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Serial: RNP-RA/16-0034

TS 5.6.2

MAY 13 2016

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**H. B. ROBINSON STEAM ELECTRIC PLANT (HBRSEP), UNIT NO. 2
DOCKET NO. 50-261 / RENEWED LICENSE NO. DPR-23**

**2015 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT
AND OFFSITE DOSE CALCULATION MANUAL, CURRENT REVISION 34**

Ladies and Gentlemen:

Enclosure I is the Radiological Environmental Operating Report for the period January 1, 2015 through December 31, 2015. This report is made in accordance with the HBRSEP, Unit No. 2 Technical Specifications, Section 5.6.2, "Annual Radiological Environmental Operating Report." In addition, Enclosure II is a copy of the HBRSEP Unit 2 Offsite Dose Calculation Manual, current Revision 34

If you have any questions concerning this report, please contact M. Scott Connelly, Acting Manager - Nuclear Regulatory Affairs at (843) 857-1569.

Sincerely,

A handwritten signature in black ink, appearing to read "DSH", written over a light blue horizontal line.

David S. Hoffman
Director – Nuclear Organization Effectiveness
H. B. Robinson Steam Electric Plant, Unit 2

DSH/am

United States Nuclear Regulatory Commission

Serial: RNP-RA/16-0034

Page 2 of 2

Enclosures:

- I. 2015 Annual Radiological Environmental Operating Report
- II. Offsite Dose Calculation Manual, Current Revision 34

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United States Nuclear Regulatory Commission
Enclosure I to Serial: RNP-RA/16-0034
216 pages (including this cover sheet)

**H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261 / RENEWED LICENSE NO. DPR-23**

2015 ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT



ANNUAL RADIOLOGICAL ENVIRONMENTAL OPERATING REPORT

DUKE ENERGY PROGRESS, LLC
H. B. ROBINSON STEAM ELECTRIC PLANT
Unit No. 2

2015



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LIST OF ACRONYMS USED IN THIS TEXT *(in alphabetical order)*

A	Annually
AR	Air Radioiodine/ Air Cartridge
AP	Air Particulate
AV	Aquatic Vegetation
BLV	Broadleaf Vegetation
C	Control
CR	Condition Report - Corrective Action Program
ERA	Environmental Resource Associates
EZA	Eckert & Ziegler Analytics
FI	Fish
FP	Food Product
GEL	General Engineering Laboratories, LLC
GPS	Global Positioning System
GW	Ground Water
I	Indicator
IR	Inner Ring - TLDs
ISFSI	Independent Spent Fuel Storage Installation
HBRSEP or RNP	H. B. Robinson Steam Electric Plant, Unit No. 2
HEEC	Harris Energy and Environmental Center
LLD	Lower Limit of Detection
M	Monthly
MDA	Minimum Detectable Activity
mrem	Millirem
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
ODCM	Off-Site Dose Calculation Manual
OR	Outer Ring - TLDs
pCi/kg	picocurie per kilogram
pCi/l	picocurie per liter
pCi/m ³	picocurie per cubic meter
Q	Quarterly
REMP	Radiological Environmental Monitoring Program
SA	Semiannually
SB	Sediment – Bottom
SS	Sediment – Shoreline
SI	Special Interest - TLDs
SW	Surface Water
TECH SPECS	Technical Specifications
TLD	Thermoluminescent Dosimeter
μCi/ml	microcurie per milliliter
W	Weekly

1.0 EXECUTIVE SUMMARY

The H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP or Robinson Nuclear Plant) is operated by Duke Energy Progress, LLC under a license granted by the Nuclear Regulatory Commission (NRC). Provisions of the Nuclear Regulatory Commission's Regulatory Guide 4.8, HBRSEP Technical Specifications, and the HBRSEP Off-Site Dose Calculation Manual (ODCM) establish the requirements of the Radiological Environmental Monitoring Program (REMP). This report describes the HBRSEP REMP and the program results for January 1, 2015, through December 31, 2015.

Included in the report are the identification of sampling locations, descriptions of environmental sampling and analysis procedures, comparisons of present environmental radioactivity levels and pre-operational environmental data, analysis of trends in environmental radiological data as potentially affected by plant operations, and a summary of environmental radiological sampling results. Quality assurance practices, sampling deviations, unavailable samples, and program changes are also discussed.

Sampling activities were conducted as prescribed by the HBRSEP ODCM. Required analyses were performed and detection capabilities were met for the collected samples required by the ODCM. One thousand four hundred and eighty-one samples were analyzed comprising 1,604 test results in order to compile data for the 2015 HBRSEP Annual Radiological Environmental Operating Report (AREOR). Based on the annual HBRSEP land use census, the current number of sampling sites for Robinson Nuclear Plant is sufficient.

Concentrations observed in the environment in 2015 for plant related radionuclides were generally within the ranges of concentrations observed in the past. Inspection of the data showed that radioactivity concentrations were as expected and positively identified measurements attributed to plant operations were within the HBRSEP ODCM regulatory limits.

The continued operation of HBRSEP has not significantly contributed measurable radiation or the presence of gamma radioactivity in the environmental media monitored, with the exception of Lake Robinson bottom sediment and aquatic vegetation (both are used for long term trending with no dose contribution to the public). The Lake Robinson surface water samples and ground water samples revealed tritium concentrations that are well within the applicable regulatory limits.

2.0 INTRODUCTION

2.1 SITE DESCRIPTION AND SAMPLE LOCATIONS

Duke Energy's H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP) consists of a pressurized water reactor with a design rating of 800 MWe (Megawatts electric). The site is shared with a pulverized coal unit (Unit No.1), which established commercial operation in 1960. Unit 1 is now offline and is in the decommissioning process. Commercial production was initiated by Unit No. 2 on March 7, 1971. The HBRSEP is located in Darlington County, South Carolina. The site is along state route 151 approximately five (5) miles northwest of Hartsville, South Carolina. The site is also approximately twenty five (25) miles northwest of Florence, South Carolina.

Lake Robinson is adjacent to the plant and is the source of cooling water. The lake was impounded during the construction of Robinson Unit No.1 (coal fired). The lake is fed by Black Creek and is approximately 2,250 acres in area. The plant intake is at the southern portion of the lake near the dam. The discharge is to a canal which conveys the cooling water to a point 4.2 miles north of the plant, where it returns to Lake Robinson.

The local economy supports primarily industrial and agricultural contributions. Fishing, boating, and swimming are popular activities on Lake Robinson and other nearby lakes. These activities contribute to the radiological pathways by consumption of fish and immersion related to swimming and boating. Consumption of milk and food products contributes to the ingestion pathway. No milk animals are located within five miles of the plant in any sector at this time, so broadleaf sampling is conducted to simulate the milk ingestion pathway.

Although the contribution to background radiation is small, Duke Energy Progress, LLC has established this program to measure the exposure pathways to man. An exposure pathway describes the source of the radiological exposure. The primary forms of potential radiological emissions from the plant are airborne and liquid discharge. The following pathways are monitored: external dose, ingestion of radioactive materials, and the inhalation of radioactive material. Specific methods and different environmental media are required to assess each pathway.

Sampling locations are chosen based upon meteorological factors, pre-operational monitoring, and results of the land use surveys. A number of locations are selected as controls. Control stations are selected because they are very unlikely to be affected by the operation of the plant. Figures 2.1-1 and 2.1-2 are maps depicting the HBRSEP Thermoluminescent Dosimeter (TLD) monitoring locations and the sampling locations. The location numbers shown on these maps correspond to those listed in Tables 2.1-A and 2.1-B.

2.2 SCOPE AND REQUIREMENTS OF THE REMP

The Radiological Environmental Monitoring Program (REMP) was established in 1973 at HBRSEP. Radiation and radioactivity in various environmental media have been monitored for 42 years. Monitoring is also provided for control locations, which would not be impacted by operations of the HBRSEP. Using these control locations and data collected prior to operation allows comparison of data collected at locations near the HBRSEP which could potentially be impacted by its operations. The preoperational program provides data on the existing environmental radioactivity levels for the site and vicinity which may be used to determine whether increases in environmental levels are attributable to the station. The operational program provides surveillance and backup support of detailed effluent monitoring, which is necessary to evaluate the significance, if any, of the contributions to the existing environmental radioactivity levels that result from station operation.

This monitoring program is based on NRC guidance as reflected in the HBRSEP Off-Site Dose Calculation Manual (ODCM), with regards to sample media, sampling locations, sampling frequency and analytical sensitivity requirements. Indicator and control locations were established for comparison purposes to distinguish radioactivity of plant origin from natural or other “man-made” environmental radioactivity. The environmental monitoring program also verifies projected and anticipated radionuclide concentrations in the environment and related exposures from releases of radionuclides from HBRSEP. This program satisfies the requirements of Section IV.B.2 of Appendix I to 10 CFR 50 and provides surveillance of all appropriate critical exposure pathways to man and protects vital interests of the company, public and state and federal agencies concerned with the environment. Reporting levels for activity found in environmental samples are listed in Table 2.2-A. Table 2.2-B lists the REMP analysis and frequency schedule.

The Annual Land Use Census, required by the HBRSEP Off-Site Dose Calculation Manual (ODCM), is performed to ensure that changes in the use of areas at or beyond the site boundary are identified and that modifications to the REMP are made if required by changes in land use. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR 50. Results are shown in Table 3.12.3.

Participation in an interlaboratory comparison program is performed in fulfillment of HBRSEP ODCM Operational Requirements. The comparison program provides for independent checks on the precision and accuracy of measurements of radioactive material in REMP sample matrices. Such checks are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR 50. A summary of the results obtained as part of this comparison program are in Section 4 of this annual report.

2.3 STATISTICAL AND CALCULATIONAL METHODOLOGY

2.3.1 ESTIMATION OF THE MEAN VALUE

There was one (1) basic statistical calculation performed on the raw data resulting from the environmental sample analysis program. The calculation involved the determination of the mean value for the indicator and the control samples for each sample medium. The mean is a widely used statistic. This value was used in the reduction of the data generated by the sampling and analysis of the various media in the Radiological Environmental Monitoring Program. "Net activity (or concentration)" is the activity (or concentration) determined to be present in the sample. No "Minimum Detectable Activity", "Lower Limit of Detection", "Less Than Level", or negative activities or concentrations are included in the calculation of the mean. The following equation was used to estimate the mean (reference 6.8):

$$\bar{x} = \frac{\sum_{i=1}^N x_i}{N}$$

Where:

\bar{x} = estimate of the mean,

i = individual sample,

N = total number of samples with a net activity (or concentration),

x_i = net activity (or concentration) for sample i.

2.3.2 LOWER LIMIT OF DETECTION AND MINIMUM DETECTABLE ACTIVITY

The Lower Limit of Detection (LLD) and Minimum Detectable Activity (MDA) are used throughout the REMP.

LLD - The LLD, as defined in the ODCM as the smallest concentration of radioactive material in a sample that will yield a net count, above the system background, that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. The LLD is an *a priori* (before the fact) lower limit of detection. The actual LLD is dependent upon the standard deviation of the background counting rate, the counting efficiency, the sample size (mass or volume), the radiochemical yield and the radioactive decay of the sample between sample collection and counting. The "required" LLD's for each sample medium and selected radionuclides are given in the ODCM and are listed in Table 2.2-C.

MDA - The MDA is the net counting rate (sample after subtraction of background) that must be surpassed before a sample is considered to contain a scientifically measurable amount of a radioactive material exceeding background amounts. The MDA is calculated using a sample background and may be thought of as an "actual" LLD for a particular sample measurement. Certain gross counting measurements display a calculated negative value, indicating background is greater than sample activity.

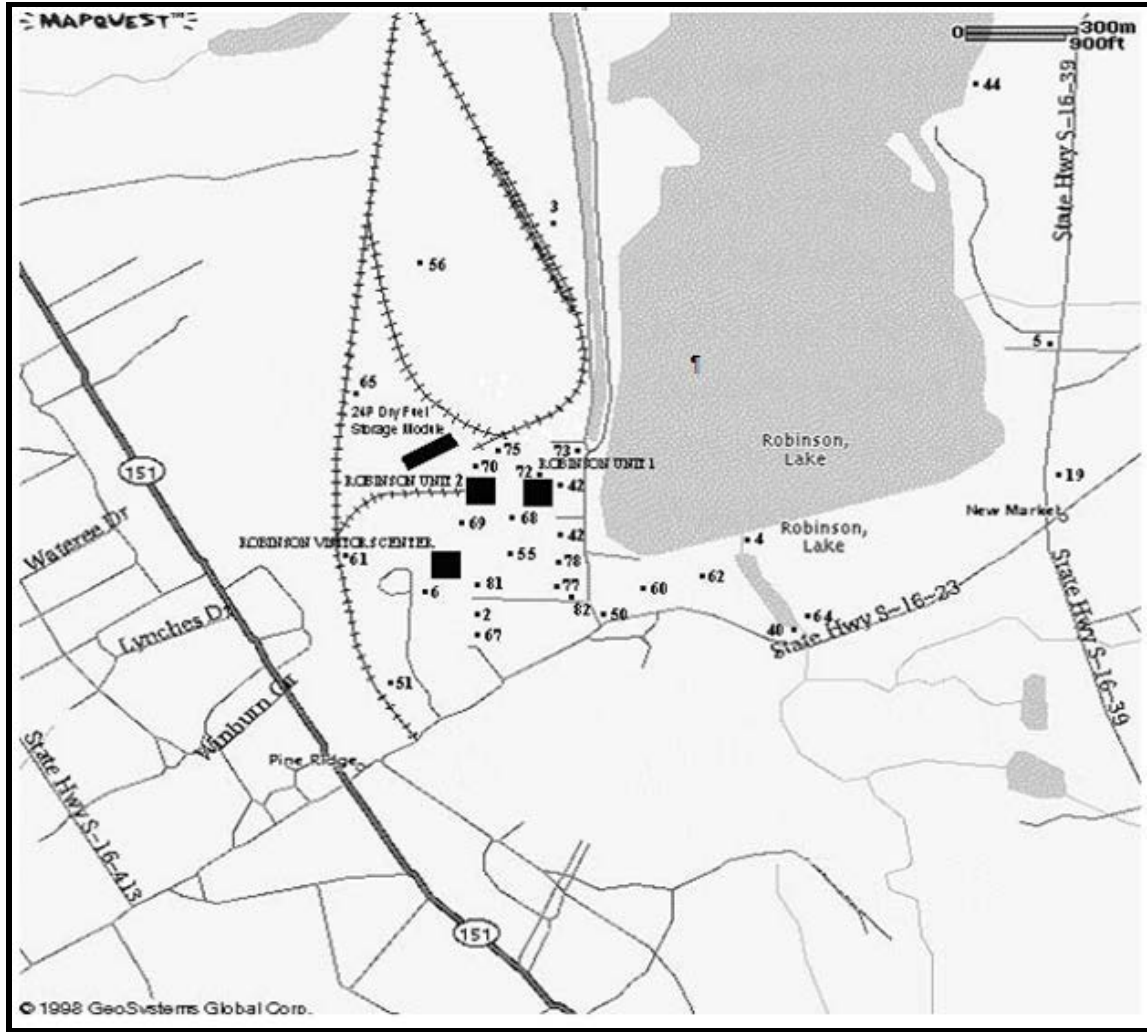
2.3.3 TREND IDENTIFICATION

One of the purposes of an environmental monitoring program is to determine if there is a buildup of radionuclides in the environment due to the operation of the nuclear station. Visual inspection of tabular or graphical presentations of data (including preoperational) is used to determine if a trend exists. A decrease in a particular radionuclide's concentration in an environmental medium does not indicate that reactor operations are removing radioactivity from the environment but that reactor operations are not adding that radionuclide to the environment in quantities exceeding the preoperational level and that the normal removal processes (radioactive decay, deposition, resuspension, etc.) are influencing the concentration.

Substantial increases or decreases in the amount of a particular radionuclide's release from the nuclear plant will greatly affect the resulting environmental levels; therefore, a knowledge of the release of a radionuclide from the nuclear plant is necessary to completely interpret the trends, or lack of trends, determined from the environmental data. Factors that may affect environmental levels of radionuclides include prevailing weather conditions (periods of drought, solar cycles or heavier than normal precipitation), construction in or around either the nuclear plant or the sampling location, and addition or deletion of other sources of radioactive materials (such as the 1986 Chernobyl accident and the 2011 Japan earthquake and tsunami, which triggered the Fukushima Dai-ichi nuclear power plant incident). Some of these factors may be obvious while others are sometimes unknown. Therefore, how trends are identified will include some judgment by plant personnel.

Figure 2.1-1

Radiological Environmental Sampling Locations
(Near Plant)

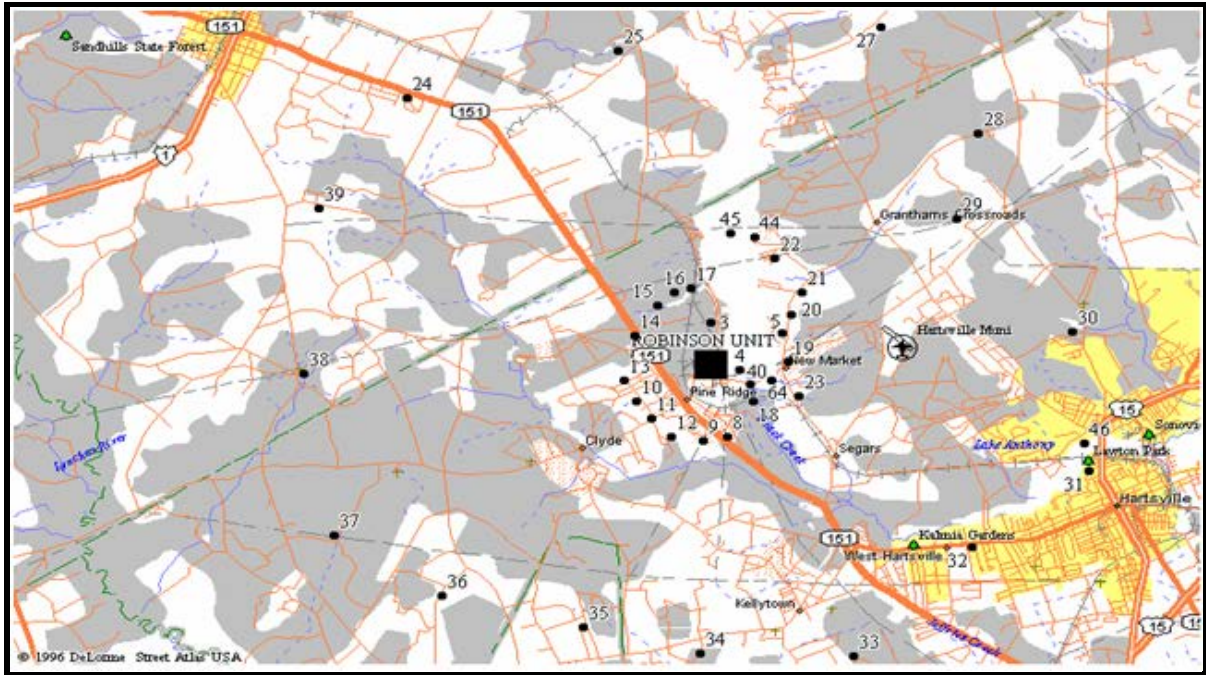


Sample Locations not shown include: 1, 7 - 18, 20 - 39, 41, 45 - 47, 49, 52, 54, 57, 58, 66, 71, 76, and 79.

Figure 2.1-1 is based upon RNP ODCM Rev. 33; however, it does not reflect the permanent removal of approximately 2000 feet of railway track section located in the inundation area of the Unit 1 coal basin dam 3514 (the section of railway track on the side toward Lake Robinson), which was performed during the week of 7/17/14.

Figure 2.1-2

**Radiological Environmental Sampling Locations
(Distant from Plant)**



Sample Locations not shown include: 1, 2, 6, 7, 26, 41, 42, 47 (varies), 50 - 52, 54 - 58 (varies), 60 - 62, 73, 75 - 79, and 81 - 82.

TABLE 2.1-A

**H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 (HBRSEP)
RADIOLOGICAL MONITORING PROGRAM SAMPLING LOCATIONS**

Site #	Type*	Location Description**	AR [†] & AP [†]	SW*	SS*	SB*	AV*	FP ^{(a)†}	Fish (FI) [†]	BLV ^{(b)†}	GW*
1	C	24.4 miles ESE Florence, S.C.	W/Q								
2	I	0.2 miles S Information Center	W/Q								
3	I	0.5 miles N Microwave Tower	W/Q								
4	I	0.4 miles ESE Spillway	W/Q								
5	I	0.9 miles ENE East shore of lake near Johnson's Landing	W/Q								
6	I	0.2 miles SSW Information Center	W/Q								
7	I	6.4 miles ESE CP&L facility on RR Avenue, Hartsville	W/Q								
40	I	0.6 miles ESE Black Creek at Old Camden Road (S-16-23) – Lake Robinson		M							
41	C	8.0 miles N Black Creek at US Hwy 1		M							
41	C	7.2 miles NNW Black Creek (upstream)				A	A				
42	I	Unit 1 Deep Wells									Q
44	I	1.6 miles NNE East shore of lake, Shady Rest Club			SA						
45	I	Site varies within Lake Robinson				A	A		SA		
46	I	Site varies within Prestwood Lake				A	A		SA		
47	C	Control station, Any lake not influenced by plant discharge							SA		
49	C	10.0 miles W or greater than 5 miles from plant						A ^(a)			
50	I	SSE Close to Site Boundary								M ^(b)	
51	I	SSW Close to Site Boundary								M ^(b)	
52	C	10 miles W near Bethune								M ^(b)	
54	I	10.1 miles E Auburndale Plantation (if irrigating from Black Creek)						A ^(a)			
55	I	0.2 miles SSE South of West Settling Pond	W/Q								
57	I	Ash Pond		M							
57	I	Ash Pond Shore			SA						
58	I	Site varies from plant						A ^(a)			
60	I	0.2 miles SE Robinson Picnic Area	W/Q								
61	I	0.3 miles WSW West Parking lot near RR tracks	W/Q								
62	I	SE Close to Site Boundary								M ^(b)	
64	I	0.6 miles SE Artesian Well									Q
66	I	Black Creek btwn Prestwood Lake discharge & upstream of Sonoco Spray Farm (downstream)		M		A	A				
67	I	S Close to Site Boundary								M ^(b)	
68	I	Well A Btwn Unit 1 Switchyard & breakroom									Q
69	I	Well B Behind the Training Building									Q
70	I	Well C Btwn O&M Building & Fab Shop									Q
71	I	0.87 miles NNW (MW-03A) Btwn Ash Pond & RR tracks									Q
72	I	0.10 miles E (MW-06) 20 ft from FP/FH 7 fire hydrant & Unit 1 North Deep Well Pump									Q
73	I	0.11 miles ENE (MW-13) Btwn Discharge Canal & Unit 1 Stand Alone Fuel Oil Tanks									Q
75	I	0.05 miles NE (PSW-02) By Unit 1 boundary Fence to Unit 2 across paved rd. from Hydrogen Gas Tanks									
76	I	0.49 miles N (PSW-03) NE corner of MET Tower Station									Q
77	I	0.25 miles SSE (TS-01B) By entrance road to Unit 1									Q
78	I	0.17 miles SSE (TS-02C) NE corner by East Settling Pond influent by fence									Q
79	I	1.0 miles N (TS-07C) S corner by cove & Discharge Canal									Q
81	I	0.19 miles SSE (TS-17B) W of West Settling Pond across paved road									Q
82	I	0.3 miles SSE (PDW-01) By entrance road to Unit 1									Q

(a) During Harvest/Growing Season

(b) When Available

* Refer to List of Acronyms Used in this Text in Table of Contents

**GPS data reflect approximate accuracy to within 2-5 meters. GPS field measurements were taken as close as possible to the item of interest.

TABLE 2.1-B

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 (HBRSEP)

RADIOLOGICAL MONITORING PROGRAM SAMPLING LOCATIONS (TLD SITES)

Table 2.1-B Codes	
C	Control
IR	Inner Ring
OR	Outer Ring
SI	Special Interest

Site #	Measure Type	Location*	Distance (miles)*	Sector	Site #	Measure Type	Location*	Distance (miles)*	Sector
1	C	Florence, SC	24.4	ESE	23	IR	New Market Road (#S-16-39)	1.0	ESE
2	IR	Information Center ^{1,2}	0.2	S	24	OR	Sowell Road (#S-13-711)	4.6	NW
3	IR	Microwave Tower	0.5	N	25	OR	Lake Robinson Road (#S-13-346)	4.0	NNW
4	IR	Spillway	0.4	ESE	26	OR	Lake Robinson Road (#S-13-346)	5.0	N
5	IR	East shore of lake near Johnson's Landing	0.9	ENE	27	OR	Prospect Church Road (#S-13-763)	5.4	NNE
6	IR	Information Center ^{1,2}	0.2	SSW	28	OR	New Market Road (#S-13-39)	4.3	NE
7	OR	CP&L Facility on RR Avenue, Hartsville	6.4	ESE	29	OR	Ruby Road (#S-16-20)	4.0	ENE
8	IR	Transmission right-of-way	0.8	SSE	30	OR	Ruby Road (#S-16-20)	4.4	E
9	IR	Transmission right-of-way	1.0	S	31	OR	Lakeshore Drive	4.6	ESE
10	IR	Clyde Church of God	1.0	WSW	32	OR	Transmission right-of-way	4.0	SE
11	IR	Old Camden Road	1.0	SW	33	OR	Bay Road (#S-16-493)	4.5	SSE
12	IR	Off of Old Camden Road	1.2	SSW	34	OR	Kellybell Road (#S-16-772)	4.7	S
13	IR	Corner of Saluda and Sandpit Roads	0.7	W	35	OR	Kelly Bridge Road (#S-31-51)	4.5	SSW
14	IR	First Baptist Church of Pine Ridge	0.8	WNW	36	OR	Kingston Drive	5.0	SW
15	IR	Transmission right-of-way	0.7	NW	37	OR	Pine Cone Road	5.0	WSW
16	IR	South side of Darlington Co. I.C. Turbine Plant	1.0	NNW	38	OR	Union Church Road	4.9	W
17	IR	Darlington Co. Plant emergency fire pump	1.2	N	39	OR	King's Pond Road	5.1	WNW
18	IR	Near Old Black Creek RR trestle	0.7	SE	55	IR	South of the West Settling Pond	0.2	SSE
19	IR	Old Camden Road (#S-16-23)	1.0	E	56	IR	North of the center of the 7P-ISFSI ^{1,2}	0.4	NNW
20	IR	New Market Road (#S-16-39)	1.0	ENE	61	IR	West Parking lot near RR tracks ²	0.3	WSW
21	IR	New Market Road (#S-16-39)	1.4	NE	65	IR	Northwest of the 24P-ISFSI ²	0.3	WNW
22	IR	Shady Rest entrance off of Cloverdale Drive	1.7	NNE					

1 Required for monitoring of the 7P-ISFSI

2 Required for monitoring of the 24P-ISFSI

* GPS data reflect approximate accuracy to within 2-5 meters. GPS field measurements were taken as close as possible to the item of interest.

TABLE 2.2-A
REPORTING LEVELS FOR RADIOACTIVITY
CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Analysis	Water (pCi/liter)	Airborne (pCi/m ³)	Fish (pCi/kg-wet)	Milk (pCi/liter)	Food Products (pCi/kg-wet)
H-3	20,000 ^(a)	----	----	----	----
Mn-54	1,000	----	30,000	----	----
Fe-59	400	----	10,000	----	----
Co-58	1,000	----	30,000	----	----
Co-60	300	----	10,000	----	----
Zn-65	300	----	20,000	----	----
Zr-Nb-95	400	----	----	----	----
I-131	2 ^(b)	0.9	----	3	100
Cs-134	30	10	1,000	60	1,000
Cs-137	50	20	2,000	70	2,000
Ba-La-140	200	----	----	300	----

(a) For drinking water samples. This is 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/liter may be used.

(b) If no drinking water pathway exists, a value of 20 pCi/liter may be used.

“----” represents no specified limits

TABLE 2.2-B
REMP ANALYSIS FREQUENCY

Sample Medium	Analysis Schedule	Gamma Isotopic	Tritium	Low Level I-131	Gross Beta	TLD
Air Radioiodine	Weekly	X				
Air Particulate	Weekly				X	
	Quarterly	X				
Direct Radiation	Quarterly					X
Surface Water	Monthly Composite	X	X			
Ground Water	Quarterly	X	X			
Ground Water (#68)	Quarterly	X	X	X		
Ground Water (#82)	Quarterly	X	X	X	X	
Bottom Sediment	Annually	X				
Shoreline Sediment	Semiannually	X				
Fish	Semiannually	X				
Aquatic Vegetation	Annually	X				
Broadleaf Vegetation	Monthly ^(a)	X				
Food Products	Annually ^(b)	X				

(a) When Available

(b) At harvest

TABLE 2.2-C**LOWER LIMITS OF DETECTION (LLD)^(a)**

Analysis	Water (pCi/liter)	Airborne (pCi/m ³)	Fish (pCi/kg-wet)	Milk (pCi/liter)	Food Products (pCi/kg-wet)	Sediment (pCi/kg-dry)
Gross Beta	----	0.01	----	----	----	----
H-3	2000 ^(c)	----	----	----	----	----
Mn-54	15	----	130	----	----	----
Fe-59	30	----	260	----	----	----
Co-58, 60	15	----	130	----	----	----
Zn-65	30	----	260	----	----	----
Zr-Nb-95 ^(b)	15	----	----	----	----	----
I-131	1 ^(d)	0.07	----	1	60	----
Cs-134	15	0.05	130	15	60	150
Cs-137	18	0.06	150	18	80	180
Ba-La-140 ^(b)	15	----	----	15	----	----

(a) The LLD is defined in Section 2.3.2.

(b) The specified LLD applies to the daughter nuclide of an equilibrium mixture of the parent and daughter nuclides.

(c) If no drinking water pathway exists, a value of 3000 pCi/liter may be used.

(d) If no drinking water pathway exists, a value of 15 pCi/liter may be used.

“----” represents no specified limits

3.0 INTERPRETATION OF RESULTS

The following section depicts and explains the review of the REMP results conducted during 2015 for the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP) and fulfills the reporting requirements of Technical Specifications and HBRSEP ODCM. Review of the 2015 REMP analysis results was performed to identify changes in environmental levels as a result of HBRSEP operations. Sample data for 2015 was compared to preoperational and historical data.

Evaluation for significant trends was performed for radionuclides that are listed as required within HBRSEP ODCM. The radionuclides include: H-3, Mn-54, Fe-59, Co-58, Co-60, Zn-65, Zr-95, Nb-95, I-131, Cs-134, Cs-137, Ba-140 and La-140. HBRSEP ODCM addresses actions to be taken if radionuclides other than those required are detected in samples collected. The occurrences of these radionuclides could be the result of HBRSEP liquid effluents which contained the radionuclides.

The purpose of the REMP is to measure accumulation of radioactivity in the environment, to determine whether this radioactivity is the result of the operation of the HBRSEP, Unit No. 2, and to assess the potential dose to the off-site population based on the cumulative measurements of radioactivity of plant origin. Approximately 1,481 samples were collected from indicator and control locations and 1,604 analyses and measurements were made during 2015. Detectable radioactivity resulting from plant operation was found in 24 out of 30 indicator samples of surface water (Appendix B). Only the tritium activity measured in the surface water of Lake Robinson and in fish samples constituted a source of public exposure. The highest concentration of any plant related radionuclide releases to the environment was tritium in Lake Robinson at an average concentration of 2.31E+3 pCi/Liter. Using the methodology of Regulatory Guide 1.109 "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I, Revision 1, dated October 1977," via fish consumption, is listed below. The maximum possible exposure to an individual from the evaporation of tritium in Lake Robinson using 2015 meteorology is 0.245 mrem/yr. to a child. Radioactivity in environmental samples attributed to plant operations in 2015 for which there is a potential dose pathway to the public is seen in Table 3.0-A.

<u>Age Group</u>	<u>2015 Dose (mrem)</u>
Adult	0.0057
Teenager	0.0043
Child	0.0036

Review of the 2015 data presented in this section supports the conclusion that there were no significant changes in environmental sample radionuclide concentrations of samples collected and analyzed from HBRSEP and surrounding areas that were attributable to plant operations. The radiological environmental data for 2015 indicates that radioactivity concentrations were not higher than expected and positively identified measurements attributable to HBRSEP operations in 2015 were within limits as specified in the HBRSEP ODCM, thus presenting no significant

impact on the environment or public health and safety. A statistical summary of the HBRSEP data for 2015 has been compiled and summarized in Appendix B along with any plant-derived activity detected within the scope of the REMP.

Table 3.0-A HBRSEP Potential Dose Pathway

Environmental Media	Radionuclide	Location w/Highest Annual Mean	Activity and Occurrence	Maximum Individual Dose (mrem/yr)
Surface Water	H-3 (tritium)	Lake Robinson (SW-40)	2,563 pCi/L (12/12)	0.0057 millirem/yr – Adult (from fish)
Surface Water	H-3 (tritium)	Lake Robinson (SW-40)	2,563 pCi/L (12/12)	0.245 millirem/yr – child (Evaporation from Lake Robinson using HBRSEP 2015 Meteorology Data)*

*This is information supplied by Murray and Trettel, Inc. in their report “Impact of Tritium Release from Lake Robinson at the Robinson Nuclear Plant for 2015.”

3.1 AIRBORNE RADIOIODINE AND PARTICULATES

The 519 air cartridge/radioiodine (AR) samples from indicator and control stations had I-131 concentrations less than the ODCM LLD of $7.00E-2$ pCi/m³. There are nine indicator sites for a total of 468 indicator samples and one control site for a total of 51 control samples during the 2015 collection year. The air samplers operated for a total of 99.33% availability for the 2015 year.

For the period of January 1, 2015, to December 31, 2015, the gross beta activity was detectable in the airborne particulate (AP) samples, with acceptable runtime, from the nine indicator locations and the control location. The 468 indicator samples had an average concentration of $1.65E-2$ pCi/m³. Similar gross beta activities were observed at the control location in Florence, which had an average concentration of $1.54E-2$ pCi/m³ in 51 control samples. Figures 3.1-1 through 3.1-9 provide a graphic representation of the gross beta activity at the indicator locations compared to the control location for the year 2015. No plant-related gamma activity was observed for any air particulate filters analyzed during 2015. The natural gamma concentrations identified are typical of the natural environment and are not attributed to plant operations. Refer to Appendix C or Appendix D for deviations and unavailable samples in the 2015 collection year.

No plant-related gamma activity was detected in quarterly composite filter samples from either the indicator or control locations during 2015. HBRSEP ODCM LLDs and reporting levels for air particulates are contained in Section 2.0 in Table 2.2-C and 2.2-A respectively.

