CuI. Recoveries were compiled for the periods March 1 through April 30 and for May 1 through May 31, 1984. These results are reported as representative of the chemical separations done throughout the year. Additional compilation of this data was not performed because the decision to close the laboratory eliminated any future applications of such statistical data.

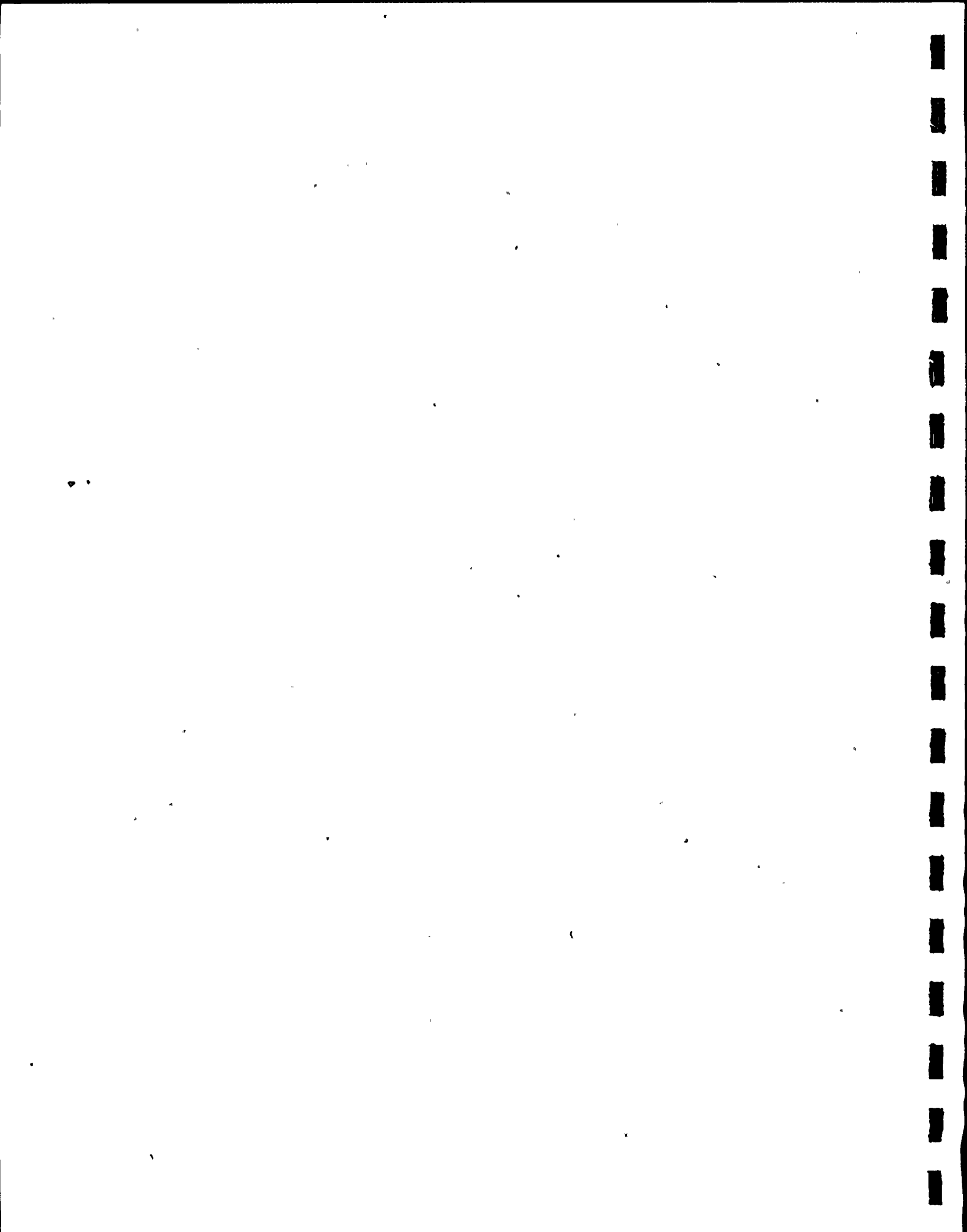


Section VI-B

Chemical Recovery Determination

Results

Analysis Type	Media	No. of Samples	Precipitate	Chemical Recovery $\pm 1s$
Period Covered 1-March-84 to 30-April-84				
I-131	water	49	CuI	0.74 ± 0.07
	milk	73	CuI	0.73 ± 0.07
Period Covered 1-May-84 to 31-May-84				
I-131	water	22	CuI	0.74 ± 0.09
	milk	32	CuI	0.73 ± 0.07



QUALITY CONTROL AT UST-RD

One of the most important attributes of a low level radio-analytical laboratory is the capability to measure low levels of radioactivity. The ability of United States Testing Co., Inc. (UST-RD) to achieve accurate and precise measurements at low activity concentrations helps the customer to confirm that conditions of the work place, or emissions from the plant area do not significantly contribute to the public's exposure to radiation. To address the needs of the customer, UST-RD has implemented a Quality Control (QC) system based on statistical concepts.

The goal of the UST-RD QC program is to demonstrate control of the analytical systems and the quality of analytical results. Primary statistical measures *used by UST-RD to assess the effectiveness of the analytical systems are the:

- . Decision Limit (L_C)
- . Mean Blank Value (MBV)
- . Detection Limit (L_d) and
- . Total Propagated Uncertainty (TPU).

L_C , Decision Limit

$$L_C = K(\sigma_0) + MBV$$

where:

K is the one-sided confidence factor at the 95% confidence level (1.645) and:

σ_0 is the observed standard deviation of a series of blank sample counts in dpm.

MBV is the mean value of a series of blank sample counts in dpm.

At L_C (with $K = 1.645$) there is only a 5% chance that a true mean count rate at the MBV will be falsely recorded as a positive value.

The L_C is used only to determine if a measurement is statistically different from background. It should not be used as a practical detection limit (DL).

DL, (Detection Limit)

The DL is defined as the smallest quantity of radioactive material that can be detected with some specified degree of confidence. If one is satisfied with a 50% degree of confidence then:

$$L_C = DL$$

However, UST-RD is obligated to report data at the 95% confidence level at a contractually specified detection level. Hence, DL is taken as:

$$DL = 2 * L_C$$

In practice, UST-RD would like L_C to be lower than 1/2 of DL.

TPU, Allowed Total Propagated Uncertainty

TPU is the allowed uncertainty around reported data and is related to the activity of the sample.

Above 20 times the specified DL for sample determinations requiring chemical separations UST-RD allows $\pm 20\%$ of the actual value except for alpha spectrometric determinations where 10% is allowed. For non-destructive analyses such as tritium determinations and direct gamma counting, UST-RD allows $\pm 10\%$ uncertainty at or above 20 times the DL.

Samples showing activity lower than 20 times the DL, allowed TPU is found using the equation:

$$TPU = \frac{(DL - L_C) * \sqrt{S * DL}}{DL * S}$$

where: S = found activity (dpm)

At one times DL (considering that L_C is actually 1/2 of DL), UST-RD allows ~ 45% uncertainty.

The above measures provide criteria by which to assess the acceptability of the analytical results via their application to the QC samples which accompany the customers' samples through the radio-analytical system.

Systematic errors must be minimized wherever possible. Hence, the QC "spikes" are prepared by weight in a separate QC laboratory and submitted to the analytical laboratory for addition to the appropriate matrix material and subsequent processing along with the customer samples. The QC laboratory also prepares the yield monitors (tracers and stable carriers) by weight using NBS traceable radioactivity standards and/or well documented procedures.

QC sample results are control charted and compared to the limits derived from the Lc, MBV, and TPU concepts. The values for MBV, Lc and Ld have been measured and are accurately known for analyses and matrices which are frequently requested. The number of spikes observed to be outside of the TPU limits are well below the 5% allowed indicating that the analytical systems are in control. The quality of the QC data is a measure of the quality of the actual sample results. Analysis of duplicate spiked samples (or duplicate sample analyses) are used as a check of the precision of the systems. The measure of the accuracy of the analytical systems is obtained by comparing the "found" value of the QC spikes to the "expected" value considering the allowed TPU at the activity level of the spikes. The TPU of the actual sample is compared to the allowed TPU at the found activity level of the sample. The result of the comparison indicates whether or not a sample needs additional counting, re-work or a complete re-run.

Traceability of the sample data is ensured by using positive log-in and laboratory flow procedures. Customer turn-around-time requirements are addressed by scheduling the analyses (presently by manual means) and by computerized sample tracking through the system. Sample activity checks are performed during sample receiving and logging for those samples coming from locations which have a history of radionuclide activity significantly above environmental levels. Bioassay samples are not expected to contain significant levels of activity except for samples from personnel who have been involved in occurrences which have resulted in personnel exposure. Positive control of the potential for cross contamination of the samples is provided by analyzing samples expected to contain higher than environmental levels of activity in laboratories which are separate from the low level laboratories.

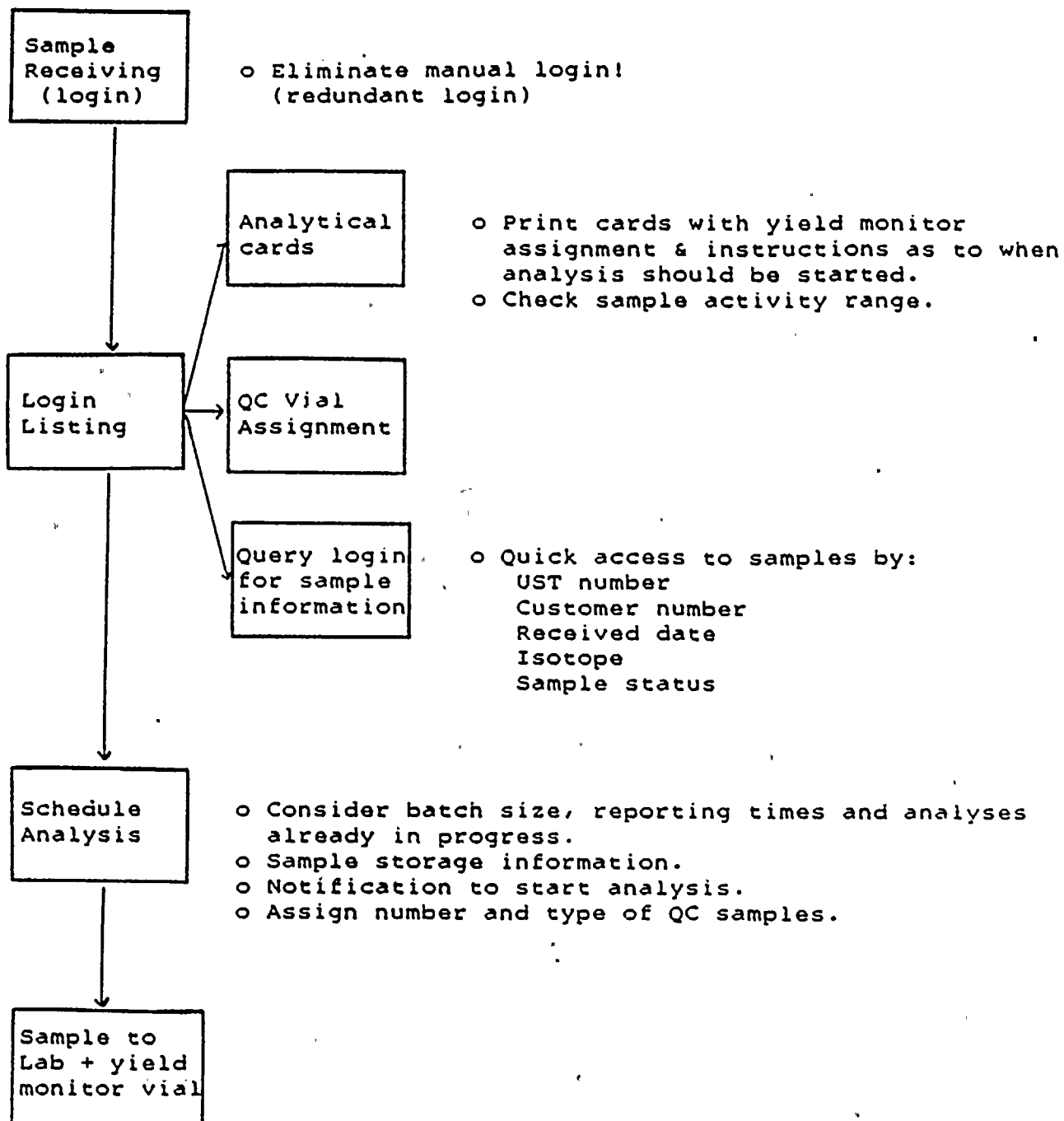
UST-RD has a comprehensive training program which certifies the analysts for the work in their respective laboratories and checks their individual performance via the QC samples. However, because of the nature of laboratory work, some level of error (even with the best of training) is to be expected. Hence, UST-RD has implemented a system of additional verification of the data prior to reporting results. Even so some errors will go undetected causing UST-RD to report nonconforming data. When non-conforming data is detected, UST-RD reports the occurrence of the error to the customer. The error source is investigated and corrective actions are suggested by the laboratory supervisor and

reviewed by the QA Department. The error is documented using a non-conforming data (NCD) report upon which is described the reason(s) for the error and the corrective actions taken or planned to minimize the reoccurrence of similiar errors in the future. Copies of the NCD are forwarded to the supervisor, the technician involved and the customer.

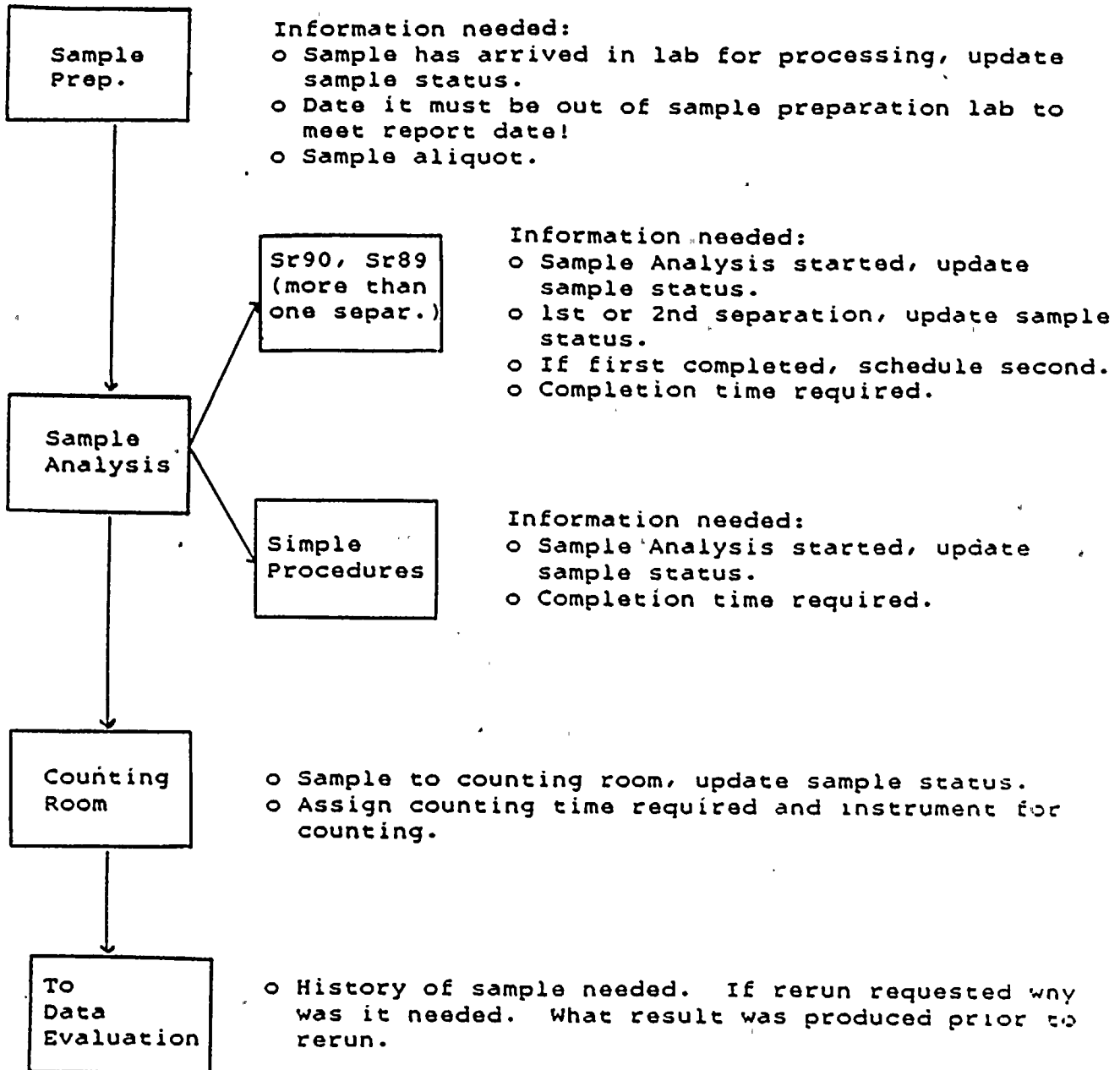
Flow of the samples through the analytical system is shown in the following diagrams.

- * Lloyd A. Currie, "Limits for Qualitative Detection and Quantitative Determination," Analytical Chemistry, Vol. 40, No 3, March 1968.

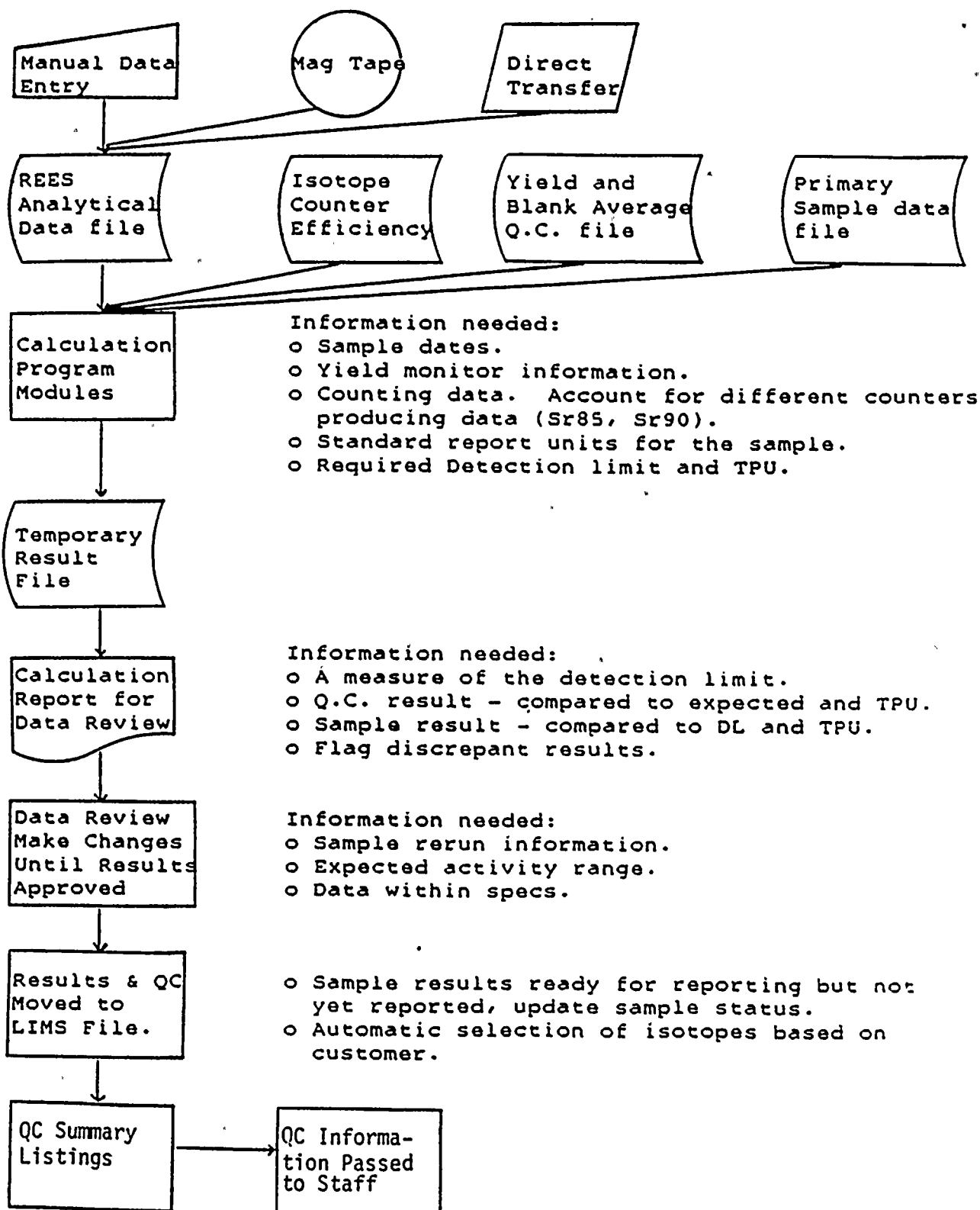
Sample Receiving



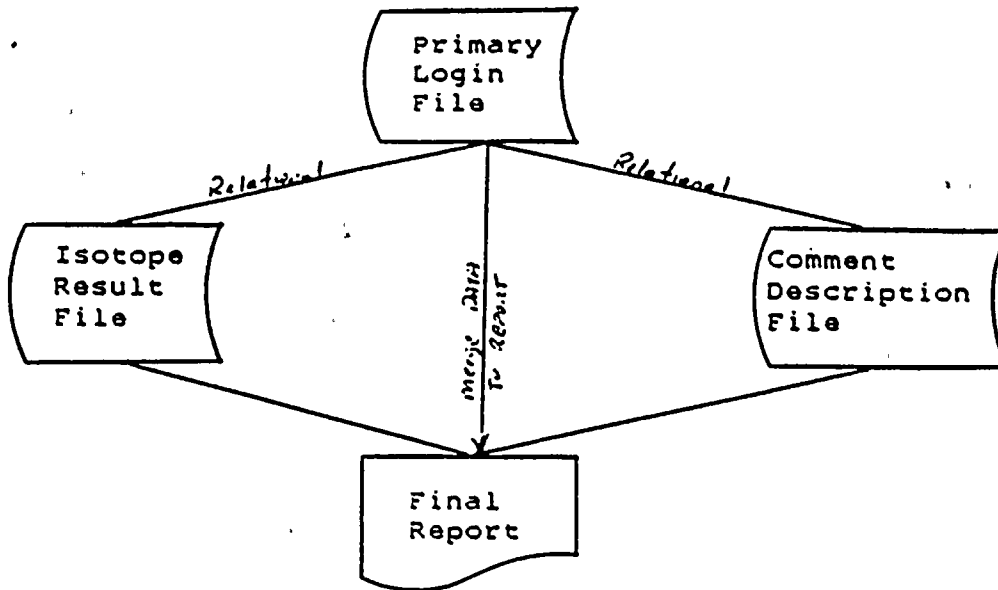
Sample Analysis



DATA EVALUATION



DATA REPORTING



Information Needed:

- o Results reported, and report date.
- o Summary information on number of samples reported over specified period.
- o Billing information.

TASK III

Quality Control Report

3rd and 4th Quarters 1984

Prepared by UST-RD for customer review.

Following is the Quality Control Report for Environmental Radiochemical Analysis (ERA), Task III, for the 3rd and 4th quarters for 1984.

To make this report more comprehensive, the analysis identifiers have been modified to include two types of total alpha and total beta analyses as well as to provide for reporting of isotopic Sr (Sr-89 and Sr-90). As soon as we can modify the software, we will report two categories of plutonium (Pu-239/240 and Pu-238).

Analysis

B	=	Gross beta activity, extracted
BD	=	Gross beta activity, directly plancheted
A	=	Gross alpha activity, extracted
AD	=	Gross alpha activity, directly plancheted
I131	=	I-131 separation
Sr90	=	Sr-90 separation
Sr89	=	Sr-89 separation
Pu239	=	Isotopic plutonium separation
Unat	=	Uranium (mass determination)
P32	=	P-32 separation
H3	=	Tritium determination
C14	=	Carbon-14 determination, Benzene Synthesis
Kr85	=	Krypton-85 determination

Matrix

W	=	Water
M	=	Milk
F	=	Air particle filter
A	=	Alfalfa
S	=	Soil
G	=	Gas (E.G. air; Kr-85 analysis, Benzene Synthesis)

A letter code following the radiochemical yield on the QC data listings, designates whether the data were corrected by tracer yield (T), gravimetric yield (G), or spike yield (S). The QC data listings are available for customer review upon request.

A.

I BLANKS

In the "Blanks" table, UST-RD shows the residual activity found in the blank sample matrix after subtraction of the counter background. L_C is determined using the standard deviation plus the residual mean activity above 0 of the "Expected" mean blank value (MBV) where sufficient data are available ($L_C = 1.645 * \text{Sigma } 0 + \text{MBV}$). Where sufficient blank data is not available, L_C is estimated. Comparison of the current data to L_C gives an indication of type I error.

The expected column shows the blank data accumulated earlier. The found column contains the data for the 3rd and 4th quarters of 1984.

In this report, UST-RD shows two values for L_C . The upper value is that obtained from the "Expected" data. The lower value is $1/2$ of the contractual L_d . Where the upper L_C is significantly greater than the lower, UST-RD will investigate the reasons for the discrepancy and cover the findings in a later report. The blanks above L_C were determined by a comparison to the contractual L_C ($1/2$ of L_d).

Blank data for direct beta counts (BD filter matrix) are elevated. Earlier, UST-RD began storing the filters away from air exposure which seems to have reduced the fluctuation. However, some fluctuation is still observed, part of which may be due to inherent background differences in different packages of unused filters. However, we feel that most of the remaining variance is probably due to using varying count lengths (some samples have higher activity than the normal samples. Hence, they are counted for shorter time and/or on higher background detectors).

Pu-239 and Sr-90 (water matrix) blanks are mixed. Some are from the intermediate level laboratory and some accompany analyses of soil and vegetation matrix such samples may be counted for shorter lengths of time because of the activity level. Hence, they are expected to show a higher blank value. We are implementing protocol to keep such data separately in the future.

Other blank data for this period appear acceptable.

Blanks

3rd and 4th Quarters 1984

Analysis	Matrix/ Amount	Expected + Sigma & (n) dpm	Found + Sigma & (n) dpm	L _C dpm* (approx.)	Blanks Above L _C
B	W 1 L	9.85E-1 +1.19E+0(23)	7.74E-1 +2.57E+0(2)	2.94E+0 4.44E+0	0
BD	W 1 L	1.01E+0 +1.30E+0(29)	7.41E-1 +1.23E+0(13)	3.14E+0 4.44E+0	0
	Fa 1	3.38E+0 +2.49E+0(30)	2.96E+0 +2.75E+0(36)	7.48E+0 5.00E+0	11
A	W 1 L	2.41E-1 +5.76E-1(31)	1.05E-1 +1.49E-1(6)	1.19E+0 4.44E+0	0
AD	W 1 L	1.47E-1 +3.18E-1(24)	1.64E-1 +2.97E-1(9)	6.70E-1 4.44E+0	0
	Fa 1	1.12E+0 +1.65E+0(36)	6.72E-1 +4.49E-1(55)	3.83E+0 1.67E+0	0
Il31	W 4 L	-2.88E-1 +1.42E+0(3)	4.40E-1 + -- --(1)	2.34E+0 2.22E+0	0
	M 4 L	7.09E-1 1.84E+0(5)	-1.00E+0 +1.61E-1(2)	3.74E+0 2.22E+0	0
SR90	Wb 1 L	2.44E-1 1.40E+0(43)	3.53E-1 +7.97E-1(30)	2.55E+0 6.55E-1	9
	F 1-6	1.69E-1 7.47E-1(8)	3.62E-1 +5.04E-1(13)	1.40E+0 1.67E+0	0
	M 4 L	None	6.94E-1 + -- --(1)	-- -- 8.90E+0	0
SR89	Wc 1 L	-2.14E-1 +1.41E-1(2)	7.91E-1 +2.40E+0(6)	2.31E+0 6.66E+0	0
	F 1-6	5.87E-1 +1.80E+0(4)	8.88E-1 +1.24E+0(10)	3.54E+0 1.67E+1	0
Pu239	Wb 1 L	1.01E-2 1.80E-2(11)	1.59E-2 +2.28E-2(28)	3.97E-2 4.44E-2	5
	F 1-6	8.05E-3 +9.90E-3(13)	3.47E-3 +1.04E-2(14)	2.43E-2 7.50E-2	0

Continuation

Analysis	Matrix/ Amount	Expected \pm Sigma & (n) dpm	Found \pm Sigma & (n) dpm	L_c dpm* (approx.)	Blanks Above L_c
Pu239	A 50 g	1.35E-2 $\pm 8.72E-3(2)$	2.06E-2 $\pm 3.45E-2(4)$	2.22E-2 6.65E-2	1
U Nat.1	W 0.1 L	4.65E-2 $\pm 5.11E-2(18)$	1.51E-2 $\pm 1.57E-2(5)$	1.31E-1 3.70E-1	0
	F 1	8.45E-2 $\pm 4.07E-2(8)$	2.26E-1 $\pm 5.30E-2(2)$	1.51E-1 1.11E+0	2
P32	W 0.1 L	1.04E+0 $\pm 1.55E+0(4)$	8.91E-1 $\pm 1.08E+0(3)$	3.59E+0 1.11E+1	0
H3	WC 0.005 L	2.46E+1 $\pm 9.46E-1(7)$	2.44E+1 $\pm 1.21E+0(40)$	2.62E+1 1.67E+0	2C
KR85	G 1 M ³	1.76E+0 $\pm 2.11E+0(4)$	None	5.23E+0 2.22E+0	---
Cl4	G	5.96E-1 $\pm 1.58E-1(4)$	None	8.56E-1 1.11E+0	---

* Two L_c 's are shown, the first is calculated from the "expected" blank data, the second is 1/2 of the contractual detection limit. The blanks are compared to the contractual L_d to assess the number of blanks above L_c . Units shown are dpm per sample. To compare to customer specifications, the L_c 's should be divided by the sample size and converted to the appropriate activity units.

1 Micrograms per sample, the "Found" data is higher than expected, but well within the contractual specifications.

a Some of the earlier blanks were counted on high background detectors and/or for shorter counting times to match the procedure used for the intermediate level samples. Intermediate level data is mixed in the "Found" data for this period. We are implementing protocol to keep the various activity level QC separate to better reflect the samples.

The water matrix for Strontium and Plutonium has been used as a universal blank for all matrices. Hence, the results of the blanks may exceed the L_c for a true water matrix blank. This can be due to shorter counting times in some cases and/or potential for higher blank values when analyzing more difficult matrices such as soil or alfalfa.

- b Blank matrix for vegetation and soil are difficult to obtain. These matrices usually contain natural and/or "fallout" activity. We have been using a water blank to fill the gap. Counting times for the various matrices are selected to meet contractual criteria. The technicians have been labeling these blanks as water (W) even though they are actually run with various other matrices. Hence, this data is mixed.

The technicians have been instructed to label these blanks such that they reflect the sample matrix which they accompany through the process and they will be shown separately in future reports once the separation has been established.

- c Instrument background is not subtracted from the tritium blank. Hence, the residual activity is not used to estimate L_C . This L_C appears elevated because the counter background is not subtracted. The blank value is subtracted from the sample data by the LSC prior to calculation. The L_C as applied to the sample data is 2.12 dpm.

II SPIKES

Data are individually yield corrected, except for extracted gross alpha (A), gross beta (B) and UF Ext where spike yields are used to correct the data. Yields for H-3 are considered quantitative. Hence, no yield adjustment is used for H-3.

Comparison of spike data at L_d gives an indication of Type II error. At the 95% confidence interval, 95% of the spikes should be greater than the L_c 's determined from the "Expected" data.

Data shown in the Found column include all of the propagated uncertainties (Total Propagated Uncertainty, T.P.U.). The T.P.U. limit is an estimation of allowed error and is calculated using the equation:

$$TPU = [(L_d - L_c)/L_d] * \text{SQRT} (S * L_d/S)$$

Where: L_d = Contractual detection limit
 S = Activity found in the sample
 L_c = $1.645 * (\text{sigma } 0) + \text{MBV}$

Quality Control Data on Spikes

3rd and 4th Quarters 1984

Analysis/ Matrix/ Amount	Expected \pm sigma* dpm	Found \pm sigma ** & (n) dpm	Spikes out of T.P.U.@ Limits	L _C dpm (Appr.)	Spikes above L _C	Mean pooled error dpm
B W,1L	1.03E+1 \pm 3.09E-1	9.89E+0 \pm -- --(1)	0	2.94E+0	1	2.06E+0
	2.07E+1 \pm 6.21E-1	1.93E+1 \pm 9.79E-1(2)	0	2.94E+0	2	2.30E+0
BD W,1L	1.03E+1 \pm 3.09E-1	1.01E+1 \pm 1.18E+0(13)	0	3.14E+0	13	1.61E+0
	2.07E+1 \pm 6.16E-1	1.94E+1 \pm 2.52E+0(12)	0	3.14E+0	12	2.26E+0
A W,1L	2.63E+0 \pm 7.89E-2	2.38E+0 \pm 6.87E-1(8)	0	1.19E+0	8	3.90E-1
	3.22E+0 \pm 9.66E-2	1.52E+0 \pm -- --(1)	0	1.19E+0	1	2.98E-1
	5.23E+0 \pm 1.51E-1	5.06E+0 \pm 1.55E+0(8)	0	1.19E+0	8	6.69E-1
AD W,1L	2.66E+0 \pm 7.99E-2	2.56E+0 4.55E-1(7)	0	6.70E-1	7	5.21E-1
	3.44E+0 \pm 1.03E-1	3.96E+0 \pm -- --(1)	0	6.70E-1	1	6.00E-1
	5.18E+0 \pm 1.56E-1	5.88E+0 \pm 1.59E+0(7)	0	6.70E-1	7	9.42E-1
I131 W,0.5L	5.31E+0 \pm 1.60E-1	3.69E+0 \pm 3.68E-1(2)	0	2.34E+0	2	9.01E-1
	2.68E+1 \pm 8.10E-1	2.56E+1 \pm 1.38E-1(2)	0	2.34E+0	2	2.68E+0
	8.1E-1 \pm 2.4E-2	9.09E-1 \pm 5.81E-1(4)	0	2.34E+0	09	5.67E-1

Continuation

Analysis/ Matrix/ Amount	Expected + sigma* dpm	Found + sigma ** & (n) dpm	Spikes out of T.P.U.@ Limits	L _c dpm (Appr.)	Spikes above L _c	Mean pooled error dpm
-----	-----	-----	-----	-----	-----	-----
1131						
M,4.1L	5.33E+0 +1.60E-1	4.24E+0 +2.93E-2(2)	0	3.74E+0	2	9.18E-1
	2.69E+1 +8.10E-1	2.73E+1 +1.33E+0(2)	0	3.74E+0	2	2.93E+0
	8.10E-1 +2.50E-2	8.97E-1 +2.48E-1(4)	0	3.74E+0	09	7.07E-1
SR90	4.08E+0	4.31E+0	1	2.55E+0	11	8.95E-1
W,1L	+1.22E-1	+6.79E-1(11)				
	6.68E+0 +2.01E-1	6.93E+0 +1.58E+0(5)	1	2.55E+0	5	1.31E+0
W,1L	5.10E+0 +1.53E-1	4.71E+0 + -- --(1)	0	2.55E+0	1	1.26E+0
SR90	5.18E+0	5.32E+0	0	1.40E+0	19	1.90E+0
F,1-6	+1.55E-1	+1.20E+0(19)				
	4.10E+0 +1.23E-1	3.45E+0 + -- --(1)	0	1.40E+0	1	9.00E-1
M,1L	5.11E+0 +1.53E-1	3.98E+0 +8.23E-1(2)	0	2.55E+0e	2	6.63E-1
A,50g	1.23E+1 +4.45E+0 (22)	1.34E+1 +1.06E+0(8)	1	2.55E+0e	8	1.56E+0
S,100gd	9.70E+1 +8.00E+0	1.06E+2 + -- --(1)	0	2.55E+0e	1	1.05E+1
S,50gd	4.85E+1 +4.00	4.73E+1 +3.85E+0(4)	0	2.55E+0e	4	4.95E+0
S,2g	6.57E+0 +1.97E+0	6.21E+0 + -- --(1)	0	2.55E+0e	1	9.20E-1

Continuation

Analysis/ Matrix/ Amount	Expected + sigma* dpm	Found + sigma ** & (n) dpm	Spikes out of T.P.U.@ Limits	L _c dpm (Appr.)	Spikes above L _c	Mean pooled error dpm
SR89 W,1L	2.12E+1 +6.40E-1	1.74E+1 +9.98E+0(2)	0	2.31E+0	2	7.03E+0
	6.79E+0 +2.00E-1	6.58E+0 + -- --(1)	0a	2.31E+0	1	3.53E+0
F,1	1.82E+1 +5.46E-1	1.84E+1 +1.19E+0(3)	0	3.54E+0	3	2.12E+0
	1.51E+1 +4.50E-1	2.07E+1 +3.21E+0(3)	0	3.54E+0	3	4.35E+0
	5.55E+0 +1.70E-1	7.82E+0 +9.41E-1(3)	0a	NA	--	1.75E+0
	3.73E+0 +1.20E-1	2.95E+0 +1.59E+0(4)	0a	NA	--	2.01E+0
	6.21E+0 +1.90E-1	8.12E+0 +2.27E+0(2)	0a	NA	--	1.71E+0
	1.45E+0 +5.00E-2	2.37E+0 +1.29E+0(4)	0a	NA	--	1.36E+0
SR89 S	1.54E+1 +4.61E-1	1.65E+1 + -- --(1)	0	3.54E+0	1	2.24E+0
Pu239 W,4L	5.23E+1 +1.57E-1	5.23E+0 +5.9E-2(2)	0	3.97E-2	2	3.11E-2
	5.11E-1 +1.53E-2	4.51E-1 +1.32E-1(13)	6f	3.97E-2	13	5.43E-2
P32 W,1L	4.67E+0 +1.40E-1	4.64E+0 + -- --(1)	0	3.59E+0	1	7.79E-1
	8.42E+0 +22.52E-1	1.04E+1 + -- --(1)	0	3.59E+0	1	1.63E+0

Continuation

Analysis/ Matrix/ Amount	Expected + sigma* dpm	Found + sigma ** & (n) dpm	Spikes out of T.P.U. @ Limits	L _C dpm (Appr.)	Spikes above L _C	Mean pooled error dpm
P32	1.08E+1 +3.24E-1	1.31E+1 +1.16E+0(2)	0	3.59E+0	2	1.81E+0
	2.20E+1 +6.60E-1	2.56E+1 +3.29E+0(2)	0	3.59E+0	2	3.14E+0
KR85	None	-- --	--	5.23E+0	--	-- --
H3 W, 0.005L	4.02E+0 +1.20E-1	4.82E+0 +1.52E+0(58)	19b	2.12E+0	57	1.72E+0
Cl4 G, 1M3	None	-- --	--	8.56E-1	--	-- --

* Relative Error = $\text{SQRT}(C^2 + D_1^2 + \dots + D_n^2 + P^2)$

where: C = calibration error (assumed to be 3%)

D = dilution error

P = pipetting error

Pipetting errors are estimated to be $\pm 1.5\%$

Weighing errors are estimated to be ± 1 mg

**This data column includes all random errors

1 Micrograms per sample

@ T.P.U., total propagated uncertainty

+ L_C for soil (S) and Alfalfa (A) is from the water matrix

a Activity of these spikes was below DL by the time they were analyzed. Hence, the TPU is not applicable.

b Some of the tritium spikes fall outside the TPU Limits because shorter counting times are used for tritium samples analyzed in the intermediate laboratory (and the accompanying samples). This problem will be corrected by analyzing appropriately higher level tritium QC spikes for the intermediate lab samples. They will appear under the code H3---H on the next report.

c The expected strontium activity for the UST-1361 Alfalfa references material used as a QC matrix for all vegetation analysis was established from earlier data.

d The expected strontium activity on a composite soil sample (used

as a QC spike, soil matrix) is based on an average of all the QC sample data accumulated over this period (2nd half 1984). The found value is 48.5 ± 4.0 dpm per 50 g.