Figure 3.1-1

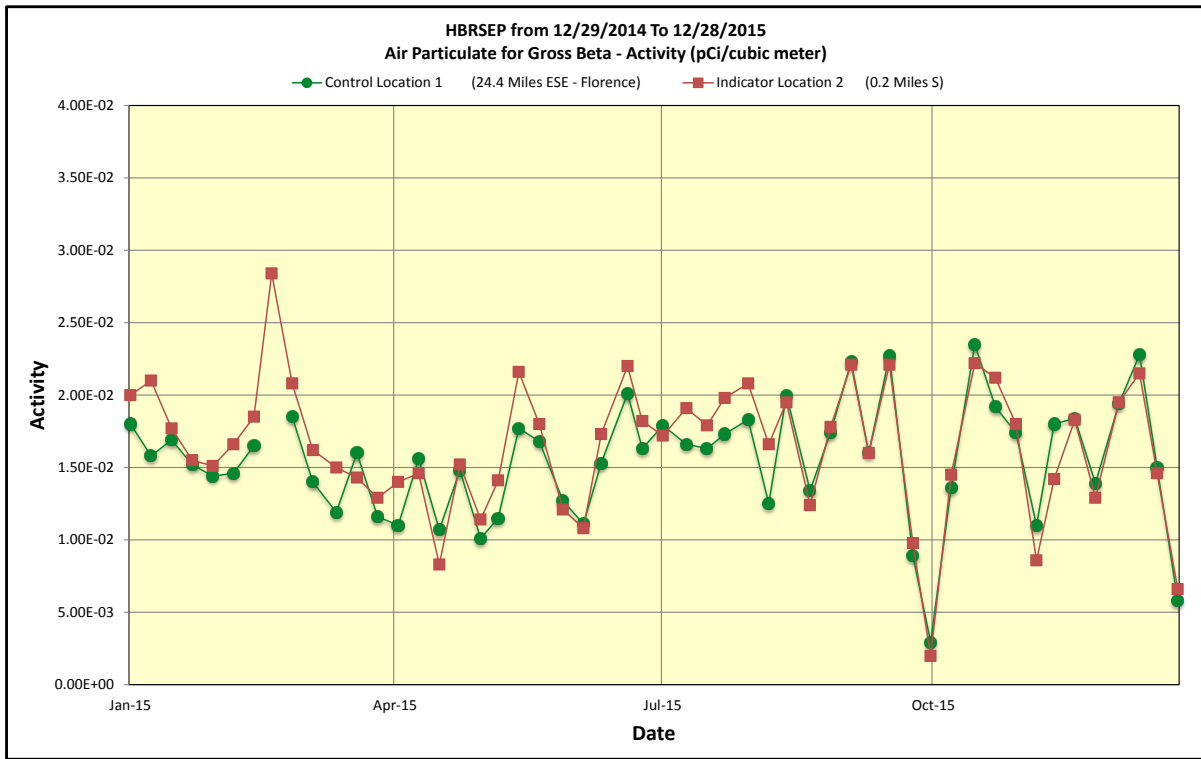


Figure 3.1-2

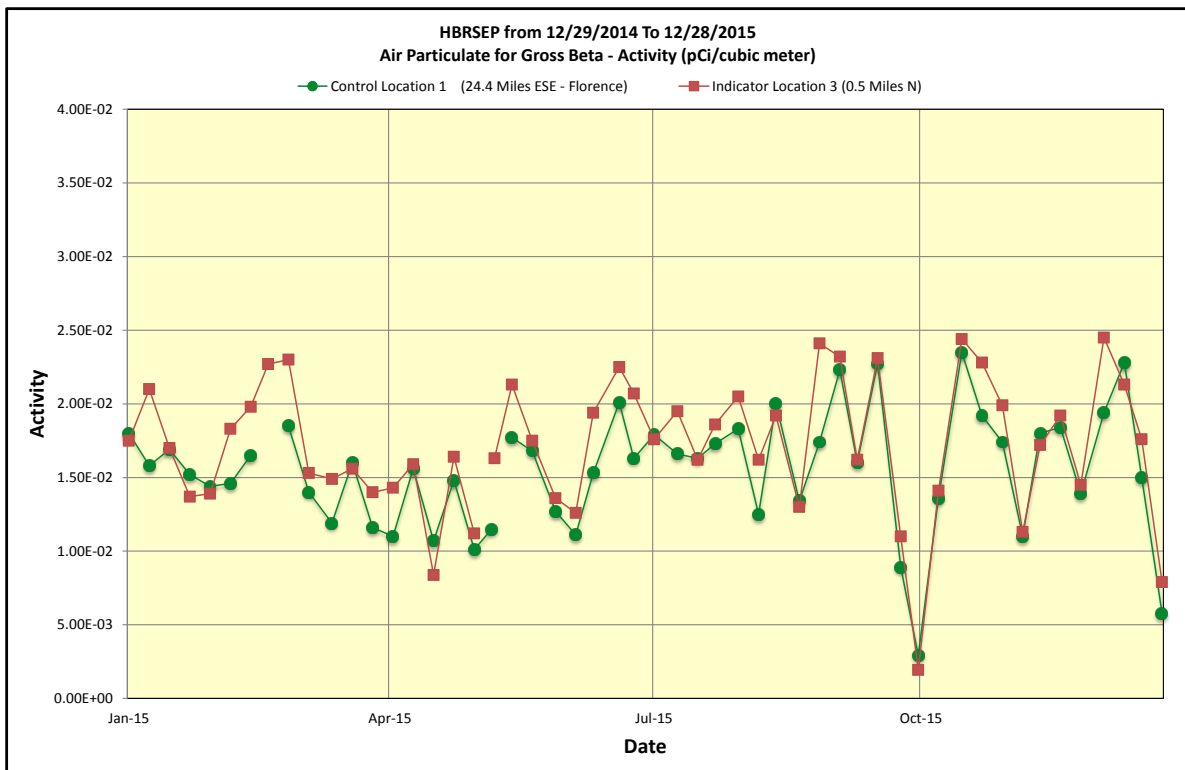


Figure 3.1-3

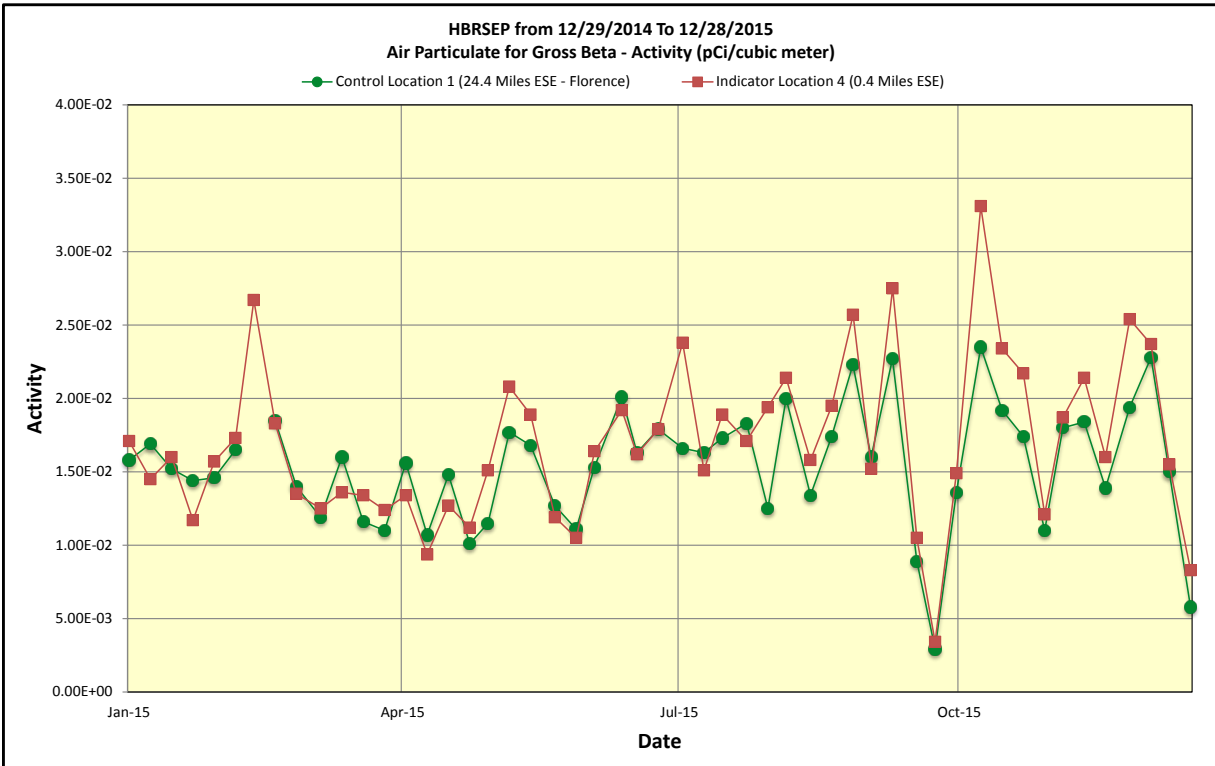


Figure 3.1-4

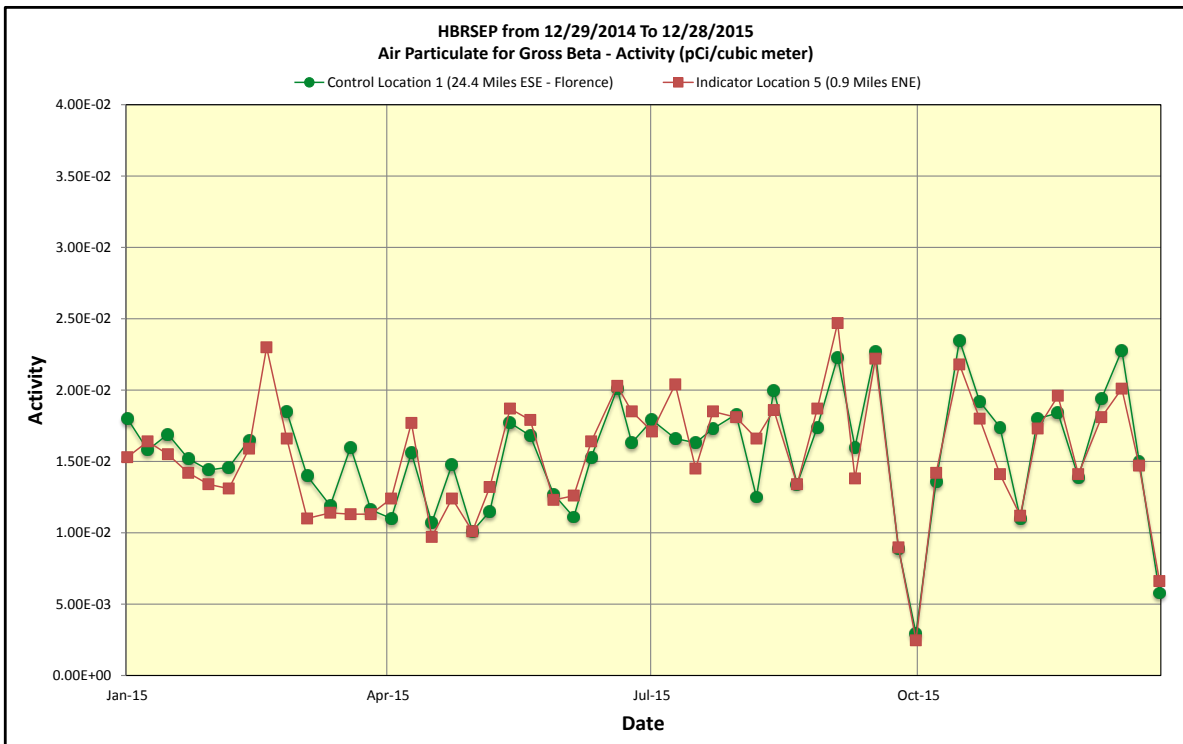


Figure 3.1-5

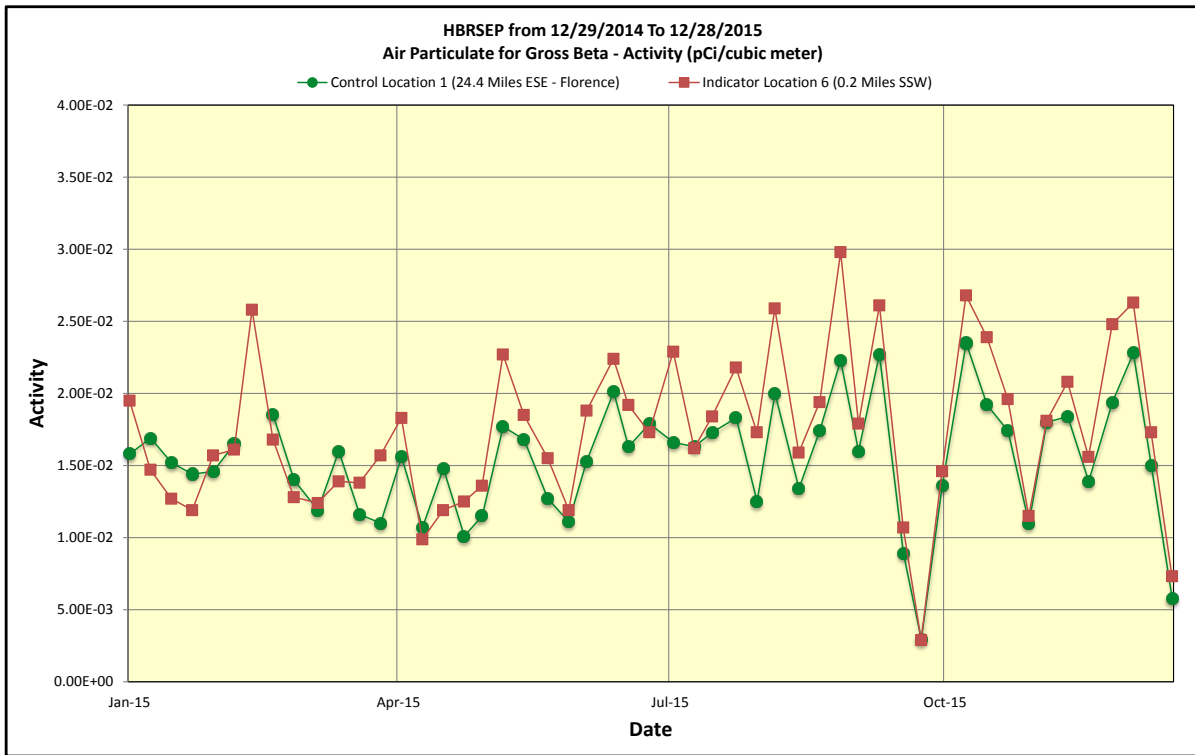


Figure 3.1-6

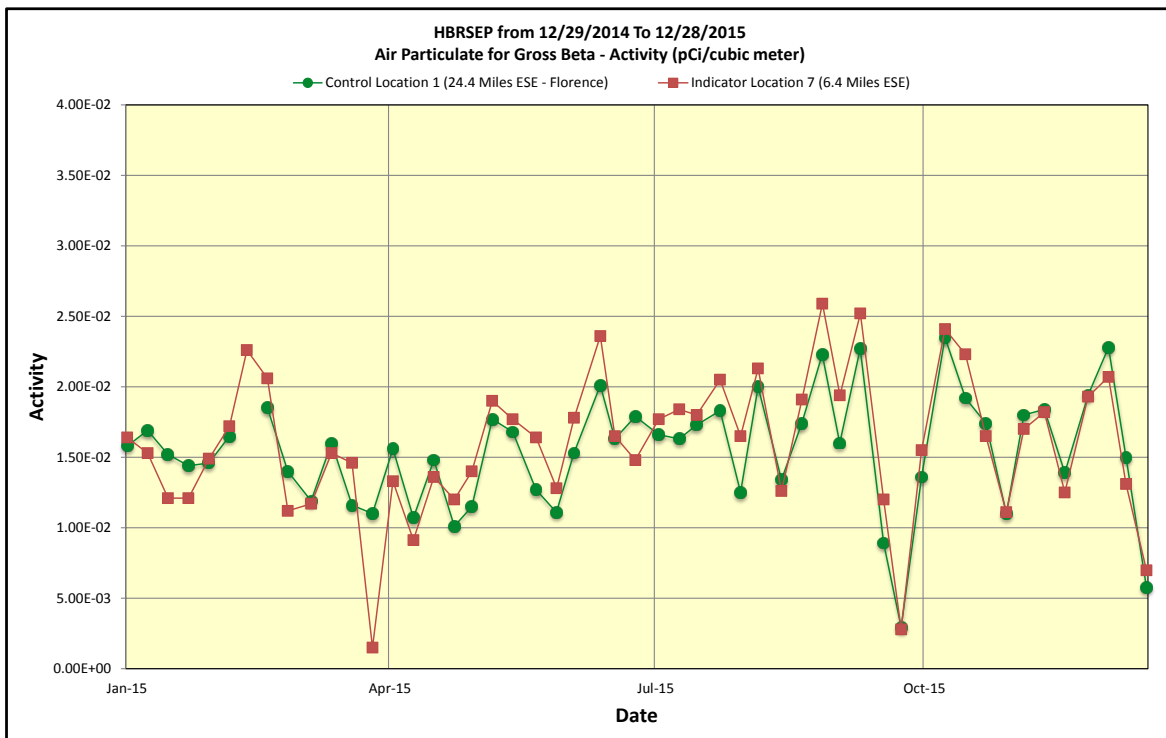


Figure 3.1-7

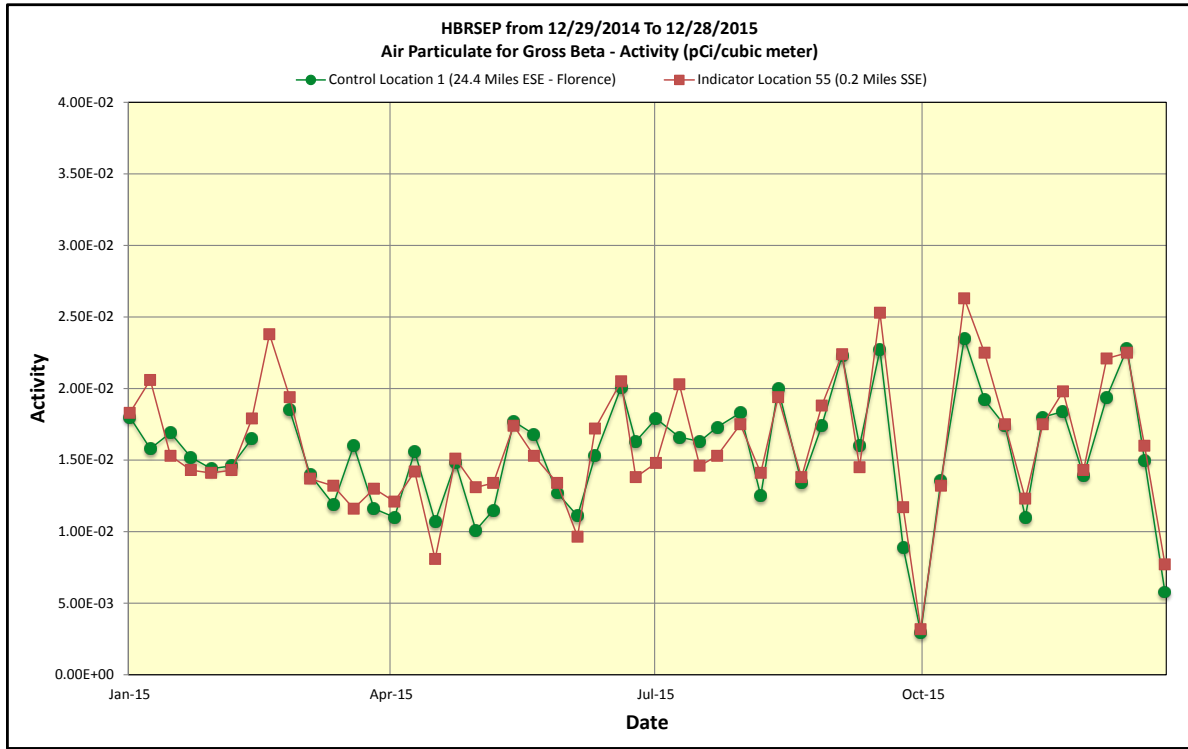


Figure 3.1-8

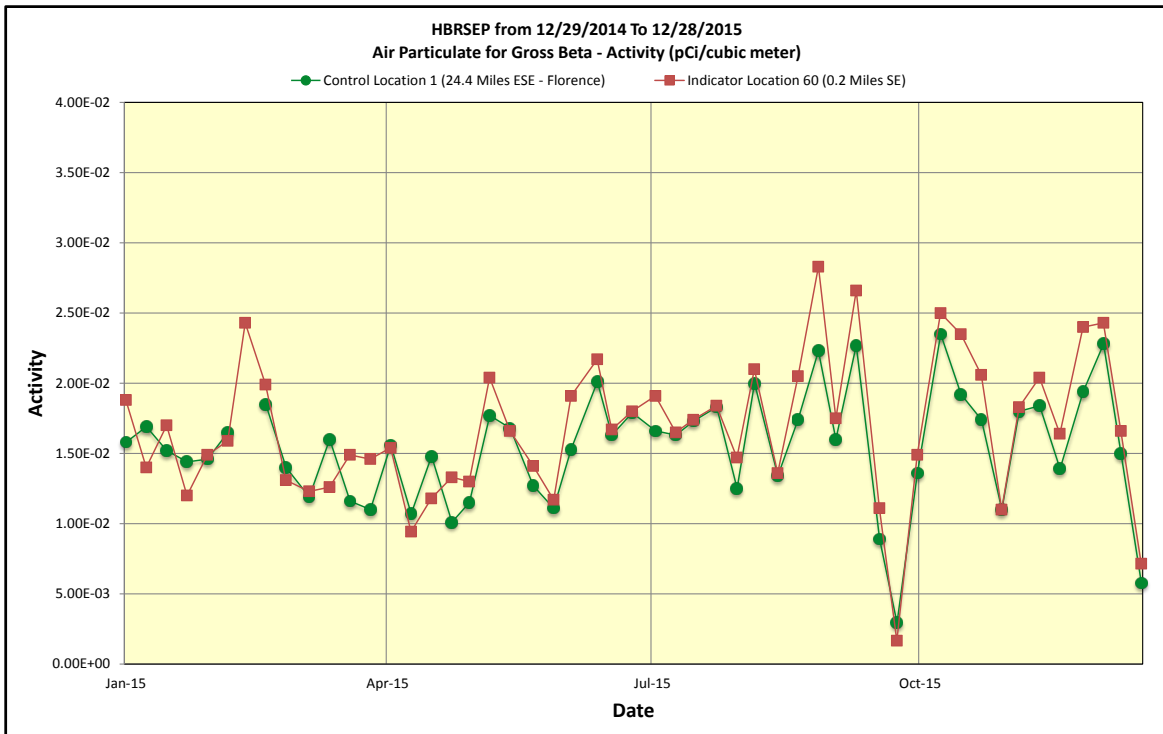
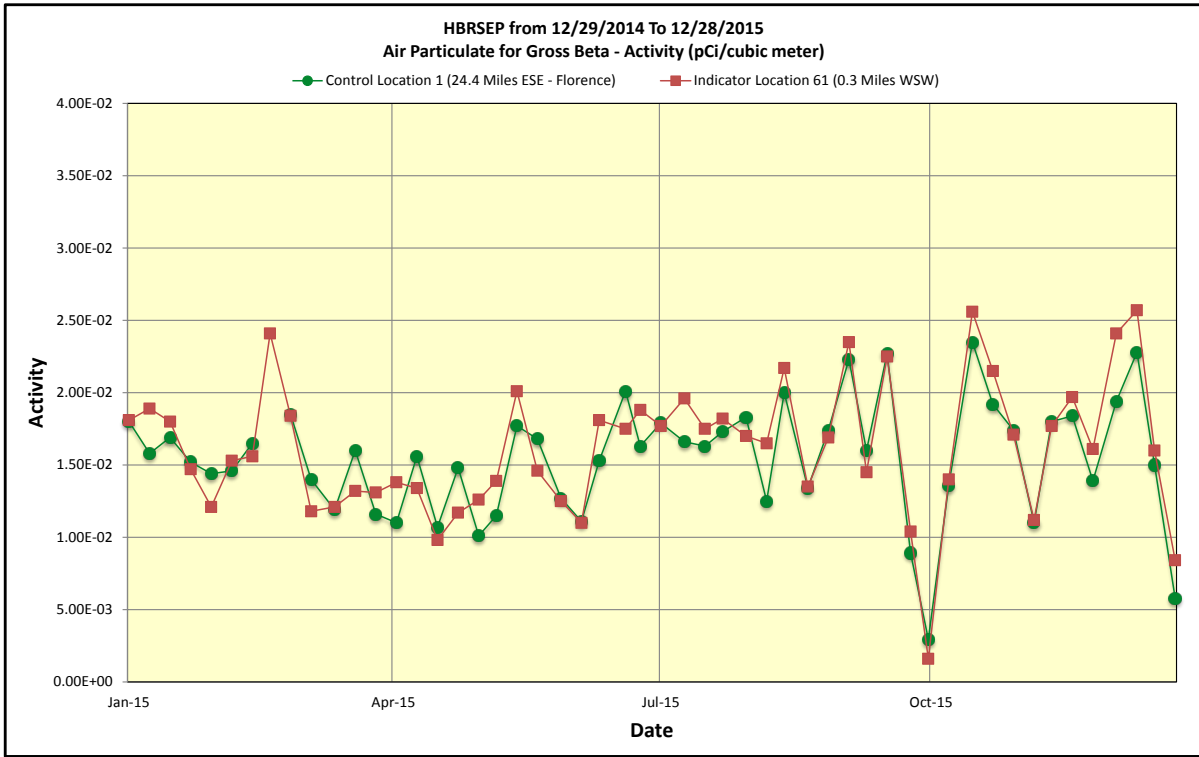


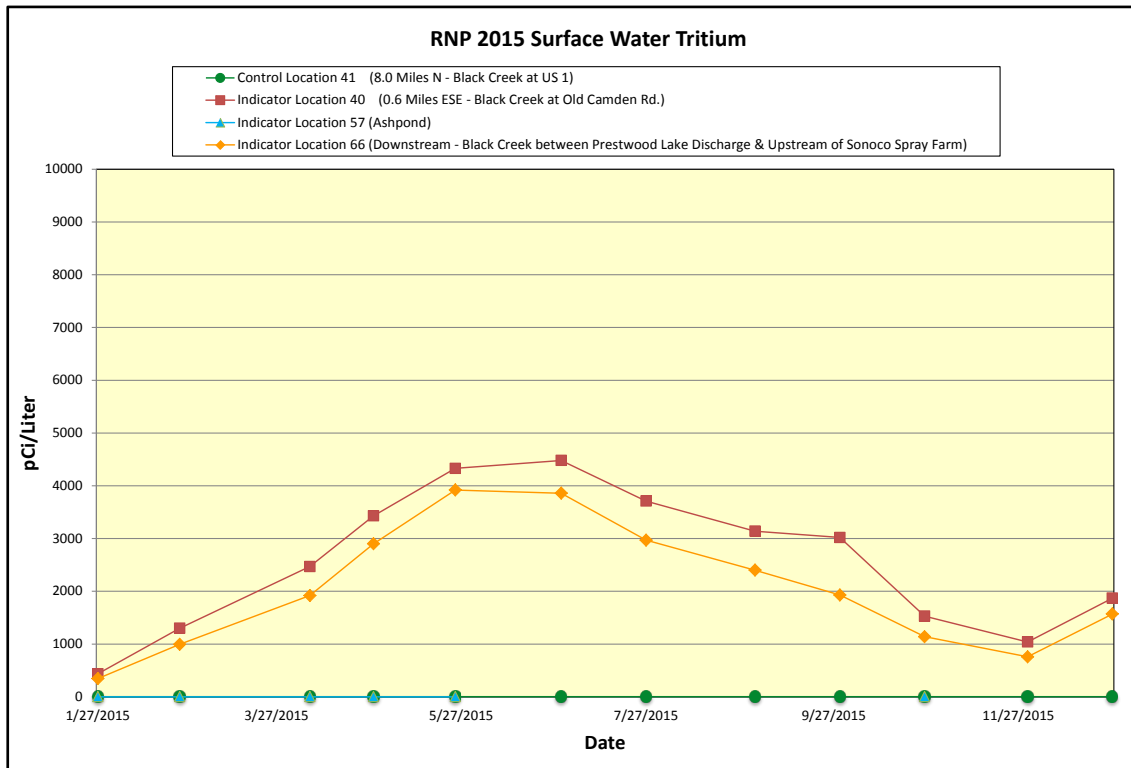
Figure 3.1-9



3.2 SURFACE WATER

Surface water (SW) composite samples are composited monthly and analyzed for gamma emitting radionuclides and for tritium radioactivity. The water samplers operated for a total of 99.59% availability for 2015. Refer to Appendix C or Appendix D for deviations and unavailable samples in the 2015 collection year, if applicable. The analyses indicated that no detectable concentrations of gamma - emitting radionuclides relating to plant effluents appeared in any of the indicator and control samples. All concentrations of natural occurring gamma-emitters were less than their respective LLDs (see Table 2.2-C). None of the control samples indicated the presence of tritium; however, 24 out of 30 indicator samples did indicate the presence of tritium in 2015. The average annual tritium activity was 2.31E+3 pCi/L, with the results ranging from 3.46E+2 pCi/L to 4.48E+3 pCi/L. The surface water indicator location with the highest tritium mean in 2015 was the Lake Robinson surface water (SW-40 - Black Creek at Old Camden Rd.) with a mean of 2.56E+3 pCi/L, and results ranging from 4.37E+2 pCi/L to 4.48E+3 pCi/L; which is attributed to plant operation. Lake Robinson's tritium activity is cyclic and follows HBRSEP's fuel cycle. Figure 3.2-1 displays the tritium activity throughout 2015 for the surface water samples. These surface waters do not supply drinking water at any downstream location and are not typically used for irrigation. Therefore, radiological dose via this pathway (surface water) is limited to the consumption of fish (0.0057 mrem/yr.) and evaporation of tritium (0.245 mrem/yr. using HBRSEP 2015 Meteorology Data) from Lake Robinson and its subsequent inhalation and ingestion from vegetable gardens and meat producing animals. Using the methodology of Regulatory Guide 1.109, a dose of 0.251 millirem/year to the maximum exposed individual could be assigned to this pathway.

Figure 3.2-1



3.3 GROUND WATER

Ground water (GW) samples are collected and analyzed quarterly for gamma emitters and tritium. Some of the ground water samples are also analyzed for low-level radioiodine (LLI-131) and for gross beta. No by-product/plant-related gamma activity associated with plant operations was detected in the fifty-seven (57) indicator samples of ground water collected in 2015. The measured concentrations of the gamma analyses indicated concentrations below their required LLD as specified in the HBRSEP ODCM in Table 4.1-3 titled "Lower Limit of Detection (LLD)" for the year 2015 and Table 2.2-C of this report. Gross alpha analysis and alpha spectroscopy/transuranic analyses were requested by HBRSEP personnel on one ground water sample, location # 82 (NCR # 742670). These analyses are not HBRSEP ODCM required analyses.

The ground water samples had detectable concentrations of tritium activity in twenty-six (26) out of fifty-seven (57) samples, for an average concentration of $6.07E+2$ pCi/L; with a range of $1.93E+2$ pCi/L to $1.62E+3$ pCi/L. The measured ground water tritium concentrations were below the required HBRSEP ODCM Table 4.1-3 LLDs for environmental samples and Table 2.2-C. The tritium limits are 2000 picocuries per Liter (pCi/L) for a drinking water pathway and 3000 pCi/L if no drinking water pathway exists. HBRSEP administratively established a ground water tritium analysis LLD of approximately 250 pCi/L, which is well below the requirements specified in the HBRSEP ODCM. These tritium results are also well below the EPA reportable drinking water limit (20,000 pCi/Liter) and the non-drinking water limit (30,000 pCi/Liter).

During 2015, sixteen (16) ground water indicator samples were analyzed for I-131 to the HBRSEP ODCM drinking water limit (<1 pCi/L). No detectable concentrations of I-131 activity were detected in the sixteen samples. The ground water sample analyzed for LLI-131 for 4th quarter 2015 had to be sent to a vendor lab (GEL) for analysis due to the EnRad Analytical Laboratory suspending analysis of water samples for LLI-131 (October 2015). This was due to two non-agreement cross check results - refer to Section 4 Eckert & Ziegler Analytics Cross Check Program (NCR # 01937710 and NCR # 01967554). Also during 2015, five (5) GW indicator samples were analyzed for gross beta activity, with activity present in four of the five samples, for an average concentration of $1.14E+0$ pCi/L, with a range of $6.51E-1$ pCi/L to $1.67E+0$ pCi/L. Two (2) ground water indicator samples were analyzed for gross alpha activity, with, with an average activity of $1.00E+0$ pCi/L; and one ground water indicator sample was also analyzed by alpha spectroscopy with no detectable activity.

In August of 2014, ground water ODCM location 71 (0.87 miles NNW [MW-03A] between Ash Pond and the Railroad tracks) was retired from the RNP REMP sampling program; however, it remains a ground water location in the HBRSEP ODCM Rev. 33, which was the applicable ODCM revision for the 2015 REMP. No indicator ground water samples, from location 71, were collected 3rd or 4th Quarter of 2014 or for any of the collection periods in 2015. Refer to Appendix C for deviations and unavailable samples in the 2015 collection year.

3.4 MILK / BROADLEAF VEGETATION

Milk monitoring has not been conducted due to the unavailability of milk samples in the area since July 17, 1998, when the dairy ceased operation. Milk sampling will resume if a new sample location is identified. Broadleaf sampling is conducted since no milk animals are located within a radius of approximately five miles of the plant in any sector and is used to calculate dose to an individual via the vegetation-milk-man pathway.

Broadleaf vegetation sampling is accomplished by collecting cherry, sassafras, persimmon, pear, and wax myrtle leaves in 2015. Three species of samples, when available, are collected monthly at five locations (one control and four indicator locations at the site boundary selected using historical meteorology with the highest calculated annual average ground level deposition). Broadleaf sampling is conducted since no milk animals are located within a radius of approximately five miles of the plant and is used to simulate dose to an individual via the milk pathway for compliance purposes.

During 2015, 21 of 84 samples taken from the indicator sites demonstrated detectable concentrations of Cs-137 for an average value of $3.84E+1$ pCi/kg (wet). The control samples had detectable concentrations of Cs-137 in 11 of 21 samples with a mean concentration of $4.21E+1$ pCi/kg (wet). Upon comparing these results, it is concluded that the indicator values reflect fallout Cs-137 contamination. Past sampling experience further supports this interpretation. Refer to Appendix C and Appendix D for deviations and unavailable samples in the 2015 collection year.

3.5 FOOD PRODUCTS

During 2015, one food product (FP) sample was collected from both the control location (FP-49) and the indicator location (FP-58). Collards and a watermelon were collected from the control location (FP-49) and the indicator location (FP-58), respectively; while no food products were collected from indicator location FP-54 at Auburndale Plantation due to this area in 2015 not being irrigated by water in which liquid plant effluents have been discharged. The control sample had detectable concentration of Cs-137 in the one sample, with a single value of $8.98E+0$ pCi/kg (wet) [NCR # 01972211]. No gamma activity associated with plant operation was detected in the indicator sample for the 2015 collection period.

3.6 AQUATIC VEGETATION

The aquatic vegetation samples are considered to be sensitive environmental indicators used as long term trending and do not constitute a dose pathway. In 2015, there were three aquatic vegetation indicator samples and one aquatic vegetation control sample collected. The aquatic vegetation samples collected pose no radiological dose consequence since this is not a dose pathway to the general public. Gamma analyses of the indicator aquatic vegetation samples detected concentrations of Co-58 in 2 of 3 samples with a mean concentration of $8.97E+0$ pCi/kg

(wet), Co-60 in 2 of 3 samples with a mean concentration of $1.71\text{E}+1$ pCi/kg (wet), and Cs-137 in 2 of 3 samples with a mean concentration of $7.80\text{E}+0$ pCi/kg (wet).

3.7 FISH

Samples of free-swimming and bottom-feeding fish were taken from Lake Robinson and Prestwood Lake (the first downstream lake) and compared to similar fish from a control lake, which is unaffected by plant operation. During 2015, 3 out of 4 bottom-feeding fish and 4 out of 4 free-swimming fish (indicator sites) demonstrated detectable concentrations of Cs-137 for an average value of $2.79\text{E}+1$ pCi/kg (wet) and $3.86\text{E}+1$ pCi/kg (wet), respectively. The control samples had detectable concentrations of Cs-137 for 1 out of 2 bottom-feeding fish and 2 out of 2 free-swimming fish for an average concentration of $3.92\text{E}+1$ pCi/kg (wet) and $8.04\text{E}+1$ pCi/kg (wet), respectively. Upon comparing these results, it is concluded that the 2015 indicator values reflect fallout Cs-137 contamination. Past sampling experience further supports this interpretation.

3.8 SHORELINE SEDIMENT

In 2015, Cesium-137 activity was observed in one out of four indicator locations with a single concentration of $3.23\text{E}+1$ pCi/kg (dry). Only naturally occurring gamma activity was detected in the other three indicator locations. Cs-137 activity has been detected in shoreline sediment samples in past years, which was attributed to worldwide fallout and not the plant operation.

3.9 BOTTOM SEDIMENT

During 2015, a total of three bottom sediment samples were analyzed from the indicator location and one from the control location. The bottom sediment samples are used as indicators of buildup of radioactivity in the environment and do not constitute a dose pathway. Cs-137 activity was detectable in two of the three indicator bottom sediment samples in 2015, with an average concentration of $1.63\text{E}+2$ pCi/kg (dry) and Co-60 activity was detectable in one of the three indicator bottom sediments with an average concentration of $7.49\text{E}+1$ pCi/kg (dry). The control sample indicated detectable Cs-137 activity with a concentration of $5.88\text{E}+1$ pCi/kg (dry). This concentration is similar to previous years and does not indicate a buildup in the environment. No other gamma activity, except for naturally occurring gamma activity, was detected in the annual bottom sediment samples in 2015.

3.10 ASIATIC CLAMS

Benthic samples from Lake Robinson during 2015 continue to confirm the absence of any substantial populations of Asiatic clams (*Corbicula fluminea*). The natural chemistry of the lake (i.e., low alkalinity and hardness) inhibits their proliferation.

3.11 DIRECT GAMMA RADIATION

3.11.1 ENVIRONMENTAL TLD

In 2015, 169 TLDs were analyzed, 165 at indicator locations and 4 at the control location. TLDs are collected and analyzed quarterly.

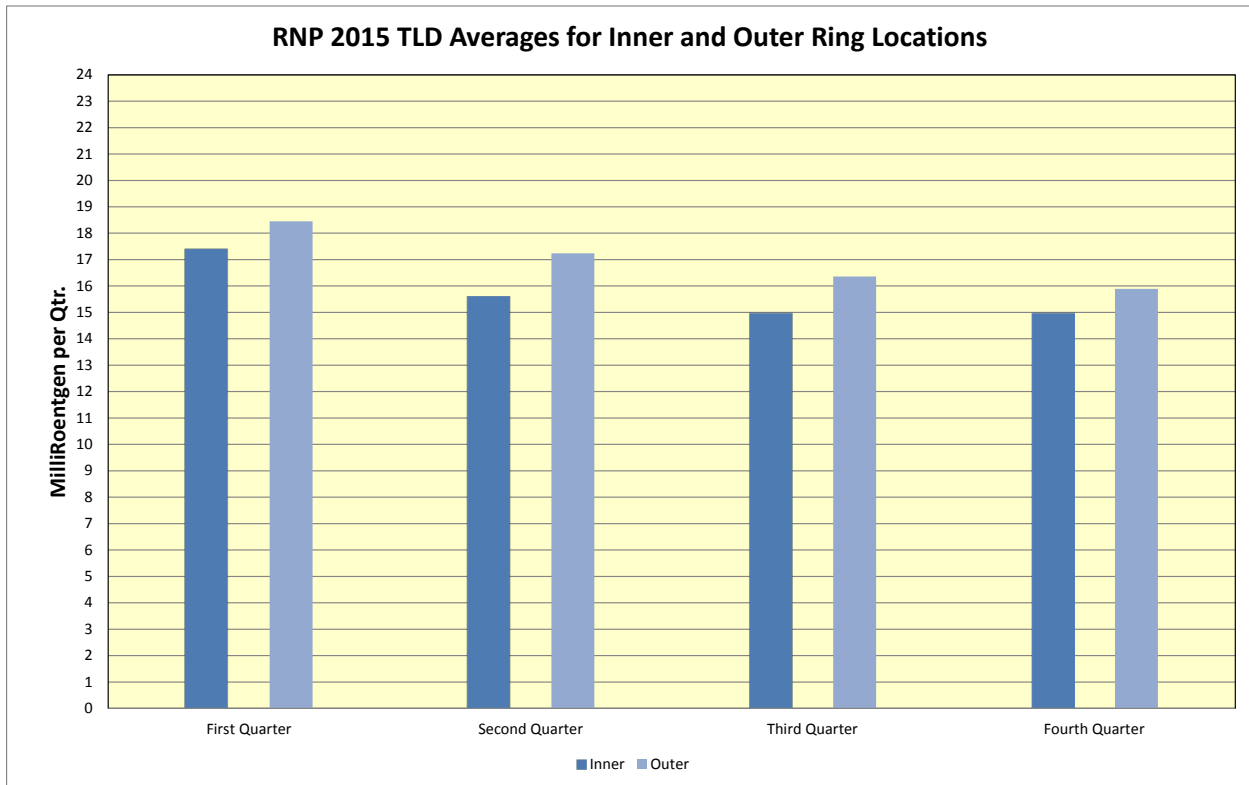
Thermoluminescent dosimeters (TLDs) were used to monitor ambient radiation exposures in the plant environs. The average quarterly exposure at the indicator and control locations was 16.2 mR/std. qtr. and 13.9 mR/std. qtr. respectively. The highest TLD indicator location for 2015 was TLD location #35 at 4.5 miles SSW at Kelly Bridge Road (#S-31-51) and its average was 23.1 mR/std. qtr. The differences among these locations are attributed to variations in soils, local geology, and are not the result of plant operations. There were three (3) missing TLDs during the HBRSEP 2015 collection period (see Appendix C).

Comparison of the quarterly TLD exposure within approximately 1 mile (inner ring) of the plant with that at approximately 5 miles (outer ring) is presented in Figure 3.11.1. These data illustrate that the quarterly inner ring TLD exposures for the four quarters of 2015 are slightly lower than the outer ring TLD exposures.

As of first quarter 2014, the environmental TLDs that are placed in the field for REMP are Harshaw TLDs. Panasonic TLDs were the type of environmental TLDs for HBRSEP REMP monitoring prior to 2014. This change was a merger initiative in order to achieve fleet standardization of the TLD program. This change in environmental TLDs for the REMP indicates a step change in activity as mentioned in NCR # 01982479 between the Panasonic TLD readings prior to 2014 and the Harshaw TLD readings from 2014 to present. There are three factors that can be attributed to the step increase that was observed: (1) the annealing method levels employed were lower for the Panasonic TLDs, (2) transit control subtraction differences, and (3) the calculation/method of fade correction (fixed fade control - vs - actual in field TLDs). Starting in 2016, enhanced analytical methods will be evaluated for future implementation when sufficient data is available. The new methods will improve data transparency and interpretation.

A TLD Intercomparison Program is conducted as part of the quality assurance program. Results of this program are included in Section 4.7.

Figure 3.11.1



3.12 LAND USE CENSUS

The 2015 HBRSEP Annual Land Use Census was conducted in July, 2015 to meet the requirements of the HBRSEP ODCM 4.4.1. Table 3.12.3 summarizes the HBRSEP 2015 census results. During the 2015 census no milk locations were identified within five miles (8 kilometers) of HBRSEP. Based on a review of sampling requirements, existing/new sample locations, and relative depositions values, no new environmental program changes were required as a result of the 2015 Land Use Census.

3.12.1 PURPOSE OF LAND USE CENSUS

The land use census identifies the pathways (or routes) that radioactive material may reach the general populations near commercial nuclear generating stations. This is accomplished by completing studies each year that identify how the surrounding lands are used by the population. A comprehensive census of the use of the land within a five-mile (8 kilometer) distance of the plant is conducted once per 12 months during the growing season. This information is used for dose assessment and to identify changes to the stations sampled and the type of samples. These results ensure that the Radiological

Environmental Monitoring Program (REMP) is based upon current data regarding human activity in the vicinity of the plant. Therefore, the purpose of the land use census is to ensure the monitoring program is current, as well as provide data for the calculation of estimated radiation exposure.

The pathways evaluated are:

- Ingestion Pathway - Results from eating food products that may have radioactive materials deposited on them, incorporated radioactive materials from the soil or atmosphere. Another pathway is through drinking milk from local cows or goats, if these are present and if not then broadleaf vegetation is collected in lieu of milk. The grass used to feed these animals may have incorporated or had deposited on it radioactive materials that can be transferred to the milk.
- Direct Radiation Exposure Pathway- Results from deposition of radioactive materials on the ground or from passage of these radioactive materials in the air.
- Inhalation Pathway- Results from breathing radioactive materials transported in the air.

3.12.2 METHODOLOGY

The following must be identified within the five-mile (8 kilometer) radius of the plant for each of the sixteen meteorological sectors (compass direction the winds may blow, for example NNE [North North East]):

- The nearest resident
- The nearest garden of greater than 500 square feet, producing broadleaf vegetables
- The nearest milk animal
- The nearest meat/egg producing animal

The primary methods are visual inspection from the roadside within the five (5) mile radius and personal contact with the individuals.

3.12.3 LAND USE CENSUS RESULTS

The HBRSEP Land Use Census was performed July 2015 to meet the requirements of the HBRSEP's ODCM. The last HBRSEP land use census was performed in June 2014. The 2014 and 2015 results of the survey for the nearest resident, garden, milk and meat/egg producing animal for each meteorological sector are compared in Table 3.12.3.

No milk producing animals were identified within the five-mile radius of the site in any sector. Milk sampling will resume if a new sample location is identified. Vegetables like tomatoes, squash, okra, cucumbers, etc. are examples of the vegetables of choice for this area and are what is typically grown and sampled in the past. Sampling of these vegetables (non-leafy) will continue until leafy vegetables can be identified. The results of the 2015 Land Use Census and 10 year average meteorological data were reviewed. No changes in release pathways were identified as a result of the land use census that would require an ODCM change, additional dose calculations, or procedure changes were identified.

Table 3.12.3 HBRSEP Land Use Census Comparison (2014 – 2015)

Nearest Pathway (Miles)**

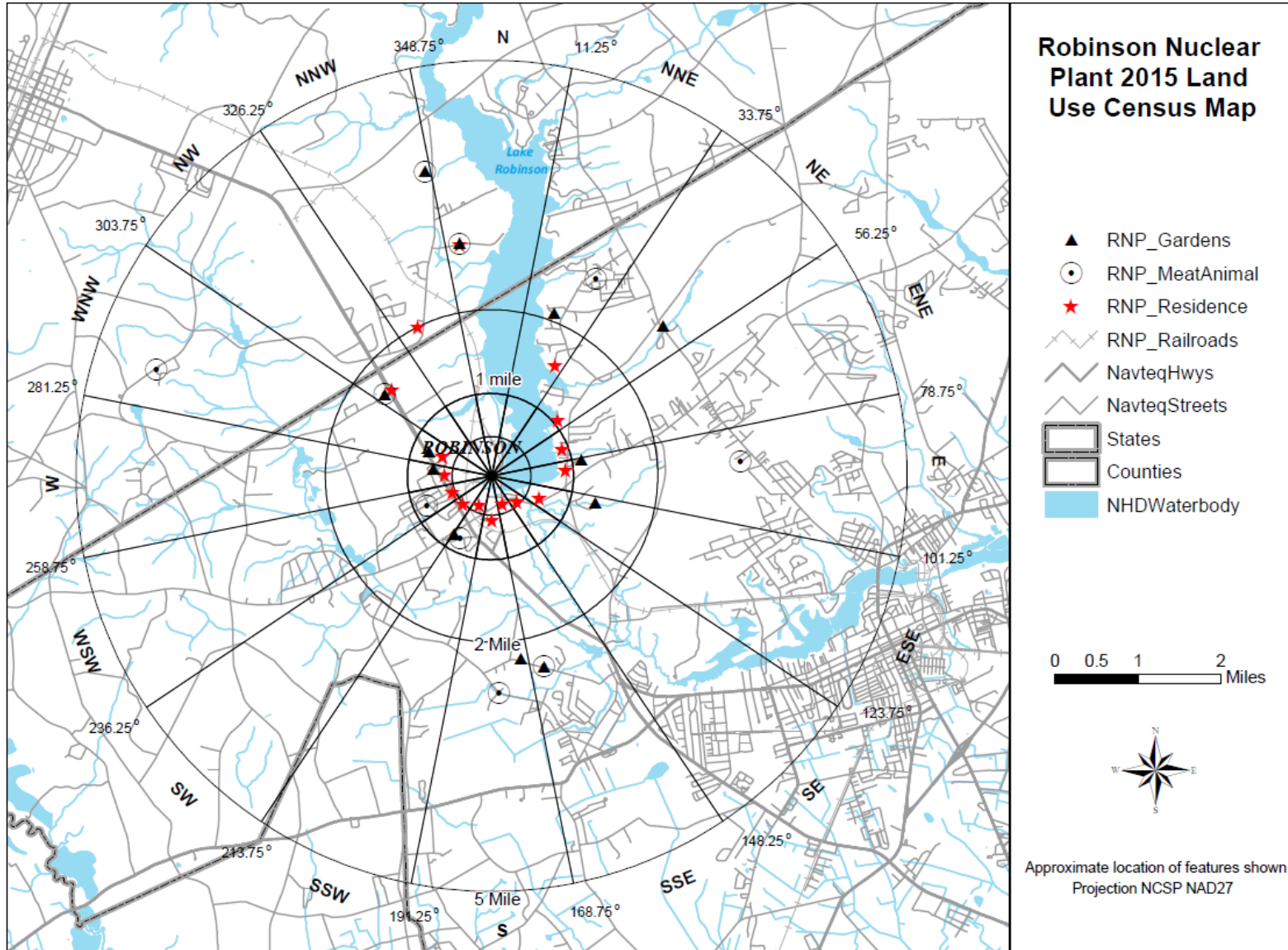
SECTOR	RESIDENT		GARDEN		MEAT/EGG ANIMAL		MILK ANIMAL	
	2014	2015	2014	2015	2014	2015	2014	2015
N	2.83	2.83	2.83	2.83	2.83	2.83	----	----
NNE	1.53	1.53	2.07	2.07	2.69	2.69	----	----
NE	1.03	1.03	2.74	2.74	----	----	----	----
ENE	0.85	0.85	----	----	----	----	----	----
E	0.90	0.90	1.09	1.09	3.00	3.00	----	----
ESE	0.62	0.62	1.28	1.28	----	----	----	----
SE	0.38	0.38	----	----	----	----	----	----
SSE	0.33	0.33	2.39	2.39	2.39	2.39	----	----
S	0.44	0.44	2.23	2.23	2.62	2.62	----	----
SSW	0.37	0.37	0.83	0.83	0.84	0.84	----	----
SW	0.46	0.46	----	----	----	----	----	----
WSW	0.46	0.46	0.86	----*	0.86	0.86	----	----
W	0.56	0.56	0.70	0.70	----	----	----	----
WNW	0.57	0.57	0.81	0.81	4.23	4.23	----	----
NW	1.50	1.50	1.62	1.62	1.62	1.62	----	----
NNW	2.00	2.00	3.82	3.82	3.82	3.82	----	----

* Represents a change from the previous year.

“----” indicates no occurrences within the 5 mile radius

** Sector and distance determined by Global Positioning System.

Figure 3.12-1



4.0 QUALITY ASSURANCE

4.1 SAMPLE COLLECTION

Environmental sample collection was performed by HBRSEP Chemistry and Fisheries and Aquatic Ecology as specified by approved sample collection procedures in 2015.

4.2 SAMPLE ANALYSIS

EnRad Laboratories performed the environmental sample analyses as specified by approved analysis procedures. EnRad Laboratories is located in Huntersville, North Carolina, at Duke Energy's Environmental Center. During 2015, a vendor laboratory, General Engineering Laboratory, LLC (GEL), performed some environmental sample analyses as specified by approved analysis procedures.

4.3 DOSIMETRY ANALYSIS

The Radiation Dosimetry and Records group performed the environmental dosimetry measurements as specified by approved dosimetry analysis procedures.

4.4 LABORATORY EQUIPMENT QUALITY ASSURANCE

4.4.1 DAILY QUALITY CONTROL

EnRad Laboratories has an internal quality assurance program, which monitors each type of instrumentation for reliability and accuracy. Daily quality control checks ensure that instruments are in proper working order and these checks are used to monitor instrument performance.

4.4.2 CALIBRATION VERIFICATION

National Institute of Standards and Technology (NIST) standards that represent counting geometries are analyzed as unknowns at various frequencies ranging from weekly to annually to verify that efficiency calibrations are valid. The frequency is dependent upon instrument use and performance. Investigations are performed and documented should calibration verification data fall outside of the acceptable limits.

4.4.3 BATCH PROCESSING

Method quality control samples are analyzed with sample analyses that are processed in batches. These include gross beta in ground water and tritium analyses.

4.5 DUKE ENERGY INTERLABORATORY COMPARISON PROGRAM

In 2015, Duke Energy Environmental Laboratory (EnRad) participated in interlaboratory programs to satisfy Radiological Environmental Monitoring Program requirements in Duke Energy nuclear plant Offsite Dose Calculation Manuals and Selected Licensee Commitments Manuals, as applicable. In addition, EnRad Laboratory participated in the Environmental Resource Associates (ERA) RadCheM™ Proficiency Testing program to satisfy the North Carolina state drinking water radiochemistry certification requirements.

EnRad Laboratory participated in three interlaboratory programs: Eckert & Ziegler Analytics (EZA), ERA, and Fleet Scientific Services (FSS). EZA results were evaluated against IP 84750 acceptance criteria stated in EnRad procedure 515, Cross Check Program Administration. ERA evaluated the results reported by EnRad based on the National Environmental Laboratory Accreditation Conference (NELAC) Field of Proficiency Testing criteria. FSS results were evaluated as prescribed in the Duke Energy Nuclear Generation Procedure SRPMP 9-2.

Low-level Iodine-131 analysis of drinking water was not required during 2015 since the dose calculated for the consumption of the water was not greater than 1 mrem per year in any supported program. This dose was calculated monthly during 2015 to ensure that low-level Iodine-131 analysis of drinking water samples was not required.

4.5.1 DUKE ENERGY INTERLABORATORY PROGRAM

EnRad Laboratories participated in the Duke Energy Fleet Scientific Services (FSS) Interlaboratory Program during 2015. Interlaboratory cross check samples including mixed gamma in water (Marinelli beakers), low-level I-131 in water, gross beta in water, and tritium in water samples were analyzed during 2015. A summary of the EnRad Laboratory program results for 2015 is documented in Table 4.0-A.

4.5.2 ECKERT & ZIEGLER ANALYTICS CROSS CHECK PROGRAM

EnRad Laboratories participated in the Eckert & Ziegler Analytics Cross Check Program during 2015. Cross check samples including air filters (single and composites), air cartridges, gross beta in water, various mixed gamma samples in Marinelli beakers (soil, vegetation, milk, and water), tritium in water, and Iodine in milk and water samples were analyzed at various times of the year. A summary of the EnRad Laboratory program results for 2015 is documented in Table 4.0-B.

Interlaboratory cross check samples from EZA were received and analyzed in all four quarters of 2015. During 2015, there were three EZA Cross Check results in non-agreement. The first non-agreement result was in the second quarter mixed gamma in vegetation sample (E11250). Agreement was achieved in seven of eight identified nuclides, with Cs-137 being the nuclide that was found in non-agreement (NCR # 01939292). Due to the non-agreement, an evaluation

was conducted to track actions and resolve how to prevent recurrence. The evaluation identified a slight negative bias for all nuclides which could be attributed to three factors: (1) mismatch between cross check geometry and calibration geometry fill-depth, (2) insufficient training of laboratory personnel regarding the importance of geometry effects, and (3) EnRad procedure # 52 when revised the procedural guidance on sample preparation to agree with calibration geometries' fill-depth was removed. How to prevent recurrence: (1) laboratory personnel were provided training to ensure an understanding of the importance of reproducing the proper geometry in all sample analyses, (2) ensure cross checks are ordered that correctly reflect calibration geometries, (3) revise EnRad procedure # 52 to address proper sample preparation to ensure proper geometry agreement, and (4) request from EZA a third quarter mixed gamma in vegetation (E11335) sample (all nuclides were in agreement and no bias was present).

The next two non-agreement results were second quarter LLI-131 in Water (E11248) and third quarter LLI-131 in Water (E11337); NCR # 01937710 and NCR # 01967544 respectively. After the second failure, the LLI-131 in Water analysis was immediately suspended at EnRad Analytical Laboratory (October 2015) and samples requiring this analysis were sent to a vendor lab (GEL). During the fourth quarter of 2015, EnRad requested and analyzed six LLI-131 in Water samples prepared by FSS and all samples were in agreement. Second quarter LLI-131 in Water (E11248) - NCR # 01937710 non-agreement was determined to have been caused by an incomplete chemical separation as the source of the cross check failure. The exact cause of the incomplete separation could not be established and given that the accompanying QC samples were acceptable, no precise cause could be attributed to the failure. In accordance with standard practice, another cross check was obtained for third quarter 2015 to validate the LLI-131 in Water methodology. The third quarter LLI-131 in Water (E11337) also yielded unacceptable results (NCR # 01967544) with result similar to the second quarter results. Immediate corrective actions included reviewing analysis package, EnRad Analytical Laboratory immediately suspended the LLI-131 in Water analysis and samples requiring this analysis were sent to a vendor lab (GEL) for analysis. Due to the second non-agreement, another evaluation was conducted to determine the cause and how to prevent recurrence. The evaluation identified the following items to help prevent recurrence: (1) revise EnRad procedure # 54 to specify method (pH) limitations of steps and to apply dechlorination steps only when needed; (2) revise EnRad procedure # 515 to address specific activity ranges, chemical matrix types, physical matrix types, or specific geometry requirements - such as I-131 cross check samples be ordered at a lower pH; (3) analyze a final set of test samples in appropriate pH to validate cause had been resolved. All FSS LLI-131 samples analyzed during fourth quarter 2015 were in agreement.

Low-Level Iodine 131 (LLI-131) activity has not been observed in water analyses at EnRad Analytical Laboratory in 2015; therefore, there is no possibility that I-131 results may have been underreported in 2015. During first quarter of 2015, EnRad Analytical Laboratory analyzed a LLI-131 in Milk

(E11171) with acceptable results (Ratio: 99%). LLI-131 in Milk methodology is essentially the same as that of water and they have similar densities.

4.5.3 ERA PROFICIENCY TESTING

EnRad Laboratories performed method proficiency testing through a program administered by Environmental Resource Associates (ERA) of Arvada, CO. ERA supplied requested method proficiency samples for analysis and nuclide concentration determination. ERA reported proficiency test results to the North Carolina Department of Health and Human Services, North Carolina Public Health Drinking Water Laboratory Certification Program. A summary of these proficiency test data for 2015 is documented in Table 4.0-C.

4.6 SPLIT COMPARISON PROGRAM

HBRSEP routinely participates in an environmental sample intercomparison program. Program elements include sampling frequency and analysis for food products, shoreline sediments, surface water, fish, aquatic vegetation, and bottom sediment collected by HBRSEP Chemistry and Fisheries, and Aquatic Ecology. Samples are routinely split with a vendor laboratory for intercomparison.

4.7 TLD INTERCOMPARISON PROGRAM

4.7.1 NUCLEAR TECHNOLOGY SERVICES INTERCOMPARISON PROGRAM

Radiation Dosimetry and Records participates in a quarterly TLD intercomparison program administered by Nuclear Technology Services, Inc. of Roswell, GA. Nuclear Technology Services irradiates environmental dosimeters quarterly and sends them to the Radiation Dosimetry and Records group for analysis of the unknown estimated delivered exposure. A summary of the 2015 Nuclear Technology Services Intercomparison Report is documented in Table 4.0-D. The individual measurements were evaluated and results falling outside the acceptable ratio criteria had an evaluation performed to identify any recommended remedial actions and to reduce anomalous errors. During third quarter of 2015 an environmental external TLD cross check failed and NCR # 02012855 was written to document this failure. To prevent recurrence, the TLD was pulled and visually inspected for cracks in the elements and overall integrity of the TLD - no abnormalities were found. A dose response check was performed and one of the elements fell outside the acceptable limits; therefore, the TLD was removed from service by separating it from the usable TLD population and writing OOS (out of service) over the barcode with a permanent marker to prevent future use. Fourth quarter 2015 results were all acceptable. Complete documentation of any evaluation will be available and provided to the NRC upon request.

4.7.2 INTERNAL CROSS CHECK (DUKE ENERGY)

Radiation Dosimetry and Records participates in a quarterly TLD intracomparison program administered internally by the Dosimetry Lab. The Dosimetry Lab Staff irradiates environmental dosimeters quarterly and submits them for analysis of the unknown estimated delivered exposure. A summary of the 2015 Internal Cross Check (Duke Energy) Program is documented in Table 4.0-D.

4.8 GENERAL ENGINEERING LABORATORY, LLC (GEL)

General Engineering Laboratory, LLC (GEL) participated in various Quality Assurance Programs for Inter-laboratory, Intra-laboratory, Third Party Cross Check programs, and a number of proficiency testing programs during 2015. A summary of the GEL quality assurance program results for the sample media types sent to GEL during 2015 is documented in Table 4.0-E. GEL Quality Assurance Program results not appearing in Table 4.0-E will be supplied upon request.

TABLE 4.0-A

DUKE ENERGY

INTERLABORATORY COMPARISON PROGRAM

2015 EnRad Fleet Scientific Services Cross Check Performance Summary

Cross check samples were distributed by Fleet Scientific Services (FSS) in accordance with Duke Energy Nuclear Generation Procedure SRPMP 9-2. Thirteen water samples were analyzed for tritium, gross beta, and mixed gamma emitters, while two water samples were analyzed for low-level I-131. The below table lists results for specific analyses. One hundred and twenty results were reported and evaluated as prescribed in procedure SRPMP 9-2. The acceptance criteria for the program was based on the NRC Inspection Manual Procedure 84750 (IP 84750). These results passed the acceptance criteria for the program with 100% agreement.

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	GO Value	EnRad/GO Ratio	Evaluation
Water LLI-131	Q154L1W1	I-131	4	pCi/L	1.13E+02	1.17E+02	0.96	Agreement
			4	pCi/L	1.19E+02	1.17E+02	1.01	Agreement
			4	pCi/L	1.19E+02	1.17E+02	1.01	Agreement
	Q154L1W2	I-131	4	pCi/L	5.57E+01	5.71E+01	0.97	Agreement
			4	pCi/L	5.51E+01	5.71E+01	0.96	Agreement
			4	pCi/L	5.41E+01	5.71E+01	0.95	Agreement
Tritium in Water	Q151TWR1	H-3	1	pCi/L	2.22E+03	2.08E+03	1.07	Agreement
			1	pCi/L	2.14E+03	2.08E+03	1.03	Agreement
	Q151TWR2	H-3	1	pCi/L	4.74E+02	4.42E+02	1.07	Agreement
			1	pCi/L	5.20E+02	4.42E+02	1.18	Agreement
	Q151TWR3	H-3	1	pCi/L	8.35E+03	8.45E+03	0.99	Agreement
			1	pCi/L	8.44E+03	8.45E+03	1.00	Agreement
Tritium in Water	Q153TWR1	H-3	3	pCi/L	1.45E+05	1.49E+05	0.97	Agreement
			3	pCi/L	1.47E+05	1.49E+05	0.99	Agreement
			3	pCi/L	1.49E+05	1.49E+05	1.00	Agreement
	Q153TWR2	H-3	3	pCi/L	2.82E+03	2.77E+03	1.02	Agreement
			3	pCi/L	2.79E+03	2.77E+03	1.01	Agreement
			3	pCi/L	2.69E+03	2.77E+03	0.97	Agreement
	Q153TWR3	H-3	3	pCi/L	3.70E+02	3.35E+02	1.11	Agreement
			3	pCi/L	3.34E+02	3.35E+02	1.00	Agreement
			3	pCi/L	3.20E+02	3.35E+02	0.96	Agreement
Beta in Water	Q153ABW1	Cs-137	3	pCi/L	1.31E+02	1.27E+02	1.03	Agreement
			3	pCi/L	1.29E+02	1.27E+02	1.02	Agreement
			3	pCi/L	1.28E+02	1.27E+02	1.01	Agreement
	Q153ABW2	Cs-137	3	pCi/L	3.24E+02	3.26E+02	0.99	Agreement
			3	pCi/L	3.32E+02	3.26E+02	1.02	Agreement
			3	pCi/L	3.24E+02	3.26E+02	0.99	Agreement
	Q153ABW3	Cs-137	3	pCi/L	2.04E+02	1.97E+02	1.04	Agreement
			3	pCi/L	2.05E+02	1.97E+02	1.04	Agreement
			3	pCi/L	2.03E+02	1.97E+02	1.03	Agreement

TABLE 4.0-A (Cont.)

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	GO Value	EnRad/GO Ratio	Evaluation	
Gamma in Water	Q151GWR1 1.0 L	Mn-54	1	pCi/L	7.06E+03	6.65E+03	1.06	Agreement	
			1	pCi/L	7.18E+03	6.65E+03	1.08	Agreement	
			1	pCi/L	7.16E+03	6.65E+03	1.08	Agreement	
			Co-57	1	pCi/L	4.84E+03	4.87E+03	0.99	Agreement
				1	pCi/L	4.93E+03	4.87E+03	1.01	Agreement
				1	pCi/L	4.88E+03	4.87E+03	1.00	Agreement
			Fe-59	1	pCi/L	7.92E+03	7.41E+03	1.07	Agreement
				1	pCi/L	8.06E+03	7.41E+03	1.09	Agreement
				1	pCi/L	8.10E+03	7.41E+03	1.09	Agreement
			Co-60	1	pCi/L	6.13E+03	6.14E+03	1.00	Agreement
				1	pCi/L	6.25E+03	6.14E+03	1.02	Agreement
				1	pCi/L	6.21E+03	6.14E+03	1.01	Agreement
			Cs-134	1	pCi/L	7.53E+03	8.53E+03	0.88	Agreement
				1	pCi/L	7.59E+03	8.53E+03	0.89	Agreement
				1	pCi/L	7.59E+03	8.53E+03	0.89	Agreement
			Cs-137	1	pCi/L	1.34E+04	1.32E+04	1.02	Agreement
				1	pCi/L	1.37E+04	1.32E+04	1.04	Agreement
				1	pCi/L	1.37E+04	1.32E+04	1.04	Agreement
	Q151GWR1 3.5 L	Mn-54	1	pCi/L	7.38E+03	6.65E+03	1.11	Agreement	
			1	pCi/L	7.32E+03	6.65E+03	1.10	Agreement	
			1	pCi/L	7.40E+03	6.65E+03	1.11	Agreement	
Co-57		1	pCi/L	5.14E+03	4.87E+03	1.05	Agreement		
		1	pCi/L	5.01E+03	4.87E+03	1.03	Agreement		
		1	pCi/L	5.17E+03	4.87E+03	1.06	Agreement		
Fe-59		1	pCi/L	8.12E+03	7.41E+03	1.10	Agreement		
		1	pCi/L	8.15E+03	7.41E+03	1.10	Agreement		
		1	pCi/L	8.12E+03	7.41E+03	1.10	Agreement		
Co-60		1	pCi/L	6.41E+03	6.14E+03	1.04	Agreement		
		1	pCi/L	6.42E+03	6.14E+03	1.05	Agreement		
		1	pCi/L	6.41E+03	6.14E+03	1.04	Agreement		
Cs-134		1	pCi/L	8.09E+03	8.53E+03	0.95	Agreement		
		1	pCi/L	8.01E+03	8.53E+03	0.94	Agreement		
		1	pCi/L	8.15E+03	8.53E+03	0.96	Agreement		
Cs-137	1	pCi/L	1.42E+04	1.32E+04	1.08	Agreement			
	1	pCi/L	1.41E+04	1.32E+04	1.07	Agreement			
	1	pCi/L	1.42E+04	1.32E+04	1.08	Agreement			

TABLE 4.0-A (Cont.)

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	GO Value	EnRad/GO Ratio	Evaluation
Gamma in Water	Q153GWR 1.0 L	Mn-54	3	pCi/L	8.38E+03	7.79E+03	1.08	Agreement
			3	pCi/L	8.43E+03	7.79E+03	1.08	Agreement
			3	pCi/L	8.48E+03	7.79E+03	1.09	Agreement
		Co-57	3	pCi/L	1.05E+04	1.05E+04	1.00	Agreement
			3	pCi/L	1.06E+04	1.05E+04	1.01	Agreement
			3	pCi/L	1.06E+04	1.05E+04	1.01	Agreement
		Fe-59	3	pCi/L	2.65E+04	2.40E+04	1.10	Agreement
			3	pCi/L	2.69E+04	2.40E+04	1.12	Agreement
			3	pCi/L	2.69E+04	2.40E+04	1.12	Agreement
		Co-60	3	pCi/L	1.24E+04	1.22E+04	1.02	Agreement
			3	pCi/L	1.25E+04	1.22E+04	1.02	Agreement
			3	pCi/L	1.26E+04	1.22E+04	1.03	Agreement
		Zn-65	3	pCi/L	1.89E+04	1.74E+04	1.09	Agreement
			3	pCi/L	1.91E+04	1.74E+04	1.10	Agreement
			3	pCi/L	1.92E+04	1.74E+04	1.10	Agreement
		Y-88	3	pCi/L	8.62E+03	8.86E+03	0.97	Agreement
			3	pCi/L	8.81E+03	8.86E+03	0.99	Agreement
			3	pCi/L	8.89E+03	8.86E+03	1.00	Agreement
		Sn-113	3	pCi/L	1.35E+04	1.31E+04	1.03	Agreement
			3	pCi/L	1.36E+04	1.31E+04	1.04	Agreement
			3	pCi/L	1.34E+04	1.31E+04	1.03	Agreement
Cs-134	3	pCi/L	6.29E+03	6.91E+03	0.91	Agreement		
	3	pCi/L	6.29E+03	6.91E+03	0.91	Agreement		
	3	pCi/L	6.37E+03	6.91E+03	0.92	Agreement		
Cs-137	3	pCi/L	1.22E+04	1.17E+04	1.05	Agreement		
	3	pCi/L	1.22E+04	1.17E+04	1.05	Agreement		
	3	pCi/L	1.22E+04	1.17E+04	1.05	Agreement		

TABLE 4.0-A (Cont.)

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	GO Value	EnRad/GO Ratio	Evaluation
Gamma in Water	Q153GWR 3.5 L	Mn-54	3	pCi/L	8.47E+03	7.79E+03	1.09	Agreement
			3	pCi/L	8.56E+03	7.79E+03	1.10	Agreement
			3	pCi/L	8.47E+03	7.79E+03	1.09	Agreement
		Co-57	3	pCi/L	1.07E+04	1.05E+04	1.02	Agreement
			3	pCi/L	1.09E+04	1.05E+04	1.04	Agreement
			3	pCi/L	1.07E+04	1.05E+04	1.02	Agreement
		Fe-59	3	pCi/L	2.66E+04	2.40E+04	1.11	Agreement
			3	pCi/L	2.67E+04	2.40E+04	1.11	Agreement
			3	pCi/L	2.66E+04	2.40E+04	1.11	Agreement
		Co-60	3	pCi/L	1.27E+04	1.22E+04	1.04	Agreement
			3	pCi/L	1.28E+04	1.22E+04	1.05	Agreement
			3	pCi/L	1.27E+04	1.22E+04	1.04	Agreement
		Zn-65	3	pCi/L	1.90E+04	1.74E+04	1.09	Agreement
			3	pCi/L	1.92E+04	1.74E+04	1.10	Agreement
			3	pCi/L	1.90E+04	1.74E+04	1.09	Agreement
		Y-88	3	pCi/L	8.93E+03	8.86E+03	1.01	Agreement
			3	pCi/L	8.96E+03	8.86E+03	1.01	Agreement
			3	pCi/L	9.00E+03	8.86E+03	1.02	Agreement
		Sn-113	3	pCi/L	1.38E+04	1.31E+04	1.06	Agreement
			3	pCi/L	1.40E+04	1.31E+04	1.07	Agreement
			3	pCi/L	1.38E+04	1.31E+04	1.06	Agreement
		Cs-134	3	pCi/L	6.53E+03	6.91E+03	0.94	Agreement
			3	pCi/L	6.58E+03	6.91E+03	0.95	Agreement
			3	pCi/L	6.55E+03	6.91E+03	0.95	Agreement
		Cs-137	3	pCi/L	1.23E+04	1.17E+04	1.05	Agreement
			3	pCi/L	1.24E+04	1.17E+04	1.06	Agreement
			3	pCi/L	1.23E+04	1.17E+04	1.05	Agreement

TABLE 4.0-B

ECKERT & ZIEGLER ANALYTICS

CROSS CHECK PROGRAM

2015 Cross Check Results for EnRad Laboratories

Interlaboratory Cross check samples are received, prepared, and analyzed in all four quarters of 2015. Results are reported directly to Eckert & Ziegler Analytics. Environmental cross check samples were analyzed in replicate, and the result closest to the mean is reported to Eckert & Ziegler Analytics. The acceptance criteria for the program was based on the NRC Inspection Manual Procedure 84750 (IP 84750). Seventy-three environmental results were reported, of which 70 (95.9%) met the acceptance criteria based on IP 84750.

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	EZA Value	EnRad/EZA Ratio	Evaluation
Gamma	E11279	Ce-141	3	pCi	87.6	84.9	1.03	Agreement
in		Cr-51	3	pCi	218	215	1.02	Agreement
Filter		Cs-134	3	pCi	83.6	84.4	0.99	Agreement
		Cs-137	3	pCi	102	102	1.00	Agreement
		Co-58	3	pCi	108	105	1.03	Agreement
		Mn-54	3	pCi	113	116	0.98	Agreement
		Fe-59	3	pCi	93	89.9	1.03	Agreement
		Zn-65	3	pCi	141	141	1.00	Agreement
		Co-60	3	pCi	133	132	1.01	Agreement

TABLE 4.0-B (Cont.)

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	EZA Value	EnRad/EZA Ratio	Evaluation
Gross Beta	E11281	Gross Beta	3	pCi	205	216	0.95	Agreement
Filter	E11411	Gross Beta	4	pCi	256	240	1.07	Agreement
Gross Beta	E11249	Cs-137	2	pCi/L	259	248	1.04	Agreement
in Water	E11407	Cs-137	4	pCi/L	242	247	0.98	Agreement
I-131 Charcoal	E11172	I-131	1	pCi	82.0	78.4	1.05	Agreement
Cartridge	E11278	I-131	3	pCi	81.5	81.4	1.00	Agreement
LLI-131 in	E11248	I-131	2	pCi/L	67.8	98.4	0.69	Non-Agreement*
Water	E11337	I-131	3	pCi/L	58.5	96.5	0.61	Non-Agreement**
LLI-131 in Milk	E11171	I-131	1	pCi/L	98.3	99.0	0.99	Agreement
Tritium in Water	E11252	H-3	2	pCi/L	13,100	13,000	1.01	Agreement
Gamma in Vegetation (Coffee Grounds)	E11250	Cr-51	2	pCi/g	0.430	0.474	0.91	Agreement
		Cs-134	2	pCi/g	0.230	0.279	0.82	Agreement
		Cs-137	2	pCi/g	0.170	0.215	0.79	Non-Agreement***
		Co-58	2	pCi/g	0.100	0.117	0.85	Agreement
		Mn-54	2	pCi/g	0.150	0.173	0.87	Agreement
		Fe-59	2	pCi/g	0.260	0.260	1.00	Agreement
		Zn-65	2	pCi/g	0.400	0.427	0.94	Agreement
		Co-60	2	pCi/g	0.300	0.331	0.91	Agreement
Gamma in Vegetation (Coffee Grounds)	E11335	Ce-141	3	pCi/g	0.307	0.312	0.98	Agreement
		Cr-51	3	pCi/g	0.819	0.788	1.04	Agreement
		Cs-134	3	pCi/g	0.272	0.310	0.88	Agreement
		Cs-137	3	pCi/g	0.383	0.373	1.03	Agreement
		Co-58	3	pCi/g	0.389	0.385	1.01	Agreement
		Mn-54	3	pCi/g	0.449	0.425	1.06	Agreement
		Fe-59	3	pCi/g	0.361	0.331	1.09	Agreement
		Zn-65	3	pCi/g	0.561	0.517	1.08	Agreement
		Co-60	3	pCi/g	0.493	0.483	1.02	Agreement

* NCR # 01937710
 **NCR # 01967544
 ***NCR # 01939292

TABLE 4.0-B (Cont.)

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	EZA Value	EnRad/EZA Ratio	Evaluation
Gamma in Composite Filter	E11280	Ce-141	3	pCi	141	140	1.01	Agreement
		Cr-51	3	pCi	370	353	1.05	Agreement
		Cs-134	3	pCi	136	139	0.98	Agreement
		Cs-137	3	pCi	164	167	0.98	Agreement
		Co-58	3	pCi	167	172	0.97	Agreement
		Mn-54	3	pCi	195	190	1.03	Agreement
		Fe-59	3	pCi	179	148	1.21	Agreement
		Zn-65	3	pCi	224	232	0.97	Agreement
		Co-60	3	pCi	213	216	0.99	Agreement
Gamma in Water	E11282	I-131	3	pCi/L	94.6	96.7	0.98	Agreement
		Ce-141	3	pCi/L	196	199	0.99	Agreement
		Cr-51	3	pCi/L	508	502	1.01	Agreement
		Cs-134	3	pCi/L	176	198	0.89	Agreement
		Cs-137	3	pCi/L	237	238	1.00	Agreement
		Co-58	3	pCi/L	240	246	0.98	Agreement
		Mn-54	3	pCi/L	286	271	1.06	Agreement
		Fe-59	3	pCi/L	229	211	1.09	Agreement
		Zn-65	3	pCi/L	353	330	1.07	Agreement
Gamma in Milk	E11170	I-131	1	pCi/L	97.9	97.5	1.00	Agreement
		Ce-141	1	pCi/L	221	211	1.05	Agreement
		Cr-51	1	pCi/L	607	555	1.09	Agreement
		Cs-134	1	pCi/L	181	191	0.95	Agreement
		Cs-137	1	pCi/L	266	253	1.05	Agreement
		Co-58	1	pCi/L	285	272	1.05	Agreement
		Mn-54	1	pCi/L	262	240	1.09	Agreement
		Fe-59	1	pCi/L	334	295	1.13	Agreement
		Zn-65	1	pCi/L	509	453	1.12	Agreement
Gamma in Soil	E11251	Cr-51	2	pCi/g	0.460	0.482	0.95	Agreement
		Cs-134	2	pCi/g	0.260	0.284	0.91	Agreement
		Cs-137	2	pCi/g	0.270	0.298	0.91	Agreement
		Co-58	2	pCi/g	0.110	0.119	0.92	Agreement
		Mn-54	2	pCi/g	0.170	0.176	0.97	Agreement
		Fe-59	2	pCi/g	0.260	0.264	0.98	Agreement
		Zn-65	2	pCi/g	0.430	0.434	0.99	Agreement
		Co-60	2	pCi/g	0.300	0.336	0.89	Agreement

TABLE 4.0-C

ENVIRONMENTAL RESOURCE ASSOCIATES (ERA)

PROFICIENCY TESTING

2015 Proficiency Test Results for EnRad Laboratories

North Carolina Department of Health and Human Services Laboratory Certification
EnRad Laboratories

Proficiency test samples are received, prepared, and analyzed in second and fourth quarters of 2015. Results are reported directly to Environmental Resource Associates as described in the instruction package within the study period. Proficiency test data are reported to ERA for evaluation. The acceptance criteria for the program was based on the National Environmental Laboratory Accreditation Conference (NELAC) Field of Proficiency Testing criteria. Fourteen results were reported of which 14 (100 %) met the acceptance criteria. ERA reports proficiency test results to the North Carolina Department of Health and Human Services, North Carolina Public Drinking Water Laboratory Certification Program. This testing is to satisfy the North Carolina state drinking water radiochemistry certification requirements.

Sample	Sample ID	Nuclide	Quarter	Units	EnRad Value	ERA Value	Acceptance Limits	Evaluation
Gamma Emitters in Water	Rad-101	Ba-133	2	pCi/L	75.5	82.5	69.3 - 90.8	Agreement
		Cs-134	2	pCi/L	69.0	75.7	61.8-83.3	Agreement
		Cs-137	2	pCi/L	188.0	189.0	170 - 210	Agreement
		Co-60	2	pCi/L	81.1	84.5	76.0 - 95.3	Agreement
		Zn-65	2	pCi/L	219.0	203.0	183 - 238	Agreement
Gamma Emitters in Water	Rad -103	Ba-133	4	pCi/L	29.6	32.5	25.9 - 36.7	Agreement
		Cs-134	4	pCi/L	54.0	62.3	50.6 - 68.5	Agreement
		Cs-137	4	pCi/L	160	157	141 -175	Agreement
		Co-60	4	pCi/L	71.2	71.1	64.0 - 80.7	Agreement
		Zn-65	4	pCi/L	141	126	113 -149	Agreement
Tritium in Water	Rad -101	H-3	2	pCi/L	3180	3280	2770-3620	Agreement
Tritium in Water	Rad -103	H-3	4	pCi/L	20600	21300	18700-23400	Agreement
Iodine-131 in Water	Rad -101	I-131	2	pCi/L	23.3	23.8	19.7 - 28.3	Agreement
	Rad -103	I-131	4	pCi/L	25.4	26.3	21.9 - 31.0	Agreement

TABLE 4.0-D

2015 ENVIRONMENTAL DOSIMETER CROSS-CHECK RESULTS

Nuclear Technology Services

Radiation Dosimetry and Records participates in a quarterly TLD intercomparison program administered by Nuclear Technology Services, Inc. of Roswell, GA. Nuclear Technology Services irradiates environmental dosimeters quarterly and sends them to the Radiation Dosimetry and Records group for analysis of the unknown estimated delivered exposure. The individual measurements were evaluated and results falling outside the acceptable ratio criteria had an evaluation performed to identify any recommended remedial actions and to reduce anomalous errors. Complete documentation of any evaluation will be available and provided to the NRC upon request.

1st Quarter 2015						2nd Quarter 2015					
TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail	TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
102480	75.35	70.21	7.32	<+/-15%	Pass	102723	18.37	21.52	-14.64	<+/-15%	Pass
102376	72.44	70.21	3.18	<+/-15%	Pass	103394	19.49	21.52	-9.43	<+/-15%	Pass
102444	73.21	70.21	4.27	<+/-15%	Pass	103058	19.49	21.52	-9.43	<+/-15%	Pass
103070	78.11	70.21	11.25	<+/-15%	Pass	103120	19.83	21.52	-7.85	<+/-15%	Pass
102008	77.96	70.21	11.04	<+/-15%	Pass	103419	19.34	21.52	-10.13	<+/-15%	Pass
Average Bias (B)			7.41			Average Bias (B)			-10.30		
Standard Deviation (S)			3.73			Standard Deviation (S)			2.57		
Measure Performance B +S			11.14	<15%	Pass	Measure Performance B +S			12.86	<15%	Pass
3rd Quarter 2015						4th Quarter 2015					
TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail	TLD Number	Reported (mR)	Delivered (mR)	Bias (% diff)	Pass/Fail Criteria	Pass/Fail
103243	20.29	18.7	8.68	<+/-15%	Pass	102869	72.88	66.9	8.91	<+/-15%	Pass
103294	20.64	18.7	10.55	<+/-15%	Pass	102239	71.35	66.9	6.62	<+/-15%	Pass
100502	19.30	18.7	3.37	<+/-15%	Pass	101338	72.24	66.9	7.95	<+/-15%	Pass
100025	19.51	18.7	4.50	<+/-15%	Pass	100372	69.80	66.9	4.30	<+/-15%	Pass
102816	21.91	18.7	17.35	<+/-15%	Fail	100357	70.90	66.9	5.95	<+/-15%	Pass
Average Bias (B)			8.89			Average Bias (B)			6.75		
Standard Deviation (S)			5.57			Standard Deviation (S)			1.78		
Measure Performance B +S			14.46	<15%	Pass	Measure Performance B +S			8.53	<15%	Pass

Fail - refer to NCR # 02012855

TABLE 4.0-D (Cont.)

Internal Crosscheck (Duke Energy)

Radiation Dosimetry and Records participates in a quarterly TLD intracomparison program administered internally by the Dosimetry Lab. The Dosimetry Lab Staff irradiates environmental dosimeters quarterly and submits them for analysis of the unknown estimated delivered exposure.

1st Quarter 2015						2nd Quarter 2015					
TLD	Reported	Delivered	Bias	Pass/Fail		TLD	Reported	Delivered	Bias	Pass/Fail	
Number	(mR)	(mR)	(% diff)	Criteria	Pass/Fail	Number	(mR)	(mR)	(% diff)	Criteria	Pass/Fail
103012	30.82	30.0	2.73	<+/-15%	Pass	100193	22.07	21.8	1.24	<+/-15%	Pass
103524	31.64	30.0	5.47	<+/-15%	Pass	101191	21.06	21.8	-3.39	<+/-15%	Pass
102769	32.31	30.0	7.70	<+/-15%	Pass	101201	21.74	21.8	-0.28	<+/-15%	Pass
103754	31.29	30.0	4.30	<+/-15%	Pass	100158	21.94	21.8	0.64	<+/-15%	Pass
102798	30.86	30.0	2.87	<+/-15%	Pass	101319	21.99	21.8	0.87	<+/-15%	Pass
103737	31.50	30.0	5.00	<+/-15%	Pass	101183	22.46	21.8	3.03	<+/-15%	Pass
102985	32.05	30.0	6.83	<+/-15%	Pass	101330	21.40	21.8	-1.83	<+/-15%	Pass
102108	29.99	30.0	-0.03	<+/-15%	Pass	100351	22.36	21.8	2.57	<+/-15%	Pass
102867	31.00	30.0	3.33	<+/-15%	Pass	101038	22.36	21.8	2.57	<+/-15%	Pass
103500	31.61	30.0	5.37	<+/-15%	Pass		22.49	21.8	3.17	<+/-15%	Pass
Average Bias (B)			4.36			Average Bias (B)			0.86		
Standard Deviation (S)			2.24			Standard Deviation (S)			2.18		
Measure Performance B +S			6.60	<15%	Pass	Measure Performance B +S			3.04	<15%	Pass
3rd Quarter 2015						4th Quarter 2015					
TLD	Reported	Delivered	Bias	Pass/Fail		TLD	Reported	Delivered	Bias	Pass/Fail	
Number	(mR)	(mR)	(% diff)	Criteria	Pass/Fail	Number	(mR)	(mR)	(% diff)	Criteria	Pass/Fail
103703	48.64	43.6	11.56	<+/-15%	Pass	100057	55.76	54.5	2.31	<+/-15%	Pass
102917	46.91	43.6	7.59	<+/-15%	Pass	103022	62.04	54.5	13.83	<+/-15%	Pass
100170	44.30	43.6	1.61	<+/-15%	Pass	103254	55.74	54.5	2.28	<+/-15%	Pass
102841	46.18	43.6	5.92	<+/-15%	Pass	100154	60.56	54.5	11.12	<+/-15%	Pass
101149	43.63	43.6	0.07	<+/-15%	Pass	103256	55.71	54.5	2.22	<+/-15%	Pass
102474	44.87	43.6	2.91	<+/-15%	Pass	101225	58.10	54.5	6.61	<+/-15%	Pass
100522	46.11	43.6	5.76	<+/-15%	Pass	100799	59.79	54.5	9.71	<+/-15%	Pass
103016	48.70	43.6	11.70	<+/-15%	Pass	100417	61.06	54.5	12.04	<+/-15%	Pass
100095	46.11	43.6	5.76	<+/-15%	Pass	103683	57.37	54.5	5.27	<+/-15%	Pass
100381	42.87	43.6	-1.67	<+/-15%	Pass	102114	55.74	54.5	2.28	<+/-15%	Pass
Average Bias (B)			5.12			Average Bias (B)			6.77		
Standard Deviation (S)			4.49			Standard Deviation (S)			4.58		
Measure Performance B +S			9.61	<15%	Pass	Measure Performance B +S			11.34	<15%	Pass

TABLE 4.0-E

2015 ANNUAL QUALITY ASSURANCE REPORT

for the RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

for GEL Laboratories, LLC (GEL)

Sample	Nuclide	Quarter	Units	GEL Value	Known Value	Acceptance Range/Ratio	Evaluation
HDT in Soil							Agreement
MAPEP-15-MaS32	Fe-55	2nd	Bq/Kg	330	205	Sens. Eval.	Agreement
(2Q 2015)		4 th	Bq/kg	557	555	389 - 722	Agreement
MAPEP-15-MaS33	Sr-90	2 nd	Bq/Kg	601.00	653	457 - 849	Agreement
(4Q 2015)		4 th	Bq/kg	403	425	298 - 553	Agreement
Gamma in Soil	Am-241	2 nd	Bq/Kg	97.0	68.0	68 - 126	Agreement
		4 th	Bq/Kg	61.7	49.5	34.7 - 64.4	Warning
	Co-57	2 nd	Bq/Kg	0.369		False Pos Test	Agreement
		4 th	Bq/Kg	1240.0	1180	826 - 1534	Agreement
MAPEP-15-MaS32	Cs-134	2 nd	Bq/Kg	639	678	475 - 881	Agreement
(2Q 2015)		4 th	Bq/Kg	933	1010	707 - 1313	Agreement
	Cs-137	2 nd	Bq/Kg	-0.279		False Pos Test	Agreement
		4 th	Bq/Kg	861.00	809	566 - 1052	Agreement
	Mn-54	2 nd	Bq/Kg	1280	1198	839 - 1557	Agreement
MAPEP-15-MaS33		4 th	Bq/Kg	1450	1340	938 - 1742	Agreement
(4Q 2015)	Zn-65	2 nd	Bq/Kg	1190.0	1064	745 - 1383	Agreement
		4 th	Bq/Kg	761.0	662	463 - 861	Agreement
	Co-60	2 nd	Bq/Kg	852	817	572 - 1062	Agreement
		4 th	Bq/Kg	2.45	1.30	Sens. Eval.	Agreement
	K-40	2 nd	Bq/Kg	684	622	435 - 809	Agreement
		4 th	Bq/Kg	687	599	419 - 779	Agreement

Note: * HTD refers to Hard-to-detect radionuclides

TABLE 4.0-E (Cont.)