- e The L_C shown is from the water (W) matrix. The alfalfa reference material has demonstrated variance of about 40% for 50 g of the material. Hence, the value outside of the TPU limit is to be expected.
- f Some of these spikes were only counted for 200 minutes because the activity levels of the actual samples were high (process water samples, intermediate lab). Hence, the spike activity (0.5 dpm) was too low to achieve the TPU limit.
- g The L_C is based on insufficient data and appears to be overestimated. These spikes were below the activity level of the L_C by the time they were analyzed. They are presented for information only. However, they do provide information to indicate that the current L_C is lower than was calculated from the "Expected" data.

III DUPLICATE SPIKES

Analysis of duplicate known yield data denotes accuracy and precision of each analysis type. Accuracy of the data are shown in the spike table.

Precision for the analyses is shown below. The mean precision is the average of the difference between duplicates relative to the mean of the duplicates. Sigma is the standard deviation about the mean precision. Short-term procedure bias may cause the sigma value to be inflated. Spike levels are generally at 1 and 2 times the contractual Ld's. Hence, allowed uncertainty is ~ 70% and 50%, respectively.

Quality Control Data of Duplicate Spikes

3rd and 4th Quarters 1984

Analysis/ Matrix		Expected Mean Precision,* + Sigma & (n), Decimal.	Observed Mean Precision,* + Sigma & (n), Decimal
B	W	9.47E-2 + 1.29E-1 (11)1	None
BD	W	1.01E-1 + 1.12E-1(16)	8.43E-2 + 4.60E-2(2)
A	W	9.85E-2 + 1.11E-1(14)1	None
AD	W	9.82E-2 + 1.071E-1(16)	6.12E-2 + 7.73E-2(2)
	F	No earlier data	None2
Il31	W	1.58E-2 + 2.05E-2(2)	3.72E-2 + 4.70E-2(2)
	M	3.22E-1 + 1.05E-1(3)	1.98E-2 + 2.13E-2(2)
SR90	W	7.75E-2 + 4.71E-2(6)	1.43E-1 + 7.51E-2(3)
	F	1.55E-1 + 1.44E-1(10)	6.76E-2 + 4.37E-2(10)
	M	No earlier data	1.46E-1 + -- --(1)
	S	2.45E-1 + 1.53E-1(4)	None
	A	1.69E-1 + -- --(1)	2.30E-2 + 3.20E-2(2)
SR89	W	1.07E-1 + 9.20E-2(4)	None
	F5	2.25E-1 + 1.46E-2(3)	8.38E-2 + 6.04E-2(9)
Pu239	W	4.49E-2 + 1.46E-2(3)	6.98E-2 + 4.00E-2(6)
	F	7.96E-2 + 6.29E-2(16)	5.82E-2 + 6.07E-2(7)
	A	7.03E-3 + -- --(1)	1.91E-2 + 1.20E-2(2)
U	W	7.75E-2 + 5.73E-2(16)	9.09E-2 + -- --(1)
	F	9.23E-2 + 8.15E-2(17)	7.10E-2 + 2.20E-2(3)
	A	No earlier data	1.90E-1 + 1.12E-1(2)
P32	W	9.46E-2 + 4.27E-2(2)	7.64E-2 + 2.16E-2(2)
H34	W	1.58E-1 + 1.16E-1(15)	1.16E-1 + 4.76E-2(9)

Continued

Analysis/ Matrix	Expected Mean Precision,* ± Sigma & (n), Decimal	Observed Mean Precision,* ± Sigma & (n), Decimal
KR85 ³ G	7.31E-2 ± 5.65E-2(6)	None
C14 G	None	None

* Expected mean - mean from earlier data.

Observed mean - mean for the current month.

- 1 B and BD (as well as A and AD) data were mixed in the "Expected" data.
- 2 Spikes for direct counts of filters are difficult to prepare. We are looking for a method to track and report replicate counting data as a substitute.
- 3 Precision for the Kr-85 analysis is from duplicate sample analyses.
- 4 Some duplicate tritium spikes that were out of the TPU limits were rejected from the precision determination because their activity levels were below Ld for the count lengths used (analyzed along with higher activity samples).
- 5 Duplicates on some of the Sr-89 data were rejected because the activity of the spikes were below the detection limit at the time of the analysis.

Errata: The observed precision for the Sr-90 analysis(water matrix) on the last report was in error. It should have been shown as 6.22E-2 ± 4.58E-2.

IV STANDARD REFERENCE MATERIALS

Standard reference material in the various matrices are difficult to obtain. We are presently issuing UST-RD generated reference material (spikes) to fill the gap.

V CHEMICAL YIELDS

Task III uses the tracer yield data to adjust analytical results except for strontium (where Sr-89/90 are requested, gravimetric yields are used. Where only Sr-90 is requested, Sr-85 tracer yields are used), and tritium, where recoveries are quantitative. Uranium recoveries are quantitative except for APF and vegetation (Alfalfa) matrices where the spike yield is used to correct the sample data. Spike yields are used to correct gross alpha and gross beta analyses.

Quality Control Data on Chemical Yield

3rd and 4th Quarters 1984

Analysis/ Matrix	Expected \pm Sigma & (n) Decimal	Found \pm Sigma & (n) Decimal
B ⁺ W	9.11E-1 \pm 1.56E-1(36)1	8.00E-1 \pm 0.00E+0(5)2
BD ⁺ W	9.24E-1 \pm 1.56E-1(46)1	1.00E+0 \pm 0.00E+0(38)3
A ⁺ W	8.80E-1 \pm 1.89E-1(46)1	8.30E-1 \pm 2.08E-4(23)2
AD ⁺ W	8.76E-1 \pm 2.02E-1(37)1	1.00E+0 \pm 0.00E+0(25)3
Il31 W	7.66E-1 \pm 1.29E-1(21)	7.60E-1 \pm 5.33E-2(4)
M	8.17E-1 \pm 1.36E-1(17)	7.14E-1 \pm 1.64E-1(10)
SR90 W	8.13E-1 \pm 1.25E-1(56)	8.06E-1 \pm 1.93E-1(49)
S	8.35E-1 \pm 2.33E-1(19)	8.68E-1 \pm 1.17E-1(33)
A	5.83E-1 \pm 1.77E-1(11)	6.68E-1 \pm 2.08E-1(8)
F	7.73E-1 \pm 1.38E-1(27)	5.90E-1 \pm 2.04E-1(6)
M	No previous data	9.20E-1 \pm 7.21E-2(3)
SR89 W	8.40E-1 \pm 6.39E-2(5)	7.63E-1 \pm 1.90E-1(12)
F	7.16E-1 \pm 1.56E-1(15)	8.67E-1 \pm 1.22E-1(29)
PU W	8.07E-1 \pm 2.15E-1(27)	7.45E-1 \pm 1.67E-1(43)
S	6.64E-1 \pm 4.01E-2(5)	5.22E-1 \pm 2.06E-1(16)
F	3.42E-1 \pm 2.42E-1(31)	7.88E-1 \pm 2.42E-1(30)
A	2.01E-1 \pm 6.18E-2(4)	4.39E-1 \pm 1.03E-1(4)
U nat*,+		
W	9.54E-1 \pm 1.56E-1(29)	8.88E-1 \pm 1.80E-1(4)
F	1.01E 0 \pm 1.65E-1(17)	8.16E-1 \pm 1.57E-1(4)
A	6.24E-1 \pm 8.77E-2(2)	6.13E-1 \pm 1.65E-1(10)

Continuation

Analysis/ Matrix	Expected \pm Sigma & (n) Decimal	Found \pm Sigma & (n) Decimal
P32 W	9.26E-1 \pm 9.39E-2(10)	8.50E-1 \pm 1.65E-1(10)
H3+ W	1.09E 0 \pm 4.14E-1(42)	1.20E+0 \pm 3.378E-1(50)
KR85+ G	1.02E+0 \pm 2.18E-2(4)	None
Cl43 G	9.64E-1 \pm 7.89E-2(17)	None

* Micrograms per sample, Radiochemical yield

+ Radiochemical yield. Other yields are gravimetric or tracer.

1 expected data for B and BD (also for A and AD) are mixed.

2 The sample results are adjusted by the mean chemical yield accumulated over a long period of time. The radiochemical yield is used as a measure to determine the correctness of the chemical yield adjustment.

RADIOCHEMICAL YIELD

Radiochemical yield is determined by dividing "found" QC spike values by "expected" QC spike values. For a statistically valid sample size, the mean of the radiochemical yield should approach 1.0. If the mean of the radiochemical yield is significantly above or below 1.0, UST-RD should investigate the source of the bias (counter calibrations, validity of spike and/or yield monitor calibrations, etc.) and report any findings in a later report. Presently, UST-RD will assume that proven biases greater than 0.15 (decimal) require investigation.

Quality Control Data on Radiochemical Yield

3rd and 4th Quarters 1984

Analysis/ Matrix		Expected, Decimal	Observed, Decimal
B	W	$9.11\text{E}-1 \pm 1.52\text{E}-1(36)$	$1.17\text{E}+0 \pm 5.66\text{E}-2(5)$
BD	W	$9.24\text{E}-1 \pm 1.53\text{E}-1(46)^1$	$9.61\text{E}-1 \pm 1.15\text{E}-1(25)$
A	W	$8.80\text{E}-1 \pm 1.89\text{E}-1(46)^1$	$1.06\text{E}+0 \pm 3.04\text{E}-1(17)$
AD	W	$8.76\text{E}-1 \pm 2.02\text{E}-1(37)^1$	$1.01\text{E}+0 \pm 2.46\text{E}-1(16)$
IL31	W	$1.12\text{E} 0 \pm 2.36\text{E}-1(6)$	$9.66\text{E}-1 \pm 5.53\text{E}-1(8)$
	M	$7.31\text{E}-1 \pm 2.03\text{E}-1(12)$	$1.01\text{E}+0 \pm 2.41\text{E}-1(8)$
SR90	W	$1.03\text{E}-1 \pm 1.37\text{E}-1(24)$	$1.04\text{E}+0 \pm 1.86\text{E}-1(17)$
	F	$9.53\text{E}-1 \pm 2.67\text{E}-1(19)$	$1.01\text{E}+0 \pm 2.21\text{E}-1(20)$
	S ³	$1.15\text{E} 0 \pm 7.87\text{E}-1(18)$	$9.90\text{E}-1 \pm 7.19\text{E}-2(6)$
	A ²	$1.23\text{E}+0 \pm 4.17\text{E}-1(3)$	$1.04\text{E}+0 \pm 7.72\text{E}-2(8)$
	M	No previous data	$7.77\text{E}-1 \pm 1.16\text{E}-1(2)$
SR89	W	$8.67\text{E}-1 \pm 1.30\text{E}-1(5)$	$8.77\text{E}-1 \pm 4.77\text{E}-1(3)$
	F	$1.11\text{E}+0 \pm 3.25\text{E}-1(11)$	$1.24\text{E}+0 \pm 4.94\text{E}-1(19)$
PU	W	$9.33\text{E}-1 \pm 9.15\text{E}-2(10)$	$8.99\text{E}-1 \pm 2.48\text{E}-1(15)$
	F	$9.62\text{E}-1 \pm 1.85\text{E}-1(18)$	$9.38\text{E}-1 \pm 1.67\text{E}-1(16)$
	A	$1.12\text{E} 0 \pm 1.41\text{E}-2(2)$	None
	S	$1.17\text{E} 0 \pm 2.10\text{E}-1(6)$	$1.06\text{E}+0 \pm 1.44\text{E}-1(16)$
U	W	$9.54\text{E}-1 \pm 1.56\text{E}-1(29)$	$8.88\text{E}-1 \pm 1.80\text{E}01(6)^4$
	F	$1.01\text{E} 0 \pm 1.65\text{E}-1(17)$	$8.16\text{E}-1 \pm 1.57\text{E}-1(6)^4$
	A	$6.24\text{E}-1 \pm 8.77\text{E}-2(2)$	$6.13\text{E}-1 \pm 1.45\text{E}-1(4)^4$
P32	W	$1.11\text{E} 0 \pm 2.94\text{E}-1(8)$	$1.16\text{E}+0 \pm 1.42\text{E}-1(6)$
H3	W	$1.09\text{E} 0 \pm 4.14\text{E}-1(42)^5$	$1.20\text{E}+0 \pm 3.78\text{E}-1(58)^5$

Continued

Analysis/ Matrix	Expected, Decimal	Observed, Decimal
KR85 G	1.02E 0 + 2.18E-2(4)	None
C14 G	9.46E-1 + 7.89E-2(17)	None

-
- 1 B and BD (as well as A and AD) data are mixed in the expected values.
 - 2 The strontium radiochemical yield for the alfalfa reference standard used at USTC is based on an average of the earlier observed results.
 - 3 The strontium radiochemical yield for soil is based on averaging data accumulated over this period (2nd half of 1984).
 - 4 The uranium radiochemical yield data listed is synonymous with the chemical yield data.
 - 5 Count lengths for the tritium QC samples are mixed. The QC samples accompanying the higher activity samples are counted for a shorter time than those which accompany the low level samples. Hence, conclusive evidence of a bias is not available at this time. UST-RD participates in laboratory intercomparisons for H-3 and the results of the intercomparison samples have been agreeing with the expected values. We have implemented protocol to increase the activity for the QC samples (where needed) to reflect the activity levels of the higher level samples. Once sufficient data has been accumulated for the various QC sample activity levels, we will re-examine the analysis and will make adjustments to eliminate any proven bias.

VI EVALUATION OF PROPAGATED ERRORS

Pooled propagated errors are shown in the "Spike" table where appropriate data were available.

VII AUDITS AND INTERCOMPARISONS

I-131 and P-32 internal audits will be analyzed in sets three times during the year to coincide with the shipment of the radioactive standard. Blanks will be analyzed on a routine basis to monitor the procedure. Non-radioactive carrier is used in both procedures for the yield monitor.

UST-RD routinely participates in a EML Intercomparison Program done on a bi-annual basis. Attached are the results of the 21st set of EML Quality Assurance (Laboratory Intercomparison) samples.

UST-RD also participates in a round robin EPA Laboratory intercomparison program. Attached are the recent results from this intercomparison.

VIII SAMPLE ACCOUNTABILITY

Individual customer accountability data is available for review upon request..

IX DISCREPANCIES AND TRENDS

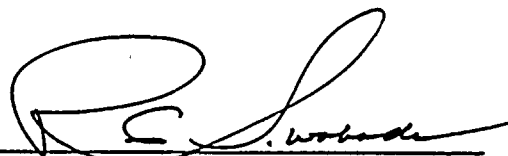
- A. No discrepancies other than those discussed were found in the Quality Control data.
- B. Trends are difficult to determine in many cases because the past QC Data are mixed to reflect the sample treatment. Varying counting times are a prime contribution to the inconsistency. We are implementing protocol to keep the data from the various centers and counting times separately.

X INDICATED CORRECTIVE ACTION

Some of the remainder of the variation in APF Blanks for direct beta (BD) analysis is caused by two factors:

- 1) Higher level filters are counted on high background detectors (approximately 16 c/m). Hence, the QC blank filters counted by this means are beyond the limits expected for filters counted on the Low background counters.
- 2) Counting times vary as per the sample requirements. Blanks will be categorized into 2 levels (high and low) to reflect the proper activity level and counting time for the various sample requirements. QC spikes will be issued at higher activity levels for the higher activity level samples.

Prepared by:



Robert G. Swoboda
Quality Control Manager

Reviewed by:

 3-29-85

Neil H. Hembree
Manager, Quality Assurance

UNITED STATES TESTING COMPANY, INC.
AND
ENVIRONMENTAL PROTECTION AGENCY
INTERLABORATORY COMPARISON OF ANALYTICAL RESULTS (a)
FOR THE YEAR 1984

Medium - Water

<u>ISOTOPE</u>	<u>MONTH</u>	<u>CONCENTRATIONS (b)</u>		
		<u>UST (c,d)</u>	<u>EXPECTED (d)</u>	<u>OTHER LABS (d)</u>
Alpha	Jan	9 + 1	10 + 5	10 + 3
Beta		16 + 1	12 + 5	13 + 3
Alpha	Mar	10 + 1 ^e	5 + 5	6 + 2
Beta		15 + 1	20 + 5	20 + 3
Alpha	May	4 + 1	3 + 5	3 + 1
Beta		5 + 1	6 + 5	7 + 2
Alpha	Jul	7 + 1	6 + 5	5 + 2
Beta		14 + 1	13 + 5	13 + 3
Alpha	Sep	10 + 1 ^e	5 + 5	5 + 2
Beta		17 + 1	16 + 5	15 + 3
Alpha	Nov	8 + 1	7 + 5	7 + 2
Beta		20 + 1	20 + 5	21 + 3

Medium - Water (Cont.)

ISOTOPE	MONTH	CONCENTRATIONS (b)		
		UST (c,d)	EXPECTED (d)	OTHER LABS (d)
G A M M A				
Cr-51	Feb	37 + 7 ^f	40 + 5	40 + 8
Co-60		8 + 2 ^f	10 + 5	11 + 2
Zn-65		49 + 2 ^f	50 + 5	50 + 8
Ru-106		43 + 10 ^f	61 + 5	55 + 9
Cs-134		26 + 1 ^f	31 + 5	29 + 3
Cs-137		15 + 1 ^f	16 + 5	16 + 3
Cr-51	Jun	63 + 7	66 + 5	64 + 13
Co-60		30 + 2	31 + 5	31 + 4
Zn-65		63 + 2	63 + 5	63 + 9
Ru-106		24 + 2	29 + 5	30 + 11
Cs-134		40 + 1	47 + 5	44 + 6
Cs-137		35 + 2	37 + 5	37 + 4

Medium - Water (Cont.)

<u>ISOTOPE</u>	<u>MONTH</u>	<u>CONCENTRATIONS (b)</u>		
		<u>UST (c,d)</u>	<u>EXPECTED (d)</u>	<u>OTHER LABS (d)</u>
H-3	Feb	2680 \pm 20	2383 \pm 351	2366 \pm 247
H-3	Apr	3625 \pm 174	3508 \pm 364	3461 \pm 288
H-3	Jun	3203 \pm 57	3081 \pm 389	3039 \pm 235
H-3	Aug	2947 \pm 95	2817 \pm 356	2842 \pm 251
H-3	Oct	2817 \pm 21	2810 \pm 356	2814 \pm 213
H-3	Dec	3207 \pm 88	3182 \pm 360	3206 \pm 236
I-131	Apr	4 \pm 1	6 \pm 0.8	6 \pm 2
I-131	Aug	37 \pm 4	34 \pm 6	36 \pm 5
I-131	Dec	41 \pm 4	36 \pm 4	36 \pm 5
Pu-239	Jan	18.7 \pm 0.2	18.8 \pm 1.9	16.5 \pm 3.1
Pu-239	Jul	13.7 \pm 0.6	12.5 \pm 1.3	11.3 \pm 2.1
Ra-226	Mar	3.5 \pm 0.1	4.1 \pm 0.61	3.8 \pm 0.7
Ra-228		2.3 \pm 0.1	2.0 \pm 0.3	2.4 \pm 0.9
Ra-226	Jun	2.8 \pm 0.4	3.5 \pm 0.5	3.5 \pm 0.5
Ra-228		3.8 \pm 0.5	2.0 \pm 0.3	2.2 \pm 0.9
Ra-226	Sep	5.1 \pm 0.5g	4.9 \pm 0.7	4.7 \pm 0.7
Ra-228		3.6 \pm 1.5g	2.3 \pm 0.4	2.4 \pm 0.8
Ra-226	Dec	7.5 \pm 2	8.6 \pm 0.7	1
Ra-228		4.2 \pm 1	4.1 \pm 0.4	1

Medium - Water (Cont.)

CONCENTRATIONS (b)

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST (c,d)</u>	<u>EXPECTED (d)</u>	<u>OTHER LABS (d)</u>
G A M M A				
Cr-51	Oct	33 \pm 1	40 \pm 5	38 \pm 8
Co-60		20 \pm 1	20 \pm 5	20 \pm 3
Zn-65		160 \pm 6h	147 \pm 7	149 \pm 12
Ru-106		42 \pm 2	47 \pm 5	45 \pm 9
Cs-134		26 \pm 1	31 \pm 5	29 \pm 3
Cs-137		26 \pm 1	24 \pm 5	25 \pm 3

Medium - Water (Cont.)

CONCENTRATIONS (b)

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST (c,d)</u>	<u>EXPECTED (d)</u>	<u>OTHER LABS (d)</u>
Sr-89	Jan	47 \pm 2	36 \pm 5	36 \pm 9
Sr-90		23 \pm 1	24 \pm 1.5	23 \pm 3
Sr-89	May	24 \pm 2	25 \pm 5	24 \pm 4
Sr-90		5 \pm 1	5 \pm 1.5	5 \pm 1
Sr-89	Sep	39 \pm 5	34 \pm 5	30 \pm 8
Sr-90		17 \pm 1	19 \pm 1.5	18 \pm 3
U-238	Feb	15 \pm 1	15 \pm 6	17 \pm 1
U-238	Aug	21 \pm 2	20 \pm 6	20 \pm 4

Medium - Milk

CONCENTRATIONS (b)

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST (c,d)</u>	<u>EXPECTED (d)</u>	<u>OTHER LABS (d)</u>
I-131	Mar	5 \pm 1	6 \pm 0.9	6 \pm 1
Sr-89	Jun	19 \pm 1	25 \pm 5	21 \pm 5
Sr-90		12 \pm 1	17 \pm 1.5	15 \pm 2
I-131		42 \pm 4	43 \pm 6	43 \pm 4
Cs-137		37 \pm 1	35 \pm 5	36 \pm 3
Sr-89	Oct	19 \pm 4 ⁱ	22 \pm 5	19 \pm 4
Sr-90		13 \pm 1 ⁱ	16 \pm 1.5	15 \pm 2
I-131		37 \pm 2	42 \pm 6	40 \pm 5
Cs-137		38 \pm 5	32 \pm 5	32 \pm 3

Medium - Food

CONCENTRATIONS (b)

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST (c,d)</u>	<u>EXPECTED (d)</u>	<u>OTHER LABS (d)</u>
Sr-89	Jan	25 \pm 1	34 \pm 5	31 \pm 5
Sr-90		16 \pm 3	20 \pm 5	21 \pm 3
I-131		24 \pm 5	20 \pm 6	20 \pm 4
Cs-137		22 \pm 3	20 \pm 5	21 \pm 3
Sr-89	Jul	19 \pm 2	25 \pm 5	22 \pm 5
Sr-90		24 \pm 2	20 \pm 1.5	18 \pm 4
I-131		43 \pm 4	39 \pm 6	39 \pm 5
Cs-137		31 \pm 2	25 \pm 5	27 \pm 3

Medium - Air Filters

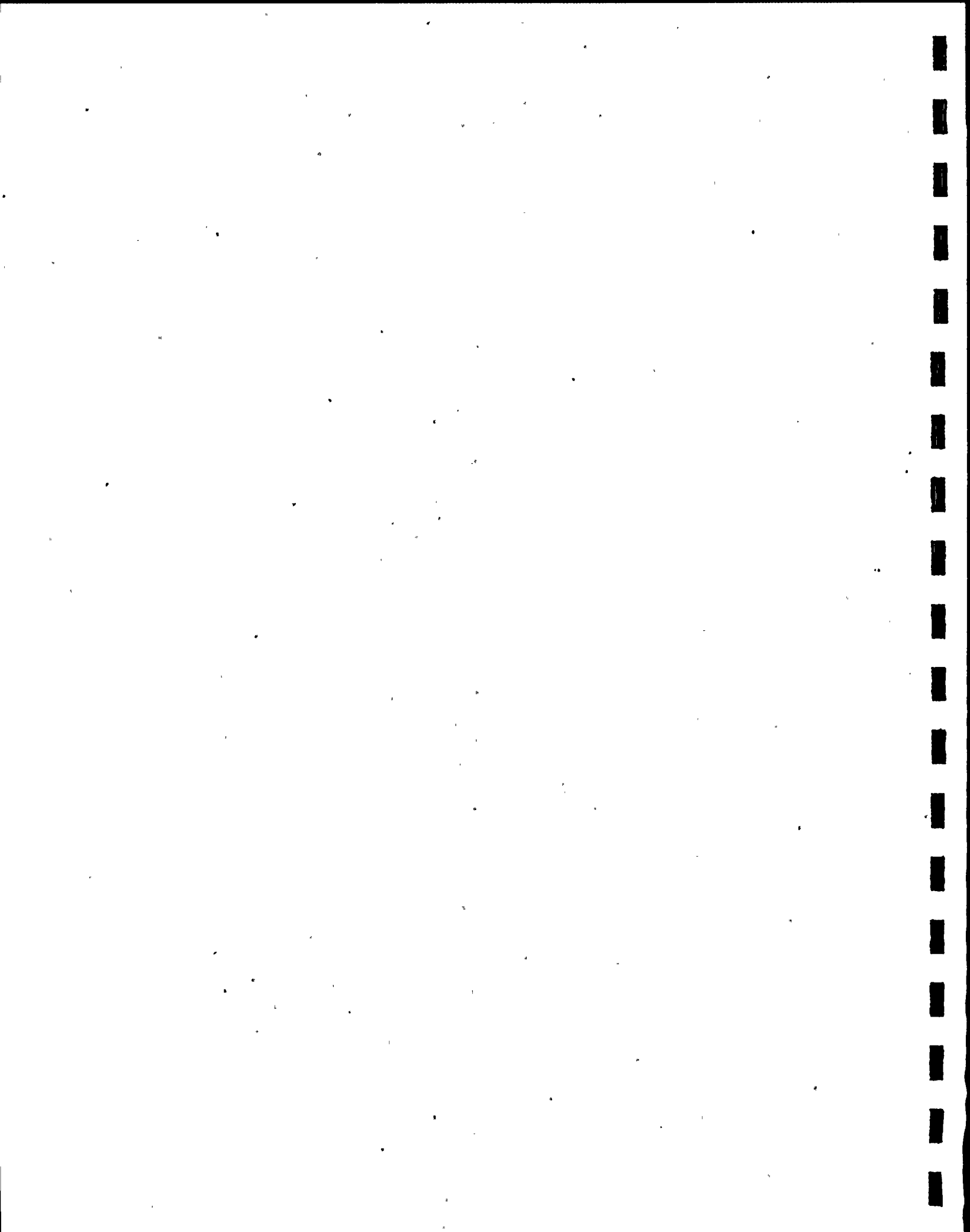
CONCENTRATIONS (b)

<u>ISOTOPE</u>	<u>MONTH</u>	<u>UST (c,d)</u>	<u>EXPECTED (d)</u>	<u>OTHER LABS (d)</u>
Alpha	Mar	18 \pm 1	15 \pm 5	16 \pm 3
Beta		57 \pm 1j	51 \pm 5	56 \pm 6
Sr-90		26 \pm 1j	21 \pm 1.5	19 \pm 2
Cs-137		12 \pm 0	10 \pm 5	12 \pm 3
Alpha	Aug	15 \pm 1	17 \pm 5	17 \pm 3
Beta		54 \pm 1	51 \pm 5	52 \pm 6
Sr-90		20 \pm 3	18 \pm 1.5	17 \pm 2
Cs-137		13 \pm 1	15 \pm 5	17 \pm 4
Alpha	Nov	15 \pm 1	15	
Beta		59 \pm 1	52	
Sr-90		33 \pm 1k	21	1
Cs-137		10 \pm 1	10	

- (a) The Environmental Protection Agency prepares spiked samples and distributes them to radiochemistry laboratories who wish to participate in the interlaboratory comparisons.
- (b) Picocuries per liter for water and milk, picocuries per sample for air, and picocuries per kilogram for food.
- (c) United States Testing Company, Inc., Richland, Washington.
- (d) Average concentration plus or minus one sigma, based on range of values encountered.
- (e) The high values have been investigated and were found to be correct. These results fall within one standard deviation of the EPA data.
- (f) An aliquot error during the calculations caused the UST results to be a factor of 8 high. The original results were:

Cr-51	292 \pm 58	Ru-106	340 \pm 78
Cs-60	62 \pm 16	Cs-134	211 \pm 10
Zn-65	388 \pm 19	Cs-137	116 \pm 6

- (g) The results listed came from reanalysis of the sample. The original results were:
Ra-226, 7.3 \pm 0.6 and Ra-228, 3.8 \pm 0.4.
A yield problem was experienced during the first analyses.
- (h) The original result reported was 16 \pm 1 due to a transcription error.
- (i) There was a chemistry problem during the first analyses. The original results were: Sr-89, 16 \pm 2 and Sr-90, 10 \pm 2.
- (j) The beta results was calculated from data which were obtained without an absorber correction. The original result was 75 \pm 1. The Sr-90 results were calculated wrong; the original result reported was 32 \pm 2.
- (k) The high Sr-90 result is being investigated.
- (l) Other Laboratory data is not yet available from EPA.



Results Form 21st Set of EML Quality Assurance Samples

Reported August 1984

Air (pCi/filter)

<u>Analysis</u>	<u>UST</u>	<u>EML</u>	<u>All Labs⁺</u>
Be-7	5110 \pm 51	4590 \pm 92	5020 \pm 82
Sr-90	5.41 \pm 0.70	4.55 \pm 0.27	4.79 \pm 0.76
Cs-137	5020 \pm 50	4860 \pm 146	4900 \pm 42
Pu-239	5.68 \pm 0.97	4.50 \pm 0.18	4.74 \pm 1.14
Am-241	1.82 \pm 0.18	2.34 \pm 0.26	2.39 \pm 0.40

Water (pCi/mL)

Sr-90	0.469 \pm 0.042	0.500 \pm 0.020	0.474 \pm 0.046
Cs-137	4.66 \pm 0.047	4.59 \pm 0.046	4.52 \pm 0.25
Pu-239	0.0253 \pm 0.0033	0.0300 \pm 0.0018	0.0265 \pm 0.0040
U-ug/mL	0.0520 \pm 0.0073	0.0650 \pm 0.0026	0.0651 \pm 0.0107

Results From 21st Set of EML Quality Assurance Samples

Reported August 1984

Soil (pCi/G)

<u>Analysis</u>	<u>UST</u>	<u>EML</u>	<u>All Labs</u>
K-40	192 \pm 2	210 \pm 6	216 \pm 33
Sr-90	0.321 \pm 0.038	0.233 \pm 0.028	0.238 \pm 0.047
Cs-137	0.335 \pm 0.007	0.410 \pm 0.037	0.418 \pm 0.062
Pu-238	0.0507 \pm 0.0056	0.0540 \pm 0.0005	0.0463 \pm 0.0100
Pu-239	2.77 \pm 0.14	3.13 \pm 0.12	2.94 \pm 0.41
Am-241	0.202 \pm 0.044	0.360 \pm 0.018	0.393 \pm 0.120
U-234	0.514 \pm 0.036*	0.830 \pm 0.050	0.892 \pm 0.277
U-238	0.495 \pm 0.035*	0.83 \pm 0.050	0.986 \pm 0.308

Vegetation (pCi/g)

<u>Analysis</u>	<u>UST</u>	<u>EML</u>	<u>All Labs</u>
K-40	162 \pm 5	234 \pm 9	226 \pm 36
Co-60	1.10 \pm 0.04	1.64 \pm 0.08	1.63 \pm 0.30
Sr-90	11.3 \pm 1.0	12.2 \pm 0.1	11.5 \pm 1.9
Cs-137	6.09 \pm 0.06	8.57 \pm 0.34	8.82 \pm 1.49
Pu-239	0.0745 \pm 0.0045	0.0680 \pm 0.0045	0.0694 \pm 0.0095

+ One Sigma Error.

* UST-RD reports "Leachable Uranium". Hence, the UST-RD value is expected to be lower than other laboratories who report total uranium.