Sample	Nuclide	Quarter	Units	GEL Value	Known Value	Acceptance Range/Ratio	Evaluation	
Gamma in Water	Ce-141	4 th	pCi/L	302	284	1.06	Agreement	
		1 st	pCi/L	140	139	1.01	Agreement	
		2 nd	pCi/L	1.24E-01	Not Pres.		Agreement	
		3 rd	pCi/L	205	199	1.03	Agreement	
EZA 4Q 2014 E11060		4 th	pCi/L	127	112	1.14	Agreement	
		Cr-51	4 th	pCi/L	543	526	1.03	Agreement
		1 st	pCi/L	395	366	1.08	Agreement	
		2 nd	pCi/L	347	293	1.18	Agreement	
		3 rd	pCi/L	542	502	1.08	Agreement	
		4 th	pCi/L	260	244	1.07	Agreement	
		EZA 1Q 2015	4 th	pCi/L	190	213	0.89	Agreement
		E11177	1 st	pCi/L	112	126	0.89	Agreement
2 nd	pCi/L		163	173	0.94	Agreement		
3 rd	pCi/L		175	198	0.89	Agreement		
4 th	pCi/L		125	139	0.90	Agreement		
	Cs-137	4 th	pCi/L	258	257	1.01	Agreement	
		1 st	pCi/L	169	167	1.01	Agreement	
		EZA 2Q 2015	2 nd	pCi/L	134	133	1.01	Agreement
		E11219	3 rd	pCi/L	240	238	1.01	Agreement
4 th	pCi/L		112	99.5	1.13	Agreement		
Co-58	4 th		pCi/L	173	168	1.03	Agreement	
1 st	pCi/L		178	180	0.99	Agreement		
		2 nd	pCi/L	72.1	72.6	0.99	Agreement	
		3 rd	pCi/L	245	246	1.00	Agreement	
		4 th	pCi/L	97.3	95.6	1.02	Agreement	
		EZA 3Q 2015	4 th	pCi/L	306	292	1.05	Agreement
E11313	Mn-54	1 st	pCi/L	166	159	1.05	Agreement	
		2 nd	pCi/L	117	107	1.10	Agreement	
		3 rd	pCi/L	288	271	1.06	Agreement	
		4 th	pCi/L	141	126	1.12	Agreement	
	Fe-59	4 th	pCi/L	251	226	1.11	Agreement	
		1 st	pCi/L	214	195	1.10	Agreement	
		2 nd	pCi/L	176	161	1.09	Agreement	
		3 rd	pCi/L	231	211	1.10	Agreement	
		4 th	pCi/L	111	93.4	1.19	Agreement	
		EZA 4Q 2015	4 th	pCi/L	420	384	1.09	Agreement
		E11415	1 st	pCi/L	325	299	1.09	Agreement
			2 nd	pCi/L	285	264	1.08	Agreement
3 rd	pCi/L		375	330	1.14	Agreement		
4 th	pCi/L		243	215	1.13	Agreement		
	Co-60	4 th	pCi/L	324	304	1.06	Agreement	
		1 st	pCi/L	323	328	0.98	Agreement	
		2 nd	pCi/L	210	205	1.03	Agreement	
		3 rd	pCi/L	311	308	1.01	Agreement	
		4 th	pCi/L	192	185	1.04	Agreement	

TABLE 4.0-E (Cont.)

Sample	Nuclide	Quarter	Units	GEL Value	Known Value	Acceptance Range/Ratio	Evaluation
Tritium in Water							
MAPEP-15-GrW32 (2Q 2015)	H-3	2 nd	Bq/L	633	563	394 - 732	Agreement
MAPEP-15-MaW33 (4Q 2015)	H-3	4 th	Bq/L	212	216	151 - 281	Agreement
I-131 in Water with EZA							
4Q 2014 E11060	I-131	4 th	pCi/L	111	95.3	1.16	Agreement
1Q 2015 E11177	I-131	1 st	pCi/L	99.2	96.7	1.03	Agreement
2Q 2015 E11219	I-131	2 nd	pCi/L	95.3	93.4	1.02	Agreement
3Q 2015 E11313	I-131	3 rd	pCi/L	100	96.7	1.03	Agreement
4Q 2015 E11415	I-131	4 th	pCi/L	105	92.6	1.13	Agreement

Other GEL 2015 Annual Environmental Quality Assurance Report results will be supplied upon request.

APPENDIX A

ENVIRONMENTAL SAMPLING
&
ANALYSIS PROCEDURES

APPENDIX A

ENVIRONMENTAL SAMPLING AND ANALYSIS PROCEDURES

Adherence to established procedures for sampling and analysis of environmental media at the H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP) was required to ensure compliance with provisions of the Nuclear Regulatory Commission's Regulatory Guide 4.8, HBRSEP Technical Specifications, and the HBRSEP Off-Site Dose Calculation Manual (ODCM). Analytical procedures were employed to ensure that the ODCM detection capabilities were achieved.

Environmental sampling and analyses were performed by HBRSEP Chemistry, Fisheries and Aquatic Ecology, EnRad Laboratories, and Dosimetry and Records.

This appendix describes the environmental sampling frequencies and analysis procedures by media type conducted in 2015.

I. CHANGE OF SAMPLING PROCEDURES

Ground Water location 71 (0.87 miles NNW [MW-03A] which is located between the Ash Pond and the Railroad tracks) was retired from the REMP sampling program in August of 2014. Therefore, no indicator ground water samples, from location 71, were collected 3rd or 4th Quarter of 2014 or in 2015 (CR # 703262). This ground water well (location 71) remains a ground water location in the HBRSEP ODCM Rev. 33, which was applicable for the 2015 REMP.

II. DESCRIPTION OF ANALYSIS PROCEDURES

Gamma spectroscopy analyses are performed using high purity germanium gamma detectors and Canberra analytical software. Designated sample volumes are transferred to appropriate counting geometries and analyzed by gamma spectroscopy. Perishable samples such as fish, food products, aquatic vegetation, and broadleaf vegetation are ground to achieve a homogeneous mixture and then transferred to an appropriate counting geometry. Soil and sediment samples are dried, sifted to remove foreign objects (rocks, clams, glass, etc.), and then transferred to an appropriate counting geometry container.

Low-level iodine analyses are performed at the EnRad Laboratory by passing a designated sample aliquot through a pre-weighed amount of ion exchange resin to remove and concentrate any iodine in the aqueous sample (water). The resin is then

dried, mixed thoroughly, and a net resin weight determined before being transferred to an appropriate counting geometry and analyzed by gamma spectroscopy.

Tritium analyses are performed monthly and quarterly by using low-level environmental liquid scintillation analysis technique on a Perkin-Elmer 2900TR liquid scintillation system or a Perkin-Elmer 3100TR liquid scintillation system. Tritium samples are distilled and batch processed with a laboratory fortified blank, matrix spike, matrix spike duplicate, and blank to verify instrument performance and sample preparation technique are acceptable.

Gross beta analysis is performed by concentrating a designated aliquot of sample precipitate and analyzing it by Tennelec XLB Series 5 gas-flow proportional counters. Samples are batch processed with a blank to ensure sample contamination has not occurred.

III. CHANGE OF ANALYSIS PROCEDURES

Gross beta analysis of air particulate filters using an un-attenuated (single point) filter specific calibration in a flat bottom planchet was implemented from second quarter 2015 forward (NCR # 01938255).

REMP air sampling heads and air particulate filter media were changed to standardize the vendors, sampling head, and filter size across the REMP nuclear fleet (NCR # 00726335).

IV. SAMPLING AND ANALYSIS PROCEDURES

A.1 AIRBORNE PARTICULATE AND RADIOIODINE

Airborne particulate and radioiodine samples at each of ten locations were composited continuously by means of continuous air samplers. Air particulates were collected on a particulate filter and radioiodines were collected in a charcoal cartridge positioned behind the filter in the sample head. The samplers are designed to operate at a constant flow rate (in order to compensate for any filter loading) and are set to sample approximately 2 cubic feet per minute. Filters and cartridges were collected weekly. A separate weekly gamma analysis was performed on each charcoal cartridge. A weekly gross beta analysis was performed on each filter and then the filters, by location, were composited to produce quarterly filter samples for gamma analysis. The continuous composite samples were collected from the locations listed below.

Location 1	=	24.4 miles ESE Florence, S.C. (Control)
Location 2	=	0.2 miles S Information Center
Location 3	=	0.5 miles N Microwave Tower
Location 4	=	0.4 miles ESE Spillway

Location 5	=	0.9 miles ENE East shore of lake near Johnson's Landing
Location 6	=	0.2 miles SSW Information Center
Location 7	=	6.4 miles ESE CP&L facility on RR Ave., Hartsville
Location 55	=	0.2 miles SSE South of West Settling Pond
Location 60	=	0.2 miles SE Robinson Picnic Area
Location 61	=	0.3 miles WSW West Parking lot near RR tracks

A.2 SURFACE WATER

Weekly composite surface water (SW) samples were collected from four locations, with aliquots going to monthly composite samples. Tritium and gamma analyses were performed on the monthly composites. The composites are collected from the locations listed below.

Location 40	=	0.6 miles ESE Black Creek at old Camden Road (S-16-23) – Lake Robinson
Location 41	=	8.0 miles N Black Creek at US Hwy 1 (Control)
Location 57	=	Ash Pond
Location 66	=	Black Creek between Prestwood Lake discharge and upstream of Sonoco Spray Farm (downstream)

A.3 GROUND WATER

Grab samples were collected quarterly from ground water (GW) wells at fifteen (15) locations. A gamma analysis and tritium analysis were performed on each sample. A low-level Iodine-131 analysis was performed on GW-42, GW-68, and GW-82. A gross beta analysis was performed only on GW-82, along with gross alpha analyses 1st quarter of 2015 and alpha spectroscopy/ transuranic analyses (NCR # 742670). The samples were collected from the locations listed below.

Location 42	=	Unit 1 Deep Wells
Location 64	=	0.6 miles SE Artesian Well
Location 68	=	Well A Btwn Unit 1 switchyard & breakroom
Location 69	=	Well B Behind the Training Building
Location 70	=	Well C Btwn the O&M Building & Fab Shop
Location 71	=	0.87 miles NNW (MW-03A) Btwn Ash Pond & RR tracks (Retired August 2014)
Location 72	=	0.1 miles E (MW-06) 20 ft from FP/FH 7 fire hydrant & Unit 1 North Deep Well Pump
Location 73	=	0.11 miles ENE (MW-13) Btwn Discharge Canal & Unit 1 Stand Alone Fuel Oil

		Tanks
Location 75	=	0.05 miles NE (PSW-02) By Unit 1 boundary Fence to Unit 2 across paved rd. from Hydrogen Gas Tanks
Location 76	=	0.49 miles N (PSW-03) NE corner of the MET Tower Station
Location 77	=	0.25 miles SSE (TS-01B) By entrance rd. to Unit 1
Location 78	=	0.17 miles SSE (TS-02C) NE corner by East Settling Pond influent by fence
Location 79	=	1.0 mile N (TS-07C) S corner by cove & Discharge Canal
Location 81	=	0.19 miles SSE (TS-17B) W of West Settling Pond across paved rd.
Location 82	=	0.3 miles SSE (PDW-01) By entrance rd. to Unit 1

A.4 BROADLEAF VEGETATION

Monthly samples, three different species, were collected at each of five locations when available. A gamma analysis was performed on each sample. The samples were collected from the locations listed below.

Location 50	=	SSE Close to Site Boundary
Location 51	=	Close to Site Boundary
Location 52	=	10 miles W near Bethune (Control)
Location 62	=	SE Close to Site Boundary
Location 67	=	S Close to Site Boundary

A.5 FOOD PRODUCTS

Annually samples, of three different types of broadleaf vegetation (edible portions), were collected when available during harvest at three locations. A gamma analysis was performed on the edible portions of each sample. The samples were collected from the locations listed below.

Location 49	=	10.0 miles W or greater than 5 miles from plant (Control)
Location 54	=	10.1 miles E Auburndale Plantation (if irrigating from Black Creek)
Location 58	=	Site varies from plant

A.6 AQUATIC VEGETATION

Annual samples were collected at each of the four locations. A gamma analysis was performed on each sample. The samples were collected from the locations listed below.

Location 41	=	7.2 miles NNW Black Creek (upstream) – (Control)
Location 45	=	Site varies within Lake Robinson
Location 46	=	Site varies within Prestwood Lake
Location 66	=	Black Creek btwn Prestwood Lake discharge & upstream of Sonoco Spray Farm (downstream)

A.7 FISH

Semiannual samples of bottom feeders and free swimmers were collected at each of three locations. A gamma analysis was performed on the edible portions of each sample. The samples were collected from the locations listed below.

Location 45	=	Site varies within Lake Robinson
Location 46	=	Site varies within Prestwood Lake
Location 47	=	Control station, Any lake not influenced by plant discharge (Control)

A.8 SHORELINE SEDIMENT

Semiannual samples were collected at each of two locations. A gamma analysis was performed on each sample following the drying and removal of rocks and clams. The samples were collected from the locations listed below.

Location 44	=	1.6 miles NNE East shore of lake, Shady Rest Club
Location 57	=	Ash Pond Shore

A.9 BOTTOM SEDIMENT

Annual samples were collected at each of the four locations. A gamma analysis was performed on each sample following the drying; the removal of rocks, clams, etc.; and grinding (if necessary). The samples were collected from the locations listed below.

Location 41	=	7.2 miles NNW Black Creek (upstream) – (Control)
Location 45	=	Site varies within Lake Robinson
Location 46	=	Site varies within Prestwood Lake
Location 66	=	Black Creek btwn Prestwood Lake discharge & upstream of Sonoco Spray Farm (downstream)

A.10 DIRECT GAMMA RADIATION (TLD)

Thermoluminescent dosimeters (TLD) were collected quarterly at forty-three locations. A gamma exposure rate was determined for each TLD. TLD locations are listed in Table 2.1-B. The TLDs were placed as indicated below.

- * An inner ring of 25 TLDs, one in each meteorological sector in the general area of the site boundary.
- * An outer ring of 17 TLDs, one in each meteorological sector in the 6 to 8 kilometer range.
- * The remaining TLDs were placed in special interest areas such as population centers, residential areas, schools, and at a control location.

A.11 ANNUAL LAND USE CENSUS

An Annual Land Use Census was conducted to identify within a distance of 5.0 miles (8 kilometers) from the plant, the nearest location from the site boundary in each of the sixteen meteorological sectors, the following:

- * The Nearest Residence
- * The Nearest Garden greater than 500 square feet or 50 square meters, producing broadleaf vegetables (fresh leafy vegetables)
- * The Nearest Milk-giving Animal (cow, goat, etc.)
- * The Nearest Meat/Egg producing Animal (beef, hogs, chickens, etc.)

The census was conducted during the growing season in July of 2015. Results are shown in Table 3.12.3. No changes were made to the sampling procedures during 2015 as a result of the 2015 census.

APPENDIX B

**RADIOLOGICAL
ENVIRONMENTAL MONITORING
PROGRAM**

SUMMARY OF RESULTS

2015

**H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 (HBRSEP)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DATA SUMMARY**

H. B. Robinson Steam Electric Plant, Unit No. 2
Darlington County, South Carolina

Docket Numbers: 50 - 261
Calendar Year: 2015

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) ⁽¹⁾	All Indicator Locations Mean ⁽²⁾⁽³⁾ Range ⁽²⁾	Location w/Highest Annual Mean ⁽²⁾		Control Locations Mean ⁽²⁾⁽³⁾ Range ⁽²⁾	No. of Non-Routine Report Meas.
				Name, Distance, and Direction	Mean ⁽²⁾⁽³⁾ Range ⁽²⁾		
Air Particulate ⁽⁴⁾ (pCi/m ³)	Gross Beta 519 ⁽⁴⁾	See Table 2.2-C	1.65E-2 (468/468) 1.49E-3 – 3.31E-2	Loc. # 6 Information Center 0.2 miles SSW	1.74E-2 (52/52) 2.89E-3 – 2.98E-2	Loc. # 1 1.54E-2 (51/51) 2.93E-3 – 2.35E-2	0
	Gamma 40	See Table 2.2-C	All less than LLD	----	----	All less than LLD	0
Air Cartridge/Radioiodine ⁽⁴⁾ (pCi/m ³)	I-131 519 ⁽⁴⁾	See Table 2.2-C	All less than LLD	----	----	All less than LLD	0
Aquatic Vegetation ⁽⁶⁾ (pCi/g, wet)	Gamma 4 ⁽⁶⁾ Co-58	----	8.97E+0 (2/3) 3.73E+0 – 1.42E+1	Loc. # 45 Site varies within Lake Robinson	1.42E+1 (1/1) Single Value	All less than LLD	0
	Co-60	----	1.71E+1 (2/3) 1.37E+1 – 2.05E+1	Loc. # 45 Site varies within Lake Robinson	2.05E+1 (1/1) Single Value	All less than LLD	0
	Cs-137	See Table 2.2-C	7.80E+0 (2/3) 7.24E+0 – 8.35E+0	Loc. # 46 Site varies within Prestwood Lake	8.35E+0 (1/1) Single Value	All less than LLD	0
Broadleaf Vegetation ⁽⁴⁾⁽⁵⁾ (pCi/g, wet)	Gamma 105 ⁽⁴⁾⁽⁵⁾ Cs-137	See Table 2.2-C	3.84E+1 (21/84) 7.40E+0 – 7.93E+1	Loc. # 50 Close to Site Boundary (BL-50) SSE	4.68E+1 (3/21) 1.99E+1 – 7.93E+1	Loc. # 52 4.21E+1 (11/21) 6.37E+0 – 1.07E+2	0
Fish Free-Swimmers (pCi/kg, wet)	Gamma 6 Cs-137	See Table 2.2-C	3.86E+1 (4/4) 2.75E+1 – 4.47E+1	Loc. # 46 Site varies within Prestwood Lake	4.16E+1 (2/2) 3.85E+1 – 4.47E+1	Loc. # 47 8.04E+1 (2/2) 7.93E+1 – 8.15E+1	0

**H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 (HBRSEP)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DATA SUMMARY (cont.)**

H. B. Robinson Steam Electric Plant, Unit No. 2
Darlington County, South Carolina

Docket Numbers: 50 - 261
Calendar Year: 2015

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) ⁽¹⁾	All Indicator Locations Mean ⁽²⁾⁽³⁾ Range ⁽²⁾	Location w/Highest Annual Mean ⁽²⁾		Control Locations Mean ⁽²⁾⁽³⁾ Range ⁽²⁾	No. of Non-Routine Report Meas.
				Name, Distance, and Direction	Mean ⁽²⁾⁽³⁾ Range ⁽²⁾		
Fish Bottom-Feeders (pCi/kg, wet)	Gamma 6 Cs-137	See Table 2.2-C	2.79E+1 (3/4) 2.10E+1 – 3.43E+1	Loc. # 46 Site varies within Prestwood Lake	3.13E+1 (2/2) 2.83E+1 – 3.43E+1	Loc. # 47 3.92E+1 (1/2) Single Value	0
Food Products ⁽⁴⁾ (pCi/kg, wet)	Gamma 2 ⁽⁴⁾ Cs-137	See Table 2.2-C	All less than LLD	-----	-----	Loc. # 49 8.98E+0 (1/1) Single Value	0
Ground Water ⁽⁴⁾⁽⁹⁾ (pCi/l)	Gamma 57 ⁽⁴⁾	See Table 2.2-C	All less than LLD	-----	-----	No Control	0
	Gross Beta 5	-----	1.14E+0 (4/5) 6.51E-1 – 1.67E+0	Loc. # 82 (PDW-01) By Entrance Rd. to U/1 0.3 miles SSE	1.14E+0 (4/5) 6.51E-1 – 1.67E+0	No Control	0
	I-131 16	See Table 2.2-C	All less than LLD	-----	-----	No Control	0
	Tritium 57 ⁽⁴⁾	2,000 ⁽⁸⁾	6.07E+2 (26/57) 1.93E+2 – 1.62E+3	Loc. # 79 (TS-07C) South corner by cove & Discharge Canal 1.0 mile N	1.49E+3 (4/4) 1.26E+3 – 1.62E+3	No Control	0
	Gross Alpha 2 ⁽⁹⁾	-----	1.00E+0 (2/2) 8.63E-1 – 1.14E+0	Loc. # 82 (PDW-01) By Entrance Rd. to U/1 0.3 miles SSE	1.00E+0 (2/2) 8.63E-1 – 1.14E+0	No Control	0
	Alpha Spectroscopy/ Transuranics 1 ⁽⁹⁾	-----	All less than LLD	-----	-----	No Control	0
Shoreline Sediment (pCi/kg, dry)	Gamma 4 Cs-137	See Table 2.2-C	3.23E+1 (1/4) Single Value	Loc. # 44 East Shore of Lake, Shady Rest Club 1.6 miles NNE	3.23E+1 (1/2) Single Value	No Control	0

**H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2 (HBRSEP)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM DATA SUMMARY (cont.)**

H. B. Robinson Steam Electric Plant, Unit No. 2
Darlington County, South Carolina

Docket Numbers: 50 - 261
Calendar Year: 2015

Medium or Pathway Sampled or Measured (Unit of Measurement)	Type and Total No. of Measurements Performed	Lower Limit of Detection (LLD) ⁽¹⁾	All Indicator Locations Mean ⁽²⁾⁽³⁾ Range ⁽²⁾	Location w/Highest Annual Mean ⁽²⁾		Control Locations Mean ⁽²⁾⁽³⁾ Range ⁽²⁾	No. of Non-Routine Report Meas.
				Name, Distance, and Direction	Mean ⁽²⁾⁽³⁾ Range ⁽²⁾		
Bottom Sediment ⁽⁶⁾ (pCi/kg, wet)	Gamma 4 Co-60	-----	7.49E+1 (1/3) Single Value	Loc. # 46 Site varies within Prestwood Lake	7.49E+1 (1/1) Single Value	All less than LLD	0
	Cs-137	See Table 2.2-C	1.63E+2 (2/3) 4.40E+0 – 3.21E+2	Loc. # 46 Site varies within Prestwood Lake	3.21E+2 (1/1) Single Value	Loc. # 41 5.88E+1 (1/1) Single Value	0
Surface Water ⁽⁴⁾ (pCi/l)	Gamma 42 ⁽⁴⁾	See Table 2.2-C	All less than LLD	-----	-----	All less than LLD	0
	Tritium 42 ⁽⁴⁾	2,000 ⁽⁸⁾	2.31E+3 (24/30) 3.46E+2 – 4.48E+3	Loc. # 40 Black Creek at Old Camden Rd. – Lake Robinson 0.6 miles ESE	2.56E+3 (12/12) 4.37E+2 – 4.48E+3	All less than LLD	0
Direct Radiation (TLD) ⁽⁴⁾ (mR per std. quarter) ⁽⁷⁾	TLD Readout 169 ⁽⁴⁾⁽⁷⁾	-----	1.62E+1 (165/165) 1.05E+1 – 2.50E+1	Loc. # 35 Kelly Bridge Road 4.5 miles SSW	2.31E+1 (4/4) 2.17E+1 – 2.45E+1	Loc. # 1 1.39E+1 (4/4) 1.28E+1 – 1.56E+1	0

Footnotes to Appendix B

1. The Lower Limit of Detection (LLD) is the smallest concentration of radioactive material in a sample that will yield a net count above system background which will be detected with 95 percent probability and with only 5 percent probability of falsely concluding that a blank observation represents a "real" signal. Due to counting statistics and varying volumes, occasionally lower LLDs are achieved. Refer to Section 2.3.2 for an explanation of how LLD values were derived.
2. Mean and range are based on detectable measurements only.
3. The fractions of all samples with detectable activities at specific locations are indicated in parentheses.
4. Missing samples or surveillances are discussed in Appendix C or Appendix D.
5. Three types of broadleaf vegetation samples are collected monthly when available from four locations for a possible total of 144 samples.
6. Bottom sediment and aquatic vegetation sampling are not required by plant Offsite Dose Calculation Manual (ODCM). Sampling and analysis is performed to monitor any radionuclide accumulation in the lake.
7. TLD exposure is reported in milliroentgen (mR) per standard quarter (91 days).
8. Tritium Lower Limit of Detection (LLD) is approximately $2.50E+2$ pCi/L for samples that typically demonstrate activity less than the LLD. The LLD was lowered in order to maintain comparable LLD and result values with the NC Department of Health and Human Services (NCDHHS), Division of Public Health / State Lab of Public Health.
9. Ground Water results for gross alpha analyses and alpha spectroscopy / transuranic analyses are included in this report as the analyses were requested by HBRSEP personnel; however, these analyses are not HBRSEP ODCM required analyses.

APPENDIX C

**SAMPLING DEVIATIONS
&
UNAVAILABLE ANALYSES**

APPENDIX C

H. B. ROBINSON NUCLEAR PLANT SAMPLING DEVIATIONS & UNAVAILABLE ANALYSES

DEVIATIONS & UNAVAILABLE REASON CODES					
BF	Blown Fuse	PI	Power Interrupt	SM	Motor / Rotor Seized
FZ	Sample Frozen	PM	Preventative Maintenance	TF	Torn Filter
IW	Inclement Weather	PO	Power Outage	VN	Vandalism
LC	Line Clog to Sampler	PS	Power out of service / Undergoing Repair	CN	Construction
OT	Other	SL	Sample Loss / Lost due to Lab Accident	SU	Seasonal Unavailability

C.1 SAMPLING DEVIATIONS

Air Particulates and Air Radioiodines

Any REMP weekly air samples (Air Cartridge or Air Radioiodine) that experience any downtime during a surveillance period will be reported as a Deviation and will be classified as a “Sampling Deviation”. The sample will be counted and the data reported; whereas, a Deviation with no available sample will be classified as an “Unavailable Analyses” and will not have any data reported. The air samplers operated for a total of 99.33% availability in 2015.

Location	Scheduled Collection Dates	Code	Description & Action to Prevent Recurrence	Corrective Action
1	2/10/15 – 2/17/15	SM	27.6 hours downtime - pump not running	733298
5	2/10/15 – 2/17/15	PI	32 hours downtime - power interruption due to ice storm	733263
60	2/10/15 – 2/17/15	PI	33 hours downtime - power interruption due to ice storm	733266
1	2/23/15 – 3/2/15	SM	25 hours downtime - pump not operating/ replaced/ returned to service	736105
55	4/28/15 – 5/5/15	OT	45.7 hours downtime - sampler not turned back on	749443
4	5/18/15 – 5/25/15	OT	5.87 hours downtime - backup power generator ran out of gas	751544
7	7/6/15 – 7/14/15	PI	98.27 hours downtime - power surge/ trip off line	759035
4	10/13/15 – 10/20/15	OT	82.9 hours downtime - power plug not seated well due to weather protector boot degradation - boot replaced	01966552
5	11/3/15 – 11/10/15	PI	16.9 hours downtime - power interruption	01973972
5	11/10/15 – 11/16/15	SM	55.8 hours downtime - sampler out-of-service, repairs made	01975705

Surface Water

Location	Scheduled Collection Dates	Code	Description & Action to Prevent Recurrence	Corrective Action
40	1/27/15 - 2/23/15	PI	33 hours downtime - power interruption due to ice storm	733270
41	1/27/15 - 2/23/15	PI	33 hours downtime - power interruption due to ice storm	733271
41	9/29/15 - 10/27/15	PI	24 hours downtime - power interruption	01961571
57	10/5/15	OT	Collection only for one week due to Ash Pond being dry	01972706

C.2 UNAVAILABLE ANALYSES

Air Particulates and Air Radioiodines

Location	Scheduled Collection Dates	Code	Description & Action to Prevent Recurrence	Corrective Action
1	2/17/15 – 2/23/15	OT	144 hours downtime - Sample pump not operating entire collection period - out-of-service, to be repaired or replaced	736098

Broadleaf (BL) Vegetation

Location	Scheduled Collection Dates	Code	Description & Action to Prevent Recurrence	Corrective Action
All BLVeg	January 2015	SU	BL vegetation unavailable due to seasonal unavailability	735547
All BLVeg	February 2015	SU	BL vegetation unavailable due to seasonal unavailability	732198
All BLVeg	March 2015	SU	BL vegetation unavailable due to seasonal unavailability	739538
All BLVeg	November 2015	SU	BL vegetation unavailable due to seasonal unavailability	01973512
All BLVeg	December 2015	SU	BL vegetation unavailable due to seasonal unavailability	01984019

All "BLVeg" represents RNP Broadleaf Vegetation locations 50 51,52,62, and 67. Each location was to be collected monthly when available and to collect 3 different kinds of broadleaf vegetation.

Ground Water

Location	Scheduled Collection Dates	Code	Description & Action to Prevent Recurrence	Corrective Action
71	All of 2015 Collection Year	OT	Well was grouted over – no sample can be collected.	703262

Surface Water

Location	Scheduled Collection Dates	Code	Description & Action to Prevent Recurrence	Corrective Action
57	June 2015	OT	No Sample - Ash Pond dry	754564
57	July 2015	OT	No Sample - Ash Pond dry	01940966
57	August 2015	OT	No Sample - Ash Pond dry	01952083
57	September 2015	OT	No Sample - Ash Pond dry	01960857
57	November 2015	OT	No Sample - Ash Pond dry	01980339
57	December 2015	OT	No Sample - Ash Pond dry	01988621

TLD

Location	Scheduled Collection Dates	Code	Description & Action to Prevent Recurrence	Corrective Action
18	1/16/15 – 4/20/15 (1 st Qtr. 2015)	VN	TLD missing in the field due to vandalism. The area was searched but the TLD could not be located.	746991
26	4/20/15 – 7/14/15 (2 nd Qtr. 2015)	OT	TLD missing in the field due to Power Pole replacement. The area was searched but the TLD could not be located.	759044
56	7/14/15 – 10/22/15 (3 rd Qtr. 2015)	OT	TLD missing in the field due to tree attached to cut down. The area was searched but the TLD could not be located.	01967911

APPENDIX D

ANALYTICAL DEVIATIONS

APPENDIX D

H. B. ROBINSON NUCLEAR PLANT

ANALYTICAL DEVIATIONS

No Analytical deviations were incurred for the 2015 Radiological Environmental Monitoring Program.

APPENDIX E

**RADIOLOGICAL
ENVIRONMENTAL MONITORING
PROGRAM RESULTS**

2015

This appendix includes sample analysis report summaries and supportive data generated from each sample medium for 2015.

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364945	12/29/2014 - 1/6/2015	Beta	1.80E-02	2.34E-03	2.35E-03
365147	1/6/2015 - 1/13/2015	Beta	1.58E-02	2.43E-03	2.57E-03
365368	1/13/2015 - 1/20/2015	Beta	1.69E-02	2.41E-03	2.34E-03
366711	1/20/2015 - 1/27/2015	Beta	1.52E-02	2.44E-03	2.68E-03
367127	1/27/2015 - 2/3/2015	Beta	1.44E-02	2.41E-03	2.69E-03
367626	2/3/2015 - 2/10/2015	Beta	1.46E-02	2.49E-03	2.89E-03
369041	2/10/2015 - 2/17/2015	Beta	1.65E-02	2.86E-03	3.25E-03
370668	2/24/2015 - 3/2/2015	Beta	1.85E-02	2.98E-03	3.26E-03
371621	3/2/2015 - 3/9/2015	Beta	1.40E-02	2.44E-03	2.78E-03
371981	3/9/2015 - 3/17/2015	Beta	1.19E-02	2.04E-03	2.28E-03
372466	3/17/2015 - 3/24/2015	Beta	1.60E-02	2.50E-03	2.72E-03
373923	3/24/2015 - 3/31/2015	Beta	1.16E-02	2.31E-03	2.77E-03
373933	12/29/2014 - 3/31/2015	Cs-134	<6.09E-04	0.00E+00	6.09E-04
		Cs-137	<3.72E-04	0.00E+00	3.72E-04
		Be-7	1.30E-01	2.10E-02	9.57E-03
		K-40	1.06E-02	6.13E-03	6.06E-03
374623	3/31/2015 - 4/7/2015	Beta	1.10E-02	2.36E-03	2.95E-03
375012	4/7/2015 - 4/14/2015	Beta	1.56E-02	2.45E-03	2.66E-03
375688	4/14/2015 - 4/21/2015	Beta	1.07E-02	2.21E-03	2.65E-03
376896	4/21/2015 - 4/28/2015	Beta	1.48E-02	2.39E-03	2.64E-03
377557	4/28/2015 - 5/5/2015	Beta	1.01E-02	2.21E-03	2.80E-03
378133	5/5/2015 - 5/11/2015	Beta	1.15E-02	2.48E-03	3.08E-03
378527	5/11/2015 - 5/18/2015	Beta	1.77E-02	2.62E-03	2.72E-03
379018	5/18/2015 - 5/25/2015	Beta	1.68E-02	2.62E-03	2.79E-03
379523	5/25/2015 - 6/2/2015	Beta	1.27E-02	2.07E-03	2.27E-03
380278	6/2/2015 - 6/9/2015	Beta	1.11E-02	2.19E-03	2.57E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m³

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
380541	6/9/2015 - 6/15/2015	Beta	1.53E-02	2.51E-03	2.78E-03
380868	6/15/2015 - 6/24/2015	Beta	2.01E-02	2.38E-03	2.25E-03
381337	6/24/2015 - 6/29/2015	Beta	1.63E-02	3.23E-03	3.93E-03
381347	3/31/2015 - 6/29/2015	Cs-134	<5.81E-04	0.00E+00	5.81E-04
		Cs-137	<3.56E-04	0.00E+00	3.56E-04
		Be-7	1.36E-01	2.17E-02	6.83E-03
		K-40	<1.06E-02	0.00E+00	1.06E-02
381661	6/29/2015 - 7/6/2015	Beta	1.79E-02	2.59E-03	2.69E-03
382233	7/6/2015 - 7/14/2015	Beta	1.66E-02	2.37E-03	2.56E-03
382654	7/14/2015 - 7/21/2015	Beta	1.63E-02	2.39E-03	2.44E-03
383583	7/21/2015 - 7/27/2015	Beta	1.73E-02	2.87E-03	3.25E-03
384155	7/27/2015 - 8/4/2015	Beta	1.83E-02	2.36E-03	2.25E-03
384726	8/4/2015 - 8/11/2015	Beta	1.25E-02	2.12E-03	2.46E-03
385474	8/11/2015 - 8/17/2015	Beta	2.00E-02	2.56E-03	2.55E-03
385992	8/17/2015 - 8/25/2015	Beta	1.34E-02	1.89E-03	1.97E-03
386887	8/25/2015 - 9/1/2015	Beta	1.74E-02	2.33E-03	2.33E-03
387470	9/1/2015 - 9/8/2015	Beta	2.23E-02	2.43E-03	2.09E-03
388832	9/8/2015 - 9/14/2015	Beta	1.60E-02	2.31E-03	2.42E-03
389472	9/14/2015 - 9/21/2015	Beta	2.27E-02	2.45E-03	2.19E-03
390073	9/21/2015 - 9/29/2015	Beta	8.91E-03	1.74E-03	2.09E-03
390714	6/29/2015 - 9/29/2015	Cs-134	<3.77E-04	0.00E+00	3.77E-04
		Cs-137	<3.44E-04	0.00E+00	3.44E-04
		Be-7	1.18E-01	1.90E-02	9.81E-03
		K-40	6.06E-03	4.33E-03	5.08E-03
390704	9/29/2015 - 10/5/2015	Beta	2.93E-03	1.71E-03	2.68E-03
392022	10/5/2015 - 10/12/2015	Beta	1.36E-02	2.13E-03	2.32E-03
392294	10/12/2015 - 10/20/2015	Beta	2.35E-02	2.29E-03	1.81E-03
393493	10/20/2015 - 10/27/2015	Beta	1.92E-02	2.23E-03	2.00E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
393890	10/27/2015 - 11/3/2015	Beta	1.74E-02	2.24E-03	2.16E-03
394915	11/3/2015 - 11/10/2015	Beta	1.10E-02	2.00E-03	2.33E-03
395367	11/10/2015 - 11/16/2015	Beta	1.80E-02	2.46E-03	2.44E-03
395692	11/16/2015 - 11/23/2015	Beta	1.84E-02	2.39E-03	2.27E-03
396184	11/23/2015 - 11/30/2015	Beta	1.39E-02	2.02E-03	2.09E-03
396702	11/30/2015 - 12/8/2015	Beta	1.94E-02	2.18E-03	2.04E-03
397253	12/8/2015 - 12/15/2015	Beta	2.28E-02	2.61E-03	2.52E-03
397957	12/15/2015 - 12/21/2015	Beta	1.50E-02	2.42E-03	2.69E-03
398345	12/21/2015 - 12/28/2015	Beta	5.77E-03	1.52E-03	1.93E-03
398745	9/29/2015 - 12/28/2015	Cs-134	<5.55E-04	0.00E+00	5.55E-04
		Cs-137	<3.69E-04	0.00E+00	3.69E-04
		Be-7	1.08E-01	1.88E-02	1.30E-02
		K-40	<8.26E-03	0.00E+00	8.26E-03

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364946	12/29/2014 - 1/6/2015	Beta	2.00E-02	2.65E-03	2.68E-03
365148	1/6/2015 - 1/13/2015	Beta	2.10E-02	2.83E-03	2.79E-03
365369	1/13/2015 - 1/20/2015	Beta	1.77E-02	2.60E-03	2.58E-03
366712	1/20/2015 - 1/27/2015	Beta	1.55E-02	2.61E-03	2.92E-03
367128	1/27/2015 - 2/3/2015	Beta	1.51E-02	2.59E-03	2.92E-03
367627	2/3/2015 - 2/10/2015	Beta	1.66E-02	2.76E-03	3.17E-03
369042	2/10/2015 - 2/17/2015	Beta	1.85E-02	2.77E-03	2.96E-03
369753	2/17/2015 - 2/23/2015	Beta	2.84E-02	3.52E-03	3.40E-03
370669	2/23/2015 - 3/2/2015	Beta	2.08E-02	2.84E-03	2.87E-03
371622	3/2/2015 - 3/9/2015	Beta	1.62E-02	2.68E-03	2.99E-03
371982	3/9/2015 - 3/17/2015	Beta	1.50E-02	2.34E-03	2.51E-03
372467	3/17/2015 - 3/24/2015	Beta	1.43E-02	2.55E-03	2.95E-03