APPENDIX B

INDEX

Section B.1	Supply System TLD Results
Table A	Quarterly TLD Results
Table B	Other TLD Results
Section B.2	NUS Radioanalytical Results
Table A	Gross Beta on Air Particulate Filters
Table B	Gamma Spectrometry of Composited Air Particulate Filter
Table C	Iodine-131 in Charcoal Cartridges
Table D	Gross Beta in Water
Table E	Tritium in Water
Table F	Gamma Spectrometry in Water
Table G	Gamma Spectrometry in Soil
Table H	Gamma Spectrometry in Sediment
Table I	Gamma Spectrometry in Fish
Table J	Gamma Spectrometry in Milk
Table K	Iodine-131 in Milk
Table L	Gamma Spectrometry of Garden Produce
Section B.3	UST-RD Radioanalytical Results
Table A	Beta in Particulate Filter
Table B	Gamma Spectrometry of Particulate Filter
Table C	I-131 in Charcoal Filter
Table D	Beta in Water
Table E	Tritium in Water
Table F	Gamma Spectrometry in Water
Table G	Gamma Spectrometry in Sediment Shoreline
Table H	Gamma Spectrometry in Fish
Table I	Gamma Spectrometry in Milk
Table J	Iodine-131 in Raw Milk
Table K	Gamma Spectrometry of Root Crop
Table L	Gamma Spectrometry of Fruit
Table M	Gamma Spectrometry of Vegetable Stock

TABLE A

QUARTERLY TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
1	MAR 29, 1984	91	0.2030	0.0122
1	JUN 28, 1984	91	0.2248	0.0126
1	AUG 14, 1984	47	0.2657	0.0325
1	SEP 27, 1984	44	0.3297	0.0479
1	DEC 27, 1984	91	0.2217	0.0107
2	MAR 29, 1984	91	0.2026	0.0154
2	JUN 28, 1984	91	0.2313	0.0066
2	SEP 27, 1984	91	0.2133	0.0160
2	SEP 27, 1984	44	0.3030	0.0273
2	DEC 27, 1984	91	0.2066	0.0058
3	MAR 29, 1984	91	0.1831	0.0140
3	JUN 28, 1984	91	0.2210	0.0040
3	SEP 27, 1984	91	0.2042	0.0102
3	SEP 27, 1984	44	0.3001	0.0341
3	DEC 27, 1984	91	0.1987	0.0060
4	MAR 29, 1984	91	0.1707	0.0108
4	JUN 28, 1984	91	0.2094	0.0110
4	SEP 27, 1984	91	0.1988	0.0082
4	DEC 27, 1984	91	0.1896	0.0219
5	MAR 30, 1984	91	0.1898	0.0124
5	JUN 28, 1984	91	0.2107	0.0077
5	SEP 28, 1984	91	0.2010	0.0055
5	DEC 27, 1984	91	0.1946	0.0050
6	MAR 29, 1984	91	0.2114	0.0720
6	JUN 28, 1984	91	0.2163	0.0080
6	SEP 27, 1984	91	0.2014	0.0077
6	SEP 27, 1984	44	0.2718	0.0203
6	DEC 27, 1984	91	0.1971	0.0036
7	MAR 29, 1984	91	0.1913	0.0146
7	JUN 28, 1984	91	0.2249	0.0085
7	SEP 27, 1984	91	0.2152	0.0097
7	SEP 27, 1984	44	0.2803	0.0114
7	DEC 27, 1984	91	0.2162	0.0115
8	MAR 30, 1984	91	0.2177	0.0200
8	JUN 28, 1984	91	0.2545	0.0121
8	SEP 28, 1984	91	0.2357	0.0112
8	DEC 27, 1984	91	0.2259	0.0296
9	MAR 30, 1984	91	0.1923	0.0072
9	JUN 28, 1984	91	0.2117	0.0072

QUARTERLY TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
9	SEP 28, 1984	91	0.2002	0.0083
9	DEC 27, 1984	91	0.2207	0.0308
10	MAR 29, 1984	91	0.1906	0.0126
10	JUN 28, 1984	91	0.2209	0.0033
10	SEP 27, 1984	91	0.2121	0.0082
10	SEP 27, 1984	44	0.2937	0.0218
10	DEC 27, 1984	91	0.2058	0.0055
11	MAR 29, 1984	91	0.2227	0.0185
11	JUN 28, 1984	91	0.2240	0.0079
11	SEP 27, 1984	91	0.2101	0.0119
11	SEP 27, 1984	44	0.3285	0.0374
11	DEC 27, 1984	91	0.2039	0.0086
12	MAR 29, 1984	91	0.2080	0.0142
12	JUN 28, 1984	91	0.2449	0.0063
12	SEP 27, 1984	91	0.2265	0.0048
12	SEP 27, 1984	44	0.2942	0.0187
12	DEC 27, 1984	91	0.2239	0.0019
13	MAR 29, 1984	91	0.1948	0.0075
13	JUN 28, 1984	91	0.2313	0.0023
13	SEP 27, 1984	44	0.2970	0.0129
13	DEC 27, 1984	91	0.2192	0.0073
14	MAR 29, 1984	91	0.1999	0.0085
14	JUN 28, 1984	91	0.2293	0.0107
14	SEP 27, 1984	91	0.2162	0.0145
14	SEP 27, 1984	44	0.2751	0.0156
14	DEC 27, 1984	91	0.2087	0.0070
15	MAR 29, 1984	91	0.2101	0.0165
15	JUN 28, 1984	91	0.2410	0.0060
15	SEP 27, 1984	91	9.9999	9.9999
15	SEP 27, 1984	44	0.2956	0.0092
15	DEC 27, 1984	91	0.2271	0.0059
16	MAR 29, 1984	91	0.2076	0.0147
16	JUN 28, 1984	91	0.2359	0.0103
16	SEP 27, 1984	91	0.2188	0.0062
16	SEP 27, 1984	44	0.2837	0.0071
16	DEC 27, 1984	91	0.2399	0.0154
17	MAR 29, 1984	91	0.1889	0.0281
17	JUN 28, 1984	91	0.2234	0.0062
17	AUG 14, 1984	47	0.2644	0.0123

QUARTERLY TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
17	SEP 27, 1984	44	0.2819	0.0090
17	DEC 27, 1984	91	0.2266	0.0263
18	MAR 29, 1984	91	0.2007	0.0083
18	JUN 28, 1984	91	0.2310	0.0110
18	AUG 14, 1984	47	0.2635	0.0135
18	SEP 27, 1984	44	0.2833	0.0081
18	DEC 27, 1984	91	0.2164	0.0142
19	MAR 29, 1984	91	0.1974	0.0109
19	JUN 28, 1984	91	0.2290	0.0045
19	AUG 14, 1984	47	0.2733	0.0153
19	SEP 27, 1984	44	0.2855	0.0064
19	DEC 27, 1984	91	0.2146	0.0104
20	MAR 29, 1984	91	0.1935	0.0083
20	JUN 28, 1984	91	0.2219	0.0073
20	AUG 14, 1984	47	0.2666	0.0056
20	SEP 27, 1984	44	0.2908	0.0181
20	DEC 27, 1984	91	0.2116	0.0068
21	MAR 29, 1984	91	0.1873	0.0046
21	JUN 28, 1984	91	0.2124	0.0084
21	SEP 27, 1984	91	0.1977	0.0079
21	OCT 15, 1984	62	0.1979	0.0114
21	DEC 27, 1984	91	0.1975	0.0070
22	MAR 29, 1984	91	0.1979	0.0096
22	JUN 28, 1984	91	0.2257	0.0068
22	SEP 27, 1984	91	0.2186	0.0088
22	SEP 27, 1984	44	0.2915	0.0075
22	DEC 27, 1984	91	0.2224	0.0069
23	MAR 29, 1984	91	0.1988	0.0096
23	JUN 28, 1984	91	0.2230	0.0032
23	SEP 27, 1984	91	0.2118	0.0086
23	SEP 27, 1984	44	0.2787	0.0116
23	DEC 27, 1984	91	0.2106	0.0066
24	MAR 29, 1984	91	0.1968	0.0074
24	JUN 28, 1984	91	0.2302	0.0046
24	SEP 27, 1984	91	0.2199	0.0082
24	SEP 27, 1984	44	0.2927	0.0091
24	DEC 27, 1984	91	0.2111	0.0043
25	MAR 29, 1984	91	0.2107	0.0110
25	JUN 28, 1984	91	0.2428	0.0139

QUARTERLY TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
25	AUG 14, 1984	47	0.2873	0.0195
25	SEP 27, 1984	44	0.2978	0.0115
25	DEC 27, 1984	91	0.2230	0.0027
40	MAR 30, 1984	91	0.2125	0.0188
40	JUN 28, 1984	91	0.2148	0.0065
40	SEP 28, 1984	91	0.2188	0.0111
40	DEC 27, 1984	91	0.2039	0.0055
41	MAR 30, 1984	91	0.2287	0.0083
41	JUN 28, 1984	91	0.2472	0.0167
41	SEP 28, 1984	91	0.2382	0.0069
41	DEC 27, 1984	91	0.2320	0.0087
42	MAR 30, 1984	91	0.2115	0.0117
42	JUN 28, 1984	91	0.2466	0.0113
42	SEP 28, 1984	91	0.2262	0.0094
42	DEC 27, 1984	91	0.2164	0.0101
43	MAR 30, 1984	91	0.2138	0.0121
43	JUN 28, 1984	91	0.2425	0.0127
43	SEP 28, 1984	91	0.2320	0.0103
43	DEC 27, 1984	91	0.2148	0.0186
44	MAR 30, 1984	91	0.2005	0.0101
44	JUN 28, 1984	91	0.2325	0.0111
44	SEP 28, 1984	91	0.2063	0.0103
44	DEC 27, 1984	91	0.2074	0.0184
45	MAR 30, 1984	91	0.1914	0.0125
45	JUN 28, 1984	91	0.2195	0.0124
45	SEP 28, 1984	91	0.2198	0.0061
45	DEC 27, 1984	91	0.2065	0.0079
46	MAR 30, 1984	91	0.2379	0.0101
46	JUN 28, 1984	91	0.2646	0.0097
46	DEC 27, 1984	91	0.2566	0.0060
47	MAR 29, 1984	91	0.1810	0.0084
47	JUN 28, 1984	91	0.2051	0.0035
47	SEP 27, 1984	91	0.1936	0.0025
47	SEP 27, 1984	44	0.2734	0.0266
47	DEC 27, 1984	91	0.1963	0.0067
49	MAR 29, 1984	91	0.1993	0.0096
49	JUN 28, 1984	91	0.2251	0.0109
49	AUG 14, 1984	47	0.2686	0.0046

QUARTERLY TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
49	SEP 27, 1984	44	0.2940	0.0143
49	DEC 27, 1984	91	0.2309	0.0046
50	MAR 29, 1984	91	0.1907	0.0102
50	JUN 28, 1984	91	0.2312	0.0182
50	SEP 27, 1984	44	0.2861	0.0060
50	DEC 27, 1984	91	0.2173	0.0026
51	MAR 29, 1984	91	0.1996	0.0142
51	JUN 28, 1984	91	0.2257	0.0078
51	SEP 27, 1984	91	0.2086	0.0087
51	SEP 27, 1984	44	0.2829	0.0046
51	DEC 27, 1984	91	0.2054	0.0041
53	MAR 30, 1984	91	0.2292	0.0091
53	JUN 28, 1984	91	0.2623	0.0064
53	SEP 28, 1984	91	0.2474	0.0119
53	DEC 27, 1984	91	0.2383	0.0088
54	MAR 30, 1984	91	0.2209	0.0088
54	JUN 28, 1984	91	0.2438	0.0035
54	SEP 28, 1984	91	0.2214	0.0074
54	DEC 27, 1984	91	0.2225	0.0060
55	MAR 29, 1984	91	0.1986	0.0064
55	JUN 28, 1984	91	0.2213	0.0075
55	SEP 27, 1984	91	0.2056	0.0095
55	SEP 27, 1984	44	0.2661	0.0123
55	DEC 27, 1984	91	0.2077	0.0051
56	MAR 29, 1984	91	0.1994	0.0162
56	JUN 28, 1984	91	0.2288	0.0163
56	SEP 27, 1984	91	0.2118	0.0130
56	SEP 27, 1984	44	0.2909	0.0325
56	DEC 27, 1984	91	0.2174	0.0092
71	MAR 29, 1984	91	0.1952	0.0125
71	JUN 28, 1984	91	0.2220	0.0093
71	SEP 27, 1984	91	0.2139	0.0069
71	SEP 27, 1984	44	0.2866	0.0055
71	DEC 27, 1984	91	0.2324	0.0055
72	MAR 29, 1984	91	0.1993	0.0076
72	JUN 28, 1984	91	0.2362	0.0044
72	SEP 27, 1984	91	0.2199	0.0103
72	SEP 27, 1984	44	0.2859	0.0128
72	DEC 27, 1984	91	0.2260	0.0079

QUARTERLY TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
73	MAR 29, 1984	91	0.1867	0.0032
73	JUN 28, 1984	91	0.2176	0.0079
73	SEP 27, 1984	91	0.2015	0.0070
73	SEP 27, 1984	44	0.2656	0.0117
73	DEC 27, 1984	91	0.2048	0.0061
74	MAR 29, 1984	91	0.2063	0.0082
74	JUN 28, 1984	91	0.2438	0.0113
74	SEP 27, 1984	91	0.2246	0.0061
74	SEP 27, 1984	44	0.2889	0.0158
74	DEC 27, 1984	91	0.2302	0.0097
75	MAR 29, 1984	91	0.1820	0.0125
75	JUN 28, 1984	91	0.2040	0.0103
75	SEP 27, 1984	91	0.1936	0.0061
75	SEP 27, 1984	44	0.2614	0.0085
75	DEC 27, 1984	91	0.2026	0.0051
76	MAR 29, 1984	91	0.1929	0.0168
76	JUN 28, 1984	91	0.2259	0.0083
76	SEP 27, 1984	91	0.2076	0.0082
76	SEP 27, 1984	44	0.2780	0.0068
76	DEC 27, 1984	91	0.2111	0.0080
77	MAR 29, 1984	91	0.1999	0.0104
77	JUN 28, 1984	91	0.2347	0.0104
77	SEP 27, 1984	91	0.2165	0.0073
77	SEP 27, 1984	44	0.2844	0.0203
77	DEC 27, 1984	91	0.2183	0.0053
78	MAR 29, 1984	91	0.1967	0.0120
78	JUN 28, 1984	91	0.2217	0.0083
78	AUG 14, 1984	47	0.2820	0.0454
78	DEC 27, 1984	91	0.2074	0.0042
79	MAR 29, 1984	91	0.2030	0.0102
79	JUN 28, 1984	91	0.2342	0.0015
79	AUG 14, 1984	47	0.2748	0.0098
79	SEP 27, 1984	44	0.2851	0.0140
79	DEC 27, 1984	91	0.2189	0.0045
80	MAR 29, 1984	91	0.1917	0.0073
80	JUN 28, 1984	91	0.2245	0.0100
80	AUG 14, 1984	47	0.2482	0.0073
80	SEP 27, 1984	44	0.2778	0.0163
80	DEC 27, 1984	91	0.2182	0.0397

QUARTERLY TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
81	MAR 29, 1984	91	0.2013	0.0036
81	JUN 28, 1984	91	0.2265	0.0149
81	SEP 27, 1984	91	0.2116	0.0088
81	SEP 27, 1984	44	0.3014	0.0091
81	DEC 27, 1984	91	0.2109	0.0067
82	MAR 29, 1984	91	0.2085	0.0119
82	JUN 28, 1984	91	0.2291	0.0049
82	SEP 27, 1984	91	0.2145	0.0073
82	SEP 27, 1984	44	0.2875	0.0195
82	DEC 27, 1984	91	0.2175	0.0096
83	MAR 29, 1984	91	0.2086	0.0155
83	JUN 28, 1984	91	0.2447	0.0069
83	AUG 14, 1984	47	0.2696	0.0139
83	SEP 27, 1984	44	0.2901	0.0207
83	DEC 27, 1984	91	0.2235	0.0105
84	MAR 29, 1984	91	0.1887	0.0060
84	JUN 28, 1984	91	0.2149	0.0103
84	SEP 27, 1984	91	0.2096	0.0075
84	SEP 27, 1984	44	0.2793	0.0191
84	DEC 27, 1984	91	0.2068	0.0075
85	MAR 29, 1984	91	0.2012	0.0075
85	JUN 28, 1984	91	0.2448	0.0371
85	AUG 14, 1984	47	0.2621	0.0023
85	SEP 27, 1984	44	0.2988	0.0123
85	DEC 27, 1984	91	0.2214	0.0058
86	MAR 29, 1984	91	0.2007	0.0050
86	JUN 28, 1984	91	0.2313	0.0054
86	SEP 27, 1984	91	0.2271	0.0092
86	SEP 27, 1984	44	0.2901	0.0108
86	DEC 27, 1984	91	0.2368	0.0115

TABLE B

OTHER TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
1	AUG 14, 1984	229	0.2325	0.0110
1	DEC 27, 1984	135	0.2325	0.0098
2	DEC 27, 1984	364	0.2141	0.0164
2	DEC 27, 1984	135	0.2313	0.0327
3	DEC 27, 1984	364	0.1988	0.0101
3	DEC 27, 1984	135	0.2150	0.0108
4	DEC 27, 1984	363	0.1967	0.0104
5	DEC 27, 1984	364	0.2025	0.0192
6	DEC 27, 1984	364	0.1965	0.0100
6	DEC 27, 1984	135	0.2213	0.0305
7	DEC 27, 1984	364	0.2142	0.0433
7	DEC 27, 1984	135	0.2382	0.0156
8	DEC 27, 1984	364	0.2326	0.0241
9	DEC 27, 1984	364	0.1971	0.0229
10	DEC 27, 1984	364	0.2086	0.0232
10	DEC 27, 1984	135	0.2209	0.0229
11	DEC 27, 1984	364	0.2101	0.0148
11	DEC 27, 1984	135	0.2190	0.0266
12	DEC 27, 1984	364	0.2287	0.0211
12	DEC 27, 1984	135	0.2402	0.0431
13	AUG 14, 1984	229	0.2262	0.0150
13	DEC 27, 1984	135	0.2221	0.0091
14	DEC 27, 1984	364	0.2182	0.0346
14	DEC 27, 1984	135	0.2221	0.0127
15	AUG 14, 1984	229	0.2398	0.0092
15	DEC 27, 1984	135	0.2378	0.0243
16	DEC 27, 1984	364	0.2177	0.0203
16	DEC 27, 1984	135	0.2330	0.0434
17	AUG 14, 1984	229	0.2294	0.0129
17	DEC 27, 1984	135	0.2346	0.0329

OTHER TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
18	AUG 14, 1984	229	0.2327	0.0047
18	DEC 27, 1984	135	0.2316	0.0441
19	AUG 14, 1984	229	0.2254	0.0107
19	DEC 27, 1984	135	0.2297	0.0282
20	AUG 14, 1984	229	0.2254	0.0056
20	DEC 27, 1984	135	0.2197	0.0206
21	DEC 27, 1984	363	0.2018	0.0267
21	DEC 27, 1984	135	0.2087	0.0166
22	DEC 27, 1984	364	0.2143	0.0142
22	DEC 27, 1984	135	0.2263	0.0204
23	DEC 27, 1984	364	0.2121	0.0221
23	DEC 27, 1984	135	0.2258	0.0590
24	DEC 27, 1984	364	0.2200	0.0182
24	DEC 27, 1984	135	0.2245	0.0214
25	AUG 14, 1984	229	0.2400	0.0084
25	DEC 27, 1984	135	0.2439	0.0766
40	DEC 27, 1984	364	0.2099	0.0150
41	DEC 27, 1984	364	0.2327	0.0184
42	DEC 27, 1984	364	0.2207	0.0260
43	DEC 27, 1984	364	0.2232	0.0180
44	DEC 27, 1984	364	0.2106	0.0281
45	DEC 27, 1984	364	0.2060	0.0156
46	DEC 28, 1984	114	0.2717	0.0170
47	DEC 27, 1984	363	0.1931	0.0072
47	DEC 27, 1984	135	0.2303	0.0732
49	AUG 14, 1984	229	0.2241	0.0068
49	DEC 27, 1984	135	0.2253	0.0392
50	AUG 14, 1984	229	9.9999	9.9999
50	DEC 27, 1984	135	0.2264	0.0282

OTHER TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
51	DEC 27, 1984	364	0.2074	0.0159
51	DEC 27, 1984	135	0.2156	0.0382
53	DEC 27, 1984	364	0.2426	0.0182
54	DEC 27, 1984	364	0.2333	0.0266
55	DEC 27, 1984	364	0.2198	0.0126
55	DEC 27, 1984	135	0.2193	0.0647
56	DEC 27, 1984	364	0.2181	0.0137
56	DEC 27, 1984	135	0.2268	0.0481
71	DEC 27, 1984	364	0.2196	0.0159
71	DEC 27, 1984	135	0.2432	0.0512
72	DEC 27, 1984	364	0.2252	0.0114
72	DEC 27, 1984	135	0.2363	0.0551
73	DEC 27, 1984	364	0.2032	0.0139
73	DEC 27, 1984	135	0.2160	0.0461
74	DEC 27, 1984	364	0.2253	0.0171
74	DEC 27, 1984	135	0.2489	0.0147
75	DEC 27, 1984	364	0.1952	0.0201
75	DEC 27, 1984	135	0.2182	0.0683
76	DEC 27, 1984	364	0.2120	0.0195
76	DEC 27, 1984	135	0.2258	0.0602
77	DEC 27, 1984	364	0.2167	0.0100
77	DEC 27, 1984	135	0.2316	0.0167
78	AUG 14, 1984	229	0.2222	0.0056
78	DEC 27, 1984	135	0.2236	0.0513
79	AUG 14, 1984	229	0.2209	0.0220
79	DEC 27, 1984	135	0.2300	0.0335
80	AUG 14, 1984	229	0.1558	0.0192
80	DEC 27, 1984	135	0.2246	0.0237
81	DEC 27, 1984	364	0.2128	0.0182
81	DEC 27, 1984	135	0.2300	0.0397

OTHER TLD

STATION	END DATE	ELAPSED DAYS	DOSE RATE (MR/DAY)	STANDARD DEVIATION
-----	-----	-----	-----	-----
82	DEC 27, 1984	364	0.2180	0.0287
82	DEC 27, 1984	135	0.2381	0.0714
83	AUG 14, 1984	229	0.2336	0.0053
83	DEC 27, 1984	135	0.2562	0.0729
84	DEC 27, 1984	364	0.2128	0.0178
84	DEC 27, 1984	135	0.2180	0.0063
85	AUG 14, 1984	229	0.2370	0.0167
85	DEC 27, 1984	135	0.2467	0.0143
86	DEC 27, 1984	364	0.2389	0.0140
86	DEC 27, 1984	135	0.2467	0.0484

APPENDIX B.1

REPORTING OF ANALYTICAL RESULTS

In the tables presenting analytical measurements, the calculated value is reported with the two sigma counting error (2s) derived from a statistical analysis of both the sample and background count rates. The precision of the results is influenced by the size of the sample, the background count rate, and the method used to round off the value obtained to reflect the degree of significance of the results. For analytical results obtained from gamma spectral analysis, the precision is also influenced by the composition and concentrations of the radionuclides in the sample, the size of the sample, and the assumptions used in selecting the radionuclides to be quantitatively determined. The two sigma error for the net counting rate is:

$$2s = 2 \left[\frac{R_s}{t_s} + \frac{R_b}{t_b} \right]^{1/2}$$

where:

R_s = sample counting rate

R_b = background counting rate

t_s = sample counting time

t_b = background counting time

If the measurements on the samples are not statistically significant (i.e., the two sigma count error is equal to or greater than the net measured value), then the radioactivity concentrations in the sample are considered not detected.

The following are definitions or descriptions of statistical terms used in the reporting and analysis of environmental monitoring results.

Precision relates to the reproducibility of measurements within a set, that is, to the scatter or dispersion of a set about its central value.

Measures of the Central Value of a Set. Mean (or Average or Arithmetic Mean) is the sum $\sum_{i=1}^n x_i$ of the values of individual results divided by the number of results in the set. The mean is given by:

$$\bar{x} = (x_1 \pm x_2 \pm \dots \pm x_n) / n = \sum_{i=1}^n x_i / n$$

Measures of Precision with a Set. Standard Deviation is the square root of the quantity (sum of squares of deviations of individual results from the mean, divided by one less than the number of results in the set). The standard deviation, s , is given by:

$$s = \sqrt{\sum_{i=1}^n (x_i - \bar{x})^2 / (n-1)}$$

Standard deviation has the same units as the measurement. It becomes a more reliable expression of precision as n becomes larger. When the measurements are independent and normally distributed, the most useful statistics are the mean for the central value and the standard deviation for the dispersion.

Note: In the USEPA Intercomparison Program, the standard deviation given by EPA is the expected laboratory result from three analyses. The standard deviation given by NUS is the standard deviation from the mean of three reported values.

Relative Standard Deviation is the standard deviation expressed as a fraction of the mean, s/\bar{x} . It is sometimes multiplied by 100 and expressed as a percentage.

Range is the difference in magnitude between the largest and the smallest results in a set. Instead of a single value, the actual limits are sometimes expressed (minimum value/maximum value).

Results reported as less than ("LT") are below the lower limit of detection (LLD). The LLD is defined as the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95 percent probability with only 5 percent probability of falsely concluding that blank observation represents a "real" signal.

For a particular measurement system (that may include radiochemical separation):

$$LLD = \frac{4.66s_b}{E \times V \times 2.22 \times Y \times \exp(-\lambda \Delta t)}$$

where:

LLD is the lower limit of detection as defined above (as pCi per unit mass or volume)

s_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute)

E is the counting efficiency (as counts per disintegration)

V is the sample size (in units of mass or volume)

2.22 is the number of disintegrations per minute per picocurie

Y is the fractional radiochemical yield (when applicable)

λ is the radioactive decay constant for the particular radionuclide

Δt is the elapsed time between sample collection and counting

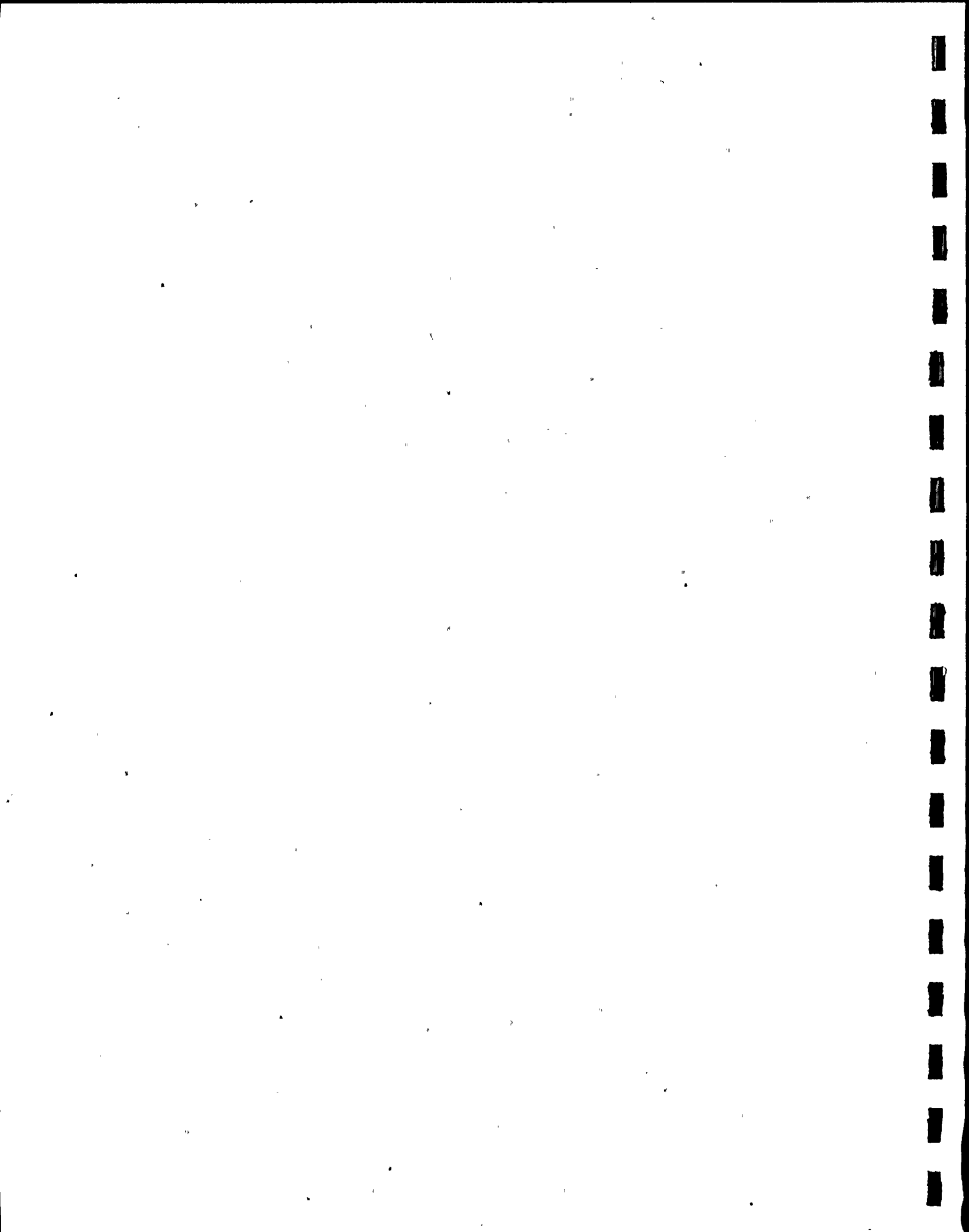


Table A
(Page 1 of 4)
Gross Beta on Air Particulate Filters
WNP-2 REMP 1984 (Operational)
(Results in E-03 pCi/m³ \pm 2s)

Month	Collection Period	1	4	5	6	7	8	9	21	23	40
Sample Location											
January	(1)										
	01/16/84 to 01/23/84	70 \pm 7	60 \pm 6	39 \pm 4	57 \pm 6	63 \pm 7	57 \pm 6	52 \pm 6	58 \pm 6	60 \pm 6	60 \pm 6
	01/23/84 to 01/30/84	4.2 \pm 2.1	4.6 \pm 2.0	3.2 \pm 2.6	5.6 \pm 2.1	6.7 \pm 2.2	5.9 \pm 2.1	4.1 \pm 2.0	6.8 \pm 2.2	5.5 \pm 2.1	5.8 \pm 2.1
February	01/30/84 to 02/06/84	22 \pm 3	19 \pm 3	17 \pm 3	19 \pm 3	19 \pm 3	26 \pm 3	17 \pm 3	20 \pm 3	21 \pm 3	23 \pm 3
	02/06/84 to 02/13/84	15 \pm 3	12 \pm 2	9.5 \pm 2.2	14 \pm 3	12 \pm 2	12 \pm 2	9.3 \pm 2.2	12 \pm 2	9.4 \pm 2.8	13 \pm 2
	02/13/84 to 02/21/84	12 \pm 2	12 \pm 2	11 \pm 2	9.9 \pm 2.0	14 \pm 2	14 \pm 2	9.8 \pm 2	13 \pm 2	14 \pm 2	14 \pm 2
	02/21/84 to 02/27/84	8.3 \pm 2.6	7.3 \pm 2.3	4.4 \pm 2.1	6.7 \pm 2.3	8.6 \pm 2.4	7.9 \pm 2.4	4.9 \pm 2.2	7.7 \pm 2.4	6.2 \pm 2.3	9.0 \pm 2.4
March	02/27/84 to 03/05/84	14 \pm 3	12 \pm 3	13 \pm 3	11 \pm 2	12 \pm 3	11 \pm 2	8.6 \pm 2.3	11 \pm 2	12 \pm 3	10 \pm 2
	03/05/84 to 03/12/84	22 \pm 3	20 \pm 3	18 \pm 3	19 \pm 3	22 \pm 3	19 \pm 3	15 \pm 3	19 \pm 3	23 \pm 3	20 \pm 3
	03/12/84 to 03/19/84	LT 4	5.4 \pm 2.0	7.6 \pm 2.2	5.1 \pm 2.0	5.2 \pm 2.0	6.0 \pm 2.1	5.8 \pm 2.1	5.8 \pm 2.1	6.1 \pm 2.1	4.3 \pm 2.0
	03/19/84 to 03/26/84 (2)										
April	03/26/84 to 04/02/84	7.0 \pm 2.1	9.8 \pm 2.3	6.1 \pm 2.1	8.7 \pm 2.2	8.7 \pm 2.2	8.3 \pm 2.2	6.3 \pm 2.1	7.8 \pm 2.2	11 \pm 2	9.8 \pm 2.4
	04/02/84 to 04/09/84	10 \pm 2	8.4 \pm 2.0	8.4 \pm 2.0	9.6 \pm 2.0	8.1 \pm 1.9	12 \pm 2	6.3 \pm 1.8	9.3 \pm 2.0	8.9 \pm 2.0	9.2 \pm 2.1
	04/09/84 to 04/16/84	11 \pm 2	7.8 \pm 2.0	8.4 \pm 2.1	9.5 \pm 2.1	8.0 \pm 2.1	8.3 \pm 2.1	7.4 \pm 2.0	8.2 \pm 2.1	9.1 \pm 2.2	9.3 \pm 2.1
	04/16/84 to 04/23/84	6.6 \pm 2.0	7.4 \pm 2.1	7.3 \pm 2.1	8.8 \pm 2.2	7.1 \pm 2.1	7.6 \pm 2.1	5.0 \pm 1.9	5.1 \pm 1.9	7.4 \pm 2.1	8.7 \pm 2.2
	04/23/84 to 04/30/84	14 \pm 2	12 \pm 2	13 \pm 2	13 \pm 2	12 \pm 2	12 \pm 2	9.2 \pm 2.2	11 \pm 2	12 \pm 4	15 \pm 3
May	04/30/84 to 05/07/84	4.9 \pm 2.0	5.1 \pm 2.0	5.1 \pm 2.0	3.5 \pm 1.9	4.0 \pm 1.9	3.3 \pm 1.9	3.9 \pm 1.9	2.9 \pm 1.8	LT 7	5.8 \pm 2.0
	05/07/84 to 05/14/84	10 \pm 2	9.9 \pm 2.2	9.2 \pm 2.2	8.6 \pm 2.1	8.5 \pm 2.1	9.1 \pm 2.2	7.8 \pm 2.1	7.8 \pm 2.1	9.7 \pm 3.0	13 \pm 2
	05/14/84 to 05/21/84	12 \pm 2	13 \pm 2	10 \pm 2	10 \pm 2	11 \pm 2	9.9 \pm 2.2	7.5 \pm 2.1	10 \pm 2	11 \pm 2	12 \pm 2
	05/21/84 to 05/29/84	11 \pm 2	9.0 \pm 2.0	7.3 \pm 1.9	6.9 \pm 1.9	7.9 \pm 2.0	7.3 \pm 1.9	9.7 \pm 2.1	4.9 \pm 1.8	9.8 \pm 2.1	10 \pm 2

TABLE A
(Page 2 of 4)
Gross Beta on Air Particulate Filters
WNP-2 REMP 1984 (Operational)
(Results in E-03 pCi/m³ \pm 2s)

Month	Collection Period	Sample Location	
		48	57
January	(1)		
	01/16/84 to 01/23/84	57 \pm 4	60 \pm 6
	01/23/84 to 01/30/84	5.8 \pm 2.1	5.7 \pm 2.1
February	01/30/84 to 02/06/84	23 \pm 3	21 \pm 3
	02/06/84 to 02/13/84	12 \pm 2	11 \pm 2
	02/13/84 to 02/21/84	12 \pm 2	11 \pm 2
	02/21/84 to 02/27/84	7.5 \pm 2.3	7.3 \pm 2.3
March	02/27/84 to 03/05/84	13 \pm 3	12 \pm 3
	03/05/84 to 03/12/84	21 \pm 3	19 \pm 3
	03/12/84 to 03/19/84	6.7 \pm 2.1	5.6 \pm 2.0
	03/19/84 to 03/26/84 (2)		
April	03/26/84 to 04/02/84	9.3 \pm 2.3	9.3 \pm 2.3
	04/02/84 to 04/09/84	9.2 \pm 2.0	9.8 \pm 2.1
	04/09/84 to 04/16/84	9.2 \pm 2.1	8.9 \pm 2.1
	04/16/84 to 04/23/84	8.4 \pm 2.1	8.6 \pm 2.2
	04/23/84 to 04/30/84	11 \pm 2	15 \pm 3
May	04/30/84 to 05/07/84	4.3 \pm 1.9	5.0 \pm 2.0
	05/07/84 to 05/14/84	11 \pm 2	8.8 \pm 2.1
	05/14/84 to 05/21/84	12 \pm 2	10 \pm 2
	05/21/84 to 05/29/84	8.5 \pm 2.0	8.8 \pm 2.0
June	05/29/84 to 06/04/84	18 \pm 17	8.3 \pm 2.3
	06/04/84 to 06/11/84	5.8 \pm 2.7	3.8 \pm 1.9

Table A
(Page 3 of 4)
Gross Beta on Air Particulate Filters
WNP-2 REMP 1984 (Operational)
(Results in E-03 pCi/m³ \pm 2s)

Month	Collection Period	Sample Location										
		1	4	5	6	7	8	9	21	23	40	
June	05/29/84 to 06/04/84	13 \pm 3	12 \pm 3	8.5 \pm 2.3	13 \pm 3	12 \pm 3	9.3 \pm 2.4	9.6 \pm 2.4	8.3 \pm 2.3	11 \pm 3	17 \pm 3	
	06/04/84 to 06/11/84	5.7 \pm 2.0	6.5 \pm 2.1	4.6 \pm 2.0	5.1 \pm 2.0	4.1 \pm 1.9	5.3 \pm 2.0	6.2 \pm 2.1	4.2 \pm 1.9	4.2 \pm 2.0	3.3 \pm 1.9	
	06/11/84 to 06/18/84	12 \pm 3	10 \pm 2	9.8 \pm 2.3	12 \pm 3	12 \pm 2	11 \pm 2	9.6 \pm 2.3	9.3 \pm 2.3	11 \pm 2	11 \pm 2	
	06/18/84 to 06/25/84	14 \pm 3	14 \pm 3	11 \pm 2	15 \pm 3	11 \pm 2	13 \pm 3	13 \pm 3	6.0 \pm 2.1	13 \pm 3	11 \pm 2	
	06/25/84 to 07/02/84	7.2 \pm 2.1	8.3 \pm 2.1	6.0 \pm 2.0	8.6 \pm 2.1	8.8 \pm 2.1	9.3 \pm 2.2	9.3 \pm 2.2	6.6 \pm 2.0	9.6 \pm 2.2	9.0 \pm 2.2	
July	07/02/84 to 07/09/84	23 \pm 3	27 \pm 3	20 \pm 3	21 \pm 3	20 \pm 3	20 \pm 3	31 \pm 4	12 \pm 2	15 \pm 3	18 \pm 3	
	07/09/84 to 07/16/84	21 \pm 3	16 \pm 3	16 \pm 3	20 \pm 3	13 \pm 3	15 \pm 3	17 \pm 3	12 \pm 3	17 \pm 3	12 \pm 3	
	07/16/84 to 07/23/84	16 \pm 3	10 \pm 3	8.8 \pm 2.4	12 \pm 3	11 \pm 3	11 \pm 3	10 \pm 3	12 \pm 3	13 \pm 3	9.6 \pm 2.5	
	07/23/84 to 07/30/84	25 \pm 3	18 \pm 3	18 \pm 3	24 \pm 3	22 \pm 3	22 \pm 3	17 \pm 3	19 \pm 3	17 \pm 3	20 \pm 3	
August	07/30/84 to 08/06/84	20 \pm 3	18 \pm 3	15 \pm 2	18 \pm 3	17 \pm 3	17 \pm 3	19 \pm 3	13 \pm 2	17 \pm 3	16 \pm 2	

LT = Less Than

- (1) Initial criticality January 19, 1984
(2) Samples lost in transit

TABLE A
(Page 4 of 4)
Gross Beta on Air Particulate Filters
WNP-2 REMP 1984 (Operational)
(Results in E-03 pCi/m³ \pm 2s)

Month	Collection Period	Sample Location	
		48	57
June	06/11/84 to 06/18/84	14 \pm 3	11 \pm 2
	06/18/84 to 06/25/84	12 \pm 2	9.8 \pm 2.3
	06/25/84 to 07/02/84	11 \pm 2	7.9 \pm 2.1
July	07/02/84 to 07/09/84	19 \pm 3	12 \pm 2
	07/09/84 to 07/16/84	15 \pm 3	13 \pm 3
	07/16/84 to 07/23/84	10 \pm 3	8.4 \pm 2.4
	07/23/84 to 07/30/84	16 \pm 3	15 \pm 3
August	07/30/84 to 08/06/84	15 \pm 2	14 \pm 2

Table B
Gamma Spectrometry of Compositied Air Particulate Filters
WNP-2 REMF 1984 (Operational)
(Results in E-03 pCi/m3 \pm 2s)

Location	Collection Period	Be-7	Ce-144	Cs-134	Cs-137	Nb-95	Zr-95
1	01/16/84 to 04/02/84 (1),(2)	LT 40	LT 14	LT 3	LT 3	LT 3	LT 6
4		LT 50	LT 9	LT 3	LT 4	LT 5	LT 9
5		LT 40	LT 9	LT 2	LT 2	LT 4	LT 6
6		35 \pm 19	LT 14	LT 3	LT 3	LT 3	LT 7
7		67 \pm 23	LT 10	LT 3	LT 3	LT 4	LT 8
8		42 \pm 18	LT 9	LT 1.9	LT 1.5	LT 3	LT 5
9		LT 40	LT 13	LT 2	LT 3	LT 4	LT 6
21		39 \pm 18	LT 14	LT 3	LT 3	LT 3	LT 7
23		37 \pm 17	LT 9	LT 2	LT 2	LT 3	LT 5
40		43 \pm 16	LT 7	LT 2	LT 2	LT 3	LT 5
48	04/02/84 to 07/02/84	57 \pm 21	LT 10	LT 2	LT 1.9	LT 3	LT 5
57		53 \pm 17	LT 7	LT 1.8	LT 2	LT 3	LT 4
1		67 \pm 16	LT 7	LT 1.4	LT 1.5	LT 2	LT 4
4		46 \pm 16	LT 8	LT 1.9	LT 3	LT 4	LT 6
5		55 \pm 16	LT 7	LT 1.6	LT 1.4	LT 2	LT 3
6		58 \pm 14	LT 6	LT 1.7	LT 1.6	LT 1.9	LT 3
7		32 \pm 15	LT 8	LT 2	LT 2	LT 3	LT 5
8		40 \pm 15	LT 7	LT 1.8	LT 1.8	LT 1.8	LT 5
9		43 \pm 18	LT 8	LT 2	LT 3	LT 3	LT 5
21		46 \pm 16	LT 7	LT 3	LT 2	LT 3	LT 5
23		42 \pm 17	LT 8	LT 3	LT 3	LT 3	LT 6
40		29 \pm 17	LT 8	LT 3	LT 3	LT 3	LT 5
48		41 \pm 18	LT 8	LT 2	LT 3	LT 3	LT 7
57		57 \pm 17	LT 7	LT 2	LT 2	LT 3	LT 5

LT = Less than

(1) Initial criticality 01/19/84.

(2) Week of 03/19 - 03/26/84 not included. Samples lost in transit.

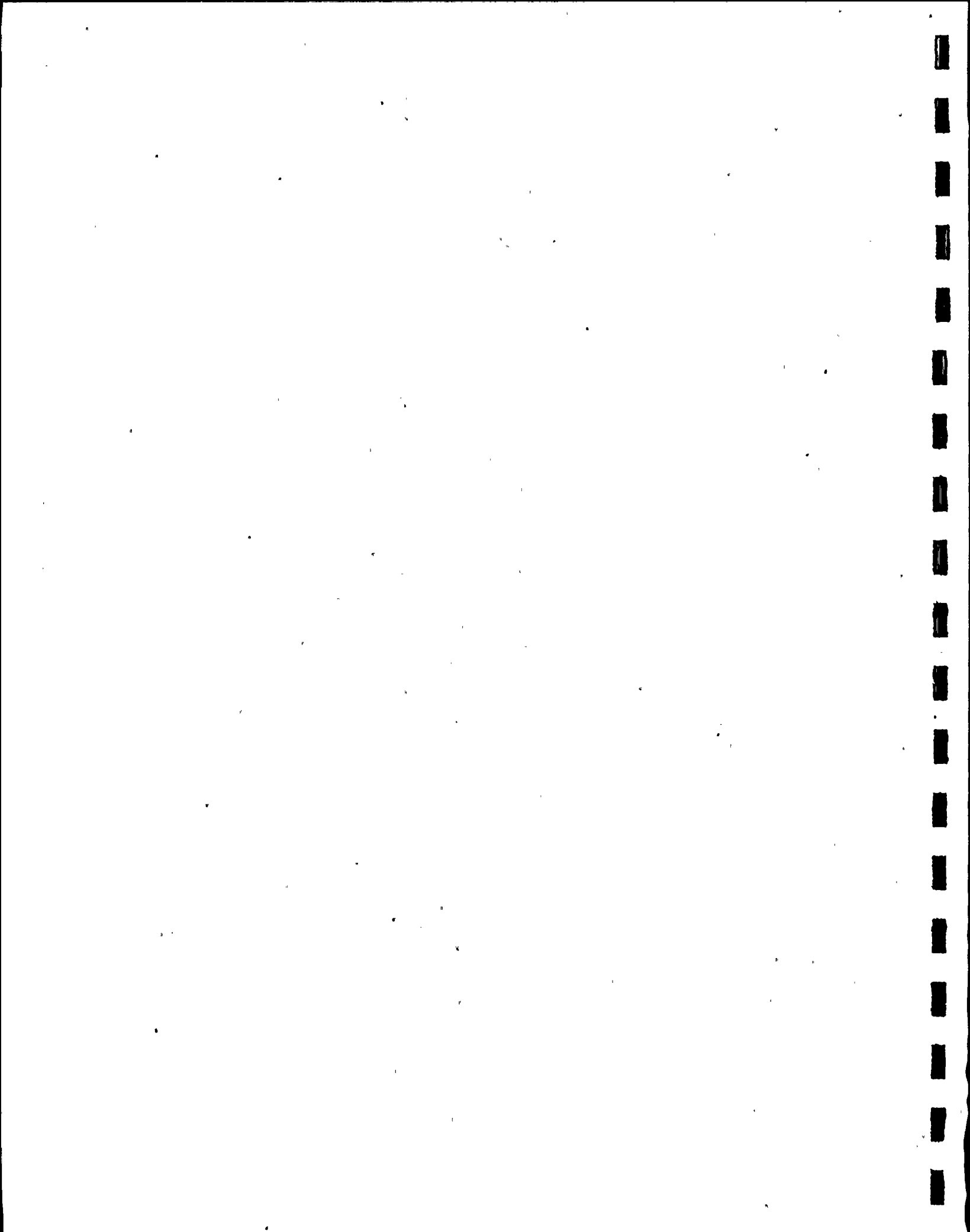


TABLE C
(Page 1 of 4)
Iodine-131 in Charcoal Cartridges
WNP-2 REMP 1984 (Operational)
(Results in pCi/m³ \pm 2s)

Month	Collection Period	1	4	5	6	7	8	9	21	23	40
January	(1)										
	01/16/84 to 01/23/84	LT 0.06	LT 0.06	LT 0.08(2)	LT 0.06	LT 0.06	LT 0.06	LT 0.06	LT 0.06	LT 0.06	LT 0.06
	01/23/84 to 01/30/84	LT 0.03	LT 0.03	LT 0.04	LT 0.03	LT 0.05	LT 0.05	LT 0.05	LT 0.03	LT 0.03	LT 0.05
February	01/30/84 to 02/06/84	LT 0.03	LT 0.03	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.04	LT 0.03	LT 0.03	LT 0.04
	02/06/84 to 02/13/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.04	LT 0.03
	02/13/84 to 02/21/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03
	02/21/84 to 02/27/84	LT 0.04	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.04	LT 0.03	LT 0.03	LT 0.03
March	02/27/84 to 03/05/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.04	LT 0.04	LT 0.04	LT 0.03	LT 0.03	LT 0.04
	03/05/84 to 03/12/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03
	03/12/84 to 03/19/84	LT 0.05	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03
	03/19/84 to 03/26/84 (3)										
April	03/26/84 to 04/02/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03
	04/02/84 to 04/09/84	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05
	04/09/84 to 04/16/84	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.02
	04/16/84 to 04/23/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03
	04/23/84 to 04/30/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.06	LT 0.03
May	04/30/84 to 05/07/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.07	LT 0.03
	05/07/84 to 05/14/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.05	LT 0.03
	05/14/84 to 05/21/84	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04
	05/21/84 to 05/29/84	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04
June	05/29/84 to 06/04/84	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04	LT 0.04
	06/04/84 to 06/11/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.02	LT 0.02	LT 0.02	LT 0.03	LT 0.03	LT 0.02

TABLE C
(Page 2 of 4)
Iodine-131 in Charcoal Cartridges
WNP-2 REMP 1984 (Operational)
(Results in pCi/m³ \pm 2s)

Month	Collection Period	Sample Location	
		48	57
January	(1)		
	01/16/84 to 01/23/84	LT 0.06	LT 0.06
	01/23/84 to 01/30/84	LT 0.05	LT 0.05
February	01/30/84 to 02/06/84	LT 0.04	LT 0.04
	02/06/84 to 02/13/84	LT 0.03	LT 0.03
	02/13/84 to 02/21/84	LT 0.03	LT 0.04
	02/21/84 to 02/27/84	LT 0.03	LT 0.03
March	02/27/84 to 03/05/84	LT 0.04	LT 0.04
	03/05/84 to 03/12/84	LT 0.03	LT 0.03
	03/12/84 to 03/19/84	LT 0.03	LT 0.03
	03/19/84 to 03/26/84 (3)		
April	03/26/84 to 04/02/84	LT 0.03	LT 0.016
	04/02/84 to 04/09/84	LT 0.05	LT 0.05
	04/09/84 to 04/16/84	LT 0.02	LT 0.02
	04/16/84 to 04/23/84	LT 0.03	LT 0.03
	04/23/84 to 04/30/84	LT 0.03	LT 0.03
May	04/30/84 to 05/07/84	LT 0.03	LT 0.03
	05/07/84 to 05/14/84	LT 0.03	LT 0.03
	05/14/84 to 05/21/84	LT 0.04	LT 0.04
	05/21/84 to 05/29/84	LT 0.04	LT 0.04
June	05/29/84 to 06/04/84	LT 0.04 (4)	LT 0.04
	06/04/84 to 06/11/84	LT 0.03	LT 0.02

Table C
(page 3 of 4)
Iodine-131 in Charcoal Cartridges
WNP-2 REMP 1984 (Operational)
(Results in pCi/m³ \pm 2s)

Month	Collection Period	Sample Location										
		1	4	5	6	7	8	9	21	23	40	
June	06/11/84 to 06/18/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.018	LT 0.018	LT 0.018	LT 0.03	LT 0.03	LT 0.018	
	06/18/84 to 06/25/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	
	06/25/84 to 07/02/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	
July	07/02/84 to 07/09/84	LT 0.02	LT 0.02	LT 0.02	LT 0.02	LT 0.04	LT 0.04	LT 0.04	LT 0.02	LT 0.02	LT 0.04	
	07/09/84 to 07/16/84	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.03	
	07/16/84 to 07/23/84	LT 0.018	LT 0.018	LT 0.018	LT 0.03	LT 0.03	LT 0.03	LT 0.03	LT 0.018	LT 0.018	LT 0.03	
	07/23/84 to 07/30/84	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	LT 0.05	
August	07/30/84 to 08/06/84	LT 0.017	LT 0.017	LT 0.017	LT 0.017	LT 0.017	LT 0.017	LT 0.017	LT 0.017	LT 0.017	LT 0.017	

LT = Less Than

- (1) Initial criticality January 19, 1984.
- (2) Lower sensitivity due to reduced volume.
- (3) Samples lost in transit.
- (4) Blown fuse. Lower sensitivity due to insufficient volume.

TABLE C
 (Page 4 of 4)
 Iodine-131 in Charcoal Cartridges
 WNP-2 REMP 1984 (Operational)
 (Results in pCi/m³ \pm 2s)

Month	Collection Period	Sample Location	
		48	57
June	06/11/84 to 06/18/84	LT 0.018	LT 0.018
	06/18/84 to 06/25/84	LT 0.03	LT 0.03
	06/25/84 to 07/02/84	LT 0.03	LT 0.03
July	07/02/84 to 07/09/84	LT 0.04	LT 0.04
	07/09/84 to 07/16/84	LT 0.03	LT 0.03
	07/16/84 to 07/23/84	LT 0.03	LT 0.03
	07/23/84 to 07/30/84	LT 0.05	LT 0.05
August	07/30/84 to 08/06/84	LT 0.017	LT 0.017

Table D
Gross Beta in Water
WNP-2 REMP 1984 (Operational)
(Results in pCi/l \pm 2s)

Month	Location	Sampling Date	Results
February	26	02/15/84	2.9 \pm 1.4
	27	02/15/84	3.9 \pm 1.4
	28	02/15/84	3.8 \pm 1.2
	29	02/15/84	2.8 \pm 1.2
March	26	(1)	
	27	03/14/84	2.6 \pm 1.2
	28	03/14/84	2.1 \pm 1.1
	29	03/14/84	2.5 \pm 1.1
April	26	04/11/84	1.6 \pm 1.2
	27	04/11/84	1.1 \pm 1.1
	28	04/11/84	LT 2
	29	04/11/84	1.1 \pm 1.1
May	26	04/11/84 to 05/09/84	2.1 \pm 1.2
	27	04/11/84 to 05/09/84	3.3 \pm 1.2
	28	04/11/84 to 05/09/84	2.1 \pm 1.1
	29	04/11/84 to 05/09/84	1.8 \pm 1.1
June	26	05/09/84 to 06/12/84	1.8 \pm 1.3
	27	05/09/84 to 06/12/84	2.1 \pm 1.3
	28	05/09/84 to 06/12/84	1.7 \pm 1.3
	29	05/09/84 to 06/12/84	2.3 \pm 1.3
July	26	06/12/84 to 07/17/84	LT 2
	27	06/12/84 to 07/17/84	1.4 \pm 1.3
	28	06/12/84 to 07/17/84	1.8 \pm 1.3
	29	06/12/84 to 07/17/84	1.7 \pm 1.3

LT = Less Than

(1) No sample collected due to pump malfunction.

Table E
Tritium in Water
WNP-2 REMP 1984 (Operational)
(Results in pCi/l \pm 2s)

Quarter	Location	Sampling Date	Tritium Activity
1	26	02/15/84	LT 300
	27	02/15/84 to 03/14/84	LT 300
	28	02/15/84 to 03/14/84	LT 300
	29	02/15/84 to 03/14/84	LT 300
	31	03/14/84	LT 300
	32	03/14/84	LT 300
	52	03/14/84	LT 300
2	26	04/11/84 to 06/12/84	LT 300
	27	04/11/84 to 06/12/84	LT 300
	28	04/11/84 to 06/12/84	LT 300
	29	04/11/84 to 06/12/84	450 \pm 180
	31	03/14/84 to 06/13/84	LT 300
	32	03/14/84 to 06/13/84	LT 300
	52	03/14/84 to 06/15/84	LT 300
3	26	06/12/84 to 07/17/84	LT 300
	27	06/12/84 to 07/17/84	LT 300
	28	06/12/84 to 07/17/84	LT 300
	29	06/12/84 to 07/17/84	LT 300

LT = Less Than

Table F
(Page 1 of 2)
Gamma Spectrometry of Water
WNP-2 REMP 1984 (Operational)
(Results in pCi/l \pm 2s)

Month	Location	Sampling Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95
February	26	02/15/84	LT 3	LT 1.1	LT 1.3	LT 1.0	LT 1.1	LT 2	LT 1.8	LT 1.1	LT 1.1	LT 2	LT 1.9
	27	02/15/84	LT 6	LT 1.8	LT 2	LT 1.7	LT 1.8	LT 4	LT 3	LT 1.9	LT 1.8	LT 4	LT 3
	28	02/15/84	LT 10	LT 3	LT 3	LT 3	LT 3	LT 6	LT 5	LT 3	LT 3	LT 6	LT 5
	29	02/15/84	LT 10	LT 3	LT 3	LT 3	LT 3	LT 6	LT 5	LT 3	LT 3	LT 6	LT 5
March	26	(1)											
	27	03/14/84	LT 7	LT 2	LT 3	LT 2	LT 2	LT 5	LT 4	LT 2	LT 2	LT 6	LT 4
	28	03/14/84	LT 6	LT 2	LT 2	LT 2	LT 2	LT 5	LT 4	LT 2	LT 2	LT 5	LT 4
	29	03/14/84	LT 7	LT 1.9	LT 2	LT 1.7	LT 1.8	LT 4	LT 4	LT 1.8	LT 1.9	LT 4	LT 3
	31	03/14/84	LT 5	LT 1.4	LT 1.6	LT 1.3	LT 1.4	LT 3	LT 3	LT 1.3	LT 1.3	LT 3	LT 2
	32	03/14/84	LT 5	LT 1.4	LT 1.6	LT 1.3	LT 1.4	LT 3	LT 3	LT 1.3	LT 1.3	LT 3	LT 2
	52	03/14/84	LT 7	LT 1.9	LT 2	LT 1.7	LT 1.8	LT 4	LT 4	LT 1.8	LT 1.9	LT 4	LT 3
April	26	04/11/84	LT 9	LT 3	LT 3	LT 3	LT 3	LT 6	LT 4	LT 3	LT 3	LT 6	LT 5
	27	04/11/84	LT 9	LT 3	LT 3	LT 3	LT 3	LT 6	LT 4	LT 3	LT 3	LT 6	LT 5
	28	04/11/84	LT 12	LT 3	LT 3	LT 2	LT 3	LT 6	LT 7	LT 3	LT 3	LT 6	LT 5
	29	04/11/84	LT 9	LT 3	LT 3	LT 3	LT 3	LT 6	LT 4	LT 3	LT 3	LT 6	LT 5
May	26	04/11-05/09/84	LT 20	LT 6	LT 8	LT 7	LT 7	LT 14	LT 13	LT 6	LT 6	LT 13	LT 12
	27	04/11-05/09/84	LT 12	LT 3	LT 4	LT 3	LT 4	LT 7	LT 7	LT 3	LT 3	LT 6	LT 6
	28	04/11-05/09/84	LT 12	LT 3	LT 4	LT 3	LT 4	LT 7	LT 7	LT 3	LT 3	LT 6	LT 6
	29	04/11-05/09/84	LT 12	LT 3	LT 4	LT 3	LT 4	LT 7	LT 7	LT 3	LT 3	LT 6	LT 6
June	26	05/09-06/12/84	LT 8	LT 2	LT 3	LT 2	LT 2	LT 5	LT 5	LT 2	LT 2	LT 5	LT 4
	27	05/09-06/12/84	LT 8	LT 2	LT 3	LT 2	LT 2	LT 5	LT 5	LT 2	LT 2	LT 5	LT 4
	28	05/09-06/12/84	LT 8	LT 2	LT 3	LT 2	LT 2	LT 5	LT 5	LT 2	LT 2	LT 5	LT 4
	29	05/09-06/12/84	LT 8	LT 2	LT 3	LT 2	LT 2	LT 5	LT 5	LT 2	LT 2	LT 5	LT 4
	31	03/14-06/13/84	LT 9	LT 3	LT 3	LT 2	LT 3	LT 6	LT 5	LT 3	LT 3	LT 6	LT 5
	32	03/14-06/13/84	LT 9	LT 3	LT 3	LT 2	LT 3	LT 6	LT 5	LT 3	LT 3	LT 6	LT 5
	52	03/14-06/13/84	LT 9	LT 3	LT 3	LT 2	LT 3	LT 6	LT 5	LT 3	LT 3	LT 6	LT 5

Table F
(Page 2 of 2)
Gamma Spectrometry of Water
WNP-2 REMP 1984 (Operational)
(Results in pCi/l \pm 2s)

Month	Location	Sampling Date	Ba-140	Co-58	Co-60	Cs-134	Cs-137	Fe-59	La-140	Mn-54	Nb-95	Zn-65	Zr-95
July	26	06/12-07/17/84	LT 12	LT 4	LT 4	LT 4	LT 4	LT 9	LT 7	LT 4	LT 5	LT 10	LT 8
	27	06/12-07/17/84	LT 12	LT 4	LT 4	LT 4	LT 4	LT 9	LT 7	LT 4	LT 5	LT 10	LT 8
	28	06/12-07/17/84	LT 12	LT 4	LT 4	LT 4	LT 4	LT 9	LT 7	LT 4	LT 5	LT 10	LT 8
	29	06/12-07/17/84	LT 12	LT 4	LT 4	LT 4	LT 4	LT 9	LT 7	LT 4	LT 5	LT 10	LT 8

LT = Less Than

(1) No sample collected due to pump malfunction.

TABLE G
Strontium 89 and 90 in Water Samples
WNP-2 REMP 1983
(Results in pCi/l \pm 2s)

Month	Location	Sampling Date	Strontium-89	Strontium-90
September	300 AREA	09/14/83		
	INTAKE	09/14/83	2.1 \pm 1.9	LT 2
	DISCHARGE	09/14/83	LT 0.9	LT 3

LT = Less Than

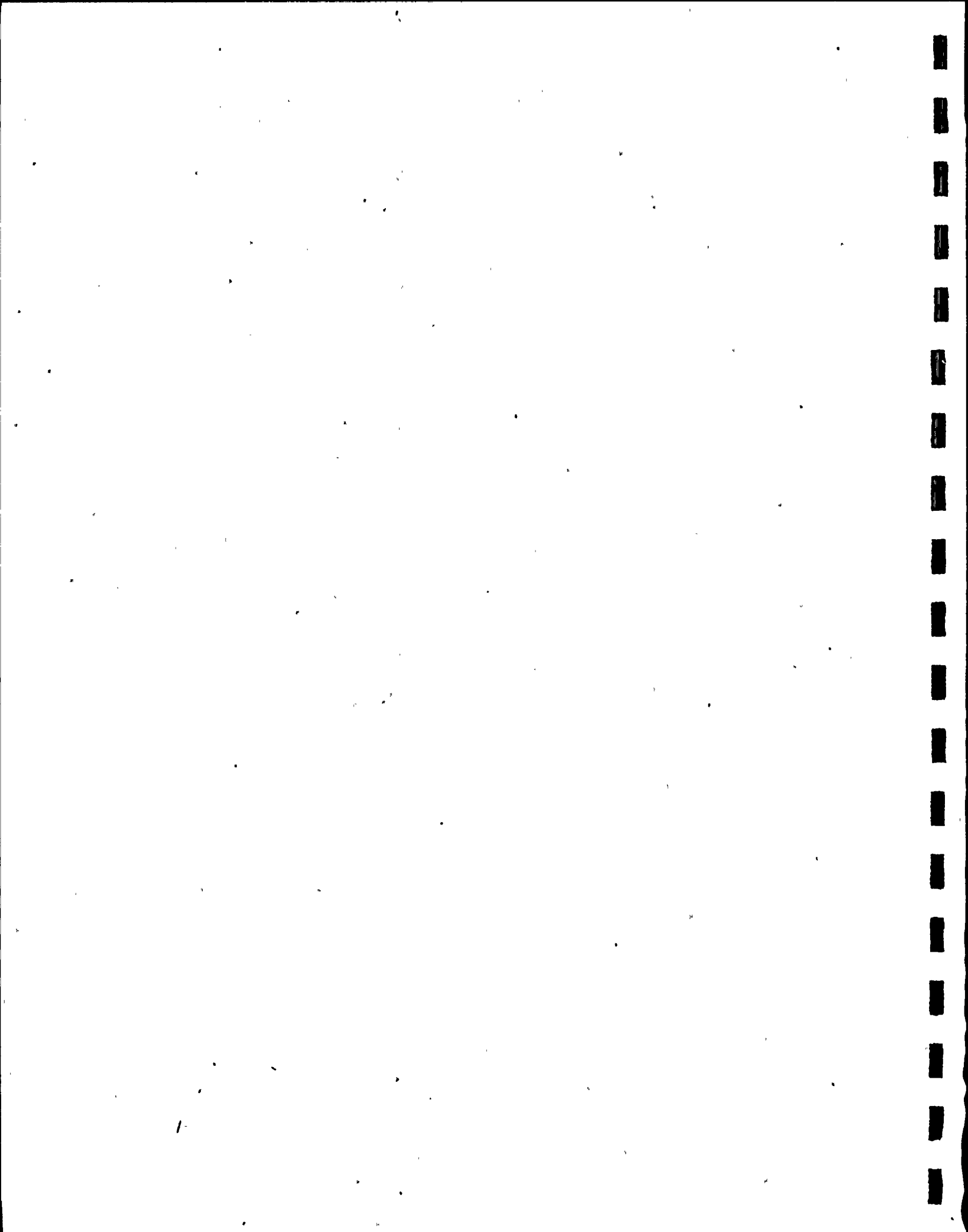


Table H
Gamma Spectrometry in Soil
WNP-2 REMP 1984 (Operational)
(Results in pCi/kg (dry) \pm 2s)

Location	Sampling Date	Ac-228	Bi-214	Cs-134	Cs-137	K-40	Pb-212	Pb-214	Ra-226	Tl-208
1	05/21/84	920 \pm 230	800 \pm 150	LT 130	180 \pm 70	15000 \pm 2000	750 \pm 170	630 \pm 150	720 \pm 150	760 \pm 200
7	05/21/84	630 \pm 180	390 \pm 100	LT 90	LT 70	14000 \pm 2000	480 \pm 110	460 \pm 100	430 \pm 100	610 \pm 150
9	05/21/84	1000 \pm 200	680 \pm 140	LT 110	LT 120	16000 \pm 2000	860 \pm 170	880 \pm 160	780 \pm 150	1200 \pm 200
21	05/21/84	310 \pm 250	480 \pm 120	LT 90	LT 90	16000 \pm 2000	490 \pm 110	560 \pm 110	520 \pm 120	500 \pm 170
23	05/21/84	760 \pm 250	450 \pm 130	LT 130	610 \pm 100	15000 \pm 2000	550 \pm 120	640 \pm 140	540 \pm 140	560 \pm 190

LT = Less Than

Table I
Gamma Spectrometry in Sediment
WNP-2 REMP 1984 (Operational)
(Results in pCi/kg (dry) \pm 2s)

Location	Sampling Date	Ac-228	Bi-214	Cs-134	Cs-137	K-40	Pb-212	Pb-214	Ra-226	Tl-208
33-Upstream	05/01/84	1600 \pm 300	950 \pm 170	LT 110	LT 110	15000 \pm 2000	1200 \pm 200	1200 \pm 200	1100 \pm 200	1500 \pm 200
34-Downstream	05/01/84	1000 \pm 200	590 \pm 130	LT 90	230 \pm 70	14000 \pm 2000	540 \pm 100	650 \pm 110	620 \pm 120	790 \pm 180

LT = Less Than

TABLE J
Gamma Spectrometry in Fish
WNP-2 REMP 1984
(Results in pCi/kg (wet) \pm 2s)

Sample Type	Location	Collection Date	Co-58	Co-60	Cs-134	Cs-137	Fe-59	K-40	Mn-54	Zn-65
Sucker	30, Columbia River	04/20/84	LT 30	LT 50	LT 30	LT 50	LT 130	3000 \pm 700	LT 40	LT 110
Carp	30, Columbia River	04/20/84	LT 60	LT 60	LT 50	LT 50	LT 170	3200 \pm 800	LT 60	LT 120
Steelhead	38, Snake River	04/25/84	LT 70	LT 80	LT 60	LT 60	LT 150	3300 \pm 800	LT 60	LT 120
Sucker	38, Snake River	04/25/84	LT 40	LT 60	LT 40	LT 50	LT 120	3200 \pm 700	LT 50	LT 110
Shad	30, Columbia River	07/19/84	LT 40	LT 40	LT 40	LT 50	LT 100	2500 \pm 700	LT 40	LT 80
Steelhead	30, Columbia River	07/19/84	LT 80	LT 80	LT 70	LT 80	LT 170	4800 \pm 1200	LT 80	LT 200
Smallmouth Bass	30, Columbia River	07/19/84	LT 50	LT 60	LT 40	LT 60	LT 130	3400 \pm 800	LT 50	LT 140
Sockeye Salmon	30, Columbia River	07/19/84	LT 70	LT 60	LT 60	LT 80	LT 150	2600 \pm 900	LT 50	LT 150
Squawfish	30, Columbia River	07/19/84	LT 50	LT 50	LT 40	LT 50	LT 120	2800 \pm 700	LT 50	LT 120
Carp	38, Snake River	07/20/84	LT 60	LT 60	LT 50	LT 50	LT 130	2400 \pm 700	LT 50	LT 150
Squawfish	38, Snake River	07/20/84	LT 50	LT 70	LT 40	LT 50	LT 140	3300 \pm 800	LT 60	LT 150
Smallmouth Bass	38, Snake River	07/20/84	LT 20	LT 30	LT 19	LT 20	LT 60	3200 \pm 400	LT 20	LT 50
Bluegill	38, Snake River	07/20/84	LT 50	LT 110	LT 60	LT 80	LT 190	2900 \pm 900	LT 50	LT 180
Catfish	38, Snake River	07/20/84	LT 70	LT 90	LT 60	LT 70	LT 170	2000 \pm 800	LT 60	LT 100

LT = Less than

Table K
Iodine-131 in Milk
WNP-2 REMP 1984 (Operational)
(Results in pCi/l \pm 2s)

Month	Sampling Date	Meeker, 9	Cooke, 35	Bleazard, 36	Pettett, 40
January	01/25/84	--	LT 0.10	--	--
February	02/07/84	LT 0.08	LT 0.09	LT 0.08	LT 0.08
March	03/06/84	LT 0.13	LT 0.14	LT 0.14	LT 0.13
April	04/03/84	LT 0.14	(2)	LT 0.13	LT 0.13
	04/17/84	LT 0.2	LT 0.3	LT 0.3	--
	04/19/84	--	--	--	LT 0.2
May	05/08/84	LT 0.13	LT 0.13	LT 0.15	LT 0.17
	05/22/84	LT 0.15	LT 0.11	LT 0.14	LT 0.10
June	06/05/84	LT 0.08	LT 0.09	LT 0.08	LT 0.08
	06/19/84	LT 0.05	LT 0.11	LT 0.10	LT 0.13
July	07/11/84	LT 0.09	LT 0.10	LT 0.10	LT 0.11
	07/24/84	LT 0.17	LT 0.18	LT 0.2	LT 0.19
August	08/07/84	LT 0.3	LT 0.3	LT 0.3	LT 0.3

LT = Less Than

- (1) Other January samples are preoperational.
Only station >#35 was sampled on 01/25/84.
(2) Sample lost in analysis.

Table L
(Page 1 of 2)
Gamma Spectrometry of Milk
WNP-2 REMP 1984 (Operational)
(Results in pCi/l \pm 2s)

Month	Sampling Location	Date	Ba-140	Cs-134	Cs-137	K-40	La-140
February	9, Meeker	02/07/84	LT 20	LT 7	LT 8	1500 \pm 200	LT 11
	35, Cooke	02/07/84	LT 15	LT 5	LT 5	1300 \pm 200	LT 7
	36, Bleazard	02/07/84	LT 15	LT 4	LT 5	1300 \pm 200	LT 8
	40, Pettett	02/07/84	LT 15	LT 5	LT 5	1400 \pm 200	LT 7
March	9, Meeker	03/06/84	LT 30	LT 7	LT 8	1400 \pm 200	LT 15
	35, Cooke	03/06/84	LT 19	LT 4	LT 5	1300 \pm 200	LT 10
	36, Bleazard	03/06/84	LT 17	LT 4	LT 4	1400 \pm 200	LT 8
	40, Pettett	03/06/84	LT 17	LT 4	LT 4	1500 \pm 200	LT 9
April	9, Meeker	04/03/84	LT 14	LT 4	LT 4	1300 \pm 200	LT 6
	35, Cooke	04/03/84	LT 20	LT 6	LT 7	1300 \pm 200	LT 12
	36, Bleazard	04/03/84	LT 16	LT 4	LT 5	1300 \pm 200	LT 7
	40, Pettett	04/03/84	LT 14	LT 4	LT 5	1500 \pm 200	LT 8
	9, Meeker	04/17/84	LT 30	LT 6	LT 6	1400 \pm 200	LT 14
	35, Cooke	04/17/84	LT 30	LT 7	LT 8	1500 \pm 200	LT 14
	36, Bleazard	04/17/84	LT 30	LT 7	LT 8	1300 \pm 200	LT 13
	40, Pettett	04/19/84	LT 30	LT 6	LT 7	1400 \pm 200	LT 13
	9, Meeker	05/08/84	LT 30	LT 9	LT 10	1300 \pm 200	LT 15
	35, Cooke	05/08/84	LT 30	LT 10	LT 11	1400 \pm 200	LT 15
May	36, Bleazard	05/08/84	LT 30	LT 10	LT 10	1100 \pm 200	LT 15
	40, Pettett	05/08/84	LT 20	LT 9	LT 10	1400 \pm 200	LT 12
	9, Meeker	05/22/84	LT 6	LT 1.8	LT 2	1300 \pm 200	LT 3
	35, Cooke	05/22/84	LT 8	LT 2	LT 3	1200 \pm 200	LT 4
	36, Bleazard	05/22/84	LT 7	LT 1.9	LT 2	1500 \pm 200	LT 3
	40, Pettett	05/22/84	LT 30	LT 7	LT 8	1400 \pm 200	LT 14
	9, Meeker	06/05/84	LT 10	LT 4	LT 4	1200 \pm 200	LT 5
	35, Cooke	06/05/84	LT 7	LT 2	LT 3	1300 \pm 200	LT 4
	36, Bleazard	06/05/84	LT 8	LT 3	LT 3	1300 \pm 200	LT 4
	40, Pettett	06/05/84	LT 8	LT 2	LT 3	1500 \pm 200	LT 4
June	9, Meeker	06/05/84	LT 10	LT 4	LT 4	1200 \pm 200	LT 5
	35, Cooke	06/05/84	LT 7	LT 2	LT 3	1300 \pm 200	LT 4
	36, Bleazard	06/05/84	LT 8	LT 3	LT 3	1300 \pm 200	LT 4
	40, Pettett	06/05/84	LT 8	LT 2	LT 3	1500 \pm 200	LT 4

Table L
(Page 2 of 2)
Gamma Spectrometry of Milk
WNP-2 REMP 1984 (Operational)
(Results in pCi/l \pm 2s)

Month	Sampling Location	Date	Ba-140	Cs-134	Cs-137	K-40	La-140
June	9, Meeker	06/19/84	LT 16	LT 5	LT 6	1300 \pm 200	LT 8
	35, Cooke	06/19/84	LT 19	LT 6	LT 7	1300 \pm 200	LT 5
	36, Bleazard	06/19/84	LT 13	LT 4	LT 5	1400 \pm 200	LT 6
	40, Pettett	06/19/84	LT 12	LT 4	LT 4	1400 \pm 200	LT 6
July	9, Meeker	07/11/84	LT 20	LT 7	LT 8	1200 \pm 200	LT 10
	35, Cooke	07/11/84	LT 30	LT 9	LT 9	1300 \pm 200	LT 10
	36, Bleazard	07/11/84	LT 18	LT 7	LT 8	1400 \pm 200	LT 8
	40, Pettett	07/11/84	LT 20	LT 8	LT 8	1300 \pm 200	LT 10
	9, Meeker	07/24/84	LT 20	LT 4	LT 5	1200 \pm 200	LT 10
	35, Cooke	07/24/84	LT 11	LT 2	LT 2	1300 \pm 200	LT 5
	36, Bleazard	07/24/84	LT 20	LT 4	LT 5	1400 \pm 200	LT 10
	40, Pettett	07/24/84	LT 20	LT 4	LT 5	1500 \pm 200	LT 12
August	9, Meeker	08/07/84	LT 30	LT 9	LT 10	1300 \pm 200	LT 12
	35, Cooke	08/07/84	LT 30	LT 9	LT 11	1400 \pm 200	LT 13
	36, Bleazard	08/07/84	LT 20	LT 7	LT 7	1300 \pm 200	LT 12
	40, Pettett	08/07/84	LT 16	LT 4	LT 5	1400 \pm 200	LT 8