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
373924	3/24/2015 - 3/31/2015	Beta	1.29E-02	2.41E-03	2.83E-03
373934	12/29/2014 - 3/31/2015	Nuclide	Activity	2 Sigma Error	LLD
		Cs-134	<6.02E-04	0.00E+00	6.02E-04
		Cs-137	<3.68E-04	0.00E+00	3.68E-04
		Be-7	1.22E-01	2.01E-02	1.00E-02
		K-40	9.70E-03	6.80E-03	8.89E-03
374624	3/31/2015 - 4/7/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.40E-02	2.49E-03	2.92E-03
375013	4/7/2015 - 4/14/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.46E-02	2.59E-03	2.96E-03
375689	4/14/2015 - 4/21/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	8.30E-03	2.05E-03	2.62E-03
376897	4/21/2015 - 4/28/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.52E-02	2.54E-03	2.84E-03
377558	4/28/2015 - 5/5/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.14E-02	2.42E-03	3.03E-03
378134	5/5/2015 - 5/11/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.41E-02	2.77E-03	3.33E-03
378528	5/11/2015 - 5/18/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	2.16E-02	2.84E-03	2.77E-03
379019	5/18/2015 - 5/25/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.80E-02	2.54E-03	2.56E-03
379524	5/25/2015 - 6/2/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.21E-02	2.16E-03	2.47E-03
380279	6/2/2015 - 6/9/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.08E-02	2.26E-03	2.70E-03
380542	6/9/2015 - 6/15/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.73E-02	2.78E-03	3.05E-03
380869	6/15/2015 - 6/24/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	2.20E-02	2.63E-03	2.51E-03
381338	6/24/2015 - 6/29/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.82E-02	3.35E-03	3.96E-03
381348	3/31/2015 - 6/29/2015	Nuclide	Activity	2 Sigma Error	LLD
		Cs-134	<7.41E-04	0.00E+00	7.41E-04
		Cs-137	<4.19E-04	0.00E+00	4.19E-04
		Be-7	1.16E-01	2.10E-02	1.65E-02
		K-40	<1.22E-02	0.00E+00	1.22E-02
381662	6/29/2015 - 7/6/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.72E-02	2.67E-03	2.88E-03
382234	7/6/2015 - 7/14/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.91E-02	2.63E-03	2.78E-03
382655	7/14/2015 - 7/21/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.79E-02	2.61E-03	2.64E-03
383584	7/21/2015 - 7/27/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.98E-02	3.26E-03	3.68E-03
384156	7/27/2015 - 8/4/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	2.08E-02	2.55E-03	2.36E-03
384727	8/4/2015 - 8/11/2015	Nuclide	Activity	2 Sigma Error	LLD
		Beta	1.66E-02	2.37E-03	2.55E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m³

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
385475	8/11/2015 - 8/17/2015	Beta	1.95E-02	2.51E-03	2.49E-03
385993	8/17/2015 - 8/25/2015	Beta	1.24E-02	1.85E-03	1.98E-03
386888	8/25/2015 - 9/1/2015	Beta	1.78E-02	2.19E-03	2.10E-03
387471	9/1/2015 - 9/8/2015	Beta	2.21E-02	2.37E-03	2.01E-03
388833	9/8/2015 - 9/14/2015	Beta	1.60E-02	2.36E-03	2.50E-03
389473	9/14/2015 - 9/21/2015	Beta	2.21E-02	2.33E-03	2.05E-03
390074	9/21/2015 - 9/29/2015	Beta	9.77E-03	1.67E-03	1.92E-03
390715	6/29/2015 - 9/29/2015	Cs-134	<5.47E-04	0.00E+00	5.47E-04
		Cs-137	<3.53E-04	0.00E+00	3.53E-04
		Be-7	1.10E-01	1.82E-02	9.32E-03
		K-40	6.83E-03	4.46E-03	4.74E-03
390705	9/29/2015 - 10/5/2015	Beta	1.98E-03	1.66E-03	2.70E-03
392023	10/5/2015 - 10/12/2015	Beta	1.45E-02	2.04E-03	2.11E-03
392295	10/12/2015 - 10/20/2015	Beta	2.22E-02	2.13E-03	1.66E-03
393494	10/20/2015 - 10/27/2015	Beta	2.12E-02	2.30E-03	1.99E-03
393891	10/27/2015 - 11/3/2015	Beta	1.80E-02	2.20E-03	2.06E-03
394916	11/3/2015 - 11/10/2015	Beta	8.58E-03	1.78E-03	2.19E-03
395368	11/10/2015 - 11/16/2015	Beta	1.42E-02	2.22E-03	2.36E-03
395693	11/16/2015 - 11/23/2015	Beta	1.83E-02	2.18E-03	1.97E-03
396185	11/23/2015 - 11/30/2015	Beta	1.29E-02	1.95E-03	2.05E-03
396703	11/30/2015 - 12/8/2015	Beta	1.95E-02	2.10E-03	1.93E-03
397254	12/8/2015 - 12/15/2015	Beta	2.15E-02	2.44E-03	2.34E-03
397958	12/15/2015 - 12/21/2015	Beta	1.46E-02	2.27E-03	2.48E-03
398346	12/21/2015 - 12/28/2015	Beta	6.60E-03	1.49E-03	1.79E-03
398746	9/29/2015 - 12/28/2015	Cs-134	<5.26E-04	0.00E+00	5.26E-04
		Cs-137	<2.92E-04	0.00E+00	2.92E-04
		Be-7	8.11E-02	1.66E-02	1.32E-02
		K-40	7.16E-03	4.03E-03	1.49E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364947	12/29/2014 - 1/6/2015	Beta	1.75E-02	2.43E-03	2.52E-03
365149	1/6/2015 - 1/13/2015	Beta	2.10E-02	2.82E-03	2.78E-03
365370	1/13/2015 - 1/20/2015	Beta	1.70E-02	2.53E-03	2.51E-03
366713	1/20/2015 - 1/27/2015	Beta	1.37E-02	2.41E-03	2.75E-03
367129	1/27/2015 - 2/3/2015	Beta	1.39E-02	2.53E-03	2.92E-03
367628	2/3/2015 - 2/10/2015	Beta	1.83E-02	2.79E-03	3.09E-03
369043	2/10/2015 - 2/17/2015	Beta	1.98E-02	2.81E-03	2.92E-03
369754	2/17/2015 - 2/23/2015	Beta	2.27E-02	3.27E-03	3.41E-03
370670	2/23/2015 - 3/2/2015	Beta	2.30E-02	2.91E-03	2.82E-03
371623	3/2/2015 - 3/9/2015	Beta	1.53E-02	2.56E-03	2.87E-03
371983	3/9/2015 - 3/17/2015	Beta	1.49E-02	2.25E-03	2.36E-03
372468	3/17/2015 - 3/24/2015	Beta	1.56E-02	2.51E-03	2.76E-03
373925	3/24/2015 - 3/31/2015	Beta	1.40E-02	2.40E-03	2.71E-03
373935	12/29/2014 - 3/31/2015	Cs-134	<4.37E-04	0.00E+00	4.37E-04
		Cs-137	<5.89E-04	0.00E+00	5.89E-04
		Be-7	1.24E-01	2.04E-02	1.25E-02
		K-40	8.56E-03	5.36E-03	5.55E-03
374625	3/31/2015 - 4/7/2015	Beta	1.43E-02	2.46E-03	2.83E-03
375014	4/7/2015 - 4/14/2015	Beta	1.59E-02	2.50E-03	2.71E-03
375690	4/14/2015 - 4/21/2015	Beta	8.38E-03	1.97E-03	2.46E-03
376898	4/21/2015 - 4/28/2015	Beta	1.64E-02	2.56E-03	2.79E-03
377559	4/28/2015 - 5/5/2015	Beta	1.12E-02	2.31E-03	2.87E-03
378135	5/5/2015 - 5/12/2015	Beta	1.63E-02	2.55E-03	2.78E-03
378529	5/12/2015 - 5/18/2015	Beta	2.13E-02	2.85E-03	2.82E-03
379020	5/18/2015 - 5/25/2015	Beta	1.75E-02	2.50E-03	2.55E-03
379525	5/25/2015 - 6/2/2015	Beta	1.36E-02	2.18E-03	2.37E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m³

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
380280	6/2/2015 - 6/9/2015	Beta	1.26E-02	2.24E-03	2.52E-03
380543	6/9/2015 - 6/15/2015	Beta	1.94E-02	2.76E-03	2.87E-03
380870	6/15/2015 - 6/24/2015	Beta	2.25E-02	2.45E-03	2.21E-03
381339	6/24/2015 - 6/29/2015	Beta	2.07E-02	3.38E-03	3.80E-03
381349	3/31/2015 - 6/29/2015	Cs-134	<5.15E-04	0.00E+00	5.15E-04
		Cs-137	<6.00E-04	0.00E+00	6.00E-04
		Be-7	1.27E-01	2.13E-02	1.14E-02
		K-40	<1.32E-02	0.00E+00	1.32E-02
381663	6/29/2015 - 7/6/2015	Beta	1.76E-02	2.57E-03	2.68E-03
382235	7/6/2015 - 7/14/2015	Beta	1.95E-02	2.46E-03	2.49E-03
382656	7/14/2015 - 7/21/2015	Beta	1.62E-02	2.46E-03	2.55E-03
383585	7/21/2015 - 7/27/2015	Beta	1.86E-02	2.96E-03	3.29E-03
384157	7/27/2015 - 8/4/2015	Beta	2.05E-02	2.43E-03	2.20E-03
384728	8/4/2015 - 8/11/2015	Beta	1.62E-02	2.51E-03	2.79E-03
385476	8/11/2015 - 8/17/2015	Beta	1.92E-02	2.74E-03	2.88E-03
385994	8/17/2015 - 8/25/2015	Beta	1.30E-02	2.01E-03	2.20E-03
386889	8/25/2015 - 9/1/2015	Beta	2.41E-02	2.98E-03	2.86E-03
387472	9/1/2015 - 9/8/2015	Beta	2.32E-02	2.44E-03	2.05E-03
388834	9/8/2015 - 9/14/2015	Beta	1.62E-02	2.57E-03	2.81E-03
389474	9/14/2015 - 9/21/2015	Beta	2.31E-02	2.64E-03	2.44E-03
390075	9/21/2015 - 9/29/2015	Beta	1.10E-02	1.94E-03	2.25E-03
390716	6/29/2015 - 9/29/2015	Cs-134	<4.54E-04	0.00E+00	4.54E-04
		Cs-137	<4.34E-04	0.00E+00	4.34E-04
		Be-7	1.25E-01	2.03E-02	1.28E-02
		K-40	<1.27E-02	0.00E+00	1.27E-02
390706	9/29/2015 - 10/5/2015	Beta	1.93E-03	1.87E-03	3.09E-03
392024	10/5/2015 - 10/12/2015	Beta	1.41E-02	2.28E-03	2.51E-03
392296	10/12/2015 - 10/20/2015	Beta	2.44E-02	2.41E-03	1.92E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
393495	10/20/2015 - 10/27/2015	Beta	2.28E-02	2.65E-03	2.37E-03
393892	10/27/2015 - 11/3/2015	Beta	1.99E-02	2.49E-03	2.37E-03
394917	11/3/2015 - 11/10/2015	Beta	1.13E-02	2.18E-03	2.61E-03
395369	11/10/2015 - 11/16/2015	Beta	1.72E-02	2.67E-03	2.85E-03
395694	11/16/2015 - 11/23/2015	Beta	1.92E-02	2.44E-03	2.28E-03
396186	11/23/2015 - 11/30/2015	Beta	1.45E-02	2.29E-03	2.48E-03
396704	11/30/2015 - 12/8/2015	Beta	2.45E-02	2.54E-03	2.27E-03
397255	12/8/2015 - 12/15/2015	Beta	2.13E-02	2.70E-03	2.76E-03
397959	12/15/2015 - 12/21/2015	Beta	1.76E-02	2.74E-03	2.97E-03
398347	12/21/2015 - 12/28/2015	Beta	7.90E-03	1.82E-03	2.22E-03
398747	9/29/2015 - 12/28/2015	Cs-134	<5.38E-04	0.00E+00	5.38E-04
		Cs-137	<4.21E-04	0.00E+00	4.21E-04
		Be-7	1.13E-01	2.02E-02	1.36E-02
		K-40	<1.12E-02	0.00E+00	1.12E-02

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
364948	12/29/2014 - 1/6/2015	Beta	1.63E-02	2.36E-03	2.50E-03
365150	1/6/2015 - 1/13/2015	Beta	1.71E-02	2.55E-03	2.65E-03
365371	1/13/2015 - 1/20/2015	Beta	1.45E-02	2.33E-03	2.41E-03
366714	1/20/2015 - 1/27/2015	Beta	1.60E-02	2.52E-03	2.74E-03
367130	1/27/2015 - 2/3/2015	Beta	1.17E-02	2.30E-03	2.75E-03
367629	2/3/2015 - 2/10/2015	Beta	1.57E-02	2.60E-03	2.98E-03
369044	2/10/2015 - 2/17/2015	Beta	1.73E-02	2.62E-03	2.82E-03
369755	2/17/2015 - 2/23/2015	Beta	2.67E-02	3.31E-03	3.19E-03
370671	2/23/2015 - 3/2/2015	Beta	1.83E-02	2.69E-03	2.82E-03
371624	3/2/2015 - 3/9/2015	Beta	1.35E-02	2.40E-03	2.76E-03
371984	3/9/2015 - 3/17/2015	Beta	1.25E-02	2.08E-03	2.29E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372469	3/17/2015 - 3/24/2015	Beta	1.36E-02	2.39E-03	2.73E-03
373926	3/24/2015 - 3/31/2015	Beta	1.34E-02	2.37E-03	2.71E-03
373936	12/29/2014 - 3/31/2015	Cs-134	<5.49E-04	0.00E+00	5.49E-04
		Cs-137	<4.34E-04	0.00E+00	4.34E-04
		Be-7	1.04E-01	1.84E-02	1.32E-02
		K-40	1.00E-02	5.86E-03	6.24E-03
374626	3/31/2015 - 4/7/2015	Beta	1.24E-02	2.33E-03	2.77E-03
375015	4/7/2015 - 4/14/2015	Beta	1.34E-02	2.42E-03	2.80E-03
375691	4/14/2015 - 4/21/2015	Beta	9.37E-03	2.03E-03	2.48E-03
376899	4/21/2015 - 4/28/2015	Beta	1.27E-02	2.09E-03	2.33E-03
377560	4/28/2015 - 5/5/2015	Beta	1.12E-02	2.30E-03	2.86E-03
378136	5/5/2015 - 5/11/2015	Beta	1.51E-02	2.71E-03	3.13E-03
378530	5/11/2015 - 5/18/2015	Beta	2.08E-02	2.68E-03	2.59E-03
379021	5/18/2015 - 5/25/2015	Beta	1.89E-02	2.71E-03	2.77E-03
379526	5/25/2015 - 6/2/2015	Beta	1.19E-02	2.05E-03	2.30E-03
380281	6/2/2015 - 6/9/2015	Beta	1.05E-02	2.13E-03	2.52E-03
380544	6/9/2015 - 6/15/2015	Beta	1.64E-02	2.60E-03	2.84E-03
380871	6/15/2015 - 6/24/2015	Beta	1.92E-02	2.37E-03	2.30E-03
381340	6/24/2015 - 6/29/2015	Beta	1.62E-02	3.09E-03	3.70E-03
381350	3/31/2015 - 6/29/2015	Cs-134	<6.06E-04	0.00E+00	6.06E-04
		Cs-137	<4.78E-04	0.00E+00	4.78E-04
		Be-7	1.35E-01	2.12E-02	1.06E-02
		K-40	<1.14E-02	0.00E+00	1.14E-02
381664	6/29/2015 - 7/6/2015	Beta	1.79E-02	2.57E-03	2.67E-03
382236	7/6/2015 - 7/14/2015	Beta	2.38E-02	2.68E-03	2.55E-03
382657	7/14/2015 - 7/21/2015	Beta	1.51E-02	2.32E-03	2.42E-03
383586	7/21/2015 - 7/27/2015	Beta	1.89E-02	3.03E-03	3.39E-03
384158	7/27/2015 - 8/4/2015	Beta	1.71E-02	2.23E-03	2.13E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
384729	8/4/2015 - 8/11/2015	Beta	1.94E-02	2.96E-03	3.28E-03
385477	8/11/2015 - 8/17/2015	Beta	2.14E-02	3.18E-03	3.40E-03
385995	8/17/2015 - 8/25/2015	Beta	1.58E-02	2.40E-03	2.61E-03
386890	8/25/2015 - 9/1/2015	Beta	1.95E-02	2.71E-03	2.76E-03
387473	9/1/2015 - 9/8/2015	Beta	2.57E-02	2.97E-03	2.64E-03
388835	9/8/2015 - 9/14/2015	Beta	1.52E-02	2.74E-03	3.17E-03
389475	9/14/2015 - 9/21/2015	Beta	2.75E-02	3.04E-03	2.75E-03
390076	9/21/2015 - 9/29/2015	Beta	1.05E-02	2.04E-03	2.46E-03
390717	6/29/2015 - 9/29/2015	Cs-134	<4.69E-04	0.00E+00	4.69E-04
		Cs-137	<4.28E-04	0.00E+00	4.28E-04
		Be-7	1.23E-01	2.12E-02	1.11E-02
		K-40	7.66E-03	5.08E-03	5.21E-03
390707	9/29/2015 - 10/5/2015	Beta	3.41E-03	2.21E-03	3.50E-03
392025	10/5/2015 - 10/12/2015	Beta	1.49E-02	2.46E-03	2.76E-03
392297	10/12/2015 - 10/20/2015	Beta	3.31E-02	3.83E-03	3.37E-03
393496	10/20/2015 - 10/27/2015	Beta	2.34E-02	2.85E-03	2.63E-03
393893	10/27/2015 - 11/3/2015	Beta	2.17E-02	2.78E-03	2.68E-03
394918	11/3/2015 - 11/10/2015	Beta	1.21E-02	2.38E-03	2.87E-03
395370	11/10/2015 - 11/16/2015	Beta	1.87E-02	2.91E-03	3.10E-03
395695	11/16/2015 - 11/23/2015	Beta	2.14E-02	2.73E-03	2.57E-03
396187	11/23/2015 - 11/30/2015	Beta	1.60E-02	2.49E-03	2.67E-03
396705	11/30/2015 - 12/8/2015	Beta	2.54E-02	2.76E-03	2.53E-03
397256	12/8/2015 - 12/15/2015	Beta	2.37E-02	2.96E-03	3.00E-03
397960	12/15/2015 - 12/21/2015	Beta	1.55E-02	2.79E-03	3.24E-03
398348	12/21/2015 - 12/28/2015	Beta	8.30E-03	1.89E-03	2.29E-03
398748	9/29/2015 - 12/28/2015	Cs-134	<5.37E-04	0.00E+00	5.37E-04
		Cs-137	<6.19E-04	0.00E+00	6.19E-04

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398748	9/29/2015 - 12/28/2015	Be-7	1.02E-01	1.97E-02	1.37E-02
		K-40	<1.49E-02	0.00E+00	1.49E-02

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364949	12/29/2014 - 1/6/2015	Beta	1.53E-02	2.25E-03	2.39E-03
365151	1/6/2015 - 1/13/2015	Beta	1.64E-02	2.50E-03	2.63E-03
365372	1/13/2015 - 1/20/2015	Beta	1.55E-02	2.34E-03	2.35E-03
366715	1/20/2015 - 1/27/2015	Beta	1.42E-02	2.41E-03	2.72E-03
367131	1/27/2015 - 2/3/2015	Beta	1.34E-02	2.36E-03	2.69E-03
367630	2/3/2015 - 2/10/2015	Beta	1.31E-02	2.40E-03	2.86E-03
369045	2/10/2015 - 2/17/2015	Beta	1.59E-02	2.63E-03	2.95E-03
369756	2/17/2015 - 2/23/2015	Beta	2.30E-02	3.52E-03	3.78E-03
370672	2/23/2015 - 3/2/2015	Beta	1.66E-02	2.51E-03	2.66E-03
371625	3/2/2015 - 3/9/2015	Beta	1.10E-02	2.25E-03	2.74E-03
371985	3/9/2015 - 3/17/2015	Beta	1.14E-02	2.06E-03	2.34E-03
372470	3/17/2015 - 3/24/2015	Beta	1.13E-02	2.25E-03	2.72E-03
373927	3/24/2015 - 3/31/2015	Beta	1.13E-02	2.23E-03	2.68E-03
373937	12/29/2014 - 3/31/2015	Cs-134	<4.37E-04	0.00E+00	4.37E-04
		Cs-137	<1.01E-04	0.00E+00	1.01E-04
		Be-7	1.05E-01	1.89E-02	1.40E-02
		K-40	7.70E-03	5.70E-03	7.38E-03
374627	3/31/2015 - 4/7/2015	Beta	1.24E-02	2.39E-03	2.88E-03
375016	4/7/2015 - 4/14/2015	Beta	1.77E-02	2.59E-03	2.72E-03
375692	4/14/2015 - 4/21/2015	Beta	9.71E-03	2.06E-03	2.49E-03
376900	4/21/2015 - 4/28/2015	Beta	1.24E-02	2.16E-03	2.47E-03
377561	4/28/2015 - 5/5/2015	Beta	1.01E-02	2.20E-03	2.79E-03
378137	5/5/2015 - 5/11/2015	Beta	1.32E-02	2.67E-03	3.24E-03
378531	5/11/2015 - 5/18/2015	Beta	1.87E-02	2.57E-03	2.57E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
379022	5/18/2015 - 5/25/2015	Beta	1.79E-02	2.68E-03	2.78E-03
379527	5/25/2015 - 6/2/2015	Beta	1.23E-02	2.14E-03	2.41E-03
380282	6/2/2015 - 6/9/2015	Beta	1.26E-02	2.29E-03	2.59E-03
380545	6/9/2015 - 6/15/2015	Beta	1.64E-02	2.66E-03	2.93E-03
380872	6/15/2015 - 6/24/2015	Beta	2.03E-02	2.40E-03	2.27E-03
381341	6/24/2015 - 6/29/2015	Beta	1.85E-02	3.33E-03	3.90E-03
381351	3/31/2015 - 6/29/2015	Cs-134	<4.32E-04	0.00E+00	4.32E-04
		Cs-137	<3.42E-04	0.00E+00	3.42E-04
		Be-7	1.24E-01	2.00E-02	1.02E-02
		K-40	<1.28E-02	0.00E+00	1.28E-02
381665	6/29/2015 - 7/6/2015	Beta	1.71E-02	2.58E-03	2.74E-03
382237	7/6/2015 - 7/14/2015	Beta	2.04E-02	2.58E-03	2.62E-03
382658	7/14/2015 - 7/21/2015	Beta	1.45E-02	2.36E-03	2.54E-03
383587	7/21/2015 - 7/27/2015	Beta	1.85E-02	3.00E-03	3.36E-03
384159	7/27/2015 - 8/4/2015	Beta	1.81E-02	2.34E-03	2.23E-03
384730	8/4/2015 - 8/11/2015	Beta	1.66E-02	2.81E-03	3.26E-03
385478	8/11/2015 - 8/17/2015	Beta	1.86E-02	2.77E-03	2.96E-03
385996	8/17/2015 - 8/25/2015	Beta	1.34E-02	1.99E-03	2.13E-03
386891	8/25/2015 - 9/1/2015	Beta	1.87E-02	2.38E-03	2.32E-03
387474	9/1/2015 - 9/8/2015	Beta	2.47E-02	2.52E-03	2.08E-03
388836	9/8/2015 - 9/14/2015	Beta	1.38E-02	2.22E-03	2.44E-03
389476	9/14/2015 - 9/21/2015	Beta	2.22E-02	2.40E-03	2.14E-03
390077	9/21/2015 - 9/29/2015	Beta	8.98E-03	1.66E-03	1.96E-03
390718	6/29/2015 - 9/29/2015	Cs-134	<5.17E-04	0.00E+00	5.17E-04
		Cs-137	<3.65E-04	0.00E+00	3.65E-04
		Be-7	1.24E-01	2.02E-02	1.15E-02
		K-40	<9.97E-03	0.00E+00	9.97E-03
390708	9/29/2015 - 10/5/2015	Beta	2.46E-03	1.94E-03	3.15E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392026	10/5/2015 - 10/12/2015	Beta	1.42E-02	2.33E-03	2.59E-03
392298	10/12/2015 - 10/20/2015	Beta	2.18E-02	2.35E-03	1.98E-03
393497	10/20/2015 - 10/27/2015	Beta	1.80E-02	2.43E-03	2.39E-03
393894	10/27/2015 - 11/3/2015	Beta	1.41E-02	2.22E-03	2.39E-03
394919	11/3/2015 - 11/10/2015	Beta	1.12E-02	2.35E-03	2.90E-03
395371	11/10/2015 - 11/16/2015	Beta	1.73E-02	3.88E-03	4.81E-03
395696	11/16/2015 - 11/23/2015	Beta	1.96E-02	2.52E-03	2.38E-03
396188	11/23/2015 - 11/30/2015	Beta	1.41E-02	2.28E-03	2.49E-03
396706	11/30/2015 - 12/8/2015	Beta	1.81E-02	2.28E-03	2.27E-03
397257	12/8/2015 - 12/15/2015	Beta	2.01E-02	2.69E-03	2.82E-03
397961	12/15/2015 - 12/21/2015	Beta	1.47E-02	2.69E-03	3.15E-03
398349	12/21/2015 - 12/28/2015	Beta	6.61E-03	1.84E-03	2.39E-03
398749	9/29/2015 - 12/28/2015	Cs-134	<4.86E-04	0.00E+00	4.86E-04
		Cs-137	<3.81E-04	0.00E+00	3.81E-04
		Be-7	9.91E-02	1.81E-02	9.43E-03
		K-40	7.52E-03	4.40E-03	1.70E-03

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364951	12/29/2014 - 1/6/2015	Beta	1.69E-02	2.29E-03	2.34E-03
365153	1/6/2015 - 1/13/2015	Beta	1.95E-02	2.56E-03	2.49E-03
365374	1/13/2015 - 1/20/2015	Beta	1.47E-02	2.25E-03	2.27E-03
366717	1/20/2015 - 1/27/2015	Beta	1.27E-02	2.23E-03	2.55E-03
367133	1/27/2015 - 2/3/2015	Beta	1.19E-02	2.22E-03	2.59E-03
367632	2/3/2015 - 2/10/2015	Beta	1.57E-02	2.47E-03	2.78E-03
369047	2/10/2015 - 2/17/2015	Beta	1.61E-02	2.45E-03	2.64E-03
369758	2/17/2015 - 2/23/2015	Beta	2.58E-02	3.17E-03	3.05E-03
370674	2/23/2015 - 3/2/2015	Beta	1.68E-02	2.45E-03	2.55E-03

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
371627	3/2/2015 - 3/9/2015	Beta	1.28E-02	2.27E-03	2.61E-03
371987	3/9/2015 - 3/17/2015	Beta	1.24E-02	1.99E-03	2.15E-03
372472	3/17/2015 - 3/24/2015	Beta	1.39E-02	2.28E-03	2.54E-03
373929	3/24/2015 - 3/31/2015	Beta	1.38E-02	2.41E-03	2.74E-03
373939	12/29/2014 - 3/31/2015	Cs-134	<5.83E-04	0.00E+00	5.83E-04
		Cs-137	<3.78E-04	0.00E+00	3.78E-04
		Be-7	1.17E-01	1.85E-02	6.71E-03
		K-40	<9.45E-03	0.00E+00	9.45E-03
374629	3/31/2015 - 4/7/2015	Beta	1.57E-02	2.58E-03	2.92E-03
375018	4/7/2015 - 4/14/2015	Beta	1.83E-02	2.70E-03	2.85E-03
375694	4/14/2015 - 4/21/2015	Beta	9.87E-03	2.10E-03	2.54E-03
376902	4/21/2015 - 4/28/2015	Beta	1.19E-02	2.07E-03	2.37E-03
377563	4/28/2015 - 5/5/2015	Beta	1.25E-02	2.40E-03	2.90E-03
378139	5/5/2015 - 5/11/2015	Beta	1.36E-02	2.67E-03	3.21E-03
378533	5/11/2015 - 5/18/2015	Beta	2.27E-02	2.83E-03	2.69E-03
379024	5/18/2015 - 5/25/2015	Beta	1.85E-02	2.61E-03	2.64E-03
379529	5/25/2015 - 6/2/2015	Beta	1.55E-02	2.29E-03	2.39E-03
380284	6/2/2015 - 6/9/2015	Beta	1.19E-02	2.26E-03	2.61E-03
380547	6/9/2015 - 6/15/2015	Beta	1.88E-02	2.80E-03	2.97E-03
380874	6/15/2015 - 6/24/2015	Beta	2.24E-02	2.61E-03	2.45E-03
381343	6/24/2015 - 6/29/2015	Beta	1.92E-02	3.34E-03	3.86E-03
381353	3/31/2015 - 6/29/2015	Cs-134	<7.47E-04	0.00E+00	7.47E-04
		Cs-137	<4.47E-04	0.00E+00	4.47E-04
		Be-7	1.42E-01	2.21E-02	1.20E-02
		K-40	<1.20E-02	0.00E+00	1.20E-02
381667	6/29/2015 - 7/6/2015	Beta	1.73E-02	2.62E-03	2.79E-03
382239	7/6/2015 - 7/14/2015	Beta	2.29E-02	2.74E-03	2.69E-03
382660	7/14/2015 - 7/21/2015	Beta	1.62E-02	2.47E-03	2.57E-03

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Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
383589	7/21/2015 - 7/27/2015	Beta	1.84E-02	3.10E-03	3.53E-03
384161	7/27/2015 - 8/4/2015	Beta	2.18E-02	2.52E-03	2.25E-03
384732	8/4/2015 - 8/11/2015	Beta	1.73E-02	2.68E-03	3.00E-03
385480	8/11/2015 - 8/17/2015	Beta	2.59E-02	3.26E-03	3.21E-03
385998	8/17/2015 - 8/25/2015	Beta	1.59E-02	2.38E-03	2.57E-03
386893	8/25/2015 - 9/1/2015	Beta	1.94E-02	2.67E-03	2.71E-03
387476	9/1/2015 - 9/8/2015	Beta	2.98E-02	3.12E-03	2.61E-03
388838	9/8/2015 - 9/14/2015	Beta	1.79E-02	2.93E-03	3.25E-03
389478	9/14/2015 - 9/21/2015	Beta	2.61E-02	2.92E-03	2.66E-03
390079	9/21/2015 - 9/29/2015	Beta	1.07E-02	2.06E-03	2.48E-03
390720	6/29/2015 - 9/29/2015	Cs-134	<5.50E-04	0.00E+00	5.50E-04
		Cs-137	<3.88E-04	0.00E+00	3.88E-04
		Be-7	1.28E-01	2.17E-02	1.54E-02
		K-40	<1.34E-02	0.00E+00	1.34E-02
390710	9/29/2015 - 10/5/2015	Beta	2.89E-03	2.15E-03	3.47E-03
392028	10/5/2015 - 10/12/2015	Beta	1.46E-02	2.43E-03	2.71E-03
392300	10/12/2015 - 10/20/2015	Beta	2.68E-02	2.66E-03	2.12E-03
393499	10/20/2015 - 10/27/2015	Beta	2.39E-02	2.85E-03	2.61E-03
393896	10/27/2015 - 11/3/2015	Beta	1.96E-02	2.62E-03	2.58E-03
394921	11/3/2015 - 11/10/2015	Beta	1.15E-02	2.31E-03	2.81E-03
395373	11/10/2015 - 11/16/2015	Beta	1.81E-02	2.82E-03	3.00E-03
395698	11/16/2015 - 11/23/2015	Beta	2.08E-02	2.67E-03	2.51E-03
396190	11/23/2015 - 11/30/2015	Beta	1.56E-02	2.43E-03	2.62E-03
396708	11/30/2015 - 12/8/2015	Beta	2.48E-02	2.67E-03	2.44E-03
397259	12/8/2015 - 12/15/2015	Beta	2.63E-02	3.06E-03	2.99E-03
397963	12/15/2015 - 12/21/2015	Beta	1.73E-02	2.83E-03	3.15E-03

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398351	12/21/2015 - 12/28/2015	Beta	7.31E-03	1.83E-03	2.29E-03
398751	9/29/2015 - 12/28/2015	Cs-134	<6.11E-04	0.00E+00	6.11E-04
		Cs-137	<4.79E-04	0.00E+00	4.79E-04
		Be-7	1.22E-01	2.22E-02	1.44E-02
		K-40	6.23E-03	4.19E-03	1.88E-03

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364954	12/29/2014 - 1/6/2015	Beta	1.76E-02	2.52E-03	2.66E-03
365156	1/6/2015 - 1/13/2015	Beta	1.64E-02	2.66E-03	2.89E-03
365377	1/13/2015 - 1/20/2015	Beta	1.53E-02	2.51E-03	2.62E-03
366720	1/20/2015 - 1/27/2015	Beta	1.21E-02	2.46E-03	2.97E-03
367136	1/27/2015 - 2/3/2015	Beta	1.21E-02	2.50E-03	3.05E-03
367635	2/3/2015 - 2/10/2015	Beta	1.49E-02	2.72E-03	3.25E-03
369050	2/10/2015 - 2/17/2015	Beta	1.72E-02	2.85E-03	3.19E-03
369761	2/17/2015 - 2/23/2015	Beta	2.26E-02	3.26E-03	3.40E-03
370677	2/23/2015 - 3/2/2015	Beta	2.06E-02	3.19E-03	3.42E-03
371630	3/2/2015 - 3/9/2015	Beta	1.12E-02	2.51E-03	3.15E-03
371990	3/9/2015 - 3/17/2015	Beta	1.17E-02	2.16E-03	2.48E-03
372475	3/17/2015 - 3/24/2015	Beta	1.53E-02	2.62E-03	2.98E-03
373932	3/24/2015 - 3/31/2015	Beta	1.46E-02	2.58E-03	2.95E-03
373942	12/29/2014 - 3/31/2015	Cs-134	<7.09E-04	0.00E+00	7.09E-04
		Cs-137	<2.92E-04	0.00E+00	2.92E-04
		Be-7	1.18E-01	1.99E-02	1.16E-02
		K-40	1.07E-02	5.64E-03	1.94E-03
374632	3/31/2015 - 4/7/2015	Beta	1.49E-03	1.87E-03	3.14E-03
375021	4/7/2015 - 4/14/2015	Beta	1.33E-02	2.36E-03	2.70E-03
375697	4/14/2015 - 4/21/2015	Beta	9.12E-03	2.06E-03	2.55E-03
376905	4/21/2015 - 4/28/2015	Beta	1.36E-02	2.26E-03	2.52E-03
377566	4/28/2015 - 5/5/2015	Beta	1.20E-02	2.35E-03	2.87E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
378142	5/5/2015 - 5/11/2015	Beta	1.40E-02	2.74E-03	3.28E-03
378536	5/11/2015 - 5/18/2015	Beta	1.90E-02	2.69E-03	2.73E-03
379027	5/18/2015 - 5/25/2015	Beta	1.77E-02	2.58E-03	2.66E-03
379532	5/25/2015 - 6/2/2015	Beta	1.64E-02	2.40E-03	2.50E-03
380287	6/2/2015 - 6/9/2015	Beta	1.28E-02	2.33E-03	2.63E-03
380550	6/9/2015 - 6/15/2015	Beta	1.78E-02	2.79E-03	3.04E-03
380877	6/15/2015 - 6/24/2015	Beta	2.36E-02	2.62E-03	2.39E-03
381346	6/24/2015 - 6/29/2015	Beta	1.65E-02	3.29E-03	4.01E-03
381356	3/31/2015 - 6/29/2015	Cs-134	<5.20E-04	0.00E+00	5.20E-04
		Cs-137	<5.00E-04	0.00E+00	5.00E-04
		Be-7	1.25E-01	2.07E-02	1.16E-02
		K-40	<1.03E-02	0.00E+00	1.03E-02
381670	6/29/2015 - 7/6/2015	Beta	1.48E-02	2.56E-03	2.90E-03
382242	7/6/2015 - 7/14/2015	Beta	1.77E-02	4.06E-03	5.25E-03
382663	7/14/2015 - 7/21/2015	Beta	1.84E-02	2.72E-03	2.78E-03
383592	7/21/2015 - 7/27/2015	Beta	1.80E-02	3.07E-03	3.52E-03
384164	7/27/2015 - 8/4/2015	Beta	2.05E-02	2.53E-03	2.34E-03
384735	8/4/2015 - 8/11/2015	Beta	1.65E-02	2.54E-03	2.83E-03
385483	8/11/2015 - 8/17/2015	Beta	2.13E-02	2.88E-03	2.94E-03
386001	8/17/2015 - 8/25/2015	Beta	1.26E-02	2.04E-03	2.28E-03
386896	8/25/2015 - 9/1/2015	Beta	1.91E-02	2.56E-03	2.56E-03
387479	9/1/2015 - 9/8/2015	Beta	2.59E-02	2.79E-03	2.38E-03
388841	9/8/2015 - 9/14/2015	Beta	1.94E-02	2.76E-03	2.87E-03
389481	9/14/2015 - 9/21/2015	Beta	2.52E-02	2.76E-03	2.47E-03
390082	9/21/2015 - 9/29/2015	Beta	1.20E-02	1.99E-03	2.24E-03
390723	6/29/2015 - 9/29/2015	Cs-134	<7.63E-04	0.00E+00	7.63E-04
		Cs-137	<4.97E-04	0.00E+00	4.97E-04



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
390723	6/29/2015 - 9/29/2015	Be-7	1.30E-01	2.17E-02	1.29E-02
		K-40	<1.16E-02	0.00E+00	1.16E-02
390713	9/29/2015 - 10/5/2015	Beta	2.78E-03	1.91E-03	3.05E-03
392031	10/5/2015 - 10/12/2015	Beta	1.55E-02	2.37E-03	2.56E-03
392303	10/12/2015 - 10/20/2015	Beta	2.41E-02	2.39E-03	1.90E-03
393502	10/20/2015 - 10/27/2015	Beta	2.23E-02	2.59E-03	2.33E-03
393899	10/27/2015 - 11/3/2015	Beta	1.65E-02	2.33E-03	2.37E-03
394924	11/3/2015 - 11/10/2015	Beta	1.11E-02	2.15E-03	2.58E-03
395376	11/10/2015 - 11/16/2015	Beta	1.70E-02	2.65E-03	2.83E-03
395701	11/16/2015 - 11/23/2015	Beta	1.82E-02	2.36E-03	2.25E-03
396193	11/23/2015 - 11/30/2015	Beta	1.25E-02	2.14E-03	2.39E-03
396711	11/30/2015 - 12/8/2015	Beta	1.93E-02	2.28E-03	2.20E-03
397262	12/8/2015 - 12/15/2015	Beta	2.07E-02	2.69E-03	2.78E-03
397966	12/15/2015 - 12/21/2015	Beta	1.31E-02	2.45E-03	2.88E-03
398354	12/21/2015 - 12/28/2015	Beta	6.98E-03	1.88E-03	2.43E-03
398754	9/29/2015 - 12/28/2015	Cs-134	<4.39E-04	0.00E+00	4.39E-04
		Cs-137	<3.99E-04	0.00E+00	3.99E-04
		Be-7	9.49E-02	1.83E-02	1.00E-02
		K-40	<1.35E-02	0.00E+00	1.35E-02

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364950	12/29/2014 - 1/6/2015	Beta	1.83E-02	2.37E-03	2.38E-03
365152	1/6/2015 - 1/13/2015	Beta	2.06E-02	2.62E-03	2.51E-03
365373	1/13/2015 - 1/20/2015	Beta	1.53E-02	2.30E-03	2.30E-03
366716	1/20/2015 - 1/27/2015	Beta	1.43E-02	2.33E-03	2.58E-03
367132	1/27/2015 - 2/3/2015	Beta	1.41E-02	2.35E-03	2.62E-03
367631	2/3/2015 - 2/10/2015	Beta	1.43E-02	2.44E-03	2.83E-03
369046	2/10/2015 - 2/17/2015	Beta	1.79E-02	2.56E-03	2.68E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m³