LT = Less Than

Table A
(Page 1 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#1	840806 TO 840813	2.54E-02	3.63E-03	5.45E-03(2S)
	840813 TO 840820	2.10E-02	3.32E-03	4.73E-03(2S)
	840820 TO 840827	2.42E-02	3.51E-03	5.22E-03(2S)
	840827 TO 840904	5.19E-03	1.84E-03	2.02E-03(2S)
	840904 TO 840907	1.21E-01	1.11E-02	2.16E-02(2S)
	840907 TO 840910	2.26E-02	5.61E-03	6.67E-03(2S)
	840910 TO 840917	1.42E-02	2.74E-03	3.58E-03(2S)
	840917 TO 840924	1.71E-02	3.02E-03	4.11E-03(2S)
	840924 TO 841001	3.31E-02	3.97E-03	6.70E-03(2S)
	841001 TO 841008	3.98E-02	4.33E-03	7.79E-03(2S)
	841008 TO 841015	1.18E-02	2.63E-03	3.26E-03(2S)
	841015 TO 841022	2.04E-02	3.22E-03	4.62E-03(2S)
	841022 TO 841026	5.66E-02	6.58E-03	1.13E-02(2S)
	841026 TO 841029	1.01E-02	3.73E-03	4.07E-03(2S)
	841029 TO 841105	1.89E-02	2.89E-03	4.21E-03(2S)
	841105 TO 841112	1.03E-02	2.35E-03	2.88E-03(2S)
	841112 TO 841119	1.24E-02	2.51E-03	3.21E-03(2S)
	841119 TO 841126	1.63E-02	2.76E-03	3.81E-03(2S)
	841126 TO 841203	1.14E-02	2.43E-03	3.04E-03(2S)
	841203 TO 841210	6.58E-02	5.19E-03	1.18E-02(2S)
	841210 TO 841217	2.46E-02	3.38E-03	5.21E-03(2S)
	841217 TO 841223	3.94E-02	4.50E-03	7.79E-03(2S)
	841223 TO 841231	1.44E-02	2.43E-03	3.36E-03(2S)
#21	840806 TO 840813	1.42E-02	2.56E-03	3.43E-03(2S)
	840813 TO 840820	1.59E-02	2.97E-03	3.92E-03(2S)
	840820 TO 840827	2.06E-02	3.20E-03	4.59E-03(2S)
	840827 TO 840904	1.75E-02	2.76E-03	3.94E-03(2S)
	840904 TO 840910	1.72E-02	3.32E-03	4.32E-03(2S)
	840910 TO 840917	1.57E-02	2.82E-03	3.80E-03(2S)
	840917 TO 840924	1.79E-02	3.00E-03	4.18E-03(2S)
	840924 TO 841001	3.32E-02	3.93E-03	6.68E-03(2S)
	841001 TO 841008	3.59E-02	4.07E-03	7.12E-03(2S)
	841008 TO 841015	1.17E-02	2.47E-03	3.12E-03(2S)
	841015 TO 841022	1.99E-02	3.14E-03	4.51E-03(2S)
	841022 TO 841029	2.55E-02	3.36E-03	5.32E-03(2S)
	841029 TO 841105	1.22E-02	2.43E-03	3.08E-03(2S)
	841105 TO 841112	9.69E-03	2.18E-03	2.68E-03(2S)
	841112 TO 841119	2.17E-02	3.07E-03	4.66E-03(2S)
	841119 TO 841126	1.26E-02	2.44E-03	3.18E-03(2S)
	841126 TO 841203	1.41E-02	2.52E-03	3.40E-03(2S)
	841203 TO 841210	7.59E-02	5.55E-03	1.35E-02(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table A
(Page 2 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#21	841210 TO 841217	3.20E-02	7.82E-03	9.38E-03(2S)
	841217 TO 841223	4.00E-02	4.46E-03	7.84E-03(2S)
	841223 TO 841231	1.72E-02	2.62E-03	3.82E-03(2S)
#23	840806 TO 840813	1.82E-02	3.01E-03	4.11E-03(2S)
	840813 TO 840820	1.79E-02	3.00E-03	4.15E-03(2S)
	840820 TO 840827	1.73E-02	2.93E-03	3.95E-03(2S)
	840827 TO 840904	2.11E-02	3.00E-03	4.42E-03(2S)
	840904 TO 840910	1.33E-02	2.92E-03	3.61E-03(2S)
	840910 TO 840917	1.78E-02	2.95E-03	4.06E-03(2S)
	840917 TO 840924	2.16E-02	3.25E-03	4.69E-03(2S)
	840924 TO 841001	3.89E-02	4.25E-03	7.63E-03(2S)
	841001 TO 841008	3.91E-02	4.26E-03	7.46E-03(2S)
	841008 TO 841015	1.47E-02	2.73E-03	3.56E-03(2S)
	841015 TO 841022	2.52E-02	3.45E-03	5.24E-03(2S)
	841022 TO 841029	3.14E-02	3.64E-03	6.24E-03(2S)
	841029 TO 841105	2.01E-02	2.97E-03	4.40E-03(2S)
	841105 TO 841112	1.24E-02	2.41E-03	3.08E-03(2S)
	841112 TO 841119	2.66E-02	3.37E-03	5.33E-03(2S)
	841119 TO 841126	1.79E-02	2.97E-03	4.14E-03(2S)
	841126 TO 841203	1.52E-02	2.65E-03	3.55E-03(2S)
	841203 TO 841210	7.37E-02	5.53E-03	1.31E-02(2S)
#4	841210 TO 841217	2.63E-02	3.36E-03	5.42E-03(2S)
	841217 TO 841223	4.76E-02	4.80E-03	8.82E-03(2S)
	841223 TO 841231	2.03E-02	2.78E-03	4.31E-03(2S)
	840806 TO 840813	1.58E-02	2.84E-03	3.80E-03(2S)
	840813 TO 840820	1.92E-02	3.20E-03	4.44E-03(2S)
	840820 TO 840827	2.21E-02	3.29E-03	4.83E-03(2S)
	840827 TO 840904	2.05E-02	2.96E-03	4.41E-03(2S)
	840904 TO 840910	1.64E-02	3.25E-03	4.17E-03(2S)
	840910 TO 840917	2.31E-02	3.34E-03	5.02E-03(2S)
	840917 TO 840924	2.19E-02	3.27E-03	4.84E-03(2S)
	840924 TO 841001	4.24E-02	4.43E-03	8.19E-03(2S)
	841001 TO 841008	4.08E-02	4.34E-03	7.94E-03(2S)
	841008 TO 841015	9.99E-03	2.33E-03	2.84E-03(2S)
	841015 TO 841022	2.79E-02	3.63E-03	5.81E-03(2S)
	841022 TO 841029	3.01E-02	3.56E-03	5.88E-03(2S)
	841029 TO 841105	2.07E-02	3.09E-03	4.55E-03(2S)
	841105 TO 841112	1.23E-02	2.39E-03	3.11E-03(2S)
	841112 TO 841119	2.92E-02	3.53E-03	5.89E-03(2S)
	841119 TO 841126	1.38E-02	2.54E-03	3.38E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table A
(Page 3 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#4	841126 TO 841203	1.05E-02	2.22E-03	2.79E-03(2S)
	841203 TO 841210	7.88E-02	5.61E-03	1.39E-02(2S)
	841210 TO 841217	2.45E-02	3.25E-03	5.01E-03(2S)
	841217 TO 841223	4.81E-02	4.84E-03	9.16E-03(2S)
	841223 TO 841231	2.68E-02	3.13E-03	5.21E-03(2S)
#40	840806 TO 840813	1.44E-02	2.75E-03	3.59E-03(2S)
	840813 TO 840820	1.51E-02	2.79E-03	3.63E-03(2S)
	840820 TO 840827	2.24E-02	3.32E-03	4.89E-03(2S)
	840827 TO 840904	1.93E-02	2.85E-03	4.21E-03(2S)
	840904 TO 840910	1.97E-02	3.52E-03	4.73E-03(2S)
	840910 TO 840917	1.58E-02	2.83E-03	3.83E-03(2S)
	840917 TO 840924	2.22E-02	3.29E-03	4.89E-03(2S)
	840924 TO 841001	3.38E-02	3.98E-03	6.79E-03(2S)
	841001 TO 841008	3.13E-02	3.83E-03	6.38E-03(2S)
	841008 TO 841015	1.32E-02	2.61E-03	3.38E-03(2S)
	841015 TO 841022	2.16E-02	3.23E-03	4.77E-03(2S)
	841022 TO 841029	2.66E-02	3.36E-03	5.32E-03(2S)
	841029 TO 841105	1.87E-02	2.96E-03	4.23E-03(2S)
	841105 TO 841112	9.93E-03	2.20E-03	2.73E-03(2S)
	841112 TO 841119	2.27E-02	3.14E-03	4.82E-03(2S)
	841119 TO 841126	1.41E-02	2.56E-03	3.42E-03(2S)
	841126 TO 841203	1.29E-02	2.42E-03	3.19E-03(2S)
	841203 TO 841210	7.71E-02	5.57E-03	1.36E-02(2S)
	841210 TO 841217	2.46E-02	3.25E-03	5.02E-03(2S)
	841217 TO 841223	4.33E-02	4.59E-03	8.36E-03(2S)
	841223 TO 841231	1.86E-02	2.64E-03	3.92E-03(2S)
#48	840806 TO 840813	1.95E-02	3.13E-03	4.42E-03(2S)
	840813 TO 840820	1.55E-02	2.79E-03	3.73E-03(2S)
	840820 TO 840827	2.61E-02	3.63E-03	5.53E-03(2S)
	840827 TO 840904	2.15E-02	3.39E-03	4.83E-03(2S)
	840904 TO 840910	1.72E-02	3.24E-03	4.25E-03(2S)
	840910 TO 840917	1.96E-02	3.16E-03	4.49E-03(2S)
	840917 TO 840924	2.01E-02	3.19E-03	4.57E-03(2S)
	840924 TO 841001	3.84E-02	4.23E-03	7.34E-03(2S)
	841001 TO 841008	3.56E-02	4.11E-03	7.11E-03(2S)
	841008 TO 841015	9.69E-03	2.44E-03	2.90E-03(2S)
	841015 TO 841022	2.39E-02	3.45E-03	5.19E-03(2S)
	841022 TO 841029	2.73E-02	3.41E-03	5.57E-03(2S)
	841029 TO 841105	1.74E-02	2.84E-03	4.00E-03(2S)
	841105 TO 841112	1.13E-02	2.32E-03	2.91E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table A
(Page 4 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#48	841112 TO 841119	1.94E-02	2.95E-03	4.30E-03(2S)
	841119 TO 841126	1.14E-02	2.41E-03	3.03E-03(2S)
	841126 TO 841203	1.79E-02	5.98E-03	6.64E-03(2S)
	841203 TO 841210	9.40E-02	7.31E-03	1.63E-02(2S)
	841210 TO 841217	1.57E-02	2.68E-03	3.69E-03(2S)
	841217 TO 841223	5.64E-02	7.54E-03	1.18E-02(2S)
	841223 TO 841231	2.21E-02	2.91E-03	4.61E-03(2S)
#5	840806 TO 840813	1.42E-02	2.70E-03	3.48E-03(2S)
	840813 TO 840820	1.90E-02	3.08E-03	4.33E-03(2S)
	840820 TO 840827	2.55E-02	3.59E-03	5.43E-03(2S)
	840827 TO 840904	1.66E-02	2.70E-03	3.71E-03(2S)
	840904 TO 840910	1.43E-02	3.00E-03	3.77E-03(2S)
	840910 TO 840917	1.66E-02	2.95E-03	4.00E-03(2S)
	840917 TO 840924	1.66E-02	2.95E-03	4.00E-03(2S)
	840924 TO 841001	3.16E-02	3.86E-03	6.27E-03(2S)
	841001 TO 841008	3.84E-02	4.26E-03	7.57E-03(2S)
	841008 TO 841015	1.07E-02	2.52E-03	3.06E-03(2S)
	841015 TO 841022	2.62E-02	3.60E-03	5.58E-03(2S)
	841022 TO 841029	2.73E-02	3.69E-03	5.75E-03(2S)
	841029 TO 841105	1.56E-02	2.72E-03	3.71E-03(2S)
	841105 TO 841112	9.89E-03	2.26E-03	2.77E-03(2S)
	841112 TO 841119	2.05E-02	3.02E-03	4.48E-03(2S)
	841119 TO 841126	1.09E-02	2.37E-03	2.95E-03(2S)
	841126 TO 841203	1.07E-02	2.33E-03	2.90E-03(2S)
	841203 TO 841210	6.80E-02	5.24E-03	1.18E-02(2S)
	841210 TO 841217	1.82E-02	2.86E-03	4.10E-03(2S)
	841217 TO 841223	8.02E-02	8.85E-03	1.57E-02(2S)
	841223 TO 841231	2.04E-02	2.80E-03	4.32E-03(2S)
#57	840806 TO 840813	1.84E-02	3.02E-03	4.22E-03(2S)
	840813 TO 840820	1.74E-02	2.97E-03	4.07E-03(2S)
	840820 TO 840827	1.62E-02	2.72E-03	3.75E-03(2S)
	840827 TO 840904	4.14E-02	6.20E-03	9.08E-03(2S)
	840904 TO 840910	2.08E-02	3.55E-03	4.78E-03(2S)
	840910 TO 840917	1.87E-02	3.05E-03	4.31E-03(2S)
	840917 TO 840924	2.14E-02	3.25E-03	4.77E-03(2S)
	840924 TO 841001	3.24E-02	3.87E-03	6.54E-03(2S)
	841001 TO 841008	3.71E-02	4.14E-03	7.32E-03(2S)
	841008 TO 841015	1.21E-02	2.55E-03	3.22E-03(2S)
	841015 TO 841022	2.07E-02	3.18E-03	4.64E-03(2S)
	841022 TO 841029	2.90E-02	3.56E-03	5.88E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table A
(Page 5 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#57	841029 TO 841105	1.82E-02	2.87E-03	4.11E-03(2S)
	841105 TO 841112	1.34E-02	2.54E-03	3.34E-03(2S)
	841112 TO 841119	2.66E-02	3.39E-03	5.48E-03(2S)
	841119 TO 841126	1.80E-02	2.83E-03	4.06E-03(2S)
	841126 TO 841203	1.36E-02	2.51E-03	3.34E-03(2S)
	841203 TO 841210	9.44E-02	6.14E-03	1.64E-02(2S)
	841210 TO 841217	2.84E-02	3.55E-03	5.81E-03(2S)
	841217 TO 841223	4.19E-02	4.52E-03	8.14E-03(2S)
	841223 TO 841231	2.01E-02	2.80E-03	4.29E-03(2S)
#6	840806 TO 840813	2.05E-02	3.18E-03	4.57E-03(2S)
	840813 TO 840820	2.25E-02	3.31E-03	4.79E-03(2S)
	840820 TO 840827	2.37E-02	3.42E-03	5.10E-03(2S)
	840827 TO 840904	2.04E-02	2.92E-03	4.38E-03(2S)
	840904 TO 840910	1.58E-02	3.23E-03	4.11E-03(2S)
	840910 TO 840917	2.06E-02	3.17E-03	4.62E-03(2S)
	840917 TO 840924	2.17E-02	3.27E-03	4.81E-03(2S)
	840924 TO 841001	4.22E-02	4.39E-03	8.16E-03(2S)
	841001 TO 841008	4.49E-02	4.52E-03	8.60E-03(2S)
	841008 TO 841015	1.47E-02	2.77E-03	3.67E-03(2S)
	841015 TO 841022	2.53E-02	3.47E-03	5.38E-03(2S)
	841022 TO 841029	4.05E-02	4.47E-03	7.93E-03(2S)
	841029 TO 841105	1.96E-02	3.02E-03	4.37E-03(2S)
	841105 TO 841112	1.08E-02	2.35E-03	2.93E-03(2S)
	841112 TO 841119	2.55E-02	3.32E-03	5.29E-03(2S)
	841119 TO 841126	1.53E-02	2.63E-03	3.61E-03(2S)
	841126 TO 841203	1.53E-02	2.64E-03	3.61E-03(2S)
	841203 TO 841210	8.94E-02	5.97E-03	1.56E-02(2S)
	841210 TO 841217	2.67E-02	3.46E-03	5.53E-03(2S)
	841217 TO 841223	5.35E-02	6.58E-03	1.09E-02(2S)
	841223 TO 841231	2.43E-02	3.05E-03	4.98E-03(2S)
#7	840806 TO 840813	2.30E-02	3.59E-03	5.14E-03(2S)
	840813 TO 840820	2.27E-02	3.70E-03	5.19E-03(2S)
	840820 TO 840827	2.42E-02	3.52E-03	5.24E-03(2S)
	840827 TO 840904	5.05E-03	1.79E-03	1.97E-03(2S)
	840904 TO 840910	3.31E-02	4.29E-03	6.81E-03(2S)
	840910 TO 840917	1.73E-02	2.97E-03	4.09E-03(2S)
	840917 TO 840924	2.25E-02	3.38E-03	4.98E-03(2S)
	840924 TO 841001	3.61E-02	4.14E-03	7.19E-03(2S)
	841001 TO 841008	3.99E-02	4.42E-03	7.86E-03(2S)
	841008 TO 841015	1.22E-02	2.66E-03	3.31E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table A
(Page 6 of 7)
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#7	841015 TO 841022	2.21E-02	3.34E-03	4.91E-03(2S)
	841022 TO 841025	7.28E-02	8.39E-03	1.45E-02(2S)
	841025 TO 841026	1.64E-01	2.47E-02	3.55E-02(2S)
	841026 TO 841029	9.98E-03	3.76E-03	4.09E-03(2S)
	841029 TO 841105	2.61E-02	3.35E-03	5.39E-03(2S)
	841105 TO 841112	1.09E-02	2.39E-03	2.97E-03(2S)
	841112 TO 841119	2.75E-02	3.49E-03	5.65E-03(2S)
	841119 TO 841126	1.60E-02	2.71E-03	3.68E-03(2S)
	841126 TO 841203	1.25E-02	2.52E-03	3.23E-03(2S)
	841203 TO 841210	9.69E-02	6.24E-03	1.68E-02(2S)
	841210 TO 841217	2.77E-02	3.45E-03	5.64E-03(2S)
	841217 TO 841223	4.62E-02	4.84E-03	8.89E-03(2S)
	841223 TO 841231	2.20E-02	2.87E-03	4.57E-03(2S)
#8	840806 TO 840813	1.86E-02	3.02E-03	4.25E-03(2S)
	840813 TO 840820	1.90E-02	3.08E-03	4.32E-03(2S)
	840820 TO 840827	2.51E-02	3.49E-03	5.31E-03(2S)
	840827 TO 840904	2.27E-02	3.13E-03	4.80E-03(2S)
	840904 TO 840910	1.92E-02	3.38E-03	4.49E-03(2S)
	840910 TO 840917	2.21E-02	3.27E-03	4.86E-03(2S)
	840917 TO 840924	2.40E-02	3.41E-03	5.18E-03(2S)
	840924 TO 841001	4.10E-02	4.33E-03	7.95E-03(2S)
	841001 TO 841008	4.00E-02	4.28E-03	7.79E-03(2S)
	841008 TO 841015	1.77E-02	3.44E-03	4.48E-03(2S)
	841015 TO 841022	2.43E-02	3.43E-03	5.24E-03(2S)
	841022 TO 841029	2.50E-02	3.32E-03	5.22E-03(2S)
	841029 TO 841105	1.80E-02	2.86E-03	4.00E-03(2S)
	841105 TO 841112	1.25E-02	2.47E-03	3.19E-03(2S)
	841112 TO 841119	2.03E-02	2.97E-03	4.43E-03(2S)
	841119 TO 841126	5.47E-03	1.73E-03	1.94E-03(2S)
	841126 TO 841203	9.93E-03	2.17E-03	2.70E-03(2S)
	841203 TO 841210	7.80E-02	5.63E-03	1.38E-02(2S)
	841210 TO 841217	1.87E-02	3.01E-03	4.27E-03(2S)
	841217 TO 841223	4.03E-02	4.49E-03	7.91E-03(2S)
	841223 TO 841231	2.24E-02	2.95E-03	4.67E-03(2S)
#9	840806 TO 840813	1.88E-02	3.20E-03	4.40E-03(2S)
	840813 TO 840820	1.69E-02	2.94E-03	3.99E-03(2S)
	840820 TO 840827	2.30E-02	3.32E-03	4.85E-03(2S)
	840827 TO 840904	2.67E-02	5.10E-03	6.66E-03(2S)
	840904 TO 840910	1.67E-02	3.18E-03	4.15E-03(2S)
	840910 TO 840917	7.78E-03	2.09E-03	2.42E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table A
(Page 7 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#9	840917 TO 840924	1.29E-02	2.60E-03	3.29E-03(2S)
	840924 TO 841001	3.54E-02	4.06E-03	7.05E-03(2S)
	841001 TO 841008	3.20E-02	3.88E-03	6.33E-03(2S)
	841008 TO 841015	9.93E-03	2.32E-03	2.79E-03(2S)
	841015 TO 841022	2.00E-02	3.10E-03	4.40E-03(2S)
	841022 TO 841029	2.70E-02	3.64E-03	5.68E-03(2S)
	841029 TO 841105	1.53E-02	2.63E-03	3.61E-03(2S)
	841105 TO 841112	7.38E-03	2.05E-03	2.37E-03(2S)
	841112 TO 841119	1.47E-02	2.57E-03	3.44E-03(2S)
	841119 TO 841126	1.30E-02	2.51E-03	3.28E-03(2S)
	841126 TO 841203	1.05E-02	2.26E-03	2.79E-03(2S)
	841203 TO 841210	6.42E-02	5.14E-03	1.16E-02(2S)
	841210 TO 841217	1.75E-02	2.81E-03	3.99E-03(2S)
	841217 TO 841223	3.42E-02	4.11E-03	6.72E-03(2S)
	841223 TO 841231	1.68E-02	2.55E-03	3.73E-03(2S)

AVERAGE RESULT (WITHOUT CONTROL) = 2.65E-02 (LOW = 5.05E-03, HIGH = 1.64E-01)
235 POSITIVE RESULTS FOUND IN 235 SAMPLES

AVERAGE RESULT FOR CONTROL = 2.10E-02 (LOW = 7.38E-03, HIGH = 6.42E-02)
21 POSITIVE RESULTS FOUND IN 21 SAMPLES

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table B
(Page 1 of 3)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD			RESULT	COUNTING ERROR	OVERALL ERROR
#1	840702 TO 841001	CS-137		1.16E-03	9.16E-04	9.18E-04(2S)
	840702 TO 841001	CS-134		1.32E-03	7.60E-04	7.64E-04(2S)
	840702 TO 841001	BE-7		1.36E-01	3.20E-02	3.20E-02(2S)
	841001 TO 841231	CS-137		* 1.42E-04	3.62E-04	3.62E-04(2S)
	841001 TO 841231	CS-134		* 1.37E-04	4.55E-04	4.55E-04(2S)
	841001 TO 841231	BE-7		4.90E-02	1.18E-02	1.18E-02(2S)
#21	840702 TO 841001	CS-137		6.33E-04	4.22E-04	4.24E-04(2S)
	840702 TO 841001	CS-134		* 2.29E-04	7.66E-04	7.66E-04(2S)
	840702 TO 841001	BE-7		9.91E-02	2.05E-02	2.05E-02(2S)
	841001 TO 841231	CS-137		*-3.99E-05	5.69E-04	5.69E-04(2S)
	841001 TO 841231	CS-134		5.97E-04	5.34E-04	5.35E-04(2S)
	841001 TO 841231	BE-7		6.70E-02	1.37E-02	1.37E-02(2S)
#23	840702 TO 841001	CS-137		6.43E-04	4.54E-04	4.56E-04(2S)
	840702 TO 841001	CS-134		*-5.13E-05	6.65E-04	6.65E-04(2S)
	840702 TO 841001	BE-7		1.72E-01	3.12E-02	3.12E-02(2S)
	841001 TO 841231	CS-137		5.89E-04	3.75E-04	3.76E-04(2S)
	841001 TO 841231	CS-134		*-3.89E-04	6.24E-04	6.25E-04(2S)
	841001 TO 841231	BE-7		7.77E-02	1.41E-02	1.41E-02(2S)
#4	840702 TO 841001	CS-137		*-6.58E-05	6.03E-04	6.03E-04(2S)
	840702 TO 841001	CS-134		*-4.21E-04	6.95E-04	6.95E-04(2S)
	840702 TO 841001	BE-7		1.56E-01	2.61E-02	2.61E-02(2S)
	841001 TO 841231	CS-137		* 2.94E-04	4.60E-04	4.61E-04(2S)
	841001 TO 841231	CS-134		*-3.04E-05	4.62E-04	4.62E-04(2S)
	841001 TO 841231	BE-7		8.89E-02	1.52E-02	1.52E-02(2S)
#40	840702 TO 841001	CS-137		* 4.05E-04	7.09E-04	7.09E-04(2S)
	840702 TO 841001	CS-134		1.03E-03	6.88E-04	6.91E-04(2S)
	840702 TO 841001	BE-7		1.31E-01	2.57E-02	2.57E-02(2S)
	841001 TO 841231	CS-137		*-5.47E-04	5.37E-04	5.38E-04(2S)
	841001 TO 841231	CS-134		* 1.72E-04	4.23E-04	4.23E-04(2S)
	841001 TO 841231	BE-7		5.32E-02	1.25E-02	1.25E-02(2S)
#48	840702 TO 841001	CS-137		* 1.78E-04	5.95E-04	5.95E-04(2S)
	840702 TO 841001	CS-134		*-5.55E-04	9.07E-04	9.07E-04(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table A
(Page 2 of 3)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#48	840702 TO 841001	BE-7	1.27E-01	2.47E-02	2.47E-02(2S)
	841001 TO 841231	CS-137	*-3.29E-04	6.54E-04	6.54E-04(2S)
	841001 TO 841231	CS-134	8.47E-04	4.37E-04	4.40E-04(2S)
	841001 TO 841231	BE-7	6.86E-02	1.65E-02	1.65E-02(2S)
#5	840702 TO 841001	CS-137	*-1.82E-04	8.13E-04	8.13E-04(2S)
	840702 TO 841001	CS-134	* 4.63E-04	4.63E-04	4.64E-04(2S)
	840702 TO 841001	BE-7	1.70E-01	3.07E-02	3.07E-02(2S)
	841001 TO 841231	CS-137	4.70E-04	3.70E-04	3.71E-04(2S)
	841001 TO 841231	CS-134	* 3.15E-04	5.55E-04	5.55E-04(2S)
	841001 TO 841231	BE-7	6.20E-02	1.42E-02	1.42E-02(2S)
#57	840702 TO 841001	CS-137	9.25E-04	5.58E-04	5.61E-04(2S)
	840702 TO 841001	CS-134	* 1.61E-04	7.59E-04	7.59E-04(2S)
	840702 TO 841001	BE-7	1.42E-01	2.63E-02	2.63E-02(2S)
	841001 TO 841231	CS-137	7.72E-04	4.23E-04	4.25E-04(2S)
	841001 TO 841231	CS-134	*-6.34E-04	6.61E-04	6.62E-04(2S)
	841001 TO 841231	BE-7	7.98E-02	1.45E-02	1.45E-02(2S)
#6	840702 TO 841001	CS-137	* 0.00E+00	6.19E-04	6.19E-04(2S)
	840702 TO 841001	CS-134	* 8.45E-05	1.69E-04	1.69E-04(2S)
	840702 TO 841001	BE-7	1.61E-01	2.58E-02	2.58E-02(2S)
	841001 TO 841231	CS-137	* 4.06E-05	4.94E-04	4.94E-04(2S)
	841001 TO 841231	CS-134	8.33E-04	4.16E-04	4.19E-04(2S)
	841001 TO 841231	BE-7	7.79E-02	1.47E-02	1.47E-02(2S)
#7	840702 TO 841001	CS-137	9.31E-04	7.22E-04	7.24E-04(2S)
	840702 TO 841001	CS-134	* 4.79E-05	6.49E-04	6.49E-04(2S)
	840702 TO 841001	BE-7	1.32E-01	2.80E-02	2.80E-02(2S)
	841001 TO 841231	CS-137	1.08E-03	8.44E-04	8.46E-04(2S)
	841001 TO 841231	CS-134	* 3.41E-04	4.38E-04	4.39E-04(2S)
	841001 TO 841231	BE-7	8.09E-02	1.62E-02	1.62E-02(2S)
#8	840702 TO 841001	CS-137	* 6.20E-04	6.44E-04	6.45E-04(2S)
	840702 TO 841001	CS-134	* 2.34E-04	6.89E-04	6.89E-04(2S)
	840702 TO 841001	BE-7	1.84E-01	2.84E-02	2.84E-02(2S)
	841001 TO 841231	CS-137	* 1.70E-04	3.15E-04	3.16E-04(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table B
(Page 3 of 3)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF PARTICLE FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#8	841001 TO 841231	CS-134	* 3.11E-04	4.43E-04	4.44E-04(2S)
	841001 TO 841231	BE-7	6.11E-02	1.44E-02	1.44E-02(2S)
#9	840702 TO 841001	CS-137	*-8.94E-04	7.66E-04	7.68E-04(2S)
	840702 TO 841001	CS-134	5.29E-04	4.32E-04	4.33E-04(2S)
	840702 TO 841001	BE-7	1.41E-01	2.49E-02	2.49E-02(2S)
	841001 TO 841231	CS-137	* 2.13E-04	3.76E-04	3.76E-04(2S)
	841001 TO 841231	CS-134	4.78E-04	4.22E-04	4.23E-04(2S)
	841001 TO 841231	BE-7	5.94E-02	1.26E-02	1.26E-02(2S)

AVERAGE RESULT (WITHOUT CONTROL) = 3.62E-02 (LOW = -6.34E-04, HIGH = 1.84E-01)
36 POSITIVE RESULTS FOUND IN 66 SAMPLES

AVERAGE RESULT FOR CONTROL = 3.35E-02 (LOW = -8.94E-04, HIGH = 1.41E-01)
4 POSITIVE RESULTS FOUND IN 6 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	3.59E-04	-5.47E-04	1.16E-03	22	9
CS-137 (CONTROL)	-3.41E-04	-8.94E-04	2.13E-04	2	0
CS-134	2.28E-04	-6.34E-04	1.32E-03	22	5
CS-134 (CONTROL)	5.03E-04	4.78E-04	5.29E-04	2	2
BE-7	1.08E-01	4.90E-02	1.84E-01	22	22
BE-7 (CONTROL)	1.00E-01	5.94E-02	1.41E-01	2	2

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table C
(Page 1 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131 IN CHARCOAL FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#1	840806 TO 840813	*-2.92E-04	1.05E-02	1.05E-02(2S)
	840813 TO 840820	* 1.66E-03	7.76E-03	7.76E-03(2S)
	840820 TO 840827	*-4.58E-03	8.21E-03	8.21E-03(2S)
	840827 TO 840904	*-4.12E-03	1.07E-02	1.07E-02(2S)
	840904 TO 840910	*-2.71E-03	1.00E-02	1.00E-02(2S)
	840910 TO 840917	* 1.38E-03	6.96E-03	6.96E-03(2S)
	840917 TO 840924	* 6.17E-03	6.65E-03	6.66E-03(2S)
	840924 TO 841001	*-1.08E-02	1.05E-02	1.05E-02(2S)
	841001 TO 841008	*-5.05E-04	1.02E-02	1.02E-02(2S)
	841008 TO 841015	*-3.47E-03	9.21E-03	9.21E-03(2S)
	841015 TO 841022	*-1.04E-02	1.35E-02	1.35E-02(2S)
	841022 TO 841029	* 1.48E-03	1.32E-02	1.32E-02(2S)
	841029 TO 841105	*-1.25E-02	1.46E-02	1.46E-02(2S)
	841105 TO 841112	* 5.75E-03	9.09E-03	9.09E-03(2S)
	841112 TO 841119	2.55E-02	1.13E-02	1.14E-02(2S)
	841119 TO 841126	* 4.37E-03	6.51E-03	6.51E-03(2S)
	841126 TO 841203	*-1.22E-02	1.18E-02	1.18E-02(2S)
	841203 TO 841210	*-3.73E-03	9.87E-03	9.88E-03(2S)
	841210 TO 841217	*-1.52E-02	1.22E-02	1.22E-02(2S)
	841217 TO 841223	4.03E-02	1.78E-02	1.80E-02(2S)
	841223 TO 841231	* 5.38E-03	8.41E-03	8.41E-03(2S)
#21	840806 TO 840813	*-7.92E-03	9.62E-03	9.63E-03(2S)
	840813 TO 840820	*-2.69E-03	8.82E-03	8.82E-03(2S)
	840820 TO 840827	* 1.46E-03	9.44E-03	9.44E-03(2S)
	840827 TO 840904	1.09E-02	8.89E-03	8.89E-03(2S)
	840904 TO 840910	1.65E-02	1.10E-02	1.11E-02(2S)
	840910 TO 840917	*-6.38E-03	8.61E-03	8.62E-03(2S)
	840917 TO 840924	* 2.74E-03	1.00E-02	1.00E-02(2S)
	840924 TO 841001	1.03E-02	8.72E-03	8.74E-03(2S)
	841001 TO 841008	* 3.62E-03	6.79E-03	6.79E-03(2S)
	841008 TO 841015	*-2.84E-03	1.11E-02	1.11E-02(2S)
	841015 TO 841022	* 1.14E-03	9.80E-03	9.80E-03(2S)
	841022 TO 841029	*-2.43E-02	1.64E-02	1.64E-02(2S)
	841029 TO 841105	1.73E-02	1.13E-02	1.13E-02(2S)
	841105 TO 841112	* 5.32E-03	9.54E-03	9.55E-03(2S)
	841112 TO 841119	*-3.84E-04	1.02E-02	1.02E-02(2S)
	841119 TO 841126	1.14E-02	9.00E-03	9.03E-03(2S)
	841126 TO 841203	*-2.71E-03	1.05E-02	1.05E-02(2S)
	841203 TO 841210	*-9.05E-03	8.98E-03	9.00E-03(2S)
	841210 TO 841217	*-4.12E-03	2.56E-02	2.56E-02(2S)
	841217 TO 841223	*-1.83E-03	1.14E-02	1.14E-02(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table C
(Page 2 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131 IN CHARCOAL FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#21	841223 TO 841231	* 4.95E-03	7.25E-03	7.26E-03(2S)
#23	840806 TO 840813	* 2.33E-03	7.17E-03	7.17E-03(2S)
	840813 TO 840820	*-4.40E-03	8.76E-03	8.76E-03(2S)
	840820 TO 840827	* 5.08E-03	8.11E-03	8.11E-03(2S)
	840827 TO 840904	*-8.61E-03	1.17E-02	1.17E-02(2S)
	840904 TO 840910	* 3.52E-03	7.30E-03	7.30E-03(2S)
	840910 TO 840917	*-1.65E-03	9.11E-03	9.11E-03(2S)
	840917 TO 840924	*-8.53E-03	1.02E-02	1.02E-02(2S)
	840924 TO 841001	9.18E-03	8.14E-03	8.16E-03(2S)
	841001 TO 841008	*-1.56E-02	1.12E-02	1.13E-02(2S)
	841008 TO 841015	* 4.40E-03	6.57E-03	6.57E-03(2S)
	841015 TO 841022	* 5.49E-04	1.13E-02	1.13E-02(2S)
	841022 TO 841029	*-1.52E-02	1.46E-02	1.47E-02(2S)
	841029 TO 841105	* 9.55E-03	1.43E-02	1.43E-02(2S)
	841105 TO 841112	* 4.71E-03	9.38E-03	9.38E-03(2S)
	841112 TO 841119	*-1.33E-02	1.60E-02	1.61E-02(2S)
	841119 TO 841126	8.77E-03	7.38E-03	7.40E-03(2S)
	841126 TO 841203	*-2.94E-03	6.79E-03	6.79E-03(2S)
	841203 TO 841210	*-1.92E-03	9.66E-03	9.66E-03(2S)
	841210 TO 841217	*-4.51E-03	1.05E-02	1.06E-02(2S)
	841217 TO 841223	* 5.08E-03	8.43E-03	8.43E-03(2S)
	841223 TO 841231	*-2.56E-03	8.38E-03	8.38E-03(2S)
#4	840806 TO 840813	*-7.90E-03	9.60E-03	9.62E-03(2S)
	840813 TO 840820	* 4.57E-03	6.49E-03	6.49E-03(2S)
	840820 TO 840827	*-5.03E-03	8.95E-03	8.96E-03(2S)
	840827 TO 840904	*-4.73E-03	1.16E-02	1.16E-02(2S)
	840904 TO 840910	1.67E-02	8.43E-03	8.49E-03(2S)
	840910 TO 840917	*-1.72E-03	8.18E-03	8.18E-03(2S)
	840917 TO 840924	*-1.53E-03	8.48E-03	8.48E-03(2S)
	840924 TO 841001	* 1.31E-03	6.62E-03	6.62E-03(2S)
	841001 TO 841008	* 3.92E-03	1.04E-02	1.04E-02(2S)
	841008 TO 841015	*-3.42E-03	1.20E-02	1.20E-02(2S)
	841015 TO 841022	* 6.59E-03	7.09E-03	7.11E-03(2S)
	841022 TO 841029	* 2.99E-03	1.14E-02	1.14E-02(2S)
	841029 TO 841105	* 2.04E-03	1.32E-02	1.32E-02(2S)
	841105 TO 841112	*-2.40E-03	5.48E-03	5.48E-03(2S)
	841112 TO 841119	2.78E-02	1.02E-02	1.04E-02(2S)
	841119 TO 841126	* 4.40E-03	9.73E-03	9.74E-03(2S)
	841126 TO 841203	*-1.18E-03	1.11E-02	1.11E-02(2S)
	841203 TO 841210	*-5.98E-03	9.72E-03	9.73E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table C
(Page 3 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131 IN CHARCOAL FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#4	841210 TO 841217	* 9.17E-03	1.52E-02	1.52E-02(2S)
	841217 TO 841223	*-3.03E-03	1.25E-02	1.25E-02(2S)
	841223 TO 841231	*-5.46E-03	9.77E-03	9.78E-03(2S)
#40	840806 TO 840813	* 2.82E-03	7.28E-03	7.28E-03(2S)
	840813 TO 840820	*-9.45E-03	9.40E-03	9.41E-03(2S)
	840820 TO 840827	*-5.13E-03	7.55E-03	7.56E-03(2S)
	840827 TO 840904	*-5.16E-03	9.11E-03	9.11E-03(2S)
	840904 TO 840910	* 1.17E-03	1.04E-02	1.04E-02(2S)
	840910 TO 840917	*-5.65E-03	1.12E-02	1.13E-02(2S)
	840917 TO 840924	* 2.05E-03	8.18E-03	8.18E-03(2S)
	840924 TO 841001	*-1.78E-02	1.22E-02	1.22E-02(2S)
	841001 TO 841008	*-6.65E-03	9.01E-03	9.02E-03(2S)
	841008 TO 841015	*-1.92E-03	6.79E-03	6.79E-03(2S)
	841015 TO 841022	1.06E-02	6.28E-03	6.31E-03(2S)
	841022 TO 841029	1.71E-02	1.12E-02	1.13E-02(2S)
	841029 TO 841105	1.28E-02	1.06E-02	1.06E-02(2S)
	841105 TO 841112	*-6.90E-03	9.56E-03	9.57E-03(2S)
	841112 TO 841119	* 3.15E-03	1.15E-02	1.15E-02(2S)
	841119 TO 841126	* 3.16E-03	9.31E-03	9.31E-03(2S)
	841126 TO 841203	* 1.72E-03	7.52E-03	7.52E-03(2S)
	841203 TO 841210	*-4.57E-03	1.02E-02	1.02E-02(2S)
	841210 TO 841217	1.23E-02	9.06E-03	9.09E-03(2S)
	841217 TO 841223	* 4.69E-03	9.22E-03	9.23E-03(2S)
	841223 TO 841231	*-2.77E-03	7.22E-03	7.22E-03(2S)
#48	840806 TO 840813	*-4.76E-03	8.23E-03	7.37E-03(2S)
	840813 TO 840820	* 6.60E-04	7.07E-03	7.07E-03(2S)
	840820 TO 840827	* 1.96E-03	8.49E-03	8.49E-03(2S)
	840827 TO 840904	*-3.77E-04	1.19E-02	1.19E-02(2S)
	840904 TO 840910	*-4.59E-03	1.22E-02	1.22E-02(2S)
	840910 TO 840917	* 1.16E-03	9.00E-03	9.00E-03(2S)
	840917 TO 840924	* 8.25E-03	8.33E-03	8.34E-03(2S)
	840924 TO 841001	*-1.23E-03	1.16E-02	1.16E-02(2S)
	841001 TO 841008	* 3.45E-03	8.90E-03	8.91E-03(2S)
	841008 TO 841015	* 6.37E-03	7.35E-03	7.36E-03(2S)
	841015 TO 841022	1.04E-02	9.87E-03	9.89E-03(2S)
	841022 TO 841029	*-9.86E-03	1.39E-02	1.39E-02(2S)
	841029 TO 841105	*-6.12E-03	1.09E-02	1.09E-02(2S)
	841105 TO 841112	* 1.36E-03	1.01E-02	1.01E-02(2S)
	841112 TO 841119	*-1.45E-02	1.91E-02	1.91E-02(2S)
	841119 TO 841126	1.18E-02	7.30E-03	7.33E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table C
(Page 4 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131 IN CHARCOAL FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#48	841126 TO 841203	* 2.08E-02	3.10E-02	3.10E-02(2S)
	841203 TO 841210	*-8.43E-03	1.05E-02	1.05E-02(2S)
	841210 TO 841217	*-3.62E-03	1.09E-02	1.09E-02(2S)
	841217 TO 841223	*-3.09E-03	2.19E-02	2.19E-02(2S)
	841223 TO 841231	* 1.96E-03	8.56E-03	8.56E-03(2S)
#5	840806 TO 840813	* 3.47E-03	8.96E-03	8.96E-03(2S)
	840813 TO 840820	7.73E-03	6.97E-03	6.99E-03(2S)
	840820 TO 840827	*-3.79E-03	7.58E-03	7.59E-03(2S)
	840827 TO 840904	* 1.76E-03	1.01E-02	1.01E-02(2S)
	840904 TO 840910	*-3.08E-03	8.49E-03	8.49E-03(2S)
	840910 TO 840917	* 1.93E-03	8.43E-03	8.43E-03(2S)
	840917 TO 840924	*-1.03E-02	8.62E-03	8.64E-03(2S)
	840924 TO 841001	*-2.18E-04	6.88E-03	6.88E-03(2S)
	841001 TO 841008	* 4.06E-03	9.07E-03	9.07E-03(2S)
	841008 TO 841015	*-4.38E-03	1.01E-02	1.01E-02(2S)
	841015 TO 841022	*-5.91E-03	9.46E-03	9.46E-03(2S)
	841022 TO 841029	*-1.88E-03	1.46E-02	1.46E-02(2S)
	841029 TO 841105	*-1.05E-03	1.33E-02	1.33E-02(2S)
	841105 TO 841112	* 1.10E-03	9.47E-03	9.47E-03(2S)
	841112 TO 841119	* 7.22E-04	1.48E-02	1.48E-02(2S)
	841119 TO 841126	* 4.81E-04	8.23E-03	8.23E-03(2S)
	841126 TO 841203	* 5.86E-04	1.00E-02	1.00E-02(2S)
	841203 TO 841210	*-3.55E-03	8.11E-03	8.11E-03(2S)
#57	841210 TO 841217	*-1.49E-03	9.26E-03	9.26E-03(2S)
	841217 TO 841223	*-9.86E-03	2.52E-02	2.52E-02(2S)
	841223 TO 841231	* 6.13E-03	7.72E-03	7.73E-03(2S)
	840806 TO 840813	* 4.13E-03	9.22E-03	9.22E-03(2S)
	840813 TO 840820	*-5.87E-03	8.64E-03	8.64E-03(2S)
	840820 TO 840827	* 8.74E-03	8.74E-03	8.74E-03(2S)
	840827 TO 840904	*-1.40E-02	2.45E-02	2.45E-02(2S)
	840904 TO 840910	*-2.07E-02	1.38E-02	1.39E-02(2S)
	840910 TO 840917	* 1.47E-03	1.08E-02	1.08E-02(2S)
	840917 TO 840924	* 3.40E-03	7.58E-03	7.58E-03(2S)
	840924 TO 841001	*-4.69E-04	7.90E-03	7.90E-03(2S)
	841001 TO 841008	* 2.49E-04	9.54E-03	9.54E-03(2S)
#57	841008 TO 841015	*-3.05E-03	9.98E-03	9.98E-03(2S)
	841015 TO 841022	*-1.85E-03	1.13E-02	1.13E-02(2S)
	841022 TO 841029	* 0.00E+00	1.20E-02	1.20E-02(2S)
	841029 TO 841105	* 8.26E-03	8.30E-03	8.32E-03(2S)
	841105 TO 841112	*-3.53E-03	7.06E-03	7.06E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table C
(Page 5 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131 IN CHARCOAL FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#57	841112 TO 841119	*-6.89E-03	1.44E-02	1.45E-02(2S)
	841119 TO 841126	7.29E-03	5.58E-03	5.60E-03(2S)
	841126 TO 841203	*-1.01E-02	1.18E-02	1.18E-02(2S)
	841203 TO 841210	*-3.86E-03	8.75E-03	8.75E-03(2S)
	841210 TO 841217	* 8.47E-03	1.40E-02	1.41E-02(2S)
	841217 TO 841223	*-6.58E-03	2.94E-02	2.94E-02(2S)
	841223 TO 841231	* 6.27E-03	8.57E-03	8.57E-03(2S)
#6	840806 TO 840813	8.72E-03	7.47E-03	7.48E-03(2S)
	840813 TO 840820	*-6.63E-03	7.82E-03	7.83E-03(2S)
	840820 TO 840827	6.84E-03	6.84E-03	6.84E-03(2S)
	840827 TO 840904	* 5.23E-03	9.46E-03	9.47E-03(2S)
	840904 TO 840910	*-1.17E-02	1.12E-02	1.13E-02(2S)
	840910 TO 840917	* 2.84E-03	9.92E-03	9.93E-03(2S)
	840917 TO 840924	* 6.77E-03	1.02E-02	1.02E-02(2S)
	840924 TO 841001	* 3.56E-03	1.03E-02	1.03E-02(2S)
	841001 TO 841008	* 3.74E-03	7.36E-03	7.37E-03(2S)
	841008 TO 841015	*-2.51E-04	1.02E-02	1.02E-02(2S)
	841015 TO 841022	* 8.70E-03	1.22E-02	1.22E-02(2S)
	841022 TO 841029	* 9.69E-03	1.16E-02	1.17E-02(2S)
	841029 TO 841105	* 1.58E-03	7.96E-03	7.96E-03(2S)
	841105 TO 841112	*-3.55E-03	9.43E-03	9.43E-03(2S)
	841112 TO 841119	*-1.97E-02	1.56E-02	1.56E-02(2S)
	841119 TO 841126	*-1.83E-03	8.71E-03	8.71E-03(2S)
	841126 TO 841203	* 4.57E-03	9.09E-03	9.10E-03(2S)
	841203 TO 841210	*-2.55E-03	7.79E-03	7.79E-03(2S)
	841210 TO 841217	*-1.79E-03	1.12E-02	1.12E-02(2S)
	841217 TO 841223	* 6.66E-03	1.47E-02	1.47E-02(2S)
	841223 TO 841231	*-3.31E-03	7.56E-03	7.56E-03(2S)
#7	840806 TO 840813	* 7.79E-03	8.48E-03	8.49E-03(2S)
	840813 TO 840820	*-1.79E-02	1.20E-02	1.21E-02(2S)
	840820 TO 840827	*-7.45E-03	8.01E-03	8.02E-03(2S)
	840827 TO 840904	1.16E-02	1.04E-02	1.05E-02(2S)
	840904 TO 840910	* 3.53E-04	1.12E-02	1.12E-02(2S)
	840910 TO 840917	*-3.76E-03	6.54E-03	6.54E-03(2S)
	840917 TO 840924	*-7.23E-04	8.59E-03	8.59E-03(2S)
	840924 TO 841001	*-6.44E-03	9.71E-03	9.71E-03(2S)
	841001 TO 841008	*-8.41E-03	9.92E-03	9.93E-03(2S)
	841008 TO 841015	* 7.62E-03	7.70E-03	7.71E-03(2S)
	841015 TO 841022	1.26E-02	7.74E-03	7.77E-03(2S)
	841022 TO 841029	*-1.29E-02	1.46E-02	1.47E-02(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table C
(Page 6 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131 IN CHARCOAL FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#7	841029 TO 841105	* 1.13E-02	1.31E-02	1.31E-02(2S)
	841105 TO 841112	*-6.41E-03	8.65E-03	8.66E-03(2S)
	841112 TO 841119	*-1.13E-02	1.47E-02	1.47E-02(2S)
	841119 TO 841126	* 3.52E-03	9.92E-03	9.92E-03(2S)
	841126 TO 841203	* 7.50E-03	8.10E-03	8.11E-03(2S)
	841203 TO 841210	* 3.44E-03	6.78E-03	6.79E-03(2S)
	841210 TO 841217	*-3.63E-03	8.30E-03	8.31E-03(2S)
	841217 TO 841223	1.33E-02	1.09E-02	1.09E-02(2S)
	841223 TO 841231	*-4.03E-04	5.87E-03	5.87E-03(2S)
#8	840806 TO 840813	*-2.59E-04	8.21E-03	8.21E-03(2S)
	840813 TO 840820	* 2.98E-03	7.19E-03	7.19E-03(2S)
	840820 TO 840827	*-9.65E-03	1.02E-02	1.02E-02(2S)
	840827 TO 840904	*-1.23E-02	1.16E-02	1.17E-02(2S)
	840904 TO 840910	* 7.16E-03	1.07E-02	1.08E-02(2S)
	840910 TO 840917	*-1.15E-02	1.10E-02	1.10E-02(2S)
	840917 TO 840924	* 2.11E-03	9.18E-03	9.18E-03(2S)
	840924 TO 841001	* 6.12E-03	8.00E-03	8.01E-03(2S)
	841001 TO 841008	*-1.15E-02	1.10E-02	1.11E-02(2S)
	841008 TO 841015	7.73E-03	6.50E-03	6.52E-03(2S)
	841015 TO 841022	* 5.06E-03	8.10E-03	8.10E-03(2S)
	841022 TO 841029	*-3.30E-03	1.57E-02	1.57E-02(2S)
	841029 TO 841105	*-3.59E-03	1.17E-02	1.18E-02(2S)
	841105 TO 841112	* 1.21E-03	7.86E-03	7.86E-03(2S)
	841112 TO 841119	*-6.11E-03	1.41E-02	1.41E-02(2S)
	841119 TO 841126	* 2.36E-03	8.98E-03	8.98E-03(2S)
	841126 TO 841203	*-8.76E-03	8.50E-03	8.51E-03(2S)
	841203 TO 841210	*-7.22E-03	9.53E-03	9.54E-03(2S)
	841210 TO 841217	*-1.61E-03	1.00E-02	1.00E-02(2S)
	841217 TO 841223	*-6.75E-03	1.09E-02	1.09E-02(2S)
	841223 TO 841231	8.15E-03	7.29E-03	7.30E-03(2S)
#9	840806 TO 840813	* 2.78E-03	6.01E-03	6.01E-03(2S)
	840813 TO 840820	*-2.40E-03	9.35E-03	9.35E-03(2S)
	840820 TO 840827	*-4.71E-04	7.93E-03	7.93E-03(2S)
	840827 TO 840904	*-1.55E-02	2.28E-02	2.28E-02(2S)
	840904 TO 840910	*-5.84E-03	1.13E-02	1.13E-02(2S)
	840910 TO 840917	*-4.02E-03	9.84E-03	9.85E-03(2S)
	840917 TO 840924	*-9.54E-03	1.03E-02	1.03E-02(2S)
	840924 TO 841001	1.31E-02	7.77E-03	7.81E-03(2S)
	841001 TO 841008	* 2.32E-03	8.49E-03	8.49E-03(2S)
	841008 TO 841015	* 6.42E-03	6.93E-03	6.94E-03(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table C
(Page 7 of 7)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131 IN CHARCOAL FILTER
Results in pCi/cubic meter