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369757	2/17/2015 - 2/23/2015	Beta	2.38E-02	3.06E-03	3.01E-03
370673	2/23/2015 - 3/2/2015	Beta	1.94E-02	2.64E-03	2.66E-03
371626	3/2/2015 - 3/9/2015	Beta	1.37E-02	2.33E-03	2.63E-03
371986	3/9/2015 - 3/17/2015	Beta	1.32E-02	2.06E-03	2.19E-03
372471	3/17/2015 - 3/24/2015	Beta	1.16E-02	2.22E-03	2.64E-03
373928	3/24/2015 - 3/31/2015	Beta	1.30E-02	2.32E-03	2.67E-03
373938	12/29/2014 - 3/31/2015	Cs-134	<6.92E-04	0.00E+00	6.92E-04
		Cs-137	<5.17E-04	0.00E+00	5.17E-04
		Be-7	1.18E-01	1.86E-02	8.33E-03
		K-40	<9.85E-03	0.00E+00	9.85E-03
374628	3/31/2015 - 4/7/2015	Beta	1.21E-02	2.31E-03	2.78E-03
375017	4/7/2015 - 4/14/2015	Beta	1.42E-02	2.47E-03	2.81E-03
375693	4/14/2015 - 4/21/2015	Beta	8.08E-03	1.97E-03	2.51E-03
376901	4/21/2015 - 4/28/2015	Beta	1.51E-02	2.26E-03	2.41E-03
377562	4/28/2015 - 5/5/2015	Beta	1.31E-02	3.01E-03	3.88E-03
378138	5/5/2015 - 5/11/2015	Beta	1.34E-02	2.64E-03	3.16E-03
378532	5/11/2015 - 5/18/2015	Beta	1.74E-02	2.53E-03	2.60E-03
379023	5/18/2015 - 5/25/2015	Beta	1.53E-02	2.42E-03	2.59E-03
379528	5/25/2015 - 6/2/2015	Beta	1.34E-02	2.13E-03	2.31E-03
380283	6/2/2015 - 6/9/2015	Beta	9.64E-03	2.08E-03	2.53E-03
380546	6/9/2015 - 6/15/2015	Beta	1.72E-02	2.64E-03	2.84E-03
380873	6/15/2015 - 6/24/2015	Beta	2.05E-02	2.44E-03	2.31E-03
381342	6/24/2015 - 6/29/2015	Beta	1.38E-02	2.99E-03	3.75E-03
381352	3/31/2015 - 6/29/2015	Cs-134	<4.93E-04	0.00E+00	4.93E-04
		Cs-137	<2.66E-04	0.00E+00	2.66E-04
		Be-7	1.14E-01	1.98E-02	1.43E-02
		K-40	<1.35E-02	0.00E+00	1.35E-02
381666	6/29/2015 - 7/6/2015	Beta	1.48E-02	2.45E-03	2.71E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
382238	7/6/2015 - 7/14/2015	Beta	2.03E-02	2.54E-03	2.56E-03
382659	7/14/2015 - 7/21/2015	Beta	1.46E-02	2.37E-03	2.53E-03
383588	7/21/2015 - 7/27/2015	Beta	1.53E-02	2.73E-03	3.20E-03
384160	7/27/2015 - 8/4/2015	Beta	1.75E-02	2.27E-03	2.17E-03
384731	8/4/2015 - 8/11/2015	Beta	1.41E-02	2.26E-03	2.55E-03
385479	8/11/2015 - 8/17/2015	Beta	1.94E-02	2.64E-03	2.72E-03
385997	8/17/2015 - 8/25/2015	Beta	1.38E-02	2.00E-03	2.12E-03
386892	8/25/2015 - 9/1/2015	Beta	1.88E-02	2.36E-03	2.29E-03
387475	9/1/2015 - 9/8/2015	Beta	2.24E-02	2.53E-03	2.21E-03
388837	9/8/2015 - 9/14/2015	Beta	1.45E-02	2.42E-03	2.70E-03
389477	9/14/2015 - 9/21/2015	Beta	2.53E-02	2.64E-03	2.31E-03
390078	9/21/2015 - 9/29/2015	Beta	1.17E-02	1.89E-03	2.11E-03
390719	6/29/2015 - 9/29/2015	Cs-134	<5.72E-04	0.00E+00	5.72E-04
		Cs-137	<2.96E-04	0.00E+00	2.96E-04
		Be-7	1.11E-01	1.81E-02	9.51E-03
		K-40	4.54E-03	3.74E-03	4.58E-03
390709	9/29/2015 - 10/5/2015	Beta	3.18E-03	2.06E-03	3.28E-03
392027	10/5/2015 - 10/12/2015	Beta	1.32E-02	2.26E-03	2.56E-03
392299	10/12/2015 - 10/20/2015	Beta	2.63E-02	2.60E-03	2.07E-03
393498	10/20/2015 - 10/27/2015	Beta	2.25E-02	2.63E-03	2.38E-03
393895	10/27/2015 - 11/3/2015	Beta	1.75E-02	2.46E-03	2.49E-03
394920	11/3/2015 - 11/10/2015	Beta	1.23E-02	2.28E-03	2.68E-03
395372	11/10/2015 - 11/16/2015	Beta	1.75E-02	2.72E-03	2.90E-03
395697	11/16/2015 - 11/23/2015	Beta	1.98E-02	2.56E-03	2.43E-03
396189	11/23/2015 - 11/30/2015	Beta	1.43E-02	2.32E-03	2.54E-03
396707	11/30/2015 - 12/8/2015	Beta	2.21E-02	2.52E-03	2.37E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397258	12/8/2015 - 12/15/2015	Beta	2.25E-02	2.81E-03	2.85E-03
397962	12/15/2015 - 12/21/2015	Beta	1.60E-02	2.74E-03	3.12E-03
398350	12/21/2015 - 12/28/2015	Beta	7.71E-03	1.77E-03	2.15E-03
398750	9/29/2015 - 12/28/2015	Cs-134	<5.29E-04	0.00E+00	5.29E-04
		Cs-137	<4.14E-04	0.00E+00	4.14E-04
		Be-7	1.11E-01	1.93E-02	1.02E-02
		K-40	<9.71E-03	0.00E+00	9.71E-03

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364952	12/29/2014 - 1/6/2015	Beta	1.64E-02	2.32E-03	2.43E-03
365154	1/6/2015 - 1/13/2015	Beta	1.88E-02	2.76E-03	2.85E-03
365375	1/13/2015 - 1/20/2015	Beta	1.40E-02	2.12E-03	2.12E-03
366718	1/20/2015 - 1/27/2015	Beta	1.70E-02	2.51E-03	2.65E-03
367134	1/27/2015 - 2/3/2015	Beta	1.20E-02	2.27E-03	2.67E-03
367633	2/3/2015 - 2/10/2015	Beta	1.49E-02	2.49E-03	2.88E-03
369048	2/10/2015 - 2/17/2015	Beta	1.59E-02	2.58E-03	2.86E-03
369759	2/17/2015 - 2/23/2015	Beta	2.43E-02	3.64E-03	3.87E-03
370675	2/23/2015 - 3/2/2015	Beta	1.99E-02	2.68E-03	2.68E-03
371628	3/2/2015 - 3/9/2015	Beta	1.31E-02	2.34E-03	2.69E-03
371988	3/9/2015 - 3/17/2015	Beta	1.23E-02	2.03E-03	2.23E-03
372473	3/17/2015 - 3/24/2015	Beta	1.26E-02	2.30E-03	2.67E-03
373930	3/24/2015 - 3/31/2015	Beta	1.49E-02	2.50E-03	2.79E-03
373940	12/29/2014 - 3/31/2015	Cs-134	<3.33E-04	0.00E+00	3.33E-04
		Cs-137	<3.85E-04	0.00E+00	3.85E-04
		Be-7	1.09E-01	1.81E-02	9.43E-03
		K-40	<1.17E-02	0.00E+00	1.17E-02
374630	3/31/2015 - 4/7/2015	Beta	1.46E-02	2.50E-03	2.88E-03
375019	4/7/2015 - 4/14/2015	Beta	1.54E-02	2.59E-03	2.91E-03
375695	4/14/2015 - 4/21/2015	Beta	9.43E-03	2.09E-03	2.57E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m³

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID	Sample Dates	Nuclide	Activity	2 Sigma Error	LLD
376903	4/21/2015 - 4/28/2015	Beta	1.18E-02	2.12E-03	2.45E-03
377564	4/28/2015 - 5/5/2015	Beta	1.33E-02	2.47E-03	2.95E-03
378140	5/5/2015 - 5/11/2015	Beta	1.30E-02	2.66E-03	3.24E-03
378534	5/11/2015 - 5/18/2015	Beta	2.04E-02	2.70E-03	2.64E-03
379025	5/18/2015 - 5/25/2015	Beta	1.66E-02	2.46E-03	2.54E-03
379530	5/25/2015 - 6/2/2015	Beta	1.41E-02	2.21E-03	2.37E-03
380285	6/2/2015 - 6/9/2015	Beta	1.17E-02	2.25E-03	2.61E-03
380548	6/9/2015 - 6/15/2015	Beta	1.91E-02	2.78E-03	2.91E-03
380875	6/15/2015 - 6/24/2015	Beta	2.17E-02	2.51E-03	2.36E-03
381344	6/24/2015 - 6/29/2015	Beta	1.67E-02	3.17E-03	3.80E-03
381354	3/31/2015 - 6/29/2015	Cs-134	<6.47E-04	0.00E+00	6.47E-04
		Cs-137	<3.89E-04	0.00E+00	3.89E-04
		Be-7	1.31E-01	2.07E-02	1.10E-02
		K-40	<1.18E-02	0.00E+00	1.18E-02
381668	6/29/2015 - 7/6/2015	Beta	1.80E-02	2.65E-03	2.78E-03
382240	7/6/2015 - 7/14/2015	Beta	1.91E-02	2.51E-03	2.59E-03
382661	7/14/2015 - 7/21/2015	Beta	1.65E-02	2.42E-03	2.46E-03
383590	7/21/2015 - 7/27/2015	Beta	1.74E-02	3.13E-03	3.67E-03
384162	7/27/2015 - 8/4/2015	Beta	1.84E-02	2.32E-03	2.17E-03
384733	8/4/2015 - 8/11/2015	Beta	1.47E-02	2.57E-03	3.02E-03
385481	8/11/2015 - 8/17/2015	Beta	2.10E-02	2.96E-03	3.10E-03
385999	8/17/2015 - 8/25/2015	Beta	1.36E-02	2.23E-03	2.51E-03
386894	8/25/2015 - 9/1/2015	Beta	2.05E-02	2.66E-03	2.62E-03
387477	9/1/2015 - 9/8/2015	Beta	2.83E-02	3.00E-03	2.53E-03
388839	9/8/2015 - 9/14/2015	Beta	1.75E-02	2.80E-03	3.07E-03
389479	9/14/2015 - 9/21/2015	Beta	2.66E-02	2.96E-03	2.68E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m³

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
390080	9/21/2015 - 9/29/2015	Beta	1.11E-02	2.04E-03	2.41E-03
390721	6/29/2015 - 9/29/2015	Cs-134	<4.62E-04	0.00E+00	4.62E-04
		Cs-137	<5.14E-04	0.00E+00	5.14E-04
		Be-7	1.28E-01	2.16E-02	1.08E-02
		K-40	<1.19E-02	0.00E+00	1.19E-02
390711	9/29/2015 - 10/5/2015	Beta	1.66E-03	2.07E-03	3.45E-03
392029	10/5/2015 - 10/12/2015	Beta	1.49E-02	2.43E-03	2.70E-03
392301	10/12/2015 - 10/20/2015	Beta	2.50E-02	2.59E-03	2.13E-03
393500	10/20/2015 - 10/27/2015	Beta	2.35E-02	2.81E-03	2.56E-03
393897	10/27/2015 - 11/3/2015	Beta	2.06E-02	2.70E-03	2.63E-03
394922	11/3/2015 - 11/10/2015	Beta	1.10E-02	2.29E-03	2.82E-03
395374	11/10/2015 - 11/16/2015	Beta	1.83E-02	2.86E-03	3.06E-03
395699	11/16/2015 - 11/23/2015	Beta	2.04E-02	2.67E-03	2.55E-03
396191	11/23/2015 - 11/30/2015	Beta	1.64E-02	2.50E-03	2.66E-03
396709	11/30/2015 - 12/8/2015	Beta	2.40E-02	2.68E-03	2.51E-03
397260	12/8/2015 - 12/15/2015	Beta	2.43E-02	2.98E-03	3.00E-03
397964	12/15/2015 - 12/21/2015	Beta	1.66E-02	2.87E-03	3.28E-03
398352	12/21/2015 - 12/28/2015	Beta	7.14E-03	1.80E-03	2.25E-03
398752	9/29/2015 - 12/28/2015	Cs-134	<6.72E-04	0.00E+00	6.72E-04
		Cs-137	<5.26E-04	0.00E+00	5.26E-04
		Be-7	1.20E-01	2.17E-02	1.29E-02
		K-40	1.33E-02	6.20E-03	1.89E-03

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364953	12/29/2014 - 1/6/2015	Beta	1.81E-02	2.49E-03	2.58E-03
365155	1/6/2015 - 1/13/2015	Beta	1.89E-02	2.68E-03	2.71E-03
365376	1/13/2015 - 1/20/2015	Beta	1.80E-02	2.56E-03	2.48E-03
366719	1/20/2015 - 1/27/2015	Beta	1.47E-02	2.48E-03	2.79E-03
367135	1/27/2015 - 2/3/2015	Beta	1.21E-02	2.37E-03	2.82E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
367634	2/3/2015 - 2/10/2015	Beta	1.53E-02	2.62E-03	3.04E-03
369049	2/10/2015 - 2/17/2015	Beta	1.56E-02	2.59E-03	2.89E-03
369760	2/17/2015 - 2/23/2015	Beta	2.41E-02	3.28E-03	3.32E-03
370676	2/23/2015 - 3/2/2015	Beta	1.84E-02	2.69E-03	2.81E-03
371629	3/2/2015 - 3/9/2015	Beta	1.18E-02	2.38E-03	2.87E-03
371989	3/9/2015 - 3/17/2015	Beta	1.21E-02	2.10E-03	2.36E-03
372474	3/17/2015 - 3/24/2015	Beta	1.32E-02	2.39E-03	2.78E-03
373931	3/24/2015 - 3/31/2015	Beta	1.31E-02	2.37E-03	2.74E-03
373941	12/29/2014 - 3/31/2015	Cs-134	<4.49E-04	0.00E+00	4.49E-04
		Cs-137	<4.11E-04	0.00E+00	4.11E-04
		Be-7	1.26E-01	2.06E-02	1.13E-02
		K-40	<1.24E-02	0.00E+00	1.24E-02
374631	3/31/2015 - 4/7/2015	Beta	1.38E-02	2.49E-03	2.92E-03
375020	4/7/2015 - 4/14/2015	Beta	1.34E-02	2.46E-03	2.86E-03
375696	4/14/2015 - 4/21/2015	Beta	9.81E-03	2.05E-03	2.46E-03
376904	4/21/2015 - 4/28/2015	Beta	1.17E-02	2.01E-03	2.28E-03
377565	4/28/2015 - 5/5/2015	Beta	1.26E-02	2.35E-03	2.82E-03
378141	5/5/2015 - 5/11/2015	Beta	1.39E-02	2.62E-03	3.09E-03
378535	5/11/2015 - 5/18/2015	Beta	2.01E-02	2.63E-03	2.57E-03
379026	5/18/2015 - 5/25/2015	Beta	1.46E-02	2.42E-03	2.65E-03
379531	5/25/2015 - 6/2/2015	Beta	1.25E-02	2.06E-03	2.26E-03
380286	6/2/2015 - 6/9/2015	Beta	1.10E-02	2.14E-03	2.50E-03
380549	6/9/2015 - 6/15/2015	Beta	1.81E-02	2.65E-03	2.78E-03
380876	6/15/2015 - 6/24/2015	Beta	1.75E-02	2.29E-03	2.29E-03
381345	6/24/2015 - 6/29/2015	Beta	1.88E-02	3.17E-03	3.61E-03
381355	3/31/2015 - 6/29/2015	Cs-134	<5.07E-04	0.00E+00	5.07E-04
		Cs-137	<4.89E-04	0.00E+00	4.89E-04

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381355	3/31/2015 - 6/29/2015	Be-7	1.38E-01	2.15E-02	1.35E-03
		K-40	<1.18E-02	0.00E+00	1.18E-02
381669	6/29/2015 - 7/6/2015	Beta	1.77E-02	2.54E-03	2.64E-03
382241	7/6/2015 - 7/14/2015	Beta	1.96E-02	2.49E-03	2.52E-03
382662	7/14/2015 - 7/21/2015	Beta	1.75E-02	2.42E-03	2.40E-03
383591	7/21/2015 - 7/27/2015	Beta	1.82E-02	2.97E-03	3.34E-03
384163	7/27/2015 - 8/4/2015	Beta	1.70E-02	2.18E-03	2.07E-03
384734	8/4/2015 - 8/11/2015	Beta	1.65E-02	2.27E-03	2.40E-03
385482	8/11/2015 - 8/17/2015	Beta	2.17E-02	2.50E-03	2.34E-03
386000	8/17/2015 - 8/25/2015	Beta	1.35E-02	1.81E-03	1.85E-03
386895	8/25/2015 - 9/1/2015	Beta	1.69E-02	2.05E-03	1.95E-03
387478	9/1/2015 - 9/8/2015	Beta	2.35E-02	2.30E-03	1.85E-03
388840	9/8/2015 - 9/14/2015	Beta	1.45E-02	2.17E-03	2.30E-03
389480	9/14/2015 - 9/21/2015	Beta	2.25E-02	2.23E-03	1.89E-03
390081	9/21/2015 - 9/29/2015	Beta	1.04E-02	1.63E-03	1.79E-03
390722	6/29/2015 - 9/29/2015	Cs-134	<4.05E-04	0.00E+00	4.05E-04
		Cs-137	<3.87E-04	0.00E+00	3.87E-04
		Be-7	1.19E-01	1.85E-02	8.67E-03
		K-40	<9.21E-03	0.00E+00	9.21E-03
390712	9/29/2015 - 10/5/2015	Beta	1.60E-03	1.99E-03	3.34E-03
392030	10/5/2015 - 10/12/2015	Beta	1.40E-02	2.32E-03	2.59E-03
392302	10/12/2015 - 10/20/2015	Beta	2.56E-02	2.56E-03	2.04E-03
393501	10/20/2015 - 10/27/2015	Beta	2.15E-02	2.67E-03	2.49E-03
393898	10/27/2015 - 11/3/2015	Beta	1.71E-02	2.44E-03	2.48E-03
394923	11/3/2015 - 11/10/2015	Beta	1.12E-02	2.24E-03	2.71E-03
395375	11/10/2015 - 11/16/2015	Beta	1.77E-02	2.80E-03	3.00E-03
395700	11/16/2015 - 11/23/2015	Beta	1.97E-02	2.57E-03	2.44E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR PARTICULATE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
396192	11/23/2015 - 11/30/2015	Beta	1.61E-02	2.41E-03	2.54E-03
396710	11/30/2015 - 12/8/2015	Beta	2.41E-02	2.61E-03	2.39E-03
397261	12/8/2015 - 12/15/2015	Beta	2.57E-02	2.95E-03	2.87E-03
397965	12/15/2015 - 12/21/2015	Beta	1.60E-02	2.71E-03	3.07E-03
398353	12/21/2015 - 12/28/2015	Beta	8.41E-03	1.85E-03	2.21E-03
398753	9/29/2015 - 12/28/2015	Cs-134	<5.91E-04	0.00E+00	5.91E-04
		Cs-137	<5.06E-04	0.00E+00	5.06E-04
		Be-7	1.08E-01	2.13E-02	1.75E-02
		K-40	9.86E-03	6.65E-03	8.61E-03

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364955	12/29/2014 - 1/6/2015	I-131	<1.26E-02	0.00E+00	1.26E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<1.18E-02	0.00E+00	1.18E-02
		Be-7	<1.10E-01	0.00E+00	1.10E-01
		K-40	4.55E-01	1.91E-01	1.94E-01
365157	1/6/2015 - 1/13/2015	I-131	<8.11E-03	0.00E+00	8.11E-03
		Cs-134	<8.37E-03	0.00E+00	8.37E-03
		Cs-137	<5.55E-03	0.00E+00	5.55E-03
		Be-7	<5.06E-02	0.00E+00	5.06E-02
		K-40	2.39E-01	1.05E-01	8.20E-02
365378	1/13/2015 - 1/20/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<1.12E-02	0.00E+00	1.12E-02
		Cs-137	<1.67E-02	0.00E+00	1.67E-02
		Be-7	<1.11E-01	0.00E+00	1.11E-01
		K-40	4.60E-01	2.04E-01	2.00E-01
366721	1/20/2015 - 1/27/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<9.15E-02	0.00E+00	9.15E-02
		K-40	5.13E-01	2.08E-01	1.77E-01
367137	1/27/2015 - 2/3/2015	I-131	<1.43E-02	0.00E+00	1.43E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<1.27E-02	0.00E+00	1.27E-02
		Be-7	<9.89E-02	0.00E+00	9.89E-02
		K-40	6.32E-01	2.14E-01	4.63E-02
367636	2/3/2015 - 2/10/2015	I-131	<1.41E-02	0.00E+00	1.41E-02
		Cs-134	<1.41E-02	0.00E+00	1.41E-02
		Cs-137	<1.37E-02	0.00E+00	1.37E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	3.69E-01	2.17E-01	2.87E-01
369051	2/10/2015 - 2/17/2015	I-131	<2.91E-02	0.00E+00	2.91E-02
		Cs-134	<1.34E-02	0.00E+00	1.34E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369051	2/10/2015 - 2/17/2015	Cs-137	<1.89E-02	0.00E+00	1.89E-02
		Be-7	<9.51E-02	0.00E+00	9.51E-02
		K-40	7.64E-01	2.85E-01	2.60E-01
370678	2/24/2015 - 3/2/2015	I-131	<2.14E-02	0.00E+00	2.14E-02
		Cs-134	<1.66E-02	0.00E+00	1.66E-02
		Cs-137	<1.39E-02	0.00E+00	1.39E-02
		Be-7	<1.28E-01	0.00E+00	1.28E-01
		K-40	6.23E-01	2.57E-01	2.32E-01
371631	3/2/2015 - 3/9/2015	I-131	<9.77E-03	0.00E+00	9.77E-03
		Cs-134	<7.12E-03	0.00E+00	7.12E-03
		Cs-137	<9.33E-03	0.00E+00	9.33E-03
		Be-7	<6.19E-02	0.00E+00	6.19E-02
		K-40	<2.67E-01	0.00E+00	2.67E-01
371991	3/9/2015 - 3/17/2015	I-131	<1.29E-02	0.00E+00	1.29E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.30E-02	0.00E+00	1.30E-02
		Be-7	<8.64E-02	0.00E+00	8.64E-02
		K-40	5.23E-01	1.98E-01	1.73E-01
372476	3/17/2015 - 3/24/2015	I-131	<1.41E-02	0.00E+00	1.41E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<9.87E-02	0.00E+00	9.87E-02
		K-40	6.50E-01	2.18E-01	4.63E-02
373943	3/24/2015 - 3/31/2015	I-131	<2.58E-02	0.00E+00	2.58E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.52E-02	0.00E+00	1.52E-02
		Be-7	<1.28E-01	0.00E+00	1.28E-01
		K-40	3.32E-01	1.82E-01	2.05E-01
374633	3/31/2015 - 4/7/2015	I-131	<2.71E-02	0.00E+00	2.71E-02
		Cs-134	<1.32E-02	0.00E+00	1.32E-02
		Cs-137	<1.53E-02	0.00E+00	1.53E-02
		Be-7	<8.12E-02	0.00E+00	8.12E-02
		K-40	6.10E-01	2.32E-01	1.99E-01
375022	4/7/2015 - 4/14/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.41E-02	0.00E+00	1.41E-02
		Cs-137	<1.57E-02	0.00E+00	1.57E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	4.66E-01	2.04E-01	2.00E-01
375698	4/14/2015 - 4/21/2015	I-131	<2.58E-02	0.00E+00	2.58E-02
		Cs-134	<1.25E-02	0.00E+00	1.25E-02
		Cs-137	<1.32E-02	0.00E+00	1.31E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	6.00E-01	2.45E-01	2.50E-01
376906	4/21/2015 - 4/28/2015	I-131	<1.27E-02	0.00E+00	1.27E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	4.60E-01	2.31E-01	2.86E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
377567	4/28/2015 - 5/5/2015	I-131	<2.31E-02	0.00E+00	2.31E-02
		Cs-134	<1.33E-02	0.00E+00	1.33E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<8.93E-02	0.00E+00	8.93E-02
		K-40	6.02E-01	2.32E-01	2.22E-01
378143	5/5/2015 - 5/11/2015	I-131	<2.68E-02	0.00E+00	2.68E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.27E-02	0.00E+00	1.27E-02
		Be-7	<1.24E-01	0.00E+00	1.24E-01
		K-40	7.16E-01	2.52E-01	1.72E-01
378537	5/11/2015 - 5/18/2015	I-131	<1.70E-02	0.00E+00	1.70E-02
		Cs-134	<1.42E-02	0.00E+00	1.42E-02
		Cs-137	<1.32E-02	0.00E+00	1.32E-02
		Be-7	<1.17E-01	0.00E+00	1.17E-01
		K-40	2.78E-01	1.57E-01	1.56E-01
379028	5/18/2015 - 5/25/2015	I-131	<2.69E-02	0.00E+00	2.69E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<1.21E-02	0.00E+00	1.21E-02
		Be-7	<1.20E-01	0.00E+00	1.20E-01
		K-40	6.37E-01	2.40E-01	1.99E-01
379533	5/25/2015 - 6/2/2015	I-131	<1.35E-02	0.00E+00	1.35E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.17E-02	0.00E+00	1.17E-02
		Be-7	<9.43E-02	0.00E+00	9.43E-02
		K-40	3.17E-01	1.38E-01	3.91E-02
380288	6/2/2015 - 6/9/2015	I-131	<1.93E-02	0.00E+00	1.94E-02
		Cs-134	<9.33E-03	0.00E+00	9.33E-03
		Cs-137	<1.40E-02	0.00E+00	1.40E-02
		Be-7	<8.52E-02	0.00E+00	8.52E-02
		K-40	5.87E-01	2.07E-01	4.68E-02
380551	6/9/2015 - 6/15/2015	I-131	<1.71E-02	0.00E+00	1.71E-02
		Cs-134	<1.24E-02	0.00E+00	1.24E-02
		Cs-137	<1.63E-02	0.00E+00	1.63E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	5.41E-01	2.25E-01	2.19E-01
380878	6/15/2015 - 6/24/2015	I-131	<1.60E-02	0.00E+00	1.60E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<9.41E-02	0.00E+00	9.41E-02
		K-40	3.81E-01	1.96E-01	2.48E-01
381357	6/24/2015 - 6/29/2015	I-131	<2.15E-02	0.00E+00	2.15E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<1.61E-01	0.00E+00	1.61E-01
		K-40	7.92E-01	3.21E-01	3.17E-01
381671	6/29/2015 - 7/6/2015	I-131	<1.94E-02	0.00E+00	1.94E-02
		Cs-134	<1.54E-02	0.00E+00	1.54E-02
		Cs-137	<1.74E-02	0.00E+00	1.74E-02
		Be-7	<7.54E-02	0.00E+00	7.54E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381671	6/29/2015 - 7/6/2015	K-40	5.66E-01	2.17E-01	1.81E-01
382243	7/6/2015 - 7/14/2015	I-131	<9.52E-03	0.00E+00	9.52E-03
		Cs-134	<6.10E-03	0.00E+00	6.10E-03
		Cs-137	<6.61E-03	0.00E+00	6.61E-03
		Be-7	<5.29E-02	0.00E+00	5.29E-02
		K-40	3.12E-01	1.08E-01	2.35E-02
382664	7/14/2015 - 7/21/2015	I-131	<1.69E-02	0.00E+00	1.69E-02
		Cs-134	<1.54E-02	0.00E+00	1.54E-02
		Cs-137	<1.52E-02	0.00E+00	1.52E-02
		Be-7	<4.93E-02	0.00E+00	4.93E-02
		K-40	4.77E-01	1.95E-01	1.64E-01
383593	7/21/2015 - 7/27/2015	I-131	<1.40E-02	0.00E+00	1.40E-02
		Cs-134	<1.48E-02	0.00E+00	1.48E-02
		Cs-137	<1.60E-02	0.00E+00	1.60E-02
		Be-7	<9.58E-02	0.00E+00	9.58E-02
		K-40	6.49E-01	2.32E-01	5.33E-02
384165	7/27/2015 - 8/4/2015	I-131	<2.39E-02	0.00E+00	2.39E-02
		Cs-134	<9.07E-03	0.00E+00	9.07E-03
		Cs-137	<1.31E-02	0.00E+00	1.31E-02
		Be-7	<8.57E-02	0.00E+00	8.57E-02
		K-40	4.35E-01	1.65E-01	4.06E-02
384736	8/4/2015 - 8/11/2015	I-131	<1.20E-02	0.00E+00	1.20E-02
		Cs-134	<1.23E-02	0.00E+00	1.23E-02
		Cs-137	<9.43E-03	0.00E+00	9.43E-03
		Be-7	<9.58E-02	0.00E+00	9.58E-02
		K-40	4.39E-01	1.62E-01	3.83E-02
385484	8/11/2015 - 8/17/2015	I-131	<1.75E-02	0.00E+00	1.75E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02
		Cs-137	<1.05E-02	0.00E+00	1.05E-02
		Be-7	<8.50E-02	0.00E+00	8.50E-02
		K-40	4.32E-01	1.79E-01	1.44E-01
386002	8/17/2015 - 8/25/2015	I-131	<4.66E-03	0.00E+00	4.66E-03
		Cs-134	<3.94E-03	0.00E+00	3.94E-03
		Cs-137	<3.00E-03	0.00E+00	3.00E-03
		Be-7	<3.79E-02	0.00E+00	3.79E-02
		K-40	2.38E-01	8.44E-02	1.90E-02
386897	8/25/2015 - 9/1/2015	I-131	<1.63E-02	0.00E+00	1.63E-02
		Cs-134	<1.22E-02	0.00E+00	1.22E-02
		Cs-137	<1.18E-02	0.00E+00	1.18E-02
		Be-7	<8.33E-02	0.00E+00	8.33E-02
		K-40	4.57E-01	1.78E-01	1.40E-01
387480	9/1/2015 - 9/8/2015	I-131	<1.55E-02	0.00E+00	1.55E-02
		Cs-134	<9.15E-03	0.00E+00	9.15E-03
		Cs-137	<1.44E-02	0.00E+00	1.44E-02
		Be-7	<6.86E-02	0.00E+00	6.86E-02
		K-40	5.85E-01	1.87E-01	3.77E-02
388842	9/8/2015 - 9/14/2015	I-131	<1.83E-02	0.00E+00	1.83E-02
		Cs-134	<1.14E-02	0.00E+00	1.14E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
388842	9/8/2015 - 9/14/2015	Cs-137	<1.01E-02	0.00E+00	1.01E-02
		Be-7	<9.41E-02	0.00E+00	9.41E-02
		K-40	3.95E-01	1.58E-01	4.11E-02
389482	9/14/2015 - 9/21/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<7.46E-03	0.00E+00	7.46E-03
		Cs-137	<1.12E-02	0.00E+00	1.12E-02
		Be-7	<6.86E-02	0.00E+00	6.86E-02
		K-40	5.11E-01	1.73E-01	3.74E-02
390083	9/21/2015 - 9/29/2015	I-131	<7.38E-03	0.00E+00	7.38E-03
		Cs-134	<5.38E-03	0.00E+00	5.38E-03
		Cs-137	<6.21E-03	0.00E+00	6.21E-03
		Be-7	<4.07E-02	0.00E+00	4.07E-02
		K-40	3.35E-01	1.08E-01	2.16E-02
390724	9/29/2015 - 10/5/2015	I-131	<2.38E-02	0.00E+00	2.38E-02
		Cs-134	<8.68E-03	0.00E+00	8.68E-03
		Cs-137	<1.19E-02	0.00E+00	1.19E-02
		Be-7	<6.46E-02	0.00E+00	6.46E-02
		K-40	4.66E-01	1.93E-01	1.69E-01
392032	10/5/2015 - 10/12/2015	I-131	<1.29E-02	0.00E+00	1.29E-02
		Cs-134	<1.25E-02	0.00E+00	1.25E-02
		Cs-137	<9.58E-03	0.00E+00	9.58E-03
		Be-7	<8.30E-02	0.00E+00	8.30E-02
		K-40	3.30E-01	1.40E-01	3.89E-02
392304	10/12/2015 - 10/20/2015	I-131	<1.37E-02	0.00E+00	1.37E-02
		Cs-134	<1.14E-02	0.00E+00	1.14E-02
		Cs-137	<1.02E-02	0.00E+00	1.02E-02
		Be-7	<8.24E-02	0.00E+00	8.24E-02
		K-40	4.00E-01	1.45E-01	3.39E-02
393503	10/20/2015 - 10/27/2015	I-131	<5.89E-03	0.00E+00	5.89E-03
		Cs-134	<4.81E-03	0.00E+00	4.81E-03
		Cs-137	<8.29E-03	0.00E+00	8.29E-03
		Be-7	<3.48E-02	0.00E+00	3.48E-02
		K-40	3.19E-01	1.14E-01	8.90E-02
393900	10/27/2015 - 11/3/2015	I-131	<1.17E-02	0.00E+00	1.17E-02
		Cs-134	<1.00E-02	0.00E+00	1.00E-02
		Cs-137	<1.24E-02	0.00E+00	1.24E-02
		Be-7	<6.25E-02	0.00E+00	6.25E-02
		K-40	4.26E-01	1.59E-01	3.85E-02
394925	11/3/2015 - 11/10/2015	I-131	<1.32E-02	0.00E+00	1.32E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<1.15E-02	0.00E+00	1.15E-02
		Be-7	<6.94E-02	0.00E+00	6.94E-02
		K-40	4.66E-01	1.67E-01	3.83E-02
395377	11/10/2015 - 11/16/2015	I-131	<2.12E-02	0.00E+00	2.12E-02
		Cs-134	<1.39E-02	0.00E+00	1.39E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<9.83E-02	0.00E+00	9.83E-02
		K-40	4.27E-01	1.68E-01	4.29E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395702	11/16/2015 - 11/23/2015	I-131	<2.45E-02	0.00E+00	2.45E-02
		Cs-134	<1.22E-02	0.00E+00	1.22E-02
		Cs-137	<1.24E-02	0.00E+00	1.24E-02
		Be-7	<9.38E-02	0.00E+00	9.38E-02
		K-40	6.10E-01	1.99E-01	4.13E-02
396194	11/23/2015 - 11/30/2015	I-131	<1.37E-02	0.00E+00	1.37E-02
		Cs-134	<6.31E-03	0.00E+00	6.31E-03
		Cs-137	<1.10E-02	0.00E+00	1.10E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	5.08E-01	1.79E-01	1.25E-01
396712	11/30/2015 - 12/8/2015	I-131	<1.07E-02	0.00E+00	1.07E-02
		Cs-134	<9.76E-03	0.00E+00	9.76E-03
		Cs-137	<9.12E-03	0.00E+00	9.12E-03
		Be-7	<6.63E-02	0.00E+00	6.63E-02
		K-40	4.99E-01	2.04E-01	2.39E-01
397263	12/8/2015 - 12/15/2015	I-131	<1.30E-02	0.00E+00	1.30E-02
		Cs-134	<5.21E-03	0.00E+00	5.21E-03
		Cs-137	<7.56E-03	0.00E+00	7.56E-03
		Be-7	<6.21E-02	0.00E+00	6.21E-02
		K-40	2.89E-01	1.05E-01	2.45E-02
397967	12/15/2015 - 12/21/2015	I-131	<3.10E-02	0.00E+00	3.10E-02
		Cs-134	<1.32E-02	0.00E+00	1.32E-02
		Cs-137	<1.62E-02	0.00E+00	1.62E-02
		Be-7	<7.71E-02	0.00E+00	7.71E-02
		K-40	3.66E-01	1.76E-01	1.71E-01
398355	12/21/2015 - 12/28/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<9.16E-03	0.00E+00	9.16E-03
		Cs-137	<1.30E-02	0.00E+00	1.30E-02
		Be-7	<9.96E-02	0.00E+00	9.96E-02
		K-40	4.78E-01	2.06E-01	2.33E-01
Sample Point 2 [INDICATOR - S @ 0.2 miles]					
364956	12/29/2014 - 1/6/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.45E-02	0.00E+00	1.45E-02
		Cs-137	<1.63E-02	0.00E+00	1.63E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	5.46E-01	1.96E-01	4.49E-02
365158	1/6/2015 - 1/13/2015	I-131	<1.03E-02	0.00E+00	1.03E-02
		Cs-134	<8.84E-03	0.00E+00	8.84E-03
		Cs-137	<6.43E-03	0.00E+00	6.43E-03
		Be-7	<5.41E-02	0.00E+00	5.41E-02
		K-40	5.09E-01	1.73E-01	1.38E-01
365379	1/13/2015 - 1/20/2015	I-131	<2.08E-02	0.00E+00	2.08E-02
		Cs-134	<1.01E-02	0.00E+00	1.01E-02
		Cs-137	<1.93E-02	0.00E+00	1.93E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	7.09E-01	2.71E-01	2.67E-01
366722	1/20/2015 - 1/27/2015	I-131	<1.67E-02	0.00E+00	1.67E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
366722	1/20/2015 - 1/27/2015	Be-7	<9.95E-02	0.00E+00	9.95E-02
		K-40	7.03E-01	2.35E-01	5.01E-02
367138	1/27/2015 - 2/3/2015	I-131	<1.89E-02	0.00E+00	1.89E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.39E-02	0.00E+00	1.39E-02
		Be-7	<1.21E-01	0.00E+00	1.21E-01
		K-40	8.00E-01	2.53E-01	5.04E-02
367637	2/3/2015 - 2/10/2015	I-131	<1.42E-02	0.00E+00	1.42E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<2.07E-02	0.00E+00	2.07E-02
		Be-7	<8.15E-02	0.00E+00	8.15E-02
		K-40	7.20E-01	2.38E-01	5.00E-02
369052	2/10/2015 - 2/17/2015	I-131	<3.22E-02	0.00E+00	3.22E-02
		Cs-134	<1.63E-02	0.00E+00	1.63E-02
		Cs-137	<2.08E-02	0.00E+00	2.08E-02
		Be-7	<1.06E-01	0.00E+00	1.06E-01
		K-40	6.59E-01	2.52E-01	2.28E-01
369763	2/17/2015 - 2/23/2015	I-131	<1.84E-02	0.00E+00	1.84E-02
		Cs-134	<1.52E-02	0.00E+00	1.52E-02
		Cs-137	<1.88E-02	0.00E+00	1.88E-02
		Be-7	<9.32E-02	0.00E+00	9.32E-02
		K-40	1.03E+00	3.10E-01	5.82E-02
370679	2/23/2015 - 3/2/2015	I-131	<1.64E-02	0.00E+00	1.64E-02
		Cs-134	<1.47E-02	0.00E+00	1.47E-02
		Cs-137	<1.91E-02	0.00E+00	1.91E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	6.84E-01	2.66E-01	2.64E-01
371632	3/2/2015 - 3/9/2015	I-131	<1.09E-02	0.00E+00	1.09E-02
		Cs-134	<7.51E-03	0.00E+00	7.51E-03
		Cs-137	<7.94E-03	0.00E+00	7.94E-03
		Be-7	<6.56E-02	0.00E+00	6.56E-02
		K-40	5.08E-01	1.95E-01	2.20E-01
371992	3/9/2015 - 3/17/2015	I-131	<1.53E-02	0.00E+00	1.53E-02
		Cs-134	<1.43E-02	0.00E+00	1.43E-02
		Cs-137	<1.22E-02	0.00E+00	1.22E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	4.80E-01	2.10E-01	2.18E-01
372477	3/17/2015 - 3/24/2015	I-131	<9.09E-03	0.00E+00	9.09E-03
		Cs-134	<8.42E-03	0.00E+00	8.42E-03
		Cs-137	<8.22E-03	0.00E+00	8.22E-03
		Be-7	<6.52E-02	0.00E+00	6.52E-02
		K-40	<3.50E-01	0.00E+00	3.50E-01
373944	3/24/2015 - 3/31/2015	I-131	<2.60E-02	0.00E+00	2.60E-02
		Cs-134	<1.63E-02	0.00E+00	1.63E-02
		Cs-137	<1.45E-02	0.00E+00	1.45E-02
		Be-7	<1.48E-01	0.00E+00	1.48E-01
		K-40	<5.18E-01	0.00E+00	5.18E-01
374634	3/31/2015 - 4/7/2015	I-131	<2.63E-02	0.00E+00	2.63E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
374634	3/31/2015 - 4/7/2015	Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.51E-02	0.00E+00	1.51E-02
		Be-7	<9.74E-02	0.00E+00	9.74E-02
		K-40	4.51E-01	1.99E-01	1.83E-01
375023	4/7/2015 - 4/14/2015	I-131	<2.16E-02	0.00E+00	2.16E-02
		Cs-134	<1.41E-02	0.00E+00	1.41E-02
		Cs-137	<1.63E-02	0.00E+00	1.63E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	7.31E-01	2.58E-01	1.99E-01
375699	4/14/2015 - 4/21/2015	I-131	<2.87E-02	0.00E+00	2.87E-02
		Cs-134	<1.40E-02	0.00E+00	1.40E-02
		Cs-137	<1.53E-02	0.00E+00	1.53E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	6.50E-01	2.34E-01	1.80E-01
376907	4/21/2015 - 4/28/2015	I-131	<1.66E-02	0.00E+00	1.66E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.33E-02	0.00E+00	1.33E-02
		Be-7	<1.27E-01	0.00E+00	1.27E-01
		K-40	<3.90E-01	0.00E+00	3.90E-01
377568	4/28/2015 - 5/5/2015	I-131	<3.46E-02	0.00E+00	3.46E-02
		Cs-134	<1.51E-02	0.00E+00	1.51E-02
		Cs-137	<1.76E-02	0.00E+00	1.76E-02
		Be-7	<9.66E-02	0.00E+00	9.66E-02
		K-40	7.64E-01	2.63E-01	2.17E-01
378144	5/5/2015 - 5/11/2015	I-131	<3.54E-02	0.00E+00	3.54E-02
		Cs-134	<1.89E-02	0.00E+00	1.89E-02
		Cs-137	<1.19E-02	0.00E+00	1.19E-02
		Be-7	<1.35E-01	0.00E+00	1.35E-01
		K-40	7.06E-01	2.66E-01	2.12E-01
378538	5/11/2015 - 5/18/2015	I-131	<2.23E-02	0.00E+00	2.23E-02
		Cs-134	<9.78E-03	0.00E+00	9.78E-03
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<1.31E-01	0.00E+00	1.31E-01
		K-40	5.37E-01	2.29E-01	2.27E-01
379029	5/18/2015 - 5/25/2015	I-131	<2.28E-02	0.00E+00	2.28E-02
		Cs-134	<1.40E-02	0.00E+00	1.40E-02
		Cs-137	<1.46E-02	0.00E+00	1.46E-02
		Be-7	<1.16E-01	0.00E+00	1.16E-01
		K-40	4.95E-01	1.97E-01	1.50E-01
379534	5/25/2015 - 6/2/2015	I-131	<2.33E-02	0.00E+00	2.33E-02
		Cs-134	<8.46E-03	0.00E+00	8.46E-03
		Cs-137	<1.83E-02	0.00E+00	1.83E-02
		Be-7	<8.44E-02	0.00E+00	8.44E-02
		K-40	4.55E-01	1.73E-01	4.25E-02
380289	6/2/2015 - 6/9/2015	I-131	<2.13E-02	0.00E+00	2.13E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<1.69E-02	0.00E+00	1.69E-02
		Be-7	<1.24E-01	0.00E+00	1.24E-01
		K-40	7.43E-01	2.59E-01	2.07E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m³