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#9	841015 TO 841022	* 4.09E-03	9.02E-03	9.03E-03(2S)
	841022 TO 841029	1.72E-02	1.27E-02	1.28E-02(2S)
	841029 TO 841105	*-1.83E-02	1.33E-02	1.34E-02(2S)
	841105 TO 841112	9.71E-03	8.33E-03	8.35E-03(2S)
	841112 TO 841119	*-9.79E-03	1.30E-02	1.30E-02(2S)
	841119 TO 841126	* 1.73E-03	6.87E-03	6.87E-03(2S)
	841126 TO 841203	*-1.85E-03	9.30E-03	9.30E-03(2S)
	841203 TO 841210	2.28E-02	7.22E-03	7.35E-03(2S)
	841210 TO 841217	* 1.61E-03	8.09E-03	8.09E-03(2S)
	841217 TO 841223	* 5.81E-04	8.62E-03	8.62E-03(2S)
	841223 TO 841231	*-4.88E-03	6.93E-03	6.94E-03(2S)

AVERAGE RESULT (WITHOUT CONTROL) = -2.36E-05 (LOW = -2.43E-02, HIGH = 4.03E-02)
27 POSITIVE RESULTS FOUND IN 231 SAMPLES

AVERAGE RESULT FOR CONTROL = 4.64E-04 (LOW = -1.83E-02, HIGH = 2.28E-02)
4 POSITIVE RESULTS FOUND IN 21 SAMPLES

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

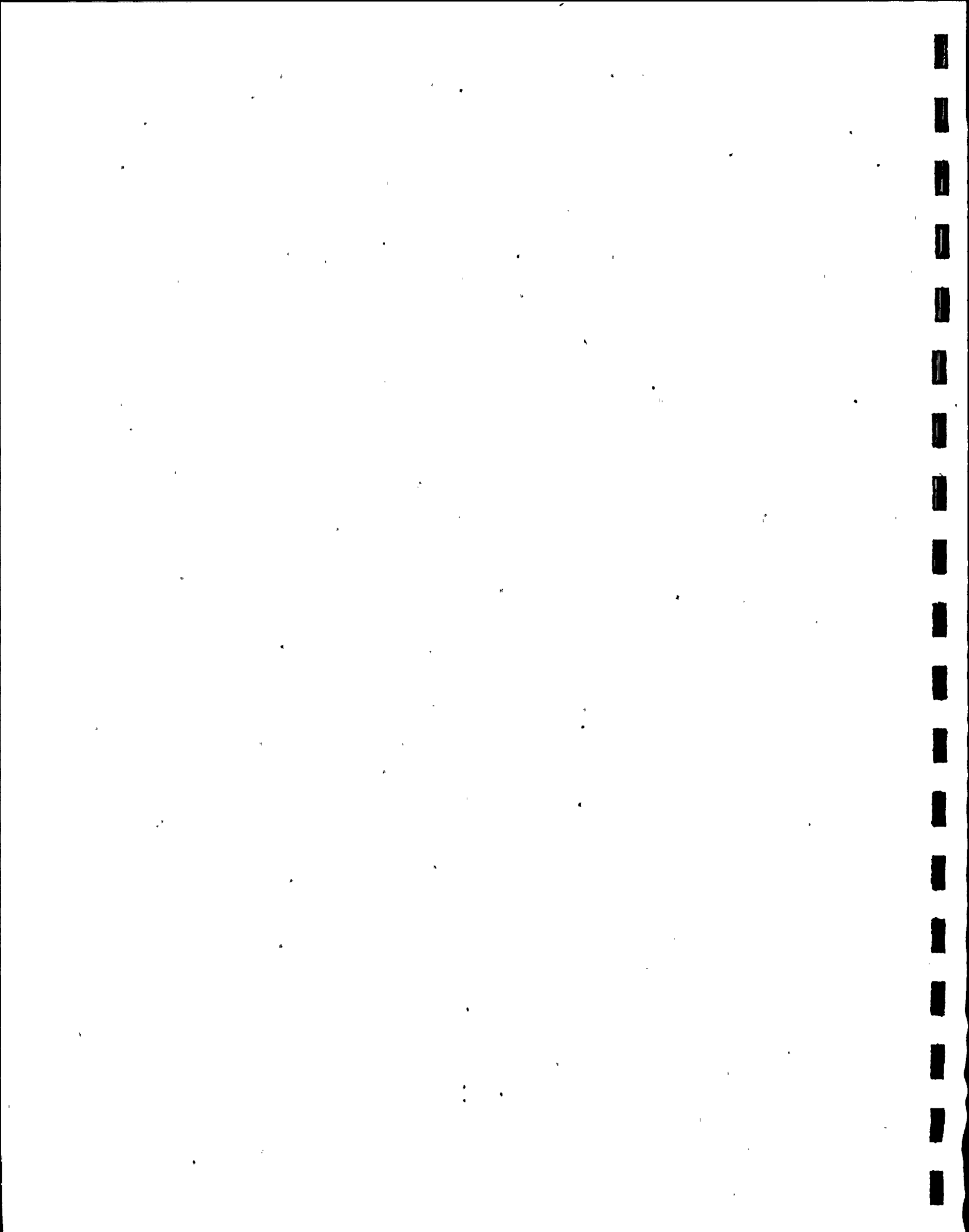


Table D
(Page 1)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

BETA IN WATER.
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#26	840717 TO 840815	* 9.68E-01	1.22E+00	1.23E+00(2S)
	840815 TO 840912	3.01E+00	1.65E+00	1.72E+00(2S)
	840912 TO 841018	* 1.10E+00	1.45E+00	1.46E+00(2S)
	841018 TO 841120	1.26E+00	4.70E-01	5.09E-01(2S)
	841120 TO 841219	* 2.75E-02	1.07E+00	1.07E+00(2S)
#27	840815 TO 840912	3.86E+00	1.74E+00	1.84E+00(2S)
	840912 TO 841018	4.13E+00	1.71E+00	1.83E+00(2S)
	841018 TO 841120	4.23E+00	7.65E-01	1.01E+00(2S)
	841120 TO 841219	4.77E+00	1.71E+00	1.86E+00(2S)
#28	840717 TO 840815	*-2.26E-01	6.60E-01	6.61E-01(2S)
	840815 TO 840912	* 8.33E-01	1.23E+00	1.24E+00(2S)
	840912 TO 841018	1.88E+00	1.30E+00	1.33E+00(2S)
	841018 TO 841120	1.30E+00	4.69E-01	5.11E-01(2S)
	841120 TO 841219	1.72E+00	1.22E+00	1.24E+00(2S)
#29	840717 TO 840815	*-1.24E-02	1.07E+00	1.07E+00(2S)
	840815 TO 840912	2.40E+00	1.43E+00	1.47E+00(2S)
	840912 TO 841018	1.23E+00	1.18E+00	1.19E+00(2S)
	841018 TO 841120	1.72E+00	4.99E-01	5.67E-01(2S)
	841120 TO 841219	1.45E+00	1.14E+00	1.16E+00(2S)

AVERAGE RESULT (WITHOUT CONTROL) = 2.09E+00 (LOW = -2.26E-01, HIGH = 4.77E+00)
11 POSITIVE RESULTS FOUND IN 14 SAMPLES

AVERAGE RESULT FOR CONTROL = 1.27E+00 (LOW = 2.75E-02, HIGH = 3.01E+00)
2 POSITIVE RESULTS FOUND IN 5 SAMPLES

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

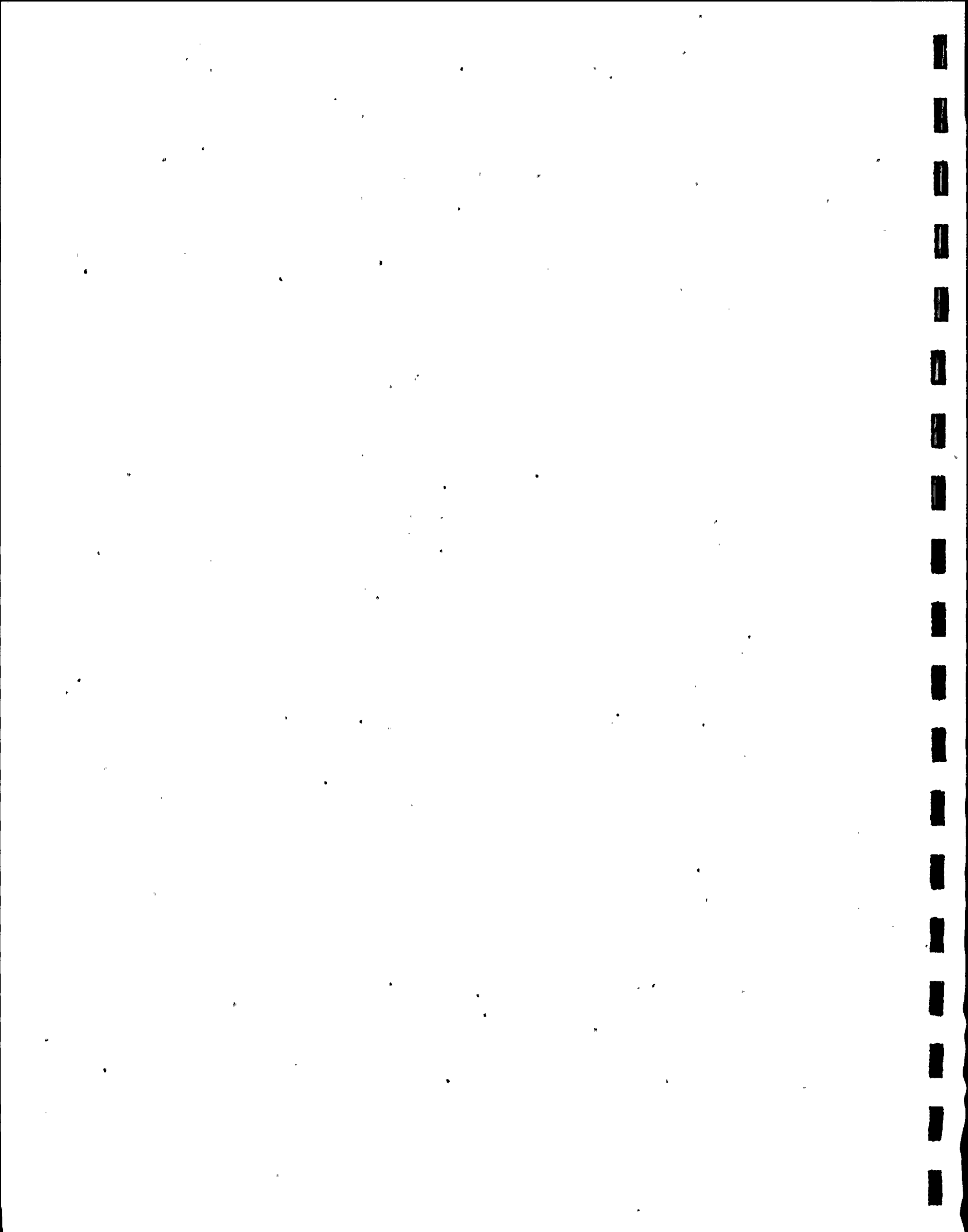


Table E
(Page 1)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

TRITIUM IN WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#26	840612 TO 840912	6.79E+02	2.01E+02	2.45E+02(2S)
	840912 TO 841219	* 2.05E+02	2.21E+02	2.85E+02(2S)
#27	840612 TO 840912	6.35E+02	2.00E+02	2.43E+02(2S)
	840912 TO 841219	8.50E+02	2.33E+02	3.10E+02(2S)
#28	840612 TO 840912	4.31E+02	1.95E+02	2.35E+02(2S)
	840912 TO 841219	5.96E+02	2.29E+02	3.00E+02(2S)
#29	840612 TO 840912	3.48E+02	1.94E+02	2.32E+02(2S)
	840912 TO 841219	* 1.91E+02	2.21E+02	2.85E+02(2S)
#31	840913 TO 840913	* 3.89E+01	1.96E+02	2.27E+02(2S)
	841219 TO 841219	* 2.61E+02	2.22E+02	2.87E+02(2S)
#32	840913 TO 840913	*-3.24E+01	1.95E+02	2.25E+02(2S)
	841219 TO 841219	* 1.98E+02	2.21E+02	2.85E+02(2S)
#52	840913 TO 840913	3.24E+02	2.02E+02	2.36E+02(2S)
	841220 TO 841220	*-5.16E+02	1.85E+02	2.32E+02(2S)

AVERAGE RESULT (WITHOUT CONTROL) = 2.77E+02 (LOW = -5.16E+02, HIGH = 8.50E+02)
6 POSITIVE RESULTS FOUND IN 12 SAMPLES

AVERAGE RESULT FOR CONTROL = 4.42E+02 (LOW = 2.05E+02, HIGH = 6.79E+02)
1 POSITIVE RESULTS FOUND IN 2 SAMPLES

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 1 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#26	840717 TO 840815	LA-140	* 2.48E+00	1.17E+01 1.17E+01(2S)
	840717 TO 840815	CO-60	1.23E+00	1.16E+00 1.17E+00(2S)
	840717 TO 840815	FE-59	* 2.90E+00	3.26E+00 3.26E+00(2S)
	840717 TO 840815	ZN-65	* 6.48E-01	2.22E+00 2.22E+00(2S)
	840717 TO 840815	MN-54	*-6.72E-01	1.12E+00 1.12E+00(2S)
	840717 TO 840815	CO-58	*-2.53E+00	1.50E+00 1.50E+00(2S)
	840717 TO 840815	NB-95	* 9.66E-01	1.64E+00 1.64E+00(2S)
	840717 TO 840815	ZR-95	* 2.02E+00	2.15E+00 2.15E+00(2S)
	840717 TO 840815	CS-137	*-3.17E-01	1.04E+00 1.04E+00(2S)
	840717 TO 840815	CS-134	* 5.55E-01	1.21E+00 1.21E+00(2S)
	840717 TO 840815	BA-140	* 5.00E+00	2.36E+01 2.36E+01(2S)
	840815 TO 840912	LA-140	* 1.72E-01	2.71E-01 2.71E-01(2S)
	840815 TO 840912	CO-60	* 0.00E+00	3.58E-01 3.58E-01(2S)
	840815 TO 840912	FE-59	* 2.71E-01	1.33E+00 1.33E+00(2S)
	840815 TO 840912	ZN-65	*-2.28E-01	7.71E-01 7.71E-01(2S)
	840815 TO 840912	MN-54	*-8.92E-02	3.59E-01 3.59E-01(2S)
	840815 TO 840912	CO-58	*-4.31E-01	5.27E-01 5.27E-01(2S)
	840815 TO 840912	NB-95	* 6.37E-01	7.72E-01 7.72E-01(2S)
	840815 TO 840912	ZR-95	* 3.69E-01	8.90E-01 8.90E-01(2S)
	840815 TO 840912	CS-137	*-2.40E-01	3.32E-01 3.32E-01(2S)
	840815 TO 840912	CS-134	4.98E-01	3.04E-01 3.04E-01(2S)
	840815 TO 840912	BA-140	*-1.25E+01	2.66E-01 2.66E-01(2S)
	840912 TO 841018	LA-140	*-2.34E+00	2.60E+00 2.60E+00(2S)
	840912 TO 841018	CO-60	1.36E+00	1.11E+00 1.12E+00(2S)
	840912 TO 841018	FE-59	*-7.54E+00	5.37E+00 5.39E+00(2S)
	840912 TO 841018	ZN-65	*-7.05E+00	5.54E+00 5.56E+00(2S)
	840912 TO 841018	MN-54	*-8.73E-01	1.43E+00 1.43E+00(2S)
	840912 TO 841018	CO-58	* 1.67E-01	1.86E+00 1.86E+00(2S)
	840912 TO 841018	NB-95	* 2.95E-01	1.60E+00 1.60E+00(2S)
	840912 TO 841018	ZR-95	*-1.58E+00	3.62E+00 3.62E+00(2S)
	840912 TO 841018	CS-137	* 1.90E-01	1.73E+00 1.73E+00(2S)
	840912 TO 841018	CS-134	*-1.57E-01	1.69E+00 1.69E+00(2S)
	840912 TO 841018	BA-140	*-4.56E+01	2.78E+01 2.79E+01(2S)
	841018 TO 841120	LA-140	2.18E+00	1.82E+00 1.82E+00(2S)
	841018 TO 841120	CO-60	1.36E+00	7.86E-01 7.90E-01(2S)
	841018 TO 841120	FE-59	* 1.24E+00	2.17E+00 2.17E+00(2S)
	841018 TO 841120	ZN-65	*-7.25E-01	2.25E+00 2.25E+00(2S)
	841018 TO 841120	MN-54	*-5.43E-01	1.19E+00 1.19E+00(2S)
	841018 TO 841120	CO-58	1.59E+00	1.01E+00 1.02E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 2 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD			RESULT	COUNTING ERROR	OVERALL ERROR
#26	841018	TO 841120	NB-95	* 6.92E-01	1.96E+00	1.96E+00(2S)
	841018	TO 841120	ZR-95	*-4.20E-01	2.43E+00	2.43E+00(2S)
	841018	TO 841120	CS-137	*-3.99E-01	1.20E+00	1.20E+00(2S)
	841018	TO 841120	CS-134	* 3.31E-01	1.38E+00	1.38E+00(2S)
	841018	TO 841120	BA-140	*-2.02E+00	2.40E+01	2.40E+01(2S)
	841120	TO 841219	LA-140	*-2.75E+00	3.56E+00	3.56E+00(2S)
	841120	TO 841219	CO-60	*-9.05E-01	2.12E+00	2.12E+00(2S)
	841120	TO 841219	FE-59	*-5.05E-01	4.63E+00	4.63E+00(2S)
	841120	TO 841219	ZN-65	* 1.43E+00	3.11E+00	3.11E+00(2S)
	841120	TO 841219	MN-54	* 1.23E+00	1.68E+00	1.68E+00(2S)
	841120	TO 841219	CO-58	*-7.31E-01	1.55E+00	1.55E+00(2S)
	841120	TO 841219	NB-95	*-4.51E-01	2.02E+00	2.02E+00(2S)
	841120	TO 841219	ZR-95	* 1.74E+00	2.57E+00	2.57E+00(2S)
	841120	TO 841219	CS-137	*-7.97E-01	1.64E+00	1.64E+00(2S)
	841120	TO 841219	CS-134	* 1.23E+00	1.42E+00	1.42E+00(2S)
	841120	TO 841219	BA-140	*-2.18E+01	3.10E+01	3.10E+01(2S)
#27	840717	TO 840815	LA-140	* 8.58E-01	1.03E+01	1.03E+01(2S)
	840717	TO 840815	CO-60	*-6.32E-01	1.08E+00	1.08E+00(2S)
	840717	TO 840815	FE-59	* 9.88E-01	2.80E+00	2.80E+00(2S)
	840717	TO 840815	ZN-65	3.13E+00	2.19E+00	2.20E+00(2S)
	840717	TO 840815	MN-54	1.00E+00	9.24E-01	9.26E-01(2S)
	840717	TO 840815	CO-58	*-1.20E+00	1.25E+00	1.25E+00(2S)
	840717	TO 840815	NB-95	* 1.37E+00	1.66E+00	1.66E+00(2S)
	840717	TO 840815	ZR-95	* 1.97E+00	2.06E+00	2.07E+00(2S)
	840717	TO 840815	CS-137	* 1.31E-02	9.01E-01	9.01E-01(2S)
	840717	TO 840815	CS-134	1.26E+00	9.50E-01	9.53E-01(2S)
	840717	TO 840815	BA-140	* 1.73E+00	2.09E+01	2.09E+01(2S)
	840815	TO 840912	LA-140	* 2.31E-01	2.49E-01	2.49E-01(2S)
	840815	TO 840912	CO-60	*-3.42E-01	3.09E-01	3.09E-01(2S)
	840815	TO 840912	FE-59	*-1.34E-01	7.16E-01	7.16E-01(2S)
	840815	TO 840912	ZN-65	* 3.86E-01	5.76E-01	5.76E-01(2S)
	840815	TO 840912	MN-54	* 1.56E-02	2.65E-01	2.65E-01(2S)
	840815	TO 840912	CO-58	*-2.82E-01	2.91E-01	2.91E-01(2S)
	840815	TO 840912	NB-95	4.75E-01	3.62E-01	3.62E-01(2S)
	840815	TO 840912	ZR-95	*-5.26E-01	5.31E-01	5.31E-01(2S)
	840815	TO 840912	CS-137	* 1.42E-01	2.38E-01	2.38E-01(2S)
	840815	TO 840912	CS-134	*-1.26E-02	2.78E-01	2.78E-01(2S)
	840815	TO 840912	BA-140	* 1.10E+00	3.35E+00	3.35E+00(2S)
	840912	TO 841018	LA-140	*-3.74E-01	1.69E+00	1.69E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 3 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#27	840912 TO 841018 CO-60	1.52E+00	1.15E+00	1.15E+00(2S)
	840912 TO 841018 ZN-65	*-3.93E-01	3.60E+00	3.60E+00(2S)
	840912 TO 841018 MN-54	*-7.41E-02	1.69E+00	1.69E+00(2S)
	840912 TO 841018 CO-58	* 6.83E-01	1.74E+00	1.74E+00(2S)
	840912 TO 841018 NB-95	*-3.01E-01	2.26E+00	2.26E+00(2S)
	840912 TO 841018 ZR-95	2.06E+00	1.56E+00	1.56E+00(2S)
	840912 TO 841018 CS-137	*-2.61E-01	1.52E+00	1.52E+00(2S)
	840912 TO 841018 CS-134	*-8.01E-02	1.83E+00	1.83E+00(2S)
	840912 TO 841018 BA-140	* 0.00E+00	2.25E+01	2.25E+01(2S)
	841018 TO 841120 LA-140	* 4.08E+00	6.09E+00	6.09E+00(2S)
	841018 TO 841120 CO-60	*-3.03E-01	7.29E-01	7.29E-01(2S)
	841018 TO 841120 FE-59	*-1.99E+00	1.72E+00	1.73E+00(2S)
	841018 TO 841120 ZN-65	* 7.33E-01	1.24E+00	1.24E+00(2S)
	841018 TO 841120 MN-54	*-2.92E-02	6.69E-01	6.69E-01(2S)
	841018 TO 841120 CO-58	* 1.44E-01	7.17E-01	7.17E-01(2S)
	841018 TO 841120 NB-95	* 7.25E-01	8.41E-01	8.42E-01(2S)
	841018 TO 841120 ZR-95	*-6.31E-01	1.36E+00	1.36E+00(2S)
	841018 TO 841120 CS-137	1.03E+00	5.28E-01	5.32E-01(2S)
	841018 TO 841120 CS-134	* 3.82E-01	7.03E-01	7.04E-01(2S)
	841018 TO 841120 BA-140	* 3.55E+00	5.30E+00	5.30E+00(2S)
	841120 TO 841219 LA-140	*-5.67E+00	3.99E+00	3.99E+00(2S)
	841120 TO 841219 CO-60	*-3.39E-01	1.53E+00	1.53E+00(2S)
	841120 TO 841219 FE-59	*-4.09E+00	4.77E+00	4.78E+00(2S)
	841120 TO 841219 ZN-65	* 1.82E+00	3.18E+00	3.19E+00(2S)
	841120 TO 841219 MN-54	*-3.81E-01	1.68E+00	1.68E+00(2S)
	841120 TO 841219 CO-58	*-4.43E-01	1.96E+00	1.96E+00(2S)
	841120 TO 841219 NB-95	* 6.36E-01	2.12E+00	2.12E+00(2S)
	841120 TO 841219 ZR-95	* 1.83E+00	3.24E+00	3.24E+00(2S)
	841120 TO 841219 CS-137	*-1.99E+00	1.90E+00	1.90E+00(2S)
	841120 TO 841219 CS-134	*-1.31E+00	1.97E+00	1.97E+00(2S)
	841120 TO 841219 BA-140	*-1.42E+01	2.02E+01	2.03E+01(2S)
#28	840717 TO 840815 LA-140	* 5.56E+00	1.29E+01	1.29E+01(2S)
	840717 TO 840815 CO-60	* 2.48E-01	1.07E+00	1.07E+00(2S)
	840717 TO 840815 FE-59	*-4.72E+00	3.72E+00	3.73E+00(2S)
	840717 TO 840815 ZN-65	*-2.51E+00	2.51E+00	2.51E+00(2S)
	840717 TO 840815 MN-54	1.19E+00	9.05E-01	9.08E-01(2S)
	840717 TO 840815 CO-58	*-6.30E-01	1.34E+00	1.34E+00(2S)
	840717 TO 840815 NB-95	*-8.79E-01	2.04E+00	2.04E+00(2S)
	840717 TO 840815 ZR-95	*-7.61E-01	2.53E+00	2.53E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 4 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#28	840717 TO 840815	CS-137	1.03E+00	1.01E+00	1.01E+00(2S)
	840717 TO 840815	CS-134	*-1.60E+00	1.21E+00	1.22E+00(2S)
	840717 TO 840815	BA-140	* 1.12E+01	2.60E+01	2.60E+01(2S)
	840815 TO 840912	LA-140	* 2.34E-01	2.42E-01	2.42E-01(2S)
	840815 TO 840912	CO-60	3.26E-01	2.43E-01	2.43E-01(2S)
	840815 TO 840912	FE-59	*-1.13E-01	6.40E-01	6.40E-01(2S)
	840815 TO 840912	ZN-65	* 1.86E-01	5.93E-01	5.93E-01(2S)
	840815 TO 840912	MN-54	4.43E-01	2.44E-01	2.44E-01(2S)
	840815 TO 840912	CO-58	* 2.22E-01	2.99E-01	2.99E-01(2S)
	840815 TO 840912	NB-95	6.03E-01	3.94E-01	3.94E-01(2S)
	840815 TO 840912	ZR-95	*-4.38E-01	5.66E-01	5.66E-01(2S)
	840815 TO 840912	CS-137	*-3.84E-03	2.92E-01	2.92E-01(2S)
	840815 TO 840912	CS-134	* 2.50E-01	2.90E-01	2.90E-01(2S)
	840815 TO 840912	BA-140	*-4.25E+00	3.91E+00	3.91E+00(2S)
	840912 TO 841018	LA-140	*-6.63E-01	1.72E+00	1.72E+00(2S)
	840912 TO 841018	CO-60	* 1.13E-01	1.66E+00	1.66E+00(2S)
	840912 TO 841018	ZN-65	*-1.01E+00	2.35E+00	2.35E+00(2S)
	840912 TO 841018	MN-54	*-7.59E-02	1.73E+00	1.73E+00(2S)
	840912 TO 841018	CO-58	* 6.11E-01	1.33E+00	1.33E+00(2S)
	840912 TO 841018	NB-95	*-1.03E-01	2.34E+00	2.34E+00(2S)
	840912 TO 841018	ZR-95	*-2.70E+00	3.56E+00	3.56E+00(2S)
	840912 TO 841018	CS-137	*-7.97E-01	1.64E+00	1.64E+00(2S)
	840912 TO 841018	CS-134	1.47E+00	9.83E-01	9.87E-01(2S)
	840912 TO 841018	BA-140	* 0.00E+00	1.84E+01	1.84E+01(2S)
	841018 TO 841120	LA-140	* 1.49E+00	6.07E+00	6.07E+00(2S)
	841018 TO 841120	CO-60	*-4.51E-02	7.91E-01	7.91E-01(2S)
	841018 TO 841120	FE-59	*-8.50E-02	1.59E+00	1.59E+00(2S)
	841018 TO 841120	ZN-65	*-5.93E-01	1.51E+00	1.51E+00(2S)
	841018 TO 841120	MN-54	*-1.49E-01	7.30E-01	7.30E-01(2S)
	841018 TO 841120	CO-58	*-4.10E-01	8.09E-01	8.09E-01(2S)
	841018 TO 841120	NB-95	* 3.25E-01	8.58E-01	8.58E-01(2S)
	841018 TO 841120	ZR-95	* 1.40E-01	1.25E+00	1.25E+00(2S)
	841018 TO 841120	CS-137	*-5.04E-01	7.93E-01	7.94E-01(2S)
	841018 TO 841120	CS-134	*-9.77E-01	8.44E-01	8.46E-01(2S)
	841018 TO 841120	BA-140	* 1.29E+00	5.28E+00	5.28E+00(2S)
	841120 TO 841219	LA-140	2.07E+00	2.07E+00	2.07E+00(2S)
	841120 TO 841219	CO-60	*-5.65E-01	1.47E+00	1.47E+00(2S)
	841120 TO 841219	FE-59	* 1.69E+00	3.67E+00	3.68E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 5 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#28	841120 TO 841219 ZN-65	* 1.01E+00	2.97E+00	2.97E+00(2S)
	841120 TO 841219 MN-54	*-1.52E-01	2.00E+00	2.00E+00(2S)
	841120 TO 841219 CO-58	1.42E+00	1.00E+00	1.01E+00(2S)
	841120 TO 841219 NB-95	* 1.27E+00	2.25E+00	2.25E+00(2S)
	841120 TO 841219 ZR-95	*-1.68E+00	3.21E+00	3.21E+00(2S)
	841120 TO 841219 CS-137	* 4.65E-01	1.01E+00	1.01E+00(2S)
	841120 TO 841219 CS-134	*-2.46E-01	1.84E+00	1.84E+00(2S)
	841120 TO 841219 BA-140	* 2.52E+00	1.80E+01	1.80E+01(2S)
#29	840717 TO 840815 LA-140	* 1.58E+00	1.03E+01	1.03E+01(2S)
	840717 TO 840815 CO-60	* 4.08E-01	9.65E-01	9.65E-01(2S)
	840717 TO 840815 FE-59	* 8.44E-01	2.76E+00	2.76E+00(2S)
	840717 TO 840815 ZN-65	* 1.96E+00	2.15E+00	2.15E+00(2S)
	840717 TO 840815 MN-54	*-6.23E-02	1.01E+00	1.01E+00(2S)
	840717 TO 840815 CO-58	* 2.55E-01	1.21E+00	1.21E+00(2S)
	840717 TO 840815 NB-95	*-2.07E-01	1.87E+00	1.87E+00(2S)
	840717 TO 840815 ZR-95	*-1.16E+00	2.33E+00	2.33E+00(2S)
	840717 TO 840815 CS-137	1.65E+00	9.27E-01	9.32E-01(2S)
	840717 TO 840815 CS-134	1.51E+00	1.01E+00	1.01E+00(2S)
	840717 TO 840815 BA-140	* 3.18E+00	2.07E+01	2.07E+01(2S)
	840815 TO 840912 LA-140	* 2.08E-01	2.28E-01	2.28E-01(2S)
	840815 TO 840912 CO-60	* 2.53E-01	2.62E-01	2.62E-01(2S)
	840815 TO 840912 FE-59	*-6.18E-01	7.87E-01	7.87E-01(2S)
	840815 TO 840912 ZN-65	5.84E-01	5.30E-01	5.30E-01(2S)
	840815 TO 840912 MN-54	* 0.00E+00	3.04E-01	3.04E-01(2S)
	840815 TO 840912 CO-58	* 2.11E-01	3.11E-01	3.11E-01(2S)
	840815 TO 840912 NB-95	*-1.90E-02	4.36E-01	4.36E-01(2S)
	840815 TO 840912 ZR-95	*-1.18E-01	6.19E-01	6.19E-01(2S)
	840815 TO 840912 CS-137	3.59E-01	2.75E-01	2.75E-01(2S)
	840815 TO 840912 CS-134	* 2.66E-01	2.97E-01	2.97E-01(2S)
	840815 TO 840912 BA-140	*-3.47E+00	4.09E+00	4.09E+00(2S)
	840912 TO 841018 LA-140	*-9.11E-01	2.14E+00	2.14E+00(2S)
	840912 TO 841018 CO-60	*-9.80E-02	1.39E+00	1.39E+00(2S)
	840912 TO 841018 ZN-65	*-1.41E+00	3.32E+00	3.32E+00(2S)
	840912 TO 841018 MN-54	*-9.51E-01	1.05E+00	1.05E+00(2S)
	840912 TO 841018 CO-58	* 0.00E+00	1.47E+00	1.47E+00(2S)
	840912 TO 841018 NB-95	* 1.19E+00	1.54E+00	1.54E+00(2S)
	840912 TO 841018 ZR-95	*-3.09E+00	3.55E+00	3.55E+00(2S)
	840912 TO 841018 CS-137	*-1.19E+00	1.38E+00	1.38E+00(2S)
	840912 TO 841018 CS-134	*-6.60E-01	1.57E+00	1.57E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 6 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#29	840912 TO 841018	BA-140	*-1.43E+00	1.88E+01	1.88E+01(2S)
	841018 TO 841120	LA-140	* 3.47E+00	6.16E+00	6.16E+00(2S)
	841018 TO 841120	CO-60	* 9.84E-02	5.07E-01	5.07E-01(2S)
	841018 TO 841120	FE-59	* 9.16E-01	1.26E+00	1.26E+00(2S)
	841018 TO 841120	ZN-65	*-1.35E+00	1.44E+00	1.45E+00(2S)
	841018 TO 841120	MN-54	* 3.47E-01	6.42E-01	6.42E-01(2S)
	841018 TO 841120	CO-58	* 0.00E+00	7.92E-01	7.92E-01(2S)
	841018 TO 841120	NB-95	*-8.72E-01	1.16E+00	1.16E+00(2S)
	841018 TO 841120	ZR-95	*-4.49E-01	1.39E+00	1.39E+00(2S)
	841018 TO 841120	CS-137	*-8.19E-01	6.65E-01	6.67E-01(2S)
	841018 TO 841120	CS-134	*-1.23E+00	7.66E-01	7.70E-01(2S)
	841018 TO 841120	BA-140	* 7.38E+00	1.31E+01	1.31E+01(2S)
	841120 TO 841219	LA-140	*-6.48E+01	1.60E+01	1.60E+01(2S)
	841120 TO 841219	CO-60	2.52E+00	2.26E+00	2.26E+00(2S)
	841120 TO 841219	FE-59	*-8.86E+00	1.36E+01	1.36E+01(2S)
	841120 TO 841219	ZN-65	*-1.62E+01	9.96E+00	1.00E+01(2S)
	841120 TO 841219	MN-54	* 1.13E+00	2.94E+00	2.94E+00(2S)
	841120 TO 841219	CO-58	* 1.70E+00	3.51E+00	3.51E+00(2S)
	841120 TO 841219	NB-95	*-1.58E+00	6.23E+00	6.23E+00(2S)
	841120 TO 841219	ZR-95	1.01E+01	7.42E+00	7.44E+00(2S)
	841120 TO 841219	CS-137	*-3.10E+00	3.94E+00	3.94E+00(2S)
	841120 TO 841219	CS-134	*-5.41E+00	4.16E+00	4.17E+00(2S)
	841120 TO 841219	BA-140	* 6.11E+01	6.30E+01	6.31E+01(2S)
#31	840913 TO 840913	LA-140	* 1.00E+00	2.00E+00	2.00E+00(2S)
	840913 TO 840913	CO-60	*-2.65E-01	3.25E-01	3.25E-01(2S)
	840913 TO 840913	FE-59	*-3.98E-01	5.94E-01	5.94E-01(2S)
	840913 TO 840913	ZN-65	*-2.49E-01	5.36E-01	5.36E-01(2S)
	840913 TO 840913	MN-54	2.92E-01	2.45E-01	2.45E-01(2S)
	840913 TO 840913	CO-58	*-3.22E-01	2.77E-01	2.77E-01(2S)
	840913 TO 840913	NB-95	* 1.07E-01	2.96E-01	2.96E-01(2S)
	840913 TO 840913	ZR-95	* 4.40E-01	4.63E-01	4.63E-01(2S)
	840913 TO 840913	CS-137	*-1.38E-01	2.94E-01	2.94E-01(2S)
	840913 TO 840913	CS-134	* 5.88E-02	3.04E-01	3.04E-01(2S)
	840913 TO 840913	BA-140	* 8.73E-01	1.74E+00	1.74E+00(2S)
	841219 TO 841219	LA-140	* 1.49E+00	1.72E+00	1.72E+00(2S)
	841219 TO 841219	CO-60	*-1.08E+00	1.78E+00	1.78E+00(2S)
	841219 TO 841219	FE-59	3.77E+00	2.38E+00	2.39E+00(2S)
	841219 TO 841219	ZN-65	* 1.33E+00	2.89E+00	2.89E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 7 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#31	841219 TO 841219	MN-54	* 7.20E-01	1.50E+00	1.50E+00(2S)
	841219 TO 841219	CO-58	*-8.28E-01	1.58E+00	1.58E+00(2S)
	841219 TO 841219	NB-95	*-1.25E+00	1.65E+00	1.65E+00(2S)
	841219 TO 841219	ZR-95	2.18E+00	2.15E+00	2.15E+00(2S)
	841219 TO 841219	CS-137	* 6.52E-01	1.25E+00	1.25E+00(2S)
	841219 TO 841219	CS-134	* 2.37E-01	1.03E+00	1.03E+00(2S)
	841219 TO 841219	BA-140	*-5.74E+00	1.14E+01	1.14E+01(2S)
#32	840913 TO 840913	LA-140	* 1.22E+00	2.12E+00	2.12E+00(2S)
	840913 TO 840913	CO-60	*-1.16E-01	3.07E-01	3.07E-01(2S)
	840913 TO 840913	FE-59	6.16E-01	5.53E-01	5.53E-01(2S)
	840913 TO 840913	ZN-65	* 4.32E-02	5.83E-01	5.83E-01(2S)
	840913 TO 840913	MN-54	*-8.09E-03	3.07E-01	3.07E-01(2S)
	840913 TO 840913	CO-58	*-2.59E-01	3.28E-01	3.28E-01(2S)
	840913 TO 840913	NB-95	* 7.05E-02	3.52E-01	3.52E-01(2S)
	840913 TO 840913	ZR-95	* 1.22E-01	4.93E-01	4.93E-01(2S)
	840913 TO 840913	CS-137	*-5.39E-02	3.17E-01	3.17E-01(2S)
	840913 TO 840913	CS-134	* 5.77E-02	3.03E-01	3.03E-01(2S)
	840913 TO 840913	BA-140	* 1.06E+00	1.84E+00	1.84E+00(2S)
	841219 TO 841219	LA-140	*-2.27E+01	3.21E+00	3.21E+00(2S)
	841219 TO 841219	CO-60	* 2.93E-01	1.49E+00	1.49E+00(2S)
	841219 TO 841219	FE-59	*-2.21E+00	3.87E+00	3.88E+00(2S)
	841219 TO 841219	ZN-65	*-3.24E+00	3.71E+00	3.71E+00(2S)
	841219 TO 841219	MN-54	* 7.92E-01	1.40E+00	1.40E+00(2S)
	841219 TO 841219	CO-58	* 6.20E-01	1.09E+00	1.09E+00(2S)
	841219 TO 841219	NB-95	*-2.00E+00	2.06E+00	2.06E+00(2S)
	841219 TO 841219	ZR-95	* 1.05E+00	1.84E+00	1.85E+00(2S)
	841219 TO 841219	CS-137	* 8.29E-01	1.28E+00	1.28E+00(2S)
	841219 TO 841219	CS-134	* 2.17E-01	1.70E+00	1.70E+00(2S)
	841219 TO 841219	BA-140	7.52E+00	6.64E+00	6.66E+00(2S)
#52	840913 TO 840913	LA-140	*-1.46E-01	1.83E+00	1.83E+00(2S)
	840913 TO 840913	CO-60	2.33E-01	2.30E-01	2.30E-01(2S)
	840913 TO 840913	FE-59	5.85E-01	4.66E-01	4.66E-01(2S)
	840913 TO 840913	ZN-65	*-7.79E-01	6.26E-01	6.26E-01(2S)
	840913 TO 840913	MN-54	* 1.25E-01	2.26E-01	2.26E-01(2S)
	840913 TO 840913	CO-58	* 6.19E-02	2.34E-01	2.34E-01(2S)
	840913 TO 840913	NB-95	*-3.64E-02	2.77E-01	2.77E-01(2S)
	840913 TO 840913	ZR-95	*-6.58E-03	4.36E-01	4.36E-01(2S)
	840913 TO 840913	CS-137	*-2.17E-01	2.58E-01	2.58E-01(2S)
	840913 TO 840913	CS-134	*-8.06E-02	2.45E-01	2.45E-01(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 8 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF WATER
Results in $\mu\text{Ci/l}$

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#52	840913 TO 840913	BA-140	*-1.27E-01	1.59E+00	1.59E+00(2S)
	841220 TO 841220	LA-140	*-8.39E-01	3.78E+00	3.78E+00(2S)
	841220 TO 841220	CO-60	* 7.56E-01	1.64E+00	1.65E+00(2S)
	841220 TO 841220	FE-59	* 9.73E-01	2.86E+00	2.86E+00(2S)
	841220 TO 841220	ZN-65	* 1.90E-01	2.58E+00	2.58E+00(2S)
	841220 TO 841220	MN-54	*-1.23E+00	1.97E+00	1.97E+00(2S)
	841220 TO 841220	CO-58	*-1.38E+00	1.82E+00	1.82E+00(2S)
	841220 TO 841220	NB-95	* 1.06E+00	1.28E+00	1.28E+00(2S)
	841220 TO 841220	ZR-95	*-1.57E+00	2.87E+00	2.88E+00(2S)
	841220 TO 841220	CS-137	* 1.04E+00	1.33E+00	1.33E+00(2S)
	841220 TO 841220	CS-134	* 3.17E-01	1.55E+00	1.55E+00(2S)
	841220 TO 841220	BA-140	* 2.57E+00	7.86E+00	7.86E+00(2S)

AVERAGE RESULT (WITHOUT CONTROL) = -8.75E-02 (LOW = -6.48E+01, HIGH = 6.11E+01)
28 POSITIVE RESULTS FOUND IN 228 SAMPLES

AVERAGE RESULT FOR CONTROL = -1.48E+00 (LOW = -4.56E+01, HIGH = 5.00E+00)
6 POSITIVE RESULTS FOUND IN 55 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE		AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
LA-140		-3.46E+00	-6.48E+01	5.56E+00	21	1
LA-140	(CONTROL)	-5.16E-02	-2.75E+00	2.48E+00	5	1
CO-60		1.42E-01	-1.08E+00	2.52E+00	21	4
CO-60	(CONTROL)	6.09E-01	-9.05E-01	1.36E+00	5	3
FE-59		-7.13E-01	-8.86E+00	3.77E+00	18	3
FE-59	(CONTROL)	-7.27E-01	-7.54E+00	2.90E+00	5	0
ZN-65		-7.79E-01	-1.62E+01	3.13E+00	21	2
ZN-65	(CONTROL)	-1.19E+00	-7.05E+00	1.43E+00	5	0
MN-54		1.40E-01	-1.23E+00	1.19E+00	21	4
MN-54	(CONTROL)	-1.89E-01	-8.73E-01	1.23E+00	5	0
CO-58		8.28E-03	-1.38E+00	1.70E+00	21	1
CO-58	(CONTROL)	-3.87E-01	-2.53E+00	1.59E+00	5	1

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table F
(Page 9 of 9)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

--- SUMMARY OF RADIONUCLIDES (CONTINUED) ---

NUCLIDE		AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
NB-95		2.78E-02	-2.00E+00	1.37E+00	21	2
NB-95	(CONTROL)	4.28E-01	-4.51E-01	9.66E-01	5	0
ZR-95		3.22E-01	-3.09E+00	1.01E+01	21	3
ZR-95	(CONTROL)	4.26E-01	-1.58E+00	2.02E+00	5	0
CS-137		-8.87E-02	-3.10E+00	1.65E+00	21	4
CS-137	(CONTROL)	-3.13E-01	-7.97E-01	1.90E-01	5	0
CS-134		-2.66E-01	-5.41E+00	1.51E+00	21	3
CS-134	(CONTROL)	4.91E-01	-1.57E-01	1.23E+00	5	1
BA-140		3.61E+00	-1.42E+01	6.11E+01	21	1
BA-140	(CONTROL)	-1.54E+01	-4.56E+01	5.00E+00	5	0

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

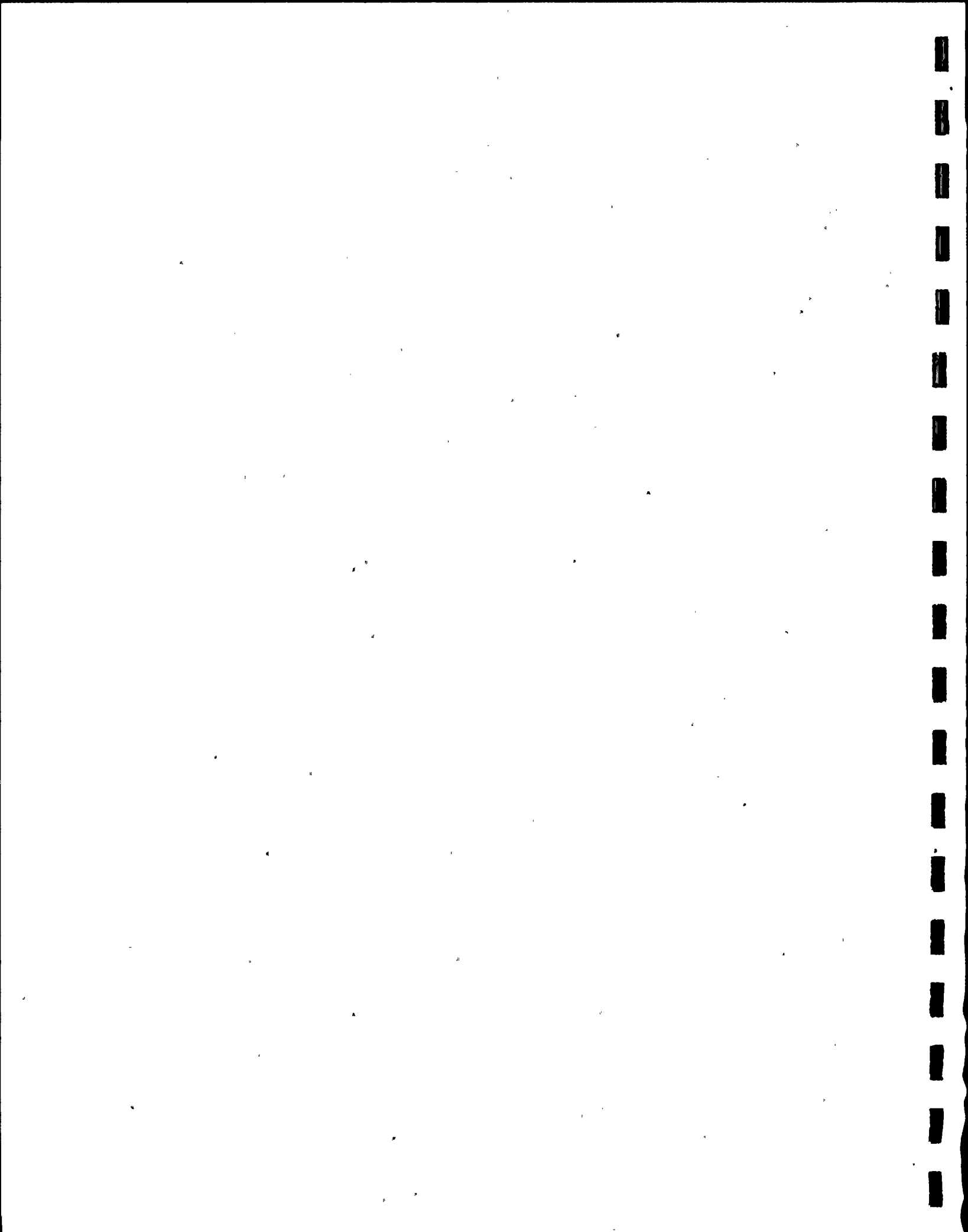


Table G
(Page 1)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF SEDIMENT BOTTOM
Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#33	841026 TO 841026	CO-60	3.71E+01	2.42E+01	2.43E+01(2S)
	841026 TO 841026	CS-137	3.40E+01	2.94E+01	2.95E+01(2S)
	841026 TO 841026	CS-134	3.14E+01	2.76E+01	2.77E+01(2S)
	841026 TO 841026	RA-226DA	6.68E+02	6.68E+01	7.79E+01(2S)
	841026 TO 841026	AC-228	9.96E+02	1.24E+02	1.38E+02(2S)
	841026 TO 841026	TL-208	2.45E+02	3.23E+01	3.55E+01(2S)
	841026 TO 841026	PB-212	6.72E+02	5.55E+01	6.86E+01(2S)
	841026 TO 841026	PB-214	6.68E+02	6.68E+01	7.79E+01(2S)
#34	841026 TO 841026	CO-60	1.29E+02	3.94E+01	4.01E+01(2S)
	841026 TO 841026	CS-137	4.57E+02	4.99E+01	5.69E+01(2S)
	841026 TO 841026	CS-134	5.53E+01	2.96E+01	2.98E+01(2S)
	841026 TO 841026	RA-226DA	5.82E+02	7.40E+01	8.18E+01(2S)
	841026 TO 841026	AC-228	7.26E+02	1.40E+02	1.47E+02(2S)
	841026 TO 841026	TL-208	2.57E+02	3.90E+01	4.19E+01(2S)
	841026 TO 841026	PB-212	9.88E+02	8.07E+01	1.00E+02(2S)
	841026 TO 841026	PB-214	5.82E+02	7.40E+01	8.18E+01(2S)
AVERAGE RESULT (WITHOUT CONTROL) = 4.72E+02 (LOW = 5.53E+01, HIGH = 9.88E+02)					
8 POSITIVE RESULTS FOUND IN 8 SAMPLES					
AVERAGE RESULT FOR CONTROL = 4.19E+02 (LOW = 3.14E+01, HIGH = 9.96E+02)					
8 POSITIVE RESULTS FOUND IN 8 SAMPLES					

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table H
(Page 1 of 3)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF FISH
Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#30	841003 TO 841003	CO-60	*-1.27E+01	3.24E+01	3.24E+01(2S)
	841003 TO 841003	FE-59	* 4.11E+01	5.20E+01	5.20E+01(2S)
	841003 TO 841003	ZN-65	*-4.46E+01	8.05E+01	8.05E+01(2S)
	841003 TO 841003	MN-54	2.74E+01	2.30E+01	2.30E+01(2S)
	841003 TO 841003	CO-58	2.40E+01	2.21E+01	2.22E+01(2S)
	841003 TO 841003	CS-137	*-5.20E+00	3.29E+01	3.29E+01(2S)
	841003 TO 841003	CS-134	* 1.22E+01	2.71E+01	2.71E+01(2S)
	841003 TO 841003	CO-60	*-7.46E+00	1.93E+01	1.93E+01(2S)
	841003 TO 841003	FE-59	*-3.10E+01	6.37E+01	6.37E+01(2S)
	841003 TO 841003	ZN-65	*-2.89E+01	5.51E+01	5.51E+01(2S)
	841003 TO 841003	MN-54	*-1.03E+01	2.59E+01	2.59E+01(2S)
	841003 TO 841003	CO-58	* 1.08E+00	2.50E+01	2.50E+01(2S)
	841003 TO 841003	CS-137	*-3.51E+01	3.27E+01	3.27E+01(2S)
	841003 TO 841003	CS-134	*-1.61E+01	2.79E+01	2.80E+01(2S)
	841003 TO 841003	CO-60	* 6.37E+00	2.01E+01	2.01E+01(2S)
	841003 TO 841003	FE-59	6.72E+01	3.47E+01	3.49E+01(2S)
	841003 TO 841003	ZN-65	4.55E+01	2.88E+01	2.89E+01(2S)
	841003 TO 841003	MN-54	* 1.28E+01	1.98E+01	1.98E+01(2S)
	841003 TO 841003	CO-58	2.58E+01	1.90E+01	1.90E+01(2S)
	841003 TO 841003	CS-137	* 2.62E+00	2.63E+01	2.63E+01(2S)
	841003 TO 841003	CS-134	*-2.04E+01	2.38E+01	2.38E+01(2S)
	841017 TO 841017	CO-60	*-1.84E+01	2.74E+01	2.74E+01(2S)
	841017 TO 841017	FE-59	* 6.87E+00	6.25E+01	6.25E+01(2S)
	841017 TO 841017	ZN-65	*-8.10E+01	7.02E+01	7.03E+01(2S)
	841017 TO 841017	MN-54	3.09E+01	1.50E+01	1.51E+01(2S)
	841017 TO 841017	CO-58	* 5.71E+00	2.19E+01	2.19E+01(2S)
	841017 TO 841017	CS-137	*-1.64E+01	2.57E+01	2.57E+01(2S)
	841017 TO 841017	CS-134	*-1.91E+01	2.40E+01	2.40E+01(2S)
#38	841004 TO 841004	CO-60	*-3.98E+01	2.60E+01	2.61E+01(2S)
	841004 TO 841004	FE-59	* 2.75E+01	4.06E+01	4.06E+01(2S)
	841004 TO 841004	ZN-65	*-2.57E+01	6.41E+01	6.41E+01(2S)
	841004 TO 841004	MN-54	*-2.37E+01	2.72E+01	2.72E+01(2S)
	841004 TO 841004	CO-58	* 1.17E+01	1.73E+01	1.73E+01(2S)
	841004 TO 841004	CS-137	* 2.65E+01	3.33E+01	3.34E+01(2S)
	841004 TO 841004	CS-134	2.06E+01	1.37E+01	1.38E+01(2S)
	841004 TO 841004	CO-60	* 1.51E+00	2.54E+01	2.54E+01(2S)
	841004 TO 841004	FE-59	9.66E+01	4.32E+01	4.36E+01(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table H
(Page 2 of 3)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF FISH
Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#38	841004 TO 841004	ZN-65	6.03E+01	3.48E+01	3.50E+01 (2S)
	841004 TO 841004	MN-54	*-1.21E+01	3.18E+01	3.18E+01 (2S)
	841004 TO 841004	CO-58	5.59E+01	2.15E+01	2.18E+01 (2S)
	841004 TO 841004	CS-137	*-2.76E+01	3.62E+01	3.62E+01 (2S)
	841004 TO 841004	CS-134	* 1.57E+01	2.73E+01	2.73E+01 (2S)
	841004 TO 841004	CO-60	* 4.74E+00	2.41E+01	2.41E+01 (2S)
	841004 TO 841004	FE-59	* 2.39E+01	4.19E+01	4.19E+01 (2S)
	841004 TO 841004	ZN-65	* 1.11E+01	5.43E+01	5.43E+01 (2S)
	841004 TO 841004	MN-54	* 4.37E+00	2.14E+01	2.14E+01 (2S)
	841004 TO 841004	CO-58	*-3.03E+01	2.89E+01	2.90E+01 (2S)
	841004 TO 841004	CS-137	* 1.24E+01	2.19E+01	2.19E+01 (2S)
	841004 TO 841004	CS-134	*-3.52E+01	3.09E+01	3.10E+01 (2S)
	841004 TO 841004	CO-60	* 9.47E+00	2.20E+01	2.20E+01 (2S)
	841004 TO 841004	FE-59	* 1.82E+01	4.64E+01	4.64E+01 (2S)
	841004 TO 841004	ZN-65	*-5.69E+01	5.36E+01	5.37E+01 (2S)
	841004 TO 841004	MN-54	* 9.35E+00	1.94E+01	1.94E+01 (2S)
	841004 TO 841004	CO-58	*-4.51E+01	2.81E+01	2.82E+01 (2S)
	841004 TO 841004	CS-137	*-7.96E+00	2.51E+01	2.51E+01 (2S)
	841004 TO 841004	CS-134	* 3.12E+00	2.44E+01	2.44E+01 (2S)
	841004 TO 841004	CO-60	* 7.66E+00	2.71E+01	2.71E+01 (2S)
	841004 TO 841004	FE-59	3.47E+01	2.62E+01	2.63E+01 (2S)
	841004 TO 841004	ZN-65	*-4.84E+01	8.24E+01	8.25E+01 (2S)
	841004 TO 841004	MN-54	*-2.76E+01	3.21E+01	3.21E+01 (2S)
	841004 TO 841004	CO-58	*-7.07E+01	3.37E+01	3.60E+01 (2S)
	841004 TO 841004	CS-137	4.32E+01	2.35E+01	2.37E+01 (2S)
	841004 TO 841004	CS-134	* 2.27E+00	2.53E+01	2.53E+01 (2S)
	841019 TO 841019	CO-60	*-6.10E+01	4.52E+01	4.54E+01 (2S)
	841019 TO 841019	FE-59	*-4.79E+01	5.81E+01	5.82E+01 (2S)
	841019 TO 841019	ZN-65	4.95E+01	4.94E+01	4.95E+01 (2S)
	841019 TO 841019	MN-54	*-2.84E+00	2.50E+01	2.50E+01 (2S)
	841019 TO 841019	CO-58	* 1.46E+01	1.85E+01	1.85E+01 (2S)
	841019 TO 841019	CS-137	5.16E+01	1.92E+01	1.94E+01 (2S)
	841019 TO 841019	CS-134	*-5.25E+00	2.74E+01	2.74E+01 (2S)
#39	841113 TO 841113	CO-60	1.35E+01	1.10E+01	1.10E+01 (2S)
	841113 TO 841113	FE-59	*-3.46E+01	3.54E+01	3.54E+01 (2S)
	841113 TO 841113	ZN-65	*-1.98E+01	4.95E+01	4.95E+01 (2S)
	841113 TO 841113	MN-54	1.52E+01	1.45E+01	1.45E+01 (2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table H
(Page 3 of 3)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF FISH
Results in pCi/kg

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#39	841113 TO 841113 CO-58	9.64E+00	7.87E+00	7.87E+00(2S)
	841113 TO 841113 CS-137	* 2.32E+00	2.32E+01	2.32E+01(2S)
	841113 TO 841113 CS-134	* 1.44E+01	1.97E+01	1.97E+01(2S)

AVERAGE RESULT (WITHOUT CONTROL) = -1.04E+00 (LOW = -8.10E+01, HIGH = 6.72E+01)
9 POSITIVE RESULTS FOUND IN 35 SAMPLES

AVERAGE RESULT FOR CONTROL = 1.15E+00 (LOW = -7.07E+01, HIGH = 9.66E+01)
8 POSITIVE RESULTS FOUND IN 42 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CO-60	-3.74E+00	-1.84E+01	1.35E+01	5	1
CO-60 (CONTROL)	-1.29E+01	-6.10E+01	9.47E+00	6	0
FE-59	9.91E+00	-3.46E+01	6.72E+01	5	1
FE-59 (CONTROL)	2.55E+01	-4.79E+01	9.66E+01	6	2
ZN-65	-2.58E+01	-8.10E+01	4.55E+01	5	1
ZN-65 (CONTROL)	-1.68E+00	-5.69E+01	6.03E+01	6	2
MN-54	1.52E+01	-1.03E+01	3.09E+01	5	3
MN-54 (CONTROL)	-8.75E+00	-2.76E+01	9.35E+00	6	0
CO-58	1.32E+01	1.08E+00	2.58E+01	5	3
CO-58 (CONTROL)	-1.07E+01	-7.07E+01	5.59E+01	6	1
CS-137	-1.04E+01	-3.51E+01	2.62E+00	5	0
CS-137 (CONTROL)	1.64E+01	-2.76E+01	5.16E+01	6	2
CS-134	-5.80E+00	-2.04E+01	1.44E+01	5	0
CS-134 (CONTROL)	2.07E-01	-3.52E+01	2.06E+01	6	1

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table I
(Page 1)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

I-131-R IN RAW MILK
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#35	840807 TO 840807	* 7.79E-02	1.91E-01	1.91E-01 (2S)
	840821 TO 840821	*-3.98E-01	2.12E-01	2.24E-01 (2S)
	840905 TO 840905	*-3.05E-01	1.42E-01	1.52E-01 (2S)
	840918 TO 840918	*-1.81E-01	2.22E-01	2.25E-01 (2S)
	841023 TO 841023	* 8.93E-03	1.30E-01	1.30E-01 (2S)
	841218 TO 841218	*-2.76E-01	1.37E-01	1.45E-01 (2S)
#36	840807 TO 840807	* 8.16E-02	2.37E-01	2.38E-01 (2S)
	840821 TO 840821	*-1.85E-01	2.35E-01	2.37E-01 (2S)
	840905 TO 840905	*-1.77E-01	1.53E-01	1.56E-01 (2S)
	840918 TO 840918	*-3.73E-02	2.43E-01	2.43E-01 (2S)
	841023 TO 841023	* 1.69E-01	2.10E-01	2.12E-01 (2S)
	841114 TO 841114	* 8.62E-02	1.75E-01	1.76E-01 (2S)
#40	841218 TO 841218	* 1.42E-02	9.79E-02	9.79E-02 (2S)
	840821 TO 840821	*-2.81E-01	2.01E-01	2.07E-01 (2S)
	840905 TO 840905	* 5.29E-02	1.36E-01	1.37E-01 (2S)
	840918 TO 840918	*-1.96E-01	2.15E-01	2.18E-01 (2S)
	841023 TO 841023	*-1.14E-02	1.71E-01	1.71E-01 (2S)
	841114 TO 841114	*-7.28E-02	1.24E-01	1.24E-01 (2S)
#60	841218 TO 841218	*-1.64E-01	1.66E-01	1.68E-01 (2S)
	840905 TO 840905	*-5.05E-02	1.47E-01	1.48E-01 (2S)
	840918 TO 840918	* 7.43E-02	1.78E-01	1.79E-01 (2S)
	841023 TO 841023	*-2.67E-01	3.42E-01	3.45E-01 (2S)
#9	841114 TO 841114	*-3.48E-02	1.70E-01	1.70E-01 (2S)
	840821 TO 840821	*-2.29E-02	2.09E-01	2.09E-01 (2S)
	840918 TO 840918	*-2.49E-01	2.08E-01	2.13E-01 (2S)
	841023 TO 841023	*-7.96E-02	1.73E-01	1.73E-01 (2S)
	841114 TO 841114	*-1.68E-01	1.39E-01	1.42E-01 (2S)
#9	841218 TO 841218	*-4.40E-02	1.69E-01	1.69E-01 (2S)

AVERAGE RESULT FOR CONTROL = -1.13E-01 (LOW = -2.49E-01, HIGH = -2.29E-02)
0 POSITIVE RESULTS FOUND IN 5 SAMPLES

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table J
(Page 1 of 4)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF RAW MILK
Results in pCi/l

LOCATION	COLLECTION PERIOD			RESULT	COUNTING ERROR	OVERALL ERROR
#35	840807 TO 840807	LA-140		*-1.55E+00	7.21E+00	7.21E+00(2S)
	840807 TO 840807	CS-137		*-4.74E+00	4.98E+00	4.99E+00(2S)
	840807 TO 840807	CS-134		* 6.97E-01	4.03E+00	4.03E+00(2S)
	840807 TO 840807	BA-140		* 7.91E+00	2.24E+01	2.24E+01(2S)
	840821 TO 840821	LA-140		*-3.91E+00	1.11E+01	1.11E+01(2S)
	840821 TO 840821	CS-137		*-7.40E+00	4.59E+00	4.61E+00(2S)
	840821 TO 840821	CS-134		*-4.84E+00	4.66E+00	4.67E+00(2S)
	840821 TO 840821	BA-140		2.80E+01	1.80E+01	1.81E+01(2S)
	840905 TO 840905	LA-140		*-5.61E+00	6.33E+00	6.34E+00(2S)
	840905 TO 840905	CS-137		* 2.66E-01	2.99E+00	2.99E+00(2S)
	840905 TO 840905	CS-134		*-1.58E+00	3.35E+00	3.35E+00(2S)
	840905 TO 840905	BA-140		* 7.15E+00	1.24E+01	1.24E+01(2S)
	840918 TO 840918	LA-140		*-1.44E-01	4.62E+00	4.62E+00(2S)
	840918 TO 840918	CS-137		*-2.57E+00	4.93E+00	4.93E+00(2S)
	840918 TO 840918	CS-134		*-1.91E-01	4.37E+00	4.37E+00(2S)
	840918 TO 840918	BA-140		*-8.19E+00	1.87E+01	1.87E+01(2S)
	841023 TO 841023	LA-140		*-3.35E-01	2.86E+00	2.86E+00(2S)
	841023 TO 841023	CS-137		*-8.42E-01	3.19E+00	3.19E+00(2S)
	841023 TO 841023	CS-134		* 1.67E+00	3.01E+00	3.01E+00(2S)
	841023 TO 841023	BA-140		*-1.92E+01	1.45E+01	1.46E+01(2S)
	841218 TO 841218	LA-140		*-1.01E+00	7.78E+00	7.78E+00(2S)
	841218 TO 841218	CS-137		*-9.74E-01	4.22E+00	4.22E+00(2S)
	841218 TO 841218	CS-134		*-1.38E+00	4.66E+00	4.66E+00(2S)
	841218 TO 841218	BA-140		* 1.13E+00	1.85E+01	1.85E+01(2S)
#36	840807 TO 840807	LA-140		*-9.97E+00	7.72E+00	7.72E+00(2S)
	840807 TO 840807	CS-137		* 4.56E-01	4.31E+00	4.31E+00(2S)
	840807 TO 840807	CS-134		*-1.45E+00	4.69E+00	4.69E+00(2S)
	840807 TO 840807	BA-140		*-2.44E+01	2.54E+01	2.54E+01(2S)
	840821 TO 840821	LA-140		9.51E+00	5.74E+00	5.77E+00(2S)
	840821 TO 840821	CS-137		* 2.74E+00	3.26E+00	3.27E+00(2S)
	840821 TO 840821	CS-134		4.12E+00	3.00E+00	3.01E+00(2S)
	840821 TO 840821	BA-140		* 3.28E-01	1.28E+01	1.28E+01(2S)
	840905 TO 840905	LA-140		*-2.47E+00	6.04E+00	6.04E+00(2S)
	840905 TO 840905	CS-137		3.49E+00	2.80E+00	2.81E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table J
(Page 2 of 4)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF RAW MILK
Results in pCi/l