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380552	6/9/2015 - 6/15/2015	I-131	<1.82E-02	0.00E+00	1.82E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.43E-02	0.00E+00	1.43E-02
		Be-7	<1.31E-01	0.00E+00	1.31E-01
		K-40	5.04E-01	2.44E-01	2.80E-01
380879	6/15/2015 - 6/24/2015	I-131	<2.24E-02	0.00E+00	2.24E-02
		Cs-134	<1.22E-02	0.00E+00	1.22E-02
		Cs-137	<1.25E-02	0.00E+00	1.25E-02
		Be-7	<9.90E-02	0.00E+00	9.90E-02
		K-40	3.71E-01	1.89E-01	2.22E-01
381358	6/24/2015 - 6/29/2015	I-131	<2.38E-02	0.00E+00	2.38E-02
		Cs-134	<1.57E-02	0.00E+00	1.57E-02
		Cs-137	<2.23E-02	0.00E+00	2.23E-02
		Be-7	<1.27E-01	0.00E+00	1.27E-01
		K-40	8.79E-01	3.28E-01	2.86E-01
381672	6/29/2015 - 7/6/2015	I-131	<1.45E-02	0.00E+00	1.45E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.68E-02	0.00E+00	1.68E-02
		Be-7	<1.35E-01	0.00E+00	1.35E-01
		K-40	6.01E-01	2.28E-01	1.76E-01
382244	7/6/2015 - 7/14/2015	I-131	<7.71E-03	0.00E+00	7.71E-03
		Cs-134	<9.12E-03	0.00E+00	9.12E-03
		Cs-137	<5.87E-03	0.00E+00	5.87E-03
		Be-7	<5.43E-02	0.00E+00	5.43E-02
		K-40	2.97E-01	1.22E-01	1.16E-01
382665	7/14/2015 - 7/21/2015	I-131	<1.78E-02	0.00E+00	1.78E-02
		Cs-134	<1.16E-02	0.00E+00	1.16E-02
		Cs-137	<1.64E-02	0.00E+00	1.64E-02
		Be-7	<1.15E-01	0.00E+00	1.15E-01
		K-40	5.50E-01	2.18E-01	1.83E-01
383594	7/21/2015 - 7/27/2015	I-131	<2.09E-02	0.00E+00	2.09E-02
		Cs-134	<1.34E-02	0.00E+00	1.34E-02
		Cs-137	<1.66E-02	0.00E+00	1.66E-02
		Be-7	<1.27E-01	0.00E+00	1.27E-01
		K-40	9.62E-01	3.40E-01	3.11E-01
384166	7/27/2015 - 8/4/2015	I-131	<2.44E-02	0.00E+00	2.44E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<1.17E-02	0.00E+00	1.17E-02
		Be-7	1.46E-02	4.73E-02	8.92E-02
		K-40	5.26E-01	2.12E-01	2.08E-01
384737	8/4/2015 - 8/11/2015	I-131	<9.18E-03	0.00E+00	9.18E-03
		Cs-134	<8.83E-03	0.00E+00	8.83E-03
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<1.16E-01	0.00E+00	1.16E-01
		K-40	5.39E-01	2.01E-01	1.74E-01
385485	8/11/2015 - 8/17/2015	I-131	<1.48E-02	0.00E+00	1.48E-02
		Cs-134	<8.29E-03	0.00E+00	8.29E-03
		Cs-137	<1.25E-02	0.00E+00	1.25E-02
		Be-7	<8.26E-02	0.00E+00	8.26E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
385485	8/11/2015 - 8/17/2015	K-40	<4.52E-01	0.00E+00	4.52E-01
386003	8/17/2015 - 8/25/2015	I-131	<7.35E-03	0.00E+00	7.35E-03
		Cs-134	<5.14E-03	0.00E+00	5.14E-03
		Cs-137	<5.10E-03	0.00E+00	5.10E-03
		Be-7	<3.92E-02	0.00E+00	3.92E-02
		K-40	2.37E-01	9.20E-02	7.66E-02
386898	8/25/2015 - 9/1/2015	I-131	<9.97E-03	0.00E+00	9.97E-03
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<9.77E-03	0.00E+00	9.77E-03
		Be-7	<8.41E-02	0.00E+00	8.41E-02
		K-40	<3.65E-01	0.00E+00	3.65E-01
387481	9/1/2015 - 9/8/2015	I-131	<1.18E-02	0.00E+00	1.18E-02
		Cs-134	<1.07E-02	0.00E+00	1.07E-02
		Cs-137	<1.32E-02	0.00E+00	1.32E-02
		Be-7	<5.90E-02	0.00E+00	5.90E-02
		K-40	<3.67E-01	0.00E+00	3.67E-01
388843	9/8/2015 - 9/14/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.48E-02	0.00E+00	1.48E-02
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<6.97E-02	0.00E+00	6.97E-02
		K-40	2.72E-01	1.88E-01	2.62E-01
389483	9/14/2015 - 9/21/2015	I-131	<1.22E-02	0.00E+00	1.22E-02
		Cs-134	<9.15E-03	0.00E+00	9.15E-03
		Cs-137	<7.44E-03	0.00E+00	7.44E-03
		Be-7	<7.00E-02	0.00E+00	7.00E-02
		K-40	<3.60E-01	0.00E+00	3.60E-01
390084	9/21/2015 - 9/29/2015	I-131	<5.83E-03	0.00E+00	5.83E-03
		Cs-134	<4.49E-03	0.00E+00	4.49E-03
		Cs-137	<4.74E-03	0.00E+00	4.74E-03
		Be-7	<3.41E-02	0.00E+00	3.41E-02
		K-40	2.45E-01	8.45E-02	1.84E-02
390725	9/29/2015 - 10/5/2015	I-131	<2.98E-02	0.00E+00	2.98E-02
		Cs-134	<1.35E-02	0.00E+00	1.35E-02
		Cs-137	<1.20E-02	0.00E+00	1.20E-02
		Be-7	<8.39E-02	0.00E+00	8.39E-02
		K-40	6.84E-01	2.27E-01	1.53E-01
392033	10/5/2015 - 10/12/2015	I-131	<1.23E-02	0.00E+00	1.23E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.41E-02	0.00E+00	1.41E-02
		Be-7	<7.52E-02	0.00E+00	7.52E-02
		K-40	4.20E-01	1.63E-01	1.34E-01
392305	10/12/2015 - 10/20/2015	I-131	<1.59E-02	0.00E+00	1.59E-02
		Cs-134	<7.55E-03	0.00E+00	7.55E-03
		Cs-137	<1.34E-02	0.00E+00	1.34E-02
		Be-7	<7.11E-02	0.00E+00	7.11E-02
		K-40	2.74E-01	1.29E-01	1.30E-01
393504	10/20/2015 - 10/27/2015	I-131	<5.86E-03	0.00E+00	5.86E-03
		Cs-134	<3.37E-03	0.00E+00	3.37E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 2 [INDICATOR - S @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
393504	10/20/2015 - 10/27/2015	Cs-137	<5.41E-03	0.00E+00	5.41E-03
		Be-7	<4.90E-02	0.00E+00	4.90E-02
		K-40	3.44E-01	1.13E-01	7.57E-02
393901	10/27/2015 - 11/3/2015	I-131	<1.37E-02	0.00E+00	1.37E-02
		Cs-134	<1.02E-02	0.00E+00	1.02E-02
		Cs-137	<1.18E-02	0.00E+00	1.18E-02
		Be-7	<7.28E-02	0.00E+00	7.28E-02
		K-40	<3.52E-01	0.00E+00	3.52E-01
394926	11/3/2015 - 11/10/2015	I-131	<1.37E-02	0.00E+00	1.37E-02
		Cs-134	<9.40E-03	0.00E+00	9.40E-03
		Cs-137	<1.31E-02	0.00E+00	1.31E-02
		Be-7	<6.52E-02	0.00E+00	6.52E-02
		K-40	3.85E-01	1.47E-01	3.60E-02
395378	11/10/2015 - 11/16/2015	I-131	<2.36E-02	0.00E+00	2.36E-02
		Cs-134	<1.16E-02	0.00E+00	1.16E-02
		Cs-137	<1.34E-02	0.00E+00	1.34E-02
		Be-7	<1.12E-01	0.00E+00	1.12E-01
		K-40	3.39E-01	1.63E-01	1.60E-01
395703	11/16/2015 - 11/23/2015	I-131	<1.78E-02	0.00E+00	1.78E-02
		Cs-134	<1.06E-02	0.00E+00	1.06E-02
		Cs-137	<8.85E-03	0.00E+00	8.85E-03
		Be-7	<6.94E-02	0.00E+00	6.94E-02
		K-40	3.85E-01	1.46E-01	3.59E-02
396195	11/23/2015 - 11/30/2015	I-131	<1.00E-02	0.00E+00	1.00E-02
		Cs-134	<1.11E-02	0.00E+00	1.11E-02
		Cs-137	<9.92E-03	0.00E+00	9.92E-03
		Be-7	<5.06E-02	0.00E+00	5.06E-02
		K-40	5.06E-01	1.93E-01	1.88E-01
396713	11/30/2015 - 12/8/2015	I-131	<1.09E-02	0.00E+00	1.09E-02
		Cs-134	<9.21E-03	0.00E+00	9.21E-03
		Cs-137	<8.62E-03	0.00E+00	8.62E-03
		Be-7	<6.74E-02	0.00E+00	6.74E-02
		K-40	<3.22E-01	0.00E+00	3.22E-01
397264	12/8/2015 - 12/15/2015	I-131	<1.08E-02	0.00E+00	1.08E-02
		Cs-134	<6.66E-03	0.00E+00	6.66E-03
		Cs-137	<7.20E-03	0.00E+00	7.20E-03
		Be-7	<4.77E-02	0.00E+00	4.77E-02
		K-40	2.81E-01	9.71E-02	2.12E-02
397968	12/15/2015 - 12/21/2015	I-131	<2.56E-02	0.00E+00	2.56E-02
		Cs-134	<1.28E-02	0.00E+00	1.28E-02
		Cs-137	<8.77E-03	0.00E+00	8.77E-03
		Be-7	<9.32E-02	0.00E+00	9.32E-02
		K-40	4.95E-01	2.00E-01	1.90E-01
398356	12/21/2015 - 12/28/2015	I-131	<9.79E-03	0.00E+00	9.79E-03
		Cs-134	<8.49E-03	0.00E+00	8.49E-03
		Cs-137	<9.61E-03	0.00E+00	9.61E-03
		Be-7	3.52E-03	5.65E-02	1.06E-01
		K-40	3.54E-01	1.48E-01	1.23E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364957	12/29/2014 - 1/6/2015	I-131	<1.65E-02	0.00E+00	1.65E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.36E-02	0.00E+00	1.36E-02
		Be-7	<9.73E-02	0.00E+00	9.73E-02
		K-40	4.64E-01	1.98E-01	1.96E-01
365159	1/6/2015 - 1/13/2015	I-131	<1.07E-02	0.00E+00	1.07E-02
		Cs-134	<8.81E-03	0.00E+00	8.81E-03
		Cs-137	<1.04E-02	0.00E+00	1.04E-02
		Be-7	<6.31E-02	0.00E+00	6.31E-02
		K-40	4.92E-01	1.64E-01	1.11E-01
365380	1/13/2015 - 1/20/2015	I-131	<1.63E-02	0.00E+00	1.63E-02
		Cs-134	<1.37E-02	0.00E+00	1.37E-02
		Cs-137	<1.79E-02	0.00E+00	1.79E-02
		Be-7	<1.12E-01	0.00E+00	1.12E-01
		K-40	4.88E-01	2.21E-01	2.27E-01
366723	1/20/2015 - 1/27/2015	I-131	<1.44E-02	0.00E+00	1.44E-02
		Cs-134	<9.41E-03	0.00E+00	9.41E-03
		Cs-137	<1.00E-02	0.00E+00	1.00E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	5.48E-01	2.13E-01	1.62E-01
367139	1/27/2015 - 2/3/2015	I-131	<1.66E-02	0.00E+00	1.66E-02
		Cs-134	<1.12E-02	0.00E+00	1.12E-02
		Cs-137	<1.39E-02	0.00E+00	1.39E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	5.22E-01	2.02E-01	5.06E-02
367638	2/3/2015 - 2/10/2015	I-131	<2.08E-02	0.00E+00	2.08E-02
		Cs-134	<1.19E-02	0.00E+00	1.19E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<8.88E-02	0.00E+00	8.88E-02
		K-40	6.91E-01	2.71E-01	2.83E-01
369053	2/10/2015 - 2/17/2015	I-131	<2.90E-02	0.00E+00	2.90E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.48E-02	0.00E+00	1.48E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	5.31E-01	2.41E-01	2.65E-01
369764	2/17/2015 - 2/23/2015	I-131	<2.47E-02	0.00E+00	2.47E-02
		Cs-134	<1.51E-02	0.00E+00	1.51E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	5.94E-01	2.64E-01	2.70E-01
370680	2/23/2015 - 3/2/2015	I-131	<1.46E-02	0.00E+00	1.46E-02
		Cs-134	<1.59E-02	0.00E+00	1.59E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<8.07E-02	0.00E+00	8.07E-02
		K-40	4.35E-01	2.07E-01	2.13E-01
371633	3/2/2015 - 3/9/2015	I-131	<9.00E-03	0.00E+00	9.00E-03
		Cs-134	<6.45E-03	0.00E+00	6.45E-03
		Cs-137	<8.00E-03	0.00E+00	8.00E-03
		Be-7	<4.38E-02	0.00E+00	4.38E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
371633	3/2/2015 - 3/9/2015	K-40	3.97E-01	1.34E-01	2.83E-02
371993	3/9/2015 - 3/17/2015	I-131	<1.06E-02	0.00E+00	1.06E-02
		Cs-134	<3.43E-03	0.00E+00	3.43E-03
		Cs-137	<8.17E-03	0.00E+00	8.17E-03
		Be-7	<4.98E-02	0.00E+00	4.98E-02
		K-40	2.33E-01	1.10E-01	1.09E-01
372478	3/17/2015 - 3/24/2015	I-131	<1.04E-02	0.00E+00	1.04E-02
		Cs-134	<5.68E-03	0.00E+00	5.68E-03
		Cs-137	<8.82E-03	0.00E+00	8.82E-03
		Be-7	<6.10E-02	0.00E+00	6.10E-02
		K-40	4.04E-01	1.33E-01	2.73E-02
373945	3/24/2015 - 3/31/2015	I-131	<2.91E-02	0.00E+00	2.91E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	6.83E-01	2.53E-01	2.42E-01
374635	3/31/2015 - 4/7/2015	I-131	<2.06E-02	0.00E+00	2.06E-02
		Cs-134	<1.19E-02	0.00E+00	1.19E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<9.45E-02	0.00E+00	9.45E-02
		K-40	6.04E-01	2.08E-01	4.55E-02
375024	4/7/2015 - 4/14/2015	I-131	<2.05E-02	0.00E+00	2.05E-02
		Cs-134	<1.61E-02	0.00E+00	1.61E-02
		Cs-137	<1.49E-02	0.00E+00	1.49E-02
		Be-7	<1.22E-01	0.00E+00	1.22E-01
		K-40	5.20E-01	2.23E-01	2.28E-01
375700	4/14/2015 - 4/21/2015	I-131	<2.21E-02	0.00E+00	2.21E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.10E-02	0.00E+00	1.10E-02
		Be-7	<9.99E-02	0.00E+00	9.99E-02
		K-40	4.27E-01	1.71E-01	4.45E-02
376908	4/21/2015 - 4/28/2015	I-131	<1.70E-02	0.00E+00	1.70E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.42E-02	0.00E+00	1.42E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	4.72E-01	1.86E-01	4.74E-02
377569	4/28/2015 - 5/5/2015	I-131	<2.90E-02	0.00E+00	2.90E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<8.17E-02	0.00E+00	8.17E-02
		K-40	7.30E-01	2.31E-01	4.60E-02
378145	5/5/2015 - 5/12/2015	I-131	<2.73E-02	0.00E+00	2.73E-02
		Cs-134	<9.35E-03	0.00E+00	9.35E-03
		Cs-137	<1.61E-02	0.00E+00	1.61E-02
		Be-7	<1.05E-01	0.00E+00	1.05E-01
		K-40	5.06E-01	2.05E-01	1.68E-01
378539	5/12/2015 - 5/18/2015	I-131	<2.17E-02	0.00E+00	2.17E-02
		Cs-134	<1.68E-02	0.00E+00	1.68E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
378539	5/12/2015 - 5/18/2015	Cs-137	<1.37E-02	0.00E+00	1.37E-02
		Be-7	<5.58E-02	0.00E+00	5.58E-02
		K-40	4.75E-01	2.43E-01	2.98E-01
379030	5/18/2015 - 5/25/2015	I-131	<2.62E-02	0.00E+00	2.62E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.11E-02	0.00E+00	1.11E-02
		Be-7	<1.26E-01	0.00E+00	1.26E-01
		K-40	5.47E-01	2.14E-01	1.88E-01
379535	5/25/2015 - 6/2/2015	I-131	<1.45E-02	0.00E+00	1.45E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<1.48E-02	0.00E+00	1.48E-02
		Be-7	<6.65E-02	0.00E+00	6.65E-02
		K-40	4.37E-01	1.66E-01	4.09E-02
380290	6/2/2015 - 6/9/2015	I-131	<1.92E-02	0.00E+00	1.92E-02
		Cs-134	<1.35E-02	0.00E+00	1.35E-02
		Cs-137	<1.57E-02	0.00E+00	1.57E-02
		Be-7	<1.15E-01	0.00E+00	1.15E-01
		K-40	4.67E-01	1.92E-01	1.48E-01
380553	6/9/2015 - 6/15/2015	I-131	<1.63E-02	0.00E+00	1.63E-02
		Cs-134	<1.19E-02	0.00E+00	1.19E-02
		Cs-137	<2.04E-02	0.00E+00	2.04E-02
		Be-7	<1.05E-01	0.00E+00	1.05E-01
		K-40	6.46E-01	2.64E-01	2.81E-01
380880	6/15/2015 - 6/24/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.08E-02	0.00E+00	1.08E-02
		Cs-137	<1.39E-02	0.00E+00	1.39E-02
		Be-7	<6.24E-02	0.00E+00	6.24E-02
		K-40	3.91E-01	1.49E-01	3.66E-02
381359	6/24/2015 - 6/29/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.51E-02	0.00E+00	1.51E-02
		Cs-137	<2.26E-02	0.00E+00	2.26E-02
		Be-7	<1.12E-01	0.00E+00	1.12E-01
		K-40	7.13E-01	2.63E-01	6.23E-02
381673	6/29/2015 - 7/6/2015	I-131	<1.78E-02	0.00E+00	1.78E-02
		Cs-134	<1.47E-02	0.00E+00	1.47E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	6.55E-01	2.17E-01	4.55E-02
382245	7/6/2015 - 7/14/2015	I-131	<8.51E-03	0.00E+00	8.51E-03
		Cs-134	<5.29E-03	0.00E+00	5.29E-03
		Cs-137	<8.20E-03	0.00E+00	8.20E-03
		Be-7	<6.24E-02	0.00E+00	6.24E-02
		K-40	3.94E-01	1.34E-01	1.04E-01
382666	7/14/2015 - 7/21/2015	I-131	<1.40E-02	0.00E+00	1.40E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<5.13E-02	0.00E+00	5.13E-02
		K-40	4.78E-01	2.22E-01	2.50E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m³

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
383595	7/21/2015 - 7/27/2015	I-131	<1.86E-02	0.00E+00	1.86E-02
		Cs-134	<1.07E-02	0.00E+00	1.07E-02
		Cs-137	<1.33E-02	0.00E+00	1.33E-02
		Be-7	<8.68E-02	0.00E+00	8.68E-02
		K-40	5.79E-01	2.97E-01	3.83E-01
384167	7/27/2015 - 8/4/2015	I-131	<1.27E-02	0.00E+00	1.27E-02
		Cs-134	<8.89E-03	0.00E+00	8.89E-03
		Cs-137	<1.09E-02	0.00E+00	1.09E-02
		Be-7	<1.01E-01	0.00E+00	1.01E-01
		K-40	5.73E-01	1.90E-01	3.98E-02
384738	8/4/2015 - 8/11/2015	I-131	<1.63E-02	0.00E+00	1.63E-02
		Cs-134	<1.06E-02	0.00E+00	1.06E-02
		Cs-137	<1.31E-02	0.00E+00	1.31E-02
		Be-7	<7.80E-02	0.00E+00	7.80E-02
		K-40	<4.18E-01	0.00E+00	4.18E-01
385486	8/11/2015 - 8/17/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.34E-02	0.00E+00	1.34E-02
		Cs-137	<1.32E-02	0.00E+00	1.32E-02
		Be-7	<9.56E-02	0.00E+00	9.56E-02
		K-40	5.40E-01	2.14E-01	1.72E-01
386004	8/17/2015 - 8/25/2015	I-131	<7.59E-03	0.00E+00	7.59E-03
		Cs-134	<5.14E-03	0.00E+00	5.14E-03
		Cs-137	<6.37E-03	0.00E+00	6.37E-03
		Be-7	<3.59E-02	0.00E+00	3.59E-02
		K-40	<2.40E-01	0.00E+00	2.40E-01
386899	8/25/2015 - 9/1/2015	I-131	<7.61E-03	0.00E+00	7.61E-03
		Cs-134	<1.63E-02	0.00E+00	1.63E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<9.47E-02	0.00E+00	9.47E-02
		K-40	4.28E-01	2.21E-01	2.63E-01
387482	9/1/2015 - 9/8/2015	I-131	<1.03E-02	0.00E+00	1.03E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02
		Cs-137	<1.27E-02	0.00E+00	1.27E-02
		Be-7	<7.33E-02	0.00E+00	7.33E-02
		K-40	4.62E-01	1.92E-01	2.03E-01
388844	9/8/2015 - 9/14/2015	I-131	<1.74E-02	0.00E+00	1.74E-02
		Cs-134	<1.48E-02	0.00E+00	1.48E-02
		Cs-137	<1.43E-02	0.00E+00	1.43E-02
		Be-7	<7.83E-02	0.00E+00	7.83E-02
		K-40	6.71E-01	2.25E-01	4.78E-02
389484	9/14/2015 - 9/21/2015	I-131	<1.45E-02	0.00E+00	1.45E-02
		Cs-134	<1.23E-02	0.00E+00	1.23E-02
		Cs-137	<1.35E-02	0.00E+00	1.35E-02
		Be-7	<6.85E-02	0.00E+00	6.85E-02
		K-40	4.88E-01	2.12E-01	2.30E-01
390085	9/21/2015 - 9/29/2015	I-131	<1.41E-02	0.00E+00	1.41E-02
		Cs-134	<8.92E-03	0.00E+00	8.92E-03
		Cs-137	<1.10E-02	0.00E+00	1.10E-02
		Be-7	<8.86E-02	0.00E+00	8.86E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
390085	9/21/2015 - 9/29/2015	K-40	3.16E-01	1.62E-01	1.87E-01
390726	9/29/2015 - 10/5/2015	I-131	<2.96E-02	0.00E+00	2.96E-02
		Cs-134	<1.00E-02	0.00E+00	1.00E-02
		Cs-137	<1.38E-02	0.00E+00	1.38E-02
		Be-7	<9.61E-02	0.00E+00	9.61E-02
		K-40	4.53E-01	2.37E-01	2.90E-01
392034	10/5/2015 - 10/12/2015	I-131	<1.46E-02	0.00E+00	1.46E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.36E-02	0.00E+00	1.36E-02
		Be-7	<6.83E-02	0.00E+00	6.83E-02
		K-40	5.36E-01	1.97E-01	1.42E-01
392306	10/12/2015 - 10/20/2015	I-131	<1.55E-02	0.00E+00	1.55E-02
		Cs-134	<1.06E-02	0.00E+00	1.06E-02
		Cs-137	<1.16E-02	0.00E+00	1.16E-02
		Be-7	<6.60E-02	0.00E+00	6.60E-02
		K-40	<3.75E-01	0.00E+00	3.75E-01
393505	10/20/2015 - 10/27/2015	I-131	<1.46E-02	0.00E+00	1.46E-02
		Cs-134	<1.43E-02	0.00E+00	1.43E-02
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<7.70E-02	0.00E+00	7.70E-02
		K-40	6.06E-01	2.22E-01	1.95E-01
393902	10/27/2015 - 11/3/2015	I-131	<1.07E-02	0.00E+00	1.07E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.75E-02	0.00E+00	1.75E-02
		Be-7	<7.67E-02	0.00E+00	7.67E-02
		K-40	4.30E-01	1.90E-01	1.90E-01
394927	11/3/2015 - 11/10/2015	I-131	<1.38E-02	0.00E+00	1.38E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.18E-02	0.00E+00	1.18E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	5.30E-01	1.98E-01	1.45E-01
395379	11/10/2015 - 11/16/2015	I-131	<2.49E-02	0.00E+00	2.49E-02
		Cs-134	<1.55E-02	0.00E+00	1.55E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	5.72E-01	2.11E-01	5.00E-02
395704	11/16/2015 - 11/23/2015	I-131	<2.06E-02	0.00E+00	2.06E-02
		Cs-134	<1.16E-02	0.00E+00	1.16E-02
		Cs-137	<1.66E-02	0.00E+00	1.66E-02
		Be-7	<1.81E-02	0.00E+00	1.81E-02
		K-40	<4.00E-01	0.00E+00	4.00E-01
396196	11/23/2015 - 11/30/2015	I-131	<2.07E-02	0.00E+00	2.07E-02
		Cs-134	<1.14E-02	0.00E+00	1.14E-02
		Cs-137	<1.07E-02	0.00E+00	1.07E-02
		Be-7	<7.07E-02	0.00E+00	7.07E-02
		K-40	<4.81E-01	0.00E+00	4.81E-01
396714	11/30/2015 - 12/8/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 3 [INDICATOR - N @ 0.5 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
396714	11/30/2015 - 12/8/2015	Cs-137	<1.19E-02	0.00E+00	1.19E-02
		Be-7	<1.09E-01	0.00E+00	1.09E-01
		K-40	3.95E-01	1.50E-01	3.69E-02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397265	12/8/2015 - 12/15/2015	I-131	<1.60E-02	0.00E+00	1.60E-02
		Cs-134	<8.09E-03	0.00E+00	8.09E-03
		Cs-137	<6.45E-03	0.00E+00	6.45E-03
		Be-7	<5.01E-02	0.00E+00	5.01E-02
		K-40	<2.90E-01	0.00E+00	2.90E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397969	12/15/2015 - 12/21/2015	I-131	<2.78E-02	0.00E+00	2.78E-02
		Cs-134	<1.46E-02	0.00E+00	1.46E-02
		Cs-137	<1.22E-02	0.00E+00	1.22E-02
		Be-7	<7.34E-02	0.00E+00	7.34E-02
		K-40	6.38E-01	2.41E-01	2.04E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398357	12/21/2015 - 12/28/2015	I-131	<1.32E-02	0.00E+00	1.32E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.19E-02	0.00E+00	1.19E-02
		Be-7	<6.09E-02	0.00E+00	6.09E-02
		K-40	3.74E-01	2.09E-01	2.68E-01

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364958	12/29/2014 - 1/6/2015	I-131	<1.56E-02	0.00E+00	1.56E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.15E-02	0.00E+00	1.15E-02
		Be-7	<9.68E-02	0.00E+00	9.68E-02
		K-40	5.77E-01	2.20E-01	2.09E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365160	1/6/2015 - 1/13/2015	I-131	<7.26E-03	0.00E+00	7.26E-03
		Cs-134	<5.35E-03	0.00E+00	5.35E-03
		Cs-137	<7.42E-03	0.00E+00	7.42E-03
		Be-7	<4.80E-02	0.00E+00	4.80E-02
		K-40	4.53E-01	1.53E-01	1.20E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365381	1/13/2015 - 1/20/2015	I-131	<1.47E-02	0.00E+00	1.47E-02
		Cs-134	<1.24E-02	0.00E+00	1.24E-02
		Cs-137	<1.63E-02	0.00E+00	1.63E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	4.97E-01	2.38E-01	2.81E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
366724	1/20/2015 - 1/27/2015	I-131	<1.85E-02	0.00E+00	1.85E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<1.41E-02	0.00E+00	1.41E-02
		Be-7	<8.55E-02	0.00E+00	8.55E-02
		K-40	5.21E-01	2.12E-01	1.86E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
367140	1/27/2015 - 2/3/2015	I-131	<2.04E-02	0.00E+00	2.04E-02
		Cs-134	<1.47E-02	0.00E+00	1.47E-02
		Cs-137	<1.42E-02	0.00E+00	1.42E-02
		Be-7	<5.29E-02	0.00E+00	5.29E-02
		K-40	7.19E-01	2.48E-01	1.91E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
367639	2/3/2015 - 2/10/2015	I-131	<1.57E-02	0.00E+00	1.57E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.29E-02	0.00E+00	1.29E-02
		Be-7	<1.19E-01	0.00E+00	1.19E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
367639	2/3/2015 - 2/10/2015	K-40	5.26E-01	2.11E-01	1.73E-01
369054	2/10/2015 - 2/17/2015	I-131	<2.82E-02	0.00E+00	2.82E-02
		Cs-134	<8.25E-03	0.00E+00	8.25E-03
		Cs-137	<1.02E-02	0.00E+00	1.02E-02
		Be-7	<1.01E-01	0.00E+00	1.01E-01
		K-40	<4.90E-01	0.00E+00	4.90E-01
369765	2/17/2015 - 2/23/2015	I-131	<6.67E-03	0.00E+00	6.67E-03
		Cs-134	<4.97E-03	0.00E+00	4.97E-03
		Cs-137	<5.01E-03	0.00E+00	5.01E-03
		Be-7	<3.43E-02	0.00E+00	3.43E-02
		K-40	2.54E-01	1.04E-01	1.25E-01
370681	2/23/2015 - 3/2/2015	I-131	<2.21E-02	0.00E+00	2.21E-02
		Cs-134	<1.65E-02	0.00E+00	1.65E-02
		Cs-137	<1.78E-02	0.00E+00	1.78E-02
		Be-7	<9.80E-02	0.00E+00	9.80E-02
		K-40	5.59E-01	2.26E-01	2.00E-01
371634	3/2/2015 - 3/9/2015	I-131	<9.51E-03	0.00E+00	9.51E-03
		Cs-134	<6.35E-03	0.00E+00	6.35E-03
		Cs-137	<7.88E-03	0.00E+00	7.88E-03
		Be-7	<4.03E-02	0.00E+00	4.03E-02
		K-40	3.91E-01	1.43E-01	1.03E-01
371994	3/9/2015 - 3/17/2015	I-131	<1.41E-02	0.00E+00	1.41E-02
		Cs-134	<9.84E-03	0.00E+00	9.84E-03
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<9.79E-02	0.00E+00	9.79E-02
		K-40	2.19E-01	1.48E-01	1.93E-01
372479	3/17/2015 - 3/24/2015	I-131	<9.97E-03	0.00E+00	9.97E-03
		Cs-134	<7.78E-03	0.00E+00	7.78E-03
		Cs-137	<8.70E-03	0.00E+00	8.70E-03
		Be-7	<4.09E-02	0.00E+00	4.09E-02
		K-40	4.88E-01	1.46E-01	2.70E-02
373946	3/24/2015 - 3/31/2015	I-131	<2.67E-02	0.00E+00	2.67E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<9.05E-02	0.00E+00	9.05E-02
		K-40	5.15E-01	2.08E-01	1.75E-01
374636	3/31/2015 - 4/7/2015	I-131	<2.39E-02	0.00E+00	2.39E-02
		Cs-134	<9.92E-03	0.00E+00	9.92E-03
		Cs-137	<1.10E-02	0.00E+00	1.10E-02
		Be-7	<9.25E-02	0.00E+00	9.25E-02
		K-40	6.68E-01	2.38E-01	2.08E-01
375025	4/7/2015 - 4/14/2015	I-131	<2.05E-02	0.00E+00	2.05E-02
		Cs-134	<1.41E-02	0.00E+00	1.41E-02
		Cs-137	<1.31E-02	0.00E+00	1.31E-02
		Be-7	<9.50E-02	0.00E+00	9.50E-02
		K-40	6.71E-01	2.25E-01	4.79E-02
375701	4/14/2015 - 4/21/2015	I-131	<2.93E-02	0.00E+00	2.93E-02
		Cs-134	<1.32E-02	0.00E+00	1.32E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
375701	4/14/2015 - 4/21/2015	Cs-137	<1.54E-02	0.00E+00	1.54E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	4.15E-01	1.87E-01	1.74E-01
376909	4/21/2015 - 4/28/2015	I-131	<1.72E-02	0.00E+00	1.72E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.36E-02	0.00E+00	1.36E-02
		Be-7	<7.19E-02	0.00E+00	7.19E-02
		K-40	5.57E-01	1.86E-01	3.97E-02
377570	4/28/2015 - 5/5/2015	I-131	<2.11E-02	0.00E+00	2.11E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<1.57E-02	0.00E+00	1.57E-02
		Be-7	<9.93E-02	0.00E+00	9.93E-02
		K-40	4.69E-01	2.23E-01	2.59E-01
378146	5/5/2015 - 5/11/2015	I-131	<3.58E-02	0.00E+00	3.58E-02
		Cs-134	<1.55E-02	0.00E+00	1.55E-02
		Cs-137	<1.29E-02	0.00E+00	1.29E-02
		Be-7	<1.53E-01	0.00E+00	1.53E-01
		K-40	5.56E-01	2.44E-01	2.49E-01
378540	5/11/2015 - 5/18/2015	I-131	<1.83E-02	0.00E+00	1.83E-02
		Cs-134	<1.35E-02	0.00E+00	1.35E-02
		Cs-137	<1.38E-02	0.00E+00	1.38E-02
		Be-7	<7.54E-02	0.00E+00	7.54E-02
		K-40	5.08E-01	1.90E-01	4.59E-02
379031	5/18/2015 - 5/25/2015	I-131	<3.17E-02	0.00E+00	3.17E-02
		Cs-134	<1.19E-02	0.00E+00	1.19E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<1.25E-01	0.00E+00	1.25E-01
		K-40	9.76E-01	2.78E-01	4.90E-02
379536	5/25/2015 - 6/2/2015	I-131	<1.13E-02	0.00E+00	1.13E-02
		Cs-134	<1.22E-02	0.00E+00	1.22E-02
		Cs-137	<9.72E-03	0.00E+00	9.72E-03
		Be-7	<1.17E-01	0.00E+00	1.17E-01
		K-40	5.10E-01	2.05E-01	2.07E-01
380291	6/2/2015 - 6/9/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<1.42E-02	0.00E+00	1.42E-02
		Cs-137	<1.38E-02	0.00E+00	1.38E-02
		Be-7	<9.77E-02	0.00E+00	9.77E-02
		K-40	<4.64E-01	0.00E+00	4.64E-01
380554	6/9/2015 - 6/15/2015	I-131	<1.60E-02	0.00E+00	1.60E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.33E-02	0.00E+00	1.33E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	6.36E-01	2.31E-01	1.64E-01
380881	6/15/2015 - 6/24/2015	I-131	<2.15E-02	0.00E+00	2.15E-02
		Cs-134	<7.59E-03	0.00E+00	7.59E-03
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<9.57E-02	0.00E+00	9.57E-02
		K-40	3.93E-01	1.67E-01	1.52E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381360	6/24/2015 - 6/29/2015	I-131	<2.51E-02	0.00E+00	2.51E-02
		Cs-134	<1.87E-02	0.00E+00	1.87E-02
		Cs-137	<1.49E-02	0.00E+00	1.49E-02
		Be-7	<1.44E-01	0.00E+00	1.44E-01
		K-40	7.72E-01	3.39E-01	3.97E-01
381674	6/29/2015 - 7/6/2015	I-131	<2.26E-02	0.00E+00	2.26E-02
		Cs-134	<1.33E-02	0.00E+00	1.33E-02
		Cs-137	<1.11E-02	0.00E+00	1.11E-02
		Be-7	<9.05E-02	0.00E+00	9.05E-02
		K-40	<4.10E-01	0.00E+00	4.10E-01
382246	7/6/2015 - 7/14/2015	I-131	<9.12E-03	0.00E+00	9.12E-03
		Cs-134	<5.97E-03	0.00E+00	5.97E-03
		Cs-137	<6.32E-03	0.00E+00	6.32E-03
		Be-7	<4.84E-02	0.00E+00	4.84E-02
		K-40	<2.67E-01	0.00E+00	2.67E-01
382667	7/14/2015 - 7/21/2015	I-131	<1.71E-02	0.00E+00	1.71E-02
		Cs-134	<1.22E-02	0.00E+00	1.22E-02
		Cs-137	<1.41E-02	0.00E+00	1.41E-02
		Be-7	<9.93E-02	0.00E+00	9.93E-02
		K-40	5.03E-01	1.99E-01	1.66E-01
383596	7/21/2015 - 7/27/2015	I-131	<1.82E-02	0.00E+00	1.82E-02
		Cs-134	<1.63E-02	0.00E+00	1.63E-02
		Cs-137	<1.91E-02	0.00E+00	1.91E-02
		Be-7	<1.32E-01	0.00E+00	1.32E-01
		K-40	<6.13E-01	0.00E+00	6.13E-01
384168	7/27/2015 - 8/4/2015	I-131	<1.74E-02	0.00E+00	1.74E-02
		Cs-134	<6.66E-03	0.00E+00	6.66E-03
		Cs-137	<9.50E-03	0.00E+00	9.50E-03
		Be-7	<8.72E-02	0.00E+00	8.72E-02
		K-40	2.61E-01	1.55E-01	1.91E-01
384739	8/4/2015 - 8/11/2015	I-131	<1.90E-02	0.00E+00	1.90E-02
		Cs-134	<1.13E-02	0.00E+00	1.13E-02
		Cs-137	<1.40E-02	0.00E+00	1.40E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	5.66E-01	2.12E-01	5.11E-02
385487	8/11/2015 - 8/17/2015	I-131	<2.35E-02	0.00E+00	2.35E-02
		Cs-134	<1.26E-02	0.00E+00	1.26E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	<5.54E-01	0.00E+00	5.54E-01
386005	8/17/2015 - 8/25/2015	I-131	<1.04E-02	0.00E+00	1.04E-02
		Cs-134	<6.34E-03	0.00E+00	6.34E-03
		Cs-137	<5.57E-03	0.00E+00	5.57E-03
		Be-7	<5.16E-02	0.00E+00	5.16E-02
		K-40	3.62E-01	1.48E-01	1.58E-01
386900	8/25/2015 - 9/1/2015	I-131	<1.96E-02	0.00E+00	1.96E-02
		Cs-134	<1.37E-02	0.00E+00	1.37E-02
		Cs-137	<1.61E-02	0.00E+00	1.61E-02
		Be-7	<9.86E-02	0.00E+00	9.86E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
386900	8/25/2015 - 9/1/2015	K-40	<4.88E-01	0.00E+00	4.88E-01
387483	9/1/2015 - 9/8/2015	I-131	<1.33E-02	0.00E+00	1.33E-02
		Cs-134	<1.54E-02	0.00E+00	1.54E-02
		Cs-137	<1.31E-02	0.00E+00	1.31E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	<5.40E-01	0.00E+00	5.40E-01
388845	9/8/2015 - 9/14/2015	I-131	<1.58E-02	0.00E+00	1.58E-02
		Cs-134	<1.50E-02	0.00E+00	1.50E-02
		Cs-137	<1.74E-02	0.00E+00	1.74E-02
		Be-7	<1.23E-01	0.00E+00	1.23E-01
		K-40	8.10E-01	2.84E-01	2.33E-01
389485	9/14/2015 - 9/21/2015	I-131	<1.76E-02	0.00E+00	1.75E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.16E-02	0.00E+00	1.16E-02
		Be-7	<1.01E-01	0.00E+00	1.01E-01
		K-40	6.61E-01	2.21E-01	4.71E-02
390086	9/21/2015 - 9/29/2015	I-131	<1.76E-02	0.00E+00	1.76E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.29E-02	0.00E+00	1.29E-02
		Be-7	<7.99E-02	0.00E+00	7.99E-02
		K-40	3.89E-01	1.87E-01	2.13E-01
390727	9/29/2015 - 10/5/2015	I-131	<2.89E-02	0.00E+00	2.89E-02
		Cs-134	<1.58E-02	0.00E+00	1.58E-02
		Cs-137	<1.20E-02	0.00E+00	1.20E-02
		Be-7	<1.28E-01	0.00E+00	1.28E-01
		K-40	7.58E-01	2.76E-01	2.11E-01
392035	10/5/2015 - 10/12/2015	I-131	<1.94E-02	0.00E+00	1.94E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<9.83E-02	0.00E+00	9.83E-02
		K-40	5.11E-01	1.91E-01	4.62E-02
392307	10/12/2015 - 10/20/2015	I-131	<2.61E-02	0.00E+00	2.61E-02
		Cs-134	<1.86E-02	0.00E+00	1.86E-02
		Cs-137	<2.04E-02	0.00E+00	2.04E-02
		Be-7	<1.45E-01	0.00E+00	1.45E-01
		K-40	7.25E-01	2.91E-01	2.52E-01
393506	10/20/2015 - 10/27/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<1.39E-02	0.00E+00	1.39E-02
		Cs-137	<1.42E-02	0.00E+00	1.42E-02
		Be-7	<1.00E-01	0.00E+00	1.00E-01
		K-40	4.82E-01	1.98E-01	1.53E-01
393903	10/27/2015 - 11/3/2015	I-131	<1.96E-02	0.00E+00	1.96E-02
		Cs-134	<1.25E-02	0.00E+00	1.25E-02
		Cs-137	<1.64E-02	0.00E+00	1.64E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	7.41E-01	2.52E-01	1.90E-01
394928	11/3/2015 - 11/10/2015	I-131	<7.97E-03	0.00E+00	7.97E-03
		Cs-134	<1.52E-02	0.00E+00	1.52E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
394928	11/3/2015 - 11/10/2015	Cs-137	<1.42E-02	0.00E+00	1.42E-02
		Be-7	<8.55E-02	0.00E+00	8.55E-02
		K-40	6.29E-01	2.61E-01	2.88E-01
395380	11/10/2015 - 11/16/2015	I-131	<3.75E-02	0.00E+00	3.75E-02
		Cs-134	<1.33E-02	0.00E+00	1.33E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<1.06E-01	0.00E+00	1.06E-01
		K-40	5.49E-01	2.73E-01	3.33E-01
395705	11/16/2015 - 11/23/2015	I-131	<2.48E-02	0.00E+00	2.48E-02
		Cs-134	<1.45E-02	0.00E+00	1.45E-02
		Cs-137	<1.29E-02	0.00E+00	1.29E-02
		Be-7	<1.25E-01	0.00E+00	1.25E-01
		K-40	<5.23E-01	0.00E+00	5.23E-01
396197	11/23/2015 - 11/30/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.51E-02	0.00E+00	1.51E-02
		Be-7	<1.23E-01	0.00E+00	1.23E-01
		K-40	5.38E-01	2.14E-01	1.82E-01
396715	11/30/2015 - 12/8/2015	I-131	<1.34E-02	0.00E+00	1.34E-02
		Cs-134	<1.00E-02	0.00E+00	1.00E-02
		Cs-137	<1.24E-02	0.00E+00	1.24E-02
		Be-7	<8.25E-02	0.00E+00	8.25E-02
		K-40	5.96E-01	2.09E-01	1.58E-01
397266	12/8/2015 - 12/15/2015	I-131	<1.54E-02	0.00E+00	1.54E-02
		Cs-134	<7.11E-03	0.00E+00	7.11E-03
		Cs-137	<9.75E-03	0.00E+00	9.75E-03
		Be-7	<4.93E-02	0.00E+00	4.93E-02
		K-40	3.79E-01	1.42E-01	1.30E-01
397970	12/15/2015 - 12/21/2015	I-131	<3.48E-02	0.00E+00	3.48E-02
		Cs-134	<1.59E-02	0.00E+00	1.59E-02
		Cs-137	<2.06E-02	0.00E+00	2.06E-02
		Be-7	<1.22E-01	0.00E+00	1.22E-01
		K-40	5.60E-01	2.35E-01	2.08E-01
398358	12/21/2015 - 12/28/2015	I-131	<1.37E-02	0.00E+00	1.37E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.78E-02	0.00E+00	1.78E-02
		Be-7	<9.55E-02	0.00E+00	9.55E-02
		K-40	6.61E-01	2.16E-01	4.48E-02