LOCATION	COLLECTION PERIOD			RESULT	COUNTING ERROR	OVERALL ERROR
#36	840905	TO 840905	CS-134	* 2.00E+00	3.10E+00	3.10E+00(2S)
	840905	TO 840905	BA-140	1.29E+01	1.20E+01	1.20E+01(2S)
	840918	TO 840918	LA-140	*-4.95E+00	6.64E+00	6.64E+00(2S)
	840918	TO 840918	CS-137	*-6.14E+00	6.20E+00	6.21E+00(2S)
	840918	TO 840918	CS-134	* 4.61E-01	6.22E+00	6.22E+00(2S)
	840918	TO 840918	BA-140	*-1.41E+01	2.63E+01	2.64E+01(2S)
	841023	TO 841023	LA-140	*-4.78E+00	4.18E+00	4.19E+00(2S)
	841023	TO 841023	CS-137	*-3.02E+00	4.26E+00	4.27E+00(2S)
	841023	TO 841023	CS-134	*-6.58E+00	4.91E+00	4.93E+00(2S)
	841023	TO 841023	BA-140	* 5.61E+00	1.99E+01	1.99E+01(2S)
	841114	TO 841114	LA-140	* 3.13E+00	5.38E+00	5.38E+00(2S)
	841114	TO 841114	CS-137	* 2.81E-01	3.25E+00	3.25E+00(2S)
	841114	TO 841114	CS-134	* 6.20E-01	3.20E+00	3.20E+00(2S)
	841114	TO 841114	BA-140	* 3.43E+00	1.11E+01	1.11E+01(2S)
	841218	TO 841218	LA-140	*-4.07E-01	5.13E+00	5.13E+00(2S)
	841218	TO 841218	CS-137	* 1.96E+00	2.88E+00	2.88E+00(2S)
	841218	TO 841218	CS-134	*-2.15E+00	3.41E+00	3.41E+00(2S)
	841218	TO 841218	BA-140	* 1.07E+01	1.10E+01	1.10E+01(2S)
#40	840821	TO 840821	LA-140	*-1.37E+00	8.32E+00	8.32E+00(2S)
	840821	TO 840821	CS-137	*-4.01E-01	2.78E+00	2.78E+00(2S)
	840821	TO 840821	CS-134	*-4.25E+00	3.41E+00	3.42E+00(2S)
	840821	TO 840821	BA-140	* 3.73E+00	1.27E+01	1.27E+01(2S)
	840905	TO 840905	LA-140	*-1.70E+01	9.01E+00	9.07E+00(2S)
	840905	TO 840905	CS-137	7.11E+00	4.05E+00	4.08E+00(2S)
	840905	TO 840905	CS-134	*-2.13E+00	4.35E+00	4.35E+00(2S)
	840905	TO 840905	BA-140	*-3.85E+01	2.01E+01	2.02E+01(2S)
	840918	TO 840918	LA-140	* 6.77E-01	3.49E+00	3.49E+00(2S)
	840918	TO 840918	CS-137	4.40E+00	3.58E+00	3.59E+00(2S)
	840918	TO 840918	CS-134	* 7.21E-01	4.84E+00	4.84E+00(2S)
	840918	TO 840918	BA-140	* 7.68E+00	1.80E+01	1.80E+01(2S)
	841023	TO 841023	LA-140	*-2.14E+00	2.68E+00	2.68E+00(2S)
	841023	TO 841023	CS-137	* 1.52E-01	3.03E+00	3.03E+00(2S)
	841023	TO 841023	CS-134	*-1.35E+00	3.20E+00	3.21E+00(2S)
	841023	TO 841023	BA-140	* 4.65E+00	1.35E+01	1.35E+01(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table J
(Page 3 of 4)
WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF RAW MILK
Results in pCi/l

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
	841114 TO 841114	LA-140	*-1.18E+00	5.55E+00	5.55E+00(2S)
	841114 TO 841114	CS-137	*-1.40E+00	2.99E+00	3.00E+00(2S)
	841114 TO 841114	CS-134	3.11E+00	2.94E+00	2.94E+00(2S)
	841114 TO 841114	BA-140	*-4.38E-01	1.27E+01	1.27E+01(2S)
	841218 TO 841218	LA-140	* 7.59E-01	5.23E+00	5.23E+00(2S)
	841218 TO 841218	CS-137	4.82E+00	2.70E+00	2.72E+00(2S)
	841218 TO 841218	CS-134	* 1.44E+00	2.90E+00	2.90E+00(2S)
	841218 TO 841218	BA-140	*-8.86E+00	1.31E+01	1.31E+01(2S)
#60	840905 TO 840905	LA-140	* 4.65E+00	7.62E+00	7.62E+00(2S)
	840905 TO 840905	CS-137	*-1.59E+00	3.81E+00	3.81E+00(2S)
	840905 TO 840905	CS-134	* 4.63E-01	4.31E+00	4.31E+00(2S)
	840905 TO 840905	BA-140	*-2.27E+01	1.75E+01	1.75E+01(2S)
	840918 TO 840918	LA-140	*-2.68E+00	5.52E+00	5.52E+00(2S)
	840918 TO 840918	CS-137	5.09E+00	4.86E+00	4.87E+00(2S)
	840918 TO 840918	CS-134	*-6.17E-01	5.51E+00	5.51E+00(2S)
	840918 TO 840918	BA-140	* 2.34E+00	2.43E+01	2.43E+01(2S)
	841023 TO 841023	LA-140	* 6.61E-01	4.29E+00	4.29E+00(2S)
	841023 TO 841023	CS-137	* 1.85E+00	4.14E+00	4.14E+00(2S)
	841023 TO 841023	CS-134	*-3.45E+00	4.42E+00	4.43E+00(2S)
	841023 TO 841023	BA-140	* 6.68E+00	1.71E+01	1.71E+01(2S)
	841114 TO 841114	LA-140	* 4.36E+00	7.23E+00	7.24E+00(2S)
	841114 TO 841114	CS-137	* 3.95E+00	4.63E+00	4.64E+00(2S)
	841114 TO 841114	CS-134	5.47E+00	4.64E+00	4.65E+00(2S)
	841114 TO 841114	BA-140	* 4.91E+00	1.83E+01	1.83E+01(2S)
#9	840821 TO 840821	LA-140	*-4.80E+00	8.09E+00	8.10E+00(2S)
	840821 TO 840821	CS-137	*-1.86E+00	3.05E+00	3.06E+00(2S)
	840821 TO 840821	CS-134	5.32E+00	2.63E+00	2.65E+00(2S)
	840821 TO 840821	BA-140	*-6.99E+00	1.37E+01	1.37E+01(2S)
	840918 TO 840918	LA-140	*-2.56E+00	4.52E+00	4.53E+00(2S)
	840918 TO 840918	CS-137	* 1.33E+00	4.51E+00	4.51E+00(2S)
	840918 TO 840918	CS-134	7.04E+00	3.78E+00	3.80E+00(2S)
	840918 TO 840918	BA-140	* 8.82E+00	1.77E+01	1.78E+01(2S)
	841023 TO 841023	LA-140	* 8.40E-01	2.57E+00	2.57E+00(2S)

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table J
(Page 4 of 4)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF RAW MILK
Results in pCi/l

LOCATION	COLLECTION PERIOD	RESULT	COUNTING ERROR	OVERALL ERROR
#9	841023 TO 841023 CS-137	* 3.16E+00	3.28E+00	3.29E+00(2S)
	841023 TO 841023 CS-134	*-4.72E+00	3.65E+00	3.66E+00(2S)
	841023 TO 841023 BA-140	*-7.21E+00	1.33E+01	1.33E+01(2S)
	841114 TO 841114 LA-140	8.04E+00	5.46E+00	5.48E+00(2S)
	841114 TO 841114 CS-137	* 1.79E+00	3.17E+00	3.17E+00(2S)
	841114 TO 841114 CS-134	*-2.88E+00	3.57E+00	3.57E+00(2S)
	841114 TO 841114 BA-140	* 1.00E+01	1.19E+01	1.19E+01(2S)
	841218 TO 841218 LA-140	* 2.45E+00	4.25E+00	4.25E+00(2S)
	841218 TO 841218 CS-137	* 2.66E+00	2.84E+00	2.85E+00(2S)
	841218 TO 841218 CS-134	* 5.95E-01	3.64E+00	3.64E+00(2S)
	841218 TO 841218 BA-140	*-8.52E+00	1.36E+01	1.37E+01(2S)

AVERAGE RESULT (WITHOUT CONTROL) = -7.25E-01 (LOW = -3.85E+01, HIGH = 2.80E+01)
11 POSITIVE RESULTS FOUND IN 92 SAMPLES

AVERAGE RESULT FOR CONTROL = 6.25E-01 (LOW = -8.52E+00, HIGH = 1.00E+01)
3 POSITIVE RESULTS FOUND IN 20 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
LA-140	-1.55E+00	-1.70E+01	9.51E+00	23	1
LA-140 (CONTROL)	7.94E-01	-4.80E+00	8.04E+00	5	1
CS-137	3.26E-01	-7.40E+00	7.11E+00	23	5
CS-137 (CONTROL)	1.42E+00	-1.86E+00	3.16E+00	5	0
CS-134	-4.00E-01	-6.58E+00	5.47E+00	23	3
CS-134 (CONTROL)	1.07E+00	-4.72E+00	7.04E+00	5	2
BA-140	-1.27E+00	-3.85E+01	2.80E+01	23	2
BA-140 (CONTROL)	-7.80E-01	-8.52E+00	1.00E+01	5	0

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table K
(Page 1)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF ROOT
Results in pCi/kg

LOCATION	COLLECTION PERIOD			RESULT	COUNTING ERROR	OVERALL ERROR
#37	840918 TO 840918	CS-137		* 2.51E+00	1.84E+01	1.84E+01(2S)
	840918 TO 840918	CS-134		*-2.48E+01	2.30E+01	2.30E+01(2S)
	840918 TO 840918	I-131		*-2.78E+00	2.58E+01	2.58E+01(2S)
#37B	840821 TO 840821	CS-137		*-1.15E+00	1.12E+01	1.12E+01(2S)
	840821 TO 840821	CS-134		*-6.39E+00	1.11E+01	1.11E+01(2S)
	840821 TO 840821	I-131		*-2.74E+00	1.18E+01	1.18E+01(2S)
#9	840821 TO 840821	CS-137		1.49E+01	9.73E+00	9.77E+00(2S)
	840821 TO 840821	CS-134		* 9.32E+00	1.03E+01	1.03E+01(2S)
	840821 TO 840821	I-131		* 6.32E+00	1.01E+01	1.01E+01(2S)
	840918 TO 840918	CS-137		*-5.47E+00	2.64E+01	2.64E+01(2S)
	840918 TO 840918	CS-134		*-1.11E+01	2.73E+01	2.73E+01(2S)
	840918 TO 840918	I-131		* 1.88E+01	2.71E+01	2.71E+01(2S)

AVERAGE RESULT (WITHOUT CONTROL) = -5.89E+00 (LOW = -2.48E+01, HIGH = 2.51E+00)
0 POSITIVE RESULTS FOUND IN 6 SAMPLES

AVERAGE RESULT FOR CONTROL = 5.46E+00 (LOW = -1.11E+01, HIGH = 1.88E+01)
1 POSITIVE RESULTS FOUND IN 6 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	6.80E-01	-1.15E+00	2.51E+00	2	0
CS-137 (CONTROL)	4.71E+00	-5.47E+00	1.49E+01	2	1
CS-134	-1.56E+01	-2.48E+01	-6.39E+00	2	0
CS-134 (CONTROL)	-8.90E-01	-1.11E+01	9.32E+00	2	0
I-131	-2.76E+00	-2.78E+00	-2.74E+00	2	0
I-131 (CONTROL)	1.26E+01	6.32E+00	1.88E+01	2	0

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table L
(Page 1)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF FRUIT
Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#37	840918 TO 840918	CS-137	*-2.21E+00	5.40E+00	5.40E+00(2S)
	840918 TO 840918	CS-134	*-1.37E+00	5.56E+00	5.56E+00(2S)
	840918 TO 840918	I-131	*-8.39E-01	6.16E+00	6.16E+00(2S)
#37B	840821 TO 840821	CS-137	* 1.13E+01	1.49E+01	1.49E+01(2S)
	840821 TO 840821	CS-134	* 1.12E+01	1.36E+01	1.36E+01(2S)
	840821 TO 840821	I-131	* 9.80E+00	1.94E+01	1.94E+01(2S)
#9	840821 TO 840821	CS-137	1.38E+01	1.32E+01	1.32E+01(2S)
	840821 TO 840821	CS-134	* 7.82E+00	1.37E+01	1.37E+01(2S)
	840821 TO 840821	I-131	*-1.13E+01	2.00E+01	2.00E+01(2S)
	840918 TO 840918	CS-137	*-1.27E+00	4.91E+00	4.91E+00(2S)
	840918 TO 840918	CS-134	* 1.51E+00	6.09E+00	6.09E+00(2S)
	840918 TO 840918	I-131	*-1.71E+00	6.24E+00	6.24E+00(2S)

AVERAGE RESULT (WITHOUT CONTROL) = 4.65E+00 (LOW = -2.21E+00, HIGH = 1.13E+01)
0 POSITIVE RESULTS FOUND IN 6 SAMPLES

AVERAGE RESULT FOR CONTROL = 2.05E+00 (LOW = -1.13E+01, HIGH = 1.38E+01)
1 POSITIVE RESULTS FOUND IN 6 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	4.55E+00	-2.21E+00	1.13E+01	2	0
CS-137 (CONTROL)	6.26E+00	-1.27E+00	1.38E+01	2	1
CS-134	4.91E+00	-1.37E+00	1.12E+01	2	0
CS-134 (CONTROL)	4.66E+00	1.51E+00	7.82E+00	2	0
I-131	4.48E+00	-8.39E-01	9.80E+00	2	0
I-131 (CONTROL)	-4.80E+00	-1.13E+01	1.71E+00	2	0

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

Table M
(Page 1)

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
WNP-2 RADIOANALYTICAL SUMMARY REPORT
PREPARED BY UNITED STATES TESTING COMPANY INC. RICHLAND, WA

GAMMA SPECTROMETRY OF VEG STOCK
Results in pCi/kg

LOCATION	COLLECTION PERIOD		RESULT	COUNTING ERROR	OVERALL ERROR
#37	840924 TO 840924	CS-137	* 7.78E+00	3.10E+01	3.10E+01(2S)
	840924 TO 840924	CS-134	* 1.98E+01	2.51E+01	2.51E+01(2S)
	840924 TO 840924	I-131	5.90E+01	4.48E+01	4.49E+01(2S)
#37B	840821 TO 840821	CS-137	* 2.60E+00	1.34E+01	1.34E+01(2S)
	840821 TO 840821	CS-134	*-2.23E+01	1.92E+01	1.92E+01(2S)
	840821 TO 840821	I-131	* 1.23E+00	1.65E+01	1.65E+01(2S)
#9	840821 TO 840821	CS-137	* 9.07E+00	1.03E+01	1.03E+01(2S)
	840821 TO 840821	CS-134	* 2.17E+00	1.06E+01	1.06E+01(2S)
	840821 TO 840821	I-131	*-9.89E+00	1.23E+01	1.23E+01(2S)
	840918 TO 840918	CS-137	*-3.09E+00	1.43E+01	1.43E+01(2S)
	840918 TO 840918	CS-134	*-2.26E+01	1.82E+01	1.82E+01(2S)
	840918 TO 840918	I-131	*-2.48E+01	2.38E+01	2.38E+01(2S)

AVERAGE RESULT (WITHOUT CONTROL) = 1.14E+01 (LOW = -2.23E+01, HIGH = 5.90E+01)
1 POSITIVE RESULTS FOUND IN 6 SAMPLES

AVERAGE RESULT FOR CONTROL = -8.19E+00 (LOW = -2.48E+01, HIGH = 9.07E+00)
0 POSITIVE RESULTS FOUND IN 6 SAMPLES

--- SUMMARY OF RADIONUCLIDES ---

NUCLIDE	AVERAGE	LOW	HIGH	# SAMPLES	# POSITIVE
CS-137	5.19E+00	2.60E+00	7.78E+00	2	0
CS-137 (CONTROL)	2.99E+00	-3.09E+00	9.07E+00	2	0
CS-134	-1.25E+00	-2.23E+01	1.98E+01	2	0
CS-134 (CONTROL)	-1.02E+01	-2.26E+01	2.17E+00	2	0
I-131	3.01E+01	1.23E+00	5.90E+01	2	1
I-131 (CONTROL)	-1.73E+01	-2.48E+01	-9.89E+00	2	0

* Denotes a result less than the overall error
(nS) specifies the level of error, 1 sigma or 2 sigma

APPENDIX C
INDEX

Section C.1 Introduction

Section C.2 Liquid Effluents

Section C.3 Gaseous Effluent

Section C.3.1 Gaseous Source Terms

Section C.3.2 Dose to Man: Airborne Pathway

Table C-1 WNP-2 Liquid Effluents - Source Terms

Table C-2 Summary of Doses from WNP-2 1984 Liquid Effluents

Table C-3 Summary of Doses from WNP-2 1984 Liquid Effluents

Table C-4 50-Mile Population Doses from WNP-2 1984 Liquid Effluents

Table C-5 WNP-2 Gaseous Effluents 1984 Source Terms

Table C-6 Summary of Doses from WNP-2 1984 Gaseous Effluents at the Site
Boundary

Table C-7 Summary of Doses from WNP-2 1984 Gaseous Effluents

Table C-8 50-Mile Population Doses - 1984 Annual Report

WNP-2 EFFLUENTS AND DOSE ASSESSMENTS SUMMARY

C.1 INTRODUCTION

The Off-Site Dose Calculation Manual (ODCM) details the site specific information and methodologies (computer models) used to predict concentrations of radioactive materials in the environment and subsequent radiation doses based on effluent releases to the environment. The following is a summary of these assessed doses.

C.2 LIQUID EFFLUENTS

C.2.1 Liquid Source Terms

The radwaste liquid effluents from WNP-2 were released in a batch mode only. No continuous release of liquid effluent occurred during the report period. An annual LADTAP computer run was performed to calculate the dose using the assumptions listed in the ODCM. Table C-1 lists the liquid source terms used in the LADTAP computer run.

All liquid discharges from the radwaste building are recirculated in a vented hold up tank at atmospheric pressure prior to sampling and discharge. Thus, no dissolved or entrained noble gases were present in the liquid discharges.

C.2.2 Doses to Man: Liquid Pathways

Doses for the Maximum Individual, Average Individual, and the 50-Mile Population Dose estimates are listed in Tables C-2, C-3 and C-4, respectively. The preoperational projected doses are also listed in these tables, and were calculated using design base source terms obtained from GALE-Liquid computer code.

The maximum exposed individual is assumed to be an adult whose exposure pathways include potable water and fish consumption. The choice of the maximum exposed individual is based on the highest fish and water consumption rates shown by that age group and the fact that most of the dose obtained from the WNP-2 liquid effluent comes from these two pathways.

Technical Specification limits and the balance to year-end are also listed in Table C-3, verifying compliance with Technical Specifications.

C.3. GASEOUS EFFLUENT

C.3.1 Gaseous Source Terms

The gaseous radwaste effluents from WNP-2 were released in a continuous mode from three (3) release points:

- a. Main Plant Vent - mixed mode release
- b. Turbine Building - ground level release
- c. Radwaste Building - ground level release.

There were no batch or abnormal releases of gaseous effluents during 1984. Monitoring and sampling of gaseous effluents were performed according to plant procedures. Setpoints for the environmental radiation monitors were set as described in the ODCM. The annual GASPAR computer run was used to calculate the doses using the gaseous source terms listed in Table C-5.

C.3.2 Dose to Man: Airborne Pathway

C.3.2.1 Site Boundary and Nearest Resident

WNP-2 gaseous effluents were released on a continuous basis. An annual GASPAR computer run was performed separately for each release point, calculating the doses at the 1.2 mile site boundary and at Taylor Flats*. Annual average atmospheric dispersion factors (X/Q) and deposition rates (D/Q) were obtained from XOQDOQ computer code. Two sets of X/Q and D/Q values were used: one set for the mixed mode release and the other for the ground level releases. Table C-5 lists the source terms used in the calculations.

The calculations of the radiation levels at the 1.2 mile Site boundary were used to verify compliance with Technical Specification limits in 10 CFR-20 and for air dose limits as listed in 10 CFR 50. The sector showing the highest X/Q value was used in the calculations, with the child age group being the maximum individual. Since no food is grown at the site boundary, only the plume submersion, ground deposition and inhalation pathways were considered.

Tables C-6 and C-7 list the respective dose estimates at the Site boundary and Taylor Flats. Table C-8 lists the 50-mile population dose estimates along with the preoperational population dose projections.

C.3.2.2 Exposure to the Public Within the 1.2 Mile Exclusion Area

There are five (5) special locations within the 1.2 mile exclusion area for which the access is not completely controlled by the Supply System. These areas are:

- a. Wye burial site - normally controlled by DOE
- b. The DOE railroad through the area
- c. The BPA Ashe Substation
- d. The WNP-2 Visitor Center
- e. WNP-1/4 parking lot and construction site

*The nearest residential location with assumed garden and milk production.

The WNP-2 Visitor Center was assumed to be the location with the highest potential for exposure to a member of the public due to its close proximity to the plant. Although the workers at the BPA Ashe Substation have a higher assumed occupancy (2000 hours/year versus 8 hours/year for the Visitor Center), they are not considered members of the public as defined in the Technical Specifications because they are "occupationally associated with the plant".

The ODCM assumes an eight (8) hour/year occupancy by a non-Supply System individual at the Visitor Center. In calculating the doses from the gaseous effluents, the GASPARG computer program used X/Q and D/Q values at a distance of 0.5 miles from the plant in the analysis.

This resulted in a calculated whole body dose commitment from the noble gases of $7.2\text{E}-03$ and $1.0\text{E}-02$ mrem to the skin.

The whole body dose commitment from iodines and particulates at the Visitor Center was $4.0\text{E}+0$ mrem whole body and $5.9\text{E}-03$ mrem to the child thyroid.

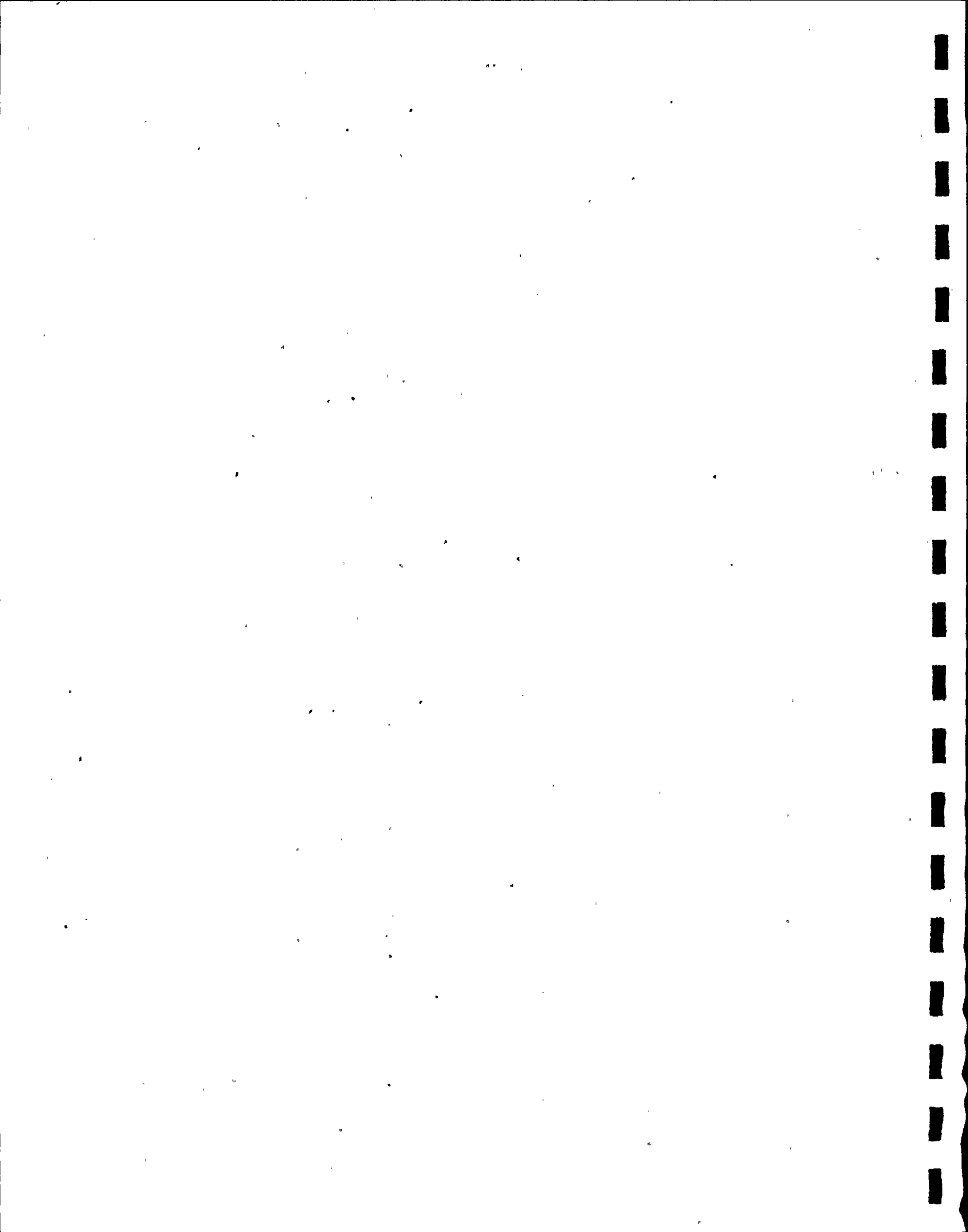


Table C-1

WNP-2 LIQUID EFFLUENTS - SOURCE TERMS

Nuclides Released	Unit	Annual
Strontium-89	Ci	4.2 E-04
Strontium-90	Ci	1.8 E-03
Cesium-134	Ci	5.1 E-04
Cesium-137	Ci	4.3 E-04
Iodine-131	Ci	4.1 E-04
Sodium-24	Ci	8.9 E-05
Cobalt-58	Ci	1.3 E-03
Cobalt-60	Ci	4.4 E-04
Iron-59	Ci	8.5 E-04
Zinc-65	Ci	1.1 E-03
Manganese-54	Ci	1.7 E-03
Chromium-51	Ci	1.5 E-02
Copper-64	Ci	1.2 E-02
Niobium-95	Ci	9.5 E-04
Molybdenum-99	Ci	3.8 E-04
Technetium-99m	Ci	5.0 E-05
Barium-lanthanum-140	Ci	1.4 E-03
Cerium-141	Ci	1.5 E-03
Cerium-144	Ci	3.9 E-03
Tritium	Ci	8.6 E-01
Iron-55	Ci	6.5 E-04
Total for Period (Above)	Ci	9.1 E-01

Table C-2

SUMMARY OF DOSES FROM WNP-2 1984 LIQUID EFFLUENTS
Maximum Individual(1)

Note: Numbers in parentheses represent technical specification limits. All doses are for the maximum individual.

Location: 1. Richland
 Exposure pathway - fishing, drinking, shoreline and food ingestion.

Age Group: Adult (maximum individual residing in Richland and fishing at the WNP-2 slough area).

<u>Pathway</u>	<u>Annual 1984 Whole Body (mrem/yr)</u>	<u>Design Base(2) Whole Body (mrem/yr)</u>	<u>Annual 1984 Maximum Organ. (mrem/yr)</u>	<u>Design Base(2) Maximum Organ. (mrem/yr)</u>
Drinking	1.6E-05	2.8E-05	5.4E-05	3.4E-05
Shoreline	1.6E-06	1.7E-05	1.8E-06	2.0E-05
Fishing	1.5E-02	2.1E-02	3.0E-02	3.8E-02
Boating	1.1E-08	8.5E-08	1.1E-08	8.5E-08
Swimming	9.3E-09	6.9E-08	9.3E-09	6.9E-09
Leafy Vegetables	1.2E-05	9.8E-07	4.5E-05	1.1E-06
Vegetables	6.2E-05	1.5E-05	2.2E-05	1.8E-05
Cow Milk	3.1E-04	8.7E-06	7.1E-04	1.2E-05
Meat	8.7E-07	1.6E-06	2.1E-06	3.7E-06
Total:	1.5E-02	2.1E-02	3.1E-02	3.8E-02
Tech. Spec. Limits: (mrem/yr)	(3.0E+0)			(1.0E+01)
Balance to Year-end(3): (mrem)	2.99E+0		Balance to Year-end: (mrem)	9.97E+0

(1) The Maximum Individual is assumed to consume food grown in the Riverview area in Pasco, Washington.

(2) Based on Design Base Source terms (i.e.-GALE Liquid Computer Code).

(3) Per Annual 1984

Table C-3

SUMMARY OF DOSES FROM WNP-2 1984 LIQUID EFFLUENTS
Average Individual(1)

Note: Numbers in parentheses represent technical specification limits.
 All doses are for the maximum individual.

Location: Richland
 Exposure pathway - fishing, drinking, shoreline and food ingestion.

Age Group: Adult (An individual residing in Richland).

<u>Pathway</u>	<u>Annual 1984 Whole Body (mrem/yr)</u>	<u>Design Base(2) Whole Body (mrem/yr)</u>	<u>Annual 1984 Maximum Organ. (mrem/yr)</u>	<u>Design Base(2) Maximum Organ. (mrem/yr)</u>
Drinking	9.4E-06	1.7E-05	3.3E-05	5.7E-05
Shoreline	5.2E-08	5.7E-07	6.1E-08	6.7E-07
Fishing	5.8E-05	1.0E-03	7.9E-05	1.9E-03
Boating	6.0E-10	5.5E-09	6.0E-10	5.5E-09
Swimming	1.0E-09	9.4E-09	1.0E-09	9.4E-09
Leafy Vegetables	1.2E-05	9.8E-07	4.5E-05	1.1E-06
Vegetables	6.2E-05	1.5E-05	2.2E-05	1.8E-05
Cow Milk	3.1E-04	8.7E-06	7.1E-04	1.2E-05
Meat	8.7E-07	1.6E-06	2.1E-06	3.7E-06
Total:				
Tech. Spec. Limits: (mrem/yr)	(3.0E+0)			(1.0E+01)
Balance to Year-end(3): (mrem)	2.99E+0		Balance to Year-end: (mrem)	9.99E+0

(1) The Average Individual is assumed to consume food grown in the Riverview area in Pasco, Washington.

(2) Based on Design Base Source terms (i.e.-GALE Liquid Computer Code).

(3) Per Annual 1984

Table C-4

50-MILE POPULATION DOSES FROM WNP-2 1984 LIQUID EFFLUENTS(1)

Pathway	ANNUAL 1984		DESIGN BASE ⁽²⁾	
	Whole Body (mrem)	Max. Body (mrem)	Whole Body (mrem)	Max. Body (mrem)
Drinking Water	6.1E-04	2.2E-03	8.3E-04	3.4E-03
Shoreline	1.7E-05	2.0E-05	1.9E-04	2.2E-04
Fishing	3.3E-05	7.1E-05	5.4E-04	1.0E-03
Swimming	3.3E-07	3.3E-07	3.1E-06	3.1E-06
Boating	8.3E-08	8.3E-08	7.7E-07	7.7E-07
Vegetables	2.2E-03	8.0E-03	4.3E-04	6.2E-04
Leafy vegetables	2.0E-03	7.5E-03	2.7E-05	4.0E-05
Milk	2.8E-05	6.6E-05	2.7E-04	4.7E-04
Meat	<u>1.4E-06</u>	<u>4.9E-05</u>	<u>5.7E-05</u>	<u>9.6E-05</u>
Total	4.9E-03	1.8E-02	2.4E-03	5.9E-03

(1) All age groups combined.

(2) Based on design base source terms (i.e., GALE Liquid Computer Code).

Table C-5
WNP-2 GASEOUS EFFLUENTS 1984
SOURCE TERMS

Nuclides Released	Unit	Reactor Building	Turbine Building	Radwaste Building
-------------------	------	------------------	------------------	-------------------

1. Fission gases

Krypton-85m	Ci	8.9 E-01	1.4 E-03	0
Krypton-87	Ci	5.9 E+0	3.6 E+0	8.8 E-01
Krypton-88	Ci	1.9 E+02	7.9 E+0	4.5 E+02
Xenon-133	Ci	5.7 E+0	3.9 E+0	2.7 E+0
Xenon-135	Ci	2.2 E+01	2.0 E+0	2.2 E+0
Xenon-135m	Ci	1.7 E+0	0	2.7 E-01
Xenon-138	Ci	4.7 E+01	5.1 E+01	1.1 E+01
Xenon-131m	Ci	4.2 E-02	0	0
Xenon-133m	Ci	9.7 E+0	9.5 E+0	2.6 E+0
Argon-41	Ci	3.4 E+0	0	0
Total for period	Ci	2.9 E+02	7.8 E+01	4.7 E+02

2. Iodines

Iodine-131	Ci	7.2 E-04	1.5 E-03	2.5 E-03
Iodine-133	Ci	4.2 E-02	1.1 E-02	2.4 E-02
Total for period	Ci	4.3 E-02	1.3 E-02	2.7 E-02

Table C-5 (Continued)

3. Particulates

Strontium-89	Ci	5.2 E-05	2.1 E-04	3.7 E-05
Strontium-90	Ci	7.1 E-05	2.3 E-04	5.0 E-05
Cesium-134	Ci	1.0 E-03	1.8 E-04	7.0 E-04
Cesium-137	Ci	1.1 E-03	1.7 E-03	7.6 E-04
Barium-lanthanum-140	Ci	2.4 E-03	3.3 E-02	1.8 E-03
Molybdenum-99	Ci	6.2 E-03	1.6 E-02	9.7 E-04
Cerium-141	Ci	1.1 E-03	1.9 E-03	6.9 E-04
Cerium-144	Ci	4.2 E-03	1.9 E-02	2.7 E-03
Cobalt-58	Ci	2.3 E-02	1.8 E-03	2.1 E-02
Cobalt-60	Ci	3.0 E-02	5.2 E-02	2.9 E-02
Chromium-51	Ci	6.7 E-03	3.4 E-01	1.4 E-01
Zinc-65	Ci	1.3 E-02	1.4 E-02	1.5 E-03
Zirconium-95	Ci	1.1 E-03	1.9 E-03	9.2 E-04
Iron-59	Ci	2.6 E-03	4.7 E-03	1.3 E-03
Manganese-54	Ci	2.3 E-03	3.3 E-02	1.3 E-03
Total for period	Ci	9.6 E-02	5.2 E-01	2.0 E-01

4. Tritium	Ci	1.6 E-02	4.2 E-02	3.2 E-02
------------	----	----------	----------	----------

Total building release	Ci	2.9 E+02	7.9 E+01	4.7 E+02
------------------------	----	----------	----------	----------

Table C-6

SUMMARY OF DOSES FROM WNP-2 1984 GASEOUS EFFLUENTS
AT THE SITE BOUNDARY

Note: Numbers in parentheses represent Technical Specification limits.

Location: 1.2 miles (Site boundary)

Age Group: Child

Beta air dose: 6.2E-01 mrad/yr (20 mrad/yr)

Gamma air dose: 2.7E+0 mrad/yr (10 mrad/yr)

Dose from Noble Gases*

<u>Whole Body</u> <u>(mrem/yr)</u>	<u>Skin</u> <u>(mrem/yr)</u>
1.8 E+0 (5.0E+02)	2.6 E+0 (3.0E+03)

Dose from Iodines and Particulates**

<u>Whole Body</u> <u>(mrem/yr)</u>	<u>Skin</u> <u>(mrem/yr)</u>
6.4 E-01 (1.5E+03)	3.6 E+0 (1.5E+03)

Cumulative Dose from Noble Gases:

Whole Body: 1.8E+0 mrem
Skin: 2.6E+0 mrem

Balance to year-end
(mrem)

<u>Whole Body</u>	<u>Skin</u>
4.98E+02	2.99E+03

Cumulative Dose from Radioiodines
and Particulates:

Whole Body: 6.4E-01 mrem
Skin: 3.6E+0 mrem

Balance to year-end
(mrem)

<u>Whole Body</u>	<u>Skin</u>
1.49E+03	1.49E+03

Cumulative Beta Air Dose: 6.2E-01 mrad/yr

Balance to year-end
(mrem)

1.9E+01

Cumulative Gamma Air Dose: 2.7E+0 mrad/yr

Balance to year-end
(mrem)

7.3E+0

Table C-7

SUMMARY OF DOSES FROM WNP-2 1984 GASEOUS EFFLUENTS

Note: Numbers in parentheses represent technical specification limits.

Location: 4.2 miles SE Taylor Flats

Age Group: Infant

Total Whole Body Dose (mrem/yr)*	Total Max. Organ Dose (mrem/yr)*
2.1E-02 (1.5E+01)	2.5E-02 (1.5E+01)

Cumulative Whole Body Dose: 2.1E-02 mrem/yr

Cumulative Max. Organ Dose: 2.5E-02 mrem/yr

*Ground, goat milk and inhalation exposure pathways.

Table C-8

50-Mile Population Doses-1984 Annual Report
Gaseous Effluent

Exposure Pathway	1984 DATA		DESIGN BASE DATA	
	Whole Body (man-Rem)	Max. Organ (man-Rem)	Whole Body (man-Rem)	Max. Organ (man-Rem)
Plume	5.9E-01	9.1E-01	2.4E-01	6.9E-01
Ground	4.4E-01	5.3E-01	4.3E-02	5.1E-02
Inhalation	1.2E-02	8.5E-01	1.1E-02	1.3E+0
Vegetables	9.5E-03	3.1E-02	1.9E-02	2.7E+0
Cow Milk	2.6E-03	1.5E-02	9.2E-03	1.8E+0
Meat	<u>9.3E-04</u>	<u>4.1E-03</u>	<u>1.9E-03</u>	<u>6.9E-02</u>
TOTAL	1.1E+0	2.3E+0	3.2E-01	6.6E+0