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364959	12/29/2014 - 1/6/2015	I-131	<1.47E-02	0.00E+00	1.47E-02
		Cs-134	<1.34E-02	0.00E+00	1.34E-02
		Cs-137	<1.29E-02	0.00E+00	1.29E-02
		Be-7	<8.65E-02	0.00E+00	8.65E-02
		K-40	5.74E-01	2.16E-01	2.08E-01
365161	1/6/2015 - 1/13/2015	I-131	<1.29E-02	0.00E+00	1.29E-02
		Cs-134	<1.00E-02	0.00E+00	1.00E-02
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<1.26E-01	0.00E+00	1.26E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365161	1/6/2015 - 1/13/2015	K-40	2.46E-01	2.38E-01	3.62E-01
365382	1/13/2015 - 1/20/2015	I-131	<1.23E-02	0.00E+00	1.23E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<1.68E-02	0.00E+00	1.68E-02
		Be-7	<7.60E-02	0.00E+00	7.60E-02
		K-40	4.16E-01	2.04E-01	2.28E-01
366725	1/20/2015 - 1/27/2015	I-131	<1.65E-02	0.00E+00	1.65E-02
		Cs-134	<1.51E-02	0.00E+00	1.51E-02
		Cs-137	<1.40E-02	0.00E+00	1.40E-02
		Be-7	<1.06E-01	0.00E+00	1.06E-01
		K-40	6.07E-01	2.25E-01	1.76E-01
367141	1/27/2015 - 2/3/2015	I-131	<1.43E-02	0.00E+00	1.43E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<8.45E-02	0.00E+00	8.45E-02
		K-40	4.83E-01	2.02E-01	1.76E-01
367640	2/3/2015 - 2/10/2015	I-131	<1.84E-02	0.00E+00	1.84E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.64E-02	0.00E+00	1.64E-02
		Be-7	<8.94E-02	0.00E+00	8.94E-02
		K-40	<4.70E-01	0.00E+00	4.70E-01
369055	2/10/2015 - 2/17/2015	I-131	<2.67E-02	0.00E+00	2.67E-02
		Cs-134	<1.75E-02	0.00E+00	1.75E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<1.46E-01	0.00E+00	1.46E-01
		K-40	6.81E-01	2.31E-01	4.99E-02
369766	2/17/2015 - 2/23/2015	I-131	<2.37E-02	0.00E+00	2.37E-02
		Cs-134	<1.44E-02	0.00E+00	1.44E-02
		Cs-137	<1.38E-02	0.00E+00	1.38E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	7.91E-01	3.05E-01	2.53E-01
370682	2/23/2015 - 3/2/2015	I-131	<2.02E-02	0.00E+00	2.02E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<8.51E-02	0.00E+00	8.51E-02
		K-40	5.65E-01	2.02E-01	4.64E-02
371635	3/2/2015 - 3/9/2015	I-131	<6.17E-03	0.00E+00	6.17E-03
		Cs-134	<6.94E-03	0.00E+00	6.94E-03
		Cs-137	<5.67E-03	0.00E+00	5.67E-03
		Be-7	<5.26E-02	0.00E+00	5.26E-02
		K-40	3.52E-01	1.40E-01	1.37E-01
371995	3/9/2015 - 3/17/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.08E-02	0.00E+00	1.08E-02
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<6.80E-02	0.00E+00	6.80E-02
		K-40	5.48E-01	2.05E-01	1.75E-01
372480	3/17/2015 - 3/24/2015	I-131	<9.71E-03	0.00E+00	9.71E-03
		Cs-134	<5.57E-03	0.00E+00	5.57E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372480	3/17/2015 - 3/24/2015	Cs-137	<6.91E-03	0.00E+00	6.91E-03
		Be-7	<6.29E-02	0.00E+00	6.29E-02
		K-40	4.78E-01	1.58E-01	1.11E-01
373947	3/24/2015 - 3/31/2015	I-131	<2.60E-02	0.00E+00	2.60E-02
		Cs-134	<9.12E-03	0.00E+00	9.12E-03
		Cs-137	<1.12E-02	0.00E+00	1.12E-02
		Be-7	<8.90E-02	0.00E+00	8.90E-02
		K-40	5.22E-01	2.09E-01	1.80E-01
374637	3/31/2015 - 4/7/2015	I-131	<2.10E-02	0.00E+00	2.10E-02
		Cs-134	<1.62E-02	0.00E+00	1.62E-02
		Cs-137	<1.39E-02	0.00E+00	1.39E-02
		Be-7	<7.90E-02	0.00E+00	7.90E-02
		K-40	4.76E-01	2.04E-01	1.92E-01
375026	4/7/2015 - 4/14/2015	I-131	<1.44E-02	0.00E+00	1.44E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.40E-02	0.00E+00	1.40E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	6.02E-01	2.10E-01	4.66E-02
375702	4/14/2015 - 4/21/2015	I-131	<2.61E-02	0.00E+00	2.61E-02
		Cs-134	<1.46E-02	0.00E+00	1.46E-02
		Cs-137	<1.72E-02	0.00E+00	1.72E-02
		Be-7	<1.01E-01	0.00E+00	1.01E-01
		K-40	8.63E-01	2.50E-01	4.50E-02
376910	4/21/2015 - 4/28/2015	I-131	<1.61E-02	0.00E+00	1.61E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<9.51E-02	0.00E+00	9.51E-02
		K-40	5.58E-01	1.92E-01	4.20E-02
377571	4/28/2015 - 5/5/2015	I-131	<3.01E-02	0.00E+00	3.01E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<9.49E-03	0.00E+00	9.49E-03
		Be-7	<6.86E-02	0.00E+00	6.86E-02
		K-40	3.50E-01	1.72E-01	1.69E-01
378147	5/5/2015 - 5/11/2015	I-131	<2.67E-02	0.00E+00	2.67E-02
		Cs-134	<1.61E-02	0.00E+00	1.61E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<1.39E-01	0.00E+00	1.39E-01
		K-40	<5.41E-01	0.00E+00	5.41E-01
378541	5/11/2015 - 5/18/2015	I-131	<1.89E-02	0.00E+00	1.89E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.73E-02	0.00E+00	1.73E-02
		Be-7	<1.16E-01	0.00E+00	1.16E-01
		K-40	5.54E-01	1.98E-01	4.55E-02
379032	5/18/2015 - 5/25/2015	I-131	<2.60E-02	0.00E+00	2.60E-02
		Cs-134	<1.52E-02	0.00E+00	1.52E-02
		Cs-137	<1.69E-02	0.00E+00	1.69E-02
		Be-7	<1.38E-01	0.00E+00	1.38E-01
		K-40	3.10E-01	2.02E-01	2.67E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
379537	5/25/2015 - 6/2/2015	I-131	<1.56E-02	0.00E+00	1.56E-02
		Cs-134	<1.34E-02	0.00E+00	1.34E-02
		Cs-137	<1.02E-02	0.00E+00	1.02E-02
		Be-7	<1.05E-01	0.00E+00	1.05E-01
		K-40	4.48E-01	1.83E-01	1.56E-01
380292	6/2/2015 - 6/9/2015	I-131	<1.44E-02	0.00E+00	1.44E-02
		Cs-134	<1.70E-02	0.00E+00	1.70E-02
		Cs-137	<1.42E-02	0.00E+00	1.42E-02
		Be-7	<8.57E-02	0.00E+00	8.57E-02
		K-40	6.45E-01	2.35E-01	1.89E-01
380555	6/9/2015 - 6/15/2015	I-131	<1.78E-02	0.00E+00	1.78E-02
		Cs-134	<1.62E-02	0.00E+00	1.62E-02
		Cs-137	<2.23E-02	0.00E+00	2.23E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	6.39E-01	2.49E-01	2.31E-01
380882	6/15/2015 - 6/24/2015	I-131	<2.03E-02	0.00E+00	2.03E-02
		Cs-134	<6.48E-03	0.00E+00	6.48E-03
		Cs-137	<1.03E-02	0.00E+00	1.03E-02
		Be-7	<1.12E-01	0.00E+00	1.12E-01
		K-40	3.52E-01	1.69E-01	1.86E-01
381361	6/24/2015 - 6/29/2015	I-131	<1.67E-02	0.00E+00	1.67E-02
		Cs-134	<2.30E-02	0.00E+00	2.30E-02
		Cs-137	<1.75E-02	0.00E+00	1.75E-02
		Be-7	<1.35E-01	0.00E+00	1.35E-01
		K-40	8.49E-01	2.92E-01	6.39E-02
381675	6/29/2015 - 7/6/2015	I-131	<2.24E-02	0.00E+00	2.24E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<1.06E-01	0.00E+00	1.06E-01
		K-40	3.89E-01	1.96E-01	2.16E-01
382247	7/6/2015 - 7/14/2015	I-131	<6.00E-03	0.00E+00	6.00E-03
		Cs-134	<7.34E-03	0.00E+00	7.34E-03
		Cs-137	<5.63E-03	0.00E+00	5.63E-03
		Be-7	<5.18E-02	0.00E+00	5.18E-02
		K-40	4.14E-01	1.28E-01	2.44E-02
382668	7/14/2015 - 7/21/2015	I-131	<1.52E-02	0.00E+00	1.52E-02
		Cs-134	<1.28E-02	0.00E+00	1.28E-02
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	6.94E-01	2.59E-01	2.60E-01
383597	7/21/2015 - 7/27/2015	I-131	<2.19E-02	0.00E+00	2.19E-02
		Cs-134	<1.62E-02	0.00E+00	1.62E-02
		Cs-137	<2.28E-02	0.00E+00	2.28E-02
		Be-7	<8.87E-02	0.00E+00	8.87E-02
		K-40	6.50E-01	2.75E-01	2.87E-01
384169	7/27/2015 - 8/4/2015	I-131	<2.20E-02	0.00E+00	2.20E-02
		Cs-134	<1.25E-02	0.00E+00	1.25E-02
		Cs-137	<1.11E-02	0.00E+00	1.11E-02
		Be-7	<9.72E-02	0.00E+00	9.72E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
384169	7/27/2015 - 8/4/2015	K-40	<3.43E-01	0.00E+00	3.43E-01
384740	8/4/2015 - 8/11/2015	I-131	<1.18E-02	0.00E+00	1.18E-02
		Cs-134	<1.49E-02	0.00E+00	1.49E-02
		Cs-137	<1.40E-02	0.00E+00	1.40E-02
		Be-7	<7.05E-02	0.00E+00	7.05E-02
		K-40	6.44E-01	2.58E-01	2.56E-01
385488	8/11/2015 - 8/17/2015	I-131	<1.27E-02	0.00E+00	1.27E-02
		Cs-134	<1.37E-02	0.00E+00	1.37E-02
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<1.30E-01	0.00E+00	1.30E-01
		K-40	4.62E-01	2.03E-01	1.78E-01
386006	8/17/2015 - 8/25/2015	I-131	<1.28E-03	0.00E+00	1.28E-03
		Cs-134	<5.22E-03	0.00E+00	5.22E-03
		Cs-137	<6.03E-03	0.00E+00	6.03E-03
		Be-7	<3.22E-02	0.00E+00	3.22E-02
		K-40	3.16E-01	1.02E-01	2.09E-02
386901	8/25/2015 - 9/1/2015	I-131	<1.19E-02	0.00E+00	1.19E-02
		Cs-134	<7.85E-03	0.00E+00	7.85E-03
		Cs-137	<1.08E-02	0.00E+00	1.08E-02
		Be-7	<9.34E-02	0.00E+00	9.34E-02
		K-40	6.41E-01	2.13E-01	1.58E-01
387484	9/1/2015 - 9/8/2015	I-131	<1.66E-02	0.00E+00	1.66E-02
		Cs-134	<8.35E-03	0.00E+00	8.35E-03
		Cs-137	<1.36E-02	0.00E+00	1.36E-02
		Be-7	<9.02E-02	0.00E+00	9.02E-02
		K-40	3.88E-01	1.50E-01	3.76E-02
388846	9/8/2015 - 9/14/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<7.15E-03	0.00E+00	7.15E-03
		Cs-137	<1.34E-02	0.00E+00	1.34E-02
		Be-7	<5.88E-02	0.00E+00	5.88E-02
		K-40	5.66E-01	2.08E-01	1.73E-01
389486	9/14/2015 - 9/21/2015	I-131	<1.51E-02	0.00E+00	1.51E-02
		Cs-134	<9.57E-03	0.00E+00	9.57E-03
		Cs-137	<1.18E-02	0.00E+00	1.18E-02
		Be-7	<7.32E-02	0.00E+00	7.32E-02
		K-40	3.24E-01	1.51E-01	1.48E-01
390087	9/21/2015 - 9/29/2015	I-131	<9.31E-03	0.00E+00	9.31E-03
		Cs-134	<7.75E-03	0.00E+00	7.75E-03
		Cs-137	<7.87E-03	0.00E+00	7.87E-03
		Be-7	<5.83E-02	0.00E+00	5.83E-02
		K-40	2.59E-01	1.13E-01	3.19E-02
390728	9/29/2015 - 10/5/2015	I-131	<2.45E-02	0.00E+00	2.45E-02
		Cs-134	<1.24E-02	0.00E+00	1.24E-02
		Cs-137	<1.85E-02	0.00E+00	1.85E-02
		Be-7	<9.80E-02	0.00E+00	9.80E-02
		K-40	8.28E-01	2.59E-01	5.10E-02
392036	10/5/2015 - 10/12/2015	I-131	<1.42E-02	0.00E+00	1.42E-02
		Cs-134	<1.57E-02	0.00E+00	1.57E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392036	10/5/2015 - 10/12/2015	Cs-137	<1.49E-02	0.00E+00	1.49E-02
		Be-7	<9.25E-02	0.00E+00	9.25E-02
		K-40	3.53E-01	1.53E-01	4.35E-02
392308	10/12/2015 - 10/20/2015	I-131	<1.55E-02	0.00E+00	1.55E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.20E-02	0.00E+00	1.20E-02
		Be-7	<7.44E-02	0.00E+00	7.44E-02
		K-40	5.63E-01	1.82E-01	3.72E-02
393507	10/20/2015 - 10/27/2015	I-131	<1.56E-02	0.00E+00	1.56E-02
		Cs-134	<1.12E-02	0.00E+00	1.12E-02
		Cs-137	<1.18E-02	0.00E+00	1.18E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	5.29E-01	1.99E-01	1.48E-01
393904	10/27/2015 - 11/3/2015	I-131	<1.08E-02	0.00E+00	1.08E-02
		Cs-134	<1.25E-02	0.00E+00	1.25E-02
		Cs-137	<1.05E-02	0.00E+00	1.05E-02
		Be-7	<9.08E-02	0.00E+00	9.08E-02
		K-40	6.80E-01	2.37E-01	2.10E-01
394929	11/3/2015 - 11/10/2015	I-131	<1.90E-02	0.00E+00	1.90E-02
		Cs-134	<1.06E-02	0.00E+00	1.06E-02
		Cs-137	<1.31E-02	0.00E+00	1.31E-02
		Be-7	<7.74E-02	0.00E+00	7.74E-02
		K-40	4.23E-01	2.14E-01	2.49E-01
395381	11/10/2015 - 11/16/2015	I-131	<4.55E-02	0.00E+00	4.55E-02
		Cs-134	<2.36E-02	0.00E+00	2.36E-02
		Cs-137	<2.08E-02	0.00E+00	2.08E-02
		Be-7	<1.80E-01	0.00E+00	1.80E-01
		K-40	<9.32E-01	0.00E+00	9.32E-01
395706	11/16/2015 - 11/23/2015	I-131	<2.31E-02	0.00E+00	2.31E-02
		Cs-134	<1.06E-02	0.00E+00	1.06E-02
		Cs-137	<1.87E-02	0.00E+00	1.87E-02
		Be-7	<8.38E-02	0.00E+00	8.38E-02
		K-40	5.79E-01	2.39E-01	2.61E-01
396198	11/23/2015 - 11/30/2015	I-131	<2.03E-02	0.00E+00	2.03E-02
		Cs-134	<1.14E-02	0.00E+00	1.14E-02
		Cs-137	<2.07E-02	0.00E+00	2.07E-02
		Be-7	<7.92E-02	0.00E+00	7.92E-02
		K-40	3.55E-01	1.54E-01	4.37E-02
396716	11/30/2015 - 12/8/2015	I-131	<1.64E-02	0.00E+00	1.64E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02
		Cs-137	<1.02E-02	0.00E+00	1.02E-02
		Be-7	<7.39E-02	0.00E+00	7.39E-02
		K-40	5.41E-01	1.94E-01	1.66E-01
397267	12/8/2015 - 12/15/2015	I-131	<1.38E-02	0.00E+00	1.38E-02
		Cs-134	<6.35E-03	0.00E+00	6.35E-03
		Cs-137	<7.20E-03	0.00E+00	7.20E-03
		Be-7	<5.00E-02	0.00E+00	5.00E-02
		K-40	4.44E-01	1.71E-01	1.91E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397971	12/15/2015 - 12/21/2015	I-131	<2.50E-02	0.00E+00	2.50E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.80E-02	0.00E+00	1.80E-02
		Be-7	<1.33E-01	0.00E+00	1.33E-01
		K-40	5.77E-01	2.45E-01	2.40E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398359	12/21/2015 - 12/28/2015	I-131	<2.12E-02	0.00E+00	2.12E-02
		Cs-134	<1.68E-02	0.00E+00	1.68E-02
		Cs-137	<1.86E-02	0.00E+00	1.86E-02
		Be-7	<6.55E-02	0.00E+00	6.55E-02
		K-40	<4.40E-01	0.00E+00	4.40E-01

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364961	12/29/2014 - 1/6/2015	I-131	<1.35E-02	0.00E+00	1.35E-02
		Cs-134	<7.19E-03	0.00E+00	7.19E-03
		Cs-137	<1.11E-02	0.00E+00	1.11E-02
		Be-7	<7.17E-02	0.00E+00	7.17E-02
		K-40	4.93E-01	1.65E-01	1.31E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365163	1/6/2015 - 1/13/2015	I-131	<5.29E-03	0.00E+00	5.29E-03
		Cs-134	<6.99E-03	0.00E+00	6.99E-03
		Cs-137	<6.95E-03	0.00E+00	6.95E-03
		Be-7	<6.79E-02	0.00E+00	6.79E-02
		K-40	3.59E-01	1.22E-01	2.63E-02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365384	1/13/2015 - 1/20/2015	I-131	<1.20E-02	0.00E+00	1.20E-02
		Cs-134	<1.08E-02	0.00E+00	1.08E-02
		Cs-137	<1.70E-02	0.00E+00	1.70E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	4.85E-01	1.95E-01	1.54E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
366727	1/20/2015 - 1/27/2015	I-131	<2.23E-02	0.00E+00	2.23E-02
		Cs-134	<9.76E-03	0.00E+00	9.76E-03
		Cs-137	<9.32E-03	0.00E+00	9.32E-03
		Be-7	<1.11E-01	0.00E+00	1.11E-01
		K-40	<5.03E-01	0.00E+00	5.03E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
367143	1/27/2015 - 2/3/2015	I-131	<2.00E-02	0.00E+00	2.00E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.44E-02	0.00E+00	1.44E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	4.47E-01	2.14E-01	2.46E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
367642	2/3/2015 - 2/10/2015	I-131	<1.74E-02	0.00E+00	1.74E-02
		Cs-134	<1.83E-02	0.00E+00	1.83E-02
		Cs-137	<1.51E-02	0.00E+00	1.51E-02
		Be-7	<9.39E-02	0.00E+00	9.39E-02
		K-40	<4.06E-01	0.00E+00	4.06E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369057	2/10/2015 - 2/17/2015	I-131	<1.48E-02	0.00E+00	1.48E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.71E-02	0.00E+00	1.71E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	6.09E-01	2.24E-01	1.88E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369768	2/17/2015 - 2/23/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.44E-02	0.00E+00	1.44E-02
		Cs-137	<1.68E-02	0.00E+00	1.68E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369768	2/17/2015 - 2/23/2015	Be-7	<9.29E-02	0.00E+00	9.29E-02
		K-40	6.72E-01	2.34E-01	5.20E-02
370684	2/23/2015 - 3/2/2015	I-131	<1.87E-02	0.00E+00	1.87E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.34E-02	0.00E+00	1.34E-02
		Be-7	<6.33E-02	0.00E+00	6.33E-02
		K-40	5.59E-01	1.97E-01	4.46E-02
371637	3/2/2015 - 3/9/2015	I-131	<2.01E-02	0.00E+00	2.01E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.78E-02	0.00E+00	1.78E-02
		Be-7	<9.00E-02	0.00E+00	9.00E-02
		K-40	6.27E-01	2.10E-01	4.47E-02
371997	3/9/2015 - 3/17/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.30E-02	0.00E+00	1.30E-02
		Be-7	<6.24E-02	0.00E+00	6.24E-02
		K-40	4.16E-01	1.65E-01	1.21E-01
372482	3/17/2015 - 3/24/2015	I-131	<5.63E-03	0.00E+00	5.63E-03
		Cs-134	<7.67E-03	0.00E+00	7.67E-03
		Cs-137	<7.86E-03	0.00E+00	7.86E-03
		Be-7	<4.21E-02	0.00E+00	4.21E-02
		K-40	3.22E-01	1.28E-01	1.13E-01
373949	3/24/2015 - 3/31/2015	I-131	<3.15E-02	0.00E+00	3.15E-02
		Cs-134	<1.45E-02	0.00E+00	1.45E-02
		Cs-137	<1.79E-02	0.00E+00	1.79E-02
		Be-7	<1.15E-01	0.00E+00	1.15E-01
		K-40	5.78E-01	2.17E-01	1.62E-01
374639	3/31/2015 - 4/7/2015	I-131	<2.42E-02	0.00E+00	2.42E-02
		Cs-134	<1.70E-02	0.00E+00	1.70E-02
		Cs-137	<1.51E-02	0.00E+00	1.51E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	5.19E-01	1.94E-01	4.69E-02
375028	4/7/2015 - 4/14/2015	I-131	<2.39E-02	0.00E+00	2.39E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.34E-02	0.00E+00	1.34E-02
		Be-7	<1.17E-01	0.00E+00	1.17E-01
		K-40	7.41E-01	2.52E-01	1.82E-01
375704	4/14/2015 - 4/21/2015	I-131	<2.32E-02	0.00E+00	2.32E-02
		Cs-134	<1.28E-02	0.00E+00	1.28E-02
		Cs-137	<1.48E-02	0.00E+00	1.48E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	4.51E-01	2.08E-01	2.20E-01
376912	4/21/2015 - 4/28/2015	I-131	<1.22E-02	0.00E+00	1.22E-02
		Cs-134	<1.24E-02	0.00E+00	1.24E-02
		Cs-137	<9.91E-03	0.00E+00	9.91E-03
		Be-7	<7.96E-02	0.00E+00	7.96E-02
		K-40	5.14E-01	2.12E-01	2.26E-01
377573	4/28/2015 - 5/5/2015	I-131	<3.63E-02	0.00E+00	3.63E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
377573	4/28/2015 - 5/5/2015	Cs-134	<1.44E-02	0.00E+00	1.44E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<1.22E-01	0.00E+00	1.22E-01
		K-40	5.83E-01	2.06E-01	4.65E-02
378149	5/5/2015 - 5/11/2015	I-131	<2.68E-02	0.00E+00	2.68E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<1.95E-02	0.00E+00	1.95E-02
		Be-7	<1.37E-01	0.00E+00	1.37E-01
		K-40	<5.44E-01	0.00E+00	5.44E-01
378543	5/11/2015 - 5/18/2015	I-131	<1.30E-02	0.00E+00	1.30E-02
		Cs-134	<1.40E-02	0.00E+00	1.40E-02
		Cs-137	<1.17E-02	0.00E+00	1.17E-02
		Be-7	<9.55E-02	0.00E+00	9.55E-02
		K-40	6.33E-01	2.17E-01	4.76E-02
379034	5/18/2015 - 5/25/2015	I-131	<2.20E-02	0.00E+00	2.20E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<7.87E-03	0.00E+00	7.87E-03
		Be-7	<1.31E-01	0.00E+00	1.31E-01
		K-40	5.37E-01	2.14E-01	1.81E-01
379539	5/25/2015 - 6/2/2015	I-131	<2.05E-02	0.00E+00	2.05E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<9.35E-02	0.00E+00	9.35E-02
		K-40	6.25E-01	2.12E-01	1.52E-01
380294	6/2/2015 - 6/9/2015	I-131	<1.19E-02	0.00E+00	1.19E-02
		Cs-134	<1.24E-02	0.00E+00	1.24E-02
		Cs-137	<1.53E-02	0.00E+00	1.53E-02
		Be-7	<8.61E-02	0.00E+00	8.61E-02
		K-40	4.64E-01	2.36E-01	2.90E-01
380557	6/9/2015 - 6/15/2015	I-131	<1.28E-02	0.00E+00	1.28E-02
		Cs-134	<1.23E-02	0.00E+00	1.23E-02
		Cs-137	<1.52E-02	0.00E+00	1.52E-02
		Be-7	<1.01E-01	0.00E+00	1.01E-01
		K-40	8.26E-01	2.58E-01	5.09E-02
380884	6/15/2015 - 6/24/2015	I-131	<2.21E-02	0.00E+00	2.21E-02
		Cs-134	<9.88E-03	0.00E+00	9.88E-03
		Cs-137	<1.11E-02	0.00E+00	1.11E-02
		Be-7	<8.46E-02	0.00E+00	8.46E-02
		K-40	5.33E-01	2.03E-01	1.83E-01
381363	6/24/2015 - 6/29/2015	I-131	<2.10E-02	0.00E+00	2.10E-02
		Cs-134	<1.53E-02	0.00E+00	1.53E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<1.34E-01	0.00E+00	1.34E-01
		K-40	8.92E-01	3.16E-01	2.38E-01
381677	6/29/2015 - 7/6/2015	I-131	<2.06E-02	0.00E+00	2.06E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.01E-02	0.00E+00	1.01E-02
		Be-7	<9.47E-02	0.00E+00	9.47E-02
		K-40	3.73E-01	2.00E-01	2.35E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
382249	7/6/2015 - 7/14/2015	I-131	<1.82E-02	0.00E+00	1.82E-02
		Cs-134	<9.49E-03	0.00E+00	9.49E-03
		Cs-137	<1.70E-02	0.00E+00	1.70E-02
		Be-7	<9.76E-02	0.00E+00	9.76E-02
		K-40	4.88E-01	1.80E-01	4.27E-02
382670	7/14/2015 - 7/21/2015	I-131	<1.83E-02	0.00E+00	1.83E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<1.39E-02	0.00E+00	1.39E-02
		Be-7	<9.22E-02	0.00E+00	9.22E-02
		K-40	6.23E-01	2.40E-01	2.29E-01
383599	7/21/2015 - 7/27/2015	I-131	<2.13E-02	0.00E+00	2.13E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.87E-02	0.00E+00	1.87E-02
		Be-7	<9.33E-02	0.00E+00	9.33E-02
		K-40	<5.94E-01	0.00E+00	5.94E-01
384171	7/27/2015 - 8/4/2015	I-131	<4.87E-03	0.00E+00	4.87E-03
		Cs-134	<3.72E-03	0.00E+00	3.72E-03
		Cs-137	<4.02E-03	0.00E+00	4.02E-03
		Be-7	<3.78E-02	0.00E+00	3.78E-02
		K-40	3.25E-01	8.70E-02	6.52E-02
384742	8/4/2015 - 8/11/2015	I-131	<1.91E-02	0.00E+00	1.91E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<7.88E-03	0.00E+00	7.88E-03
		Be-7	<7.53E-02	0.00E+00	7.53E-02
		K-40	5.36E-01	1.98E-01	4.68E-02
385490	8/11/2015 - 8/17/2015	I-131	<2.51E-02	0.00E+00	2.51E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.94E-02	0.00E+00	1.94E-02
		Be-7	<1.42E-01	0.00E+00	1.42E-01
		K-40	6.68E-01	2.80E-01	3.00E-01
386008	8/17/2015 - 8/25/2015	I-131	<5.30E-03	0.00E+00	5.30E-03
		Cs-134	<5.68E-03	0.00E+00	5.68E-03
		Cs-137	<7.05E-03	0.00E+00	7.05E-03
		Be-7	<5.33E-02	0.00E+00	5.33E-02
		K-40	4.16E-01	1.46E-01	1.36E-01
386903	8/25/2015 - 9/1/2015	I-131	<1.66E-02	0.00E+00	1.66E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<1.27E-02	0.00E+00	1.27E-02
		Be-7	<1.09E-01	0.00E+00	1.09E-01
		K-40	5.95E-01	2.07E-01	4.61E-02
387486	9/1/2015 - 9/8/2015	I-131	<1.91E-02	0.00E+00	1.91E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.52E-02	0.00E+00	1.52E-02
		Be-7	<1.00E-01	0.00E+00	1.00E-01
		K-40	6.97E-01	2.28E-01	4.72E-02
388848	9/8/2015 - 9/14/2015	I-131	<2.04E-02	0.00E+00	2.04E-02
		Cs-134	<1.53E-02	0.00E+00	1.53E-02
		Cs-137	<1.65E-02	0.00E+00	1.65E-02
		Be-7	<9.05E-02	0.00E+00	9.05E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
388848	9/8/2015 - 9/14/2015	K-40	6.52E-01	2.37E-01	5.52E-02
389488	9/14/2015 - 9/21/2015	I-131	<1.70E-02	0.00E+00	1.70E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	5.37E-01	1.95E-01	4.55E-02
390089	9/21/2015 - 9/29/2015	I-131	<1.18E-02	0.00E+00	1.18E-02
		Cs-134	<9.85E-03	0.00E+00	9.85E-03
		Cs-137	<9.99E-03	0.00E+00	9.99E-03
		Be-7	<6.64E-02	0.00E+00	6.64E-02
		K-40	4.24E-01	1.90E-01	2.01E-01
390730	9/29/2015 - 10/5/2015	I-131	<2.87E-02	0.00E+00	2.87E-02
		Cs-134	<1.57E-02	0.00E+00	1.57E-02
		Cs-137	<1.54E-02	0.00E+00	1.54E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	<5.29E-01	0.00E+00	5.29E-01
392038	10/5/2015 - 10/12/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.36E-02	0.00E+00	1.36E-02
		Be-7	<9.68E-02	0.00E+00	9.68E-02
		K-40	5.53E-01	1.98E-01	4.55E-02
392310	10/12/2015 - 10/20/2015	I-131	<9.21E-03	0.00E+00	9.21E-03
		Cs-134	<1.23E-02	0.00E+00	1.23E-02
		Cs-137	<1.37E-02	0.00E+00	1.37E-02
		Be-7	<7.97E-02	0.00E+00	7.97E-02
		K-40	4.86E-01	1.87E-01	1.55E-01
393509	10/20/2015 - 10/27/2015	I-131	<8.90E-03	0.00E+00	8.90E-03
		Cs-134	<8.48E-03	0.00E+00	8.48E-03
		Cs-137	<1.64E-03	0.00E+00	1.64E-03
		Be-7	<5.15E-02	0.00E+00	5.15E-02
		K-40	3.17E-01	1.37E-01	1.45E-01
393906	10/27/2015 - 11/3/2015	I-131	<1.74E-02	0.00E+00	1.74E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<9.77E-03	0.00E+00	9.77E-03
		Be-7	<9.84E-02	0.00E+00	9.84E-02
		K-40	7.77E-01	2.56E-01	1.98E-01
394931	11/3/2015 - 11/10/2015	I-131	<1.60E-02	0.00E+00	1.60E-02
		Cs-134	<1.61E-02	0.00E+00	1.61E-02
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<9.82E-02	0.00E+00	9.82E-02
		K-40	5.62E-01	2.01E-01	4.62E-02
395383	11/10/2015 - 11/16/2015	I-131	<3.03E-02	0.00E+00	3.03E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.12E-02	0.00E+00	1.12E-02
		Be-7	<1.29E-01	0.00E+00	1.29E-01
		K-40	5.65E-01	2.35E-01	2.11E-01
395708	11/16/2015 - 11/23/2015	I-131	<2.95E-02	0.00E+00	2.95E-02
		Cs-134	<1.02E-02	0.00E+00	1.02E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395708	11/16/2015 - 11/23/2015	Cs-137	<1.57E-02	0.00E+00	1.57E-02
		Be-7	<1.34E-01	0.00E+00	1.34E-01
		K-40	<4.77E-01	0.00E+00	4.77E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
396200	11/23/2015 - 11/30/2015	I-131	<1.70E-02	0.00E+00	1.70E-02
		Cs-134	<1.28E-02	0.00E+00	1.28E-02
		Cs-137	<1.13E-02	0.00E+00	1.13E-02
		Be-7	<9.11E-02	0.00E+00	9.11E-02
		K-40	7.46E-01	2.49E-01	1.86E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
396718	11/30/2015 - 12/8/2015	I-131	<1.79E-02	0.00E+00	1.79E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.19E-02	0.00E+00	1.19E-02
		Be-7	<7.94E-02	0.00E+00	7.94E-02
		K-40	3.81E-01	1.53E-01	3.97E-02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397269	12/8/2015 - 12/15/2015	I-131	<1.43E-02	0.00E+00	1.43E-02
		Cs-134	<6.30E-03	0.00E+00	6.30E-03
		Cs-137	<6.97E-03	0.00E+00	6.97E-03
		Be-7	<5.43E-02	0.00E+00	5.43E-02
		K-40	3.39E-01	1.25E-01	2.96E-02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397973	12/15/2015 - 12/21/2015	I-131	<2.37E-02	0.00E+00	2.37E-02
		Cs-134	<1.62E-02	0.00E+00	1.62E-02
		Cs-137	<1.90E-02	0.00E+00	1.90E-02
		Be-7	<1.19E-01	0.00E+00	1.19E-01
		K-40	<5.62E-01	0.00E+00	5.62E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398361	12/21/2015 - 12/28/2015	I-131	<1.91E-02	0.00E+00	1.91E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.44E-02	0.00E+00	1.44E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	5.63E-01	2.14E-01	1.76E-01

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364964	12/29/2014 - 1/6/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.70E-02	0.00E+00	1.70E-02
		Cs-137	<1.09E-02	0.00E+00	1.09E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	7.41E-01	2.52E-01	2.18E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365166	1/6/2015 - 1/13/2015	I-131	<8.54E-03	0.00E+00	8.54E-03
		Cs-134	<6.50E-03	0.00E+00	6.50E-03
		Cs-137	<7.24E-03	0.00E+00	7.24E-03
		Be-7	<5.22E-02	0.00E+00	5.22E-02
		K-40	5.15E-01	1.79E-01	1.68E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365387	1/13/2015 - 1/20/2015	I-131	<2.41E-02	0.00E+00	2.41E-02
		Cs-134	<1.52E-02	0.00E+00	1.52E-02
		Cs-137	<1.77E-02	0.00E+00	1.77E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	6.41E-01	2.54E-01	2.39E-01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
366730	1/20/2015 - 1/27/2015	I-131	<2.22E-02	0.00E+00	2.22E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.82E-02	0.00E+00	1.82E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
366730	1/20/2015 - 1/27/2015	K-40	<4.72E-01	0.00E+00	4.72E-01
367146	1/27/2015 - 2/3/2015	I-131	<1.97E-02	0.00E+00	1.97E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.70E-02	0.00E+00	1.70E-02
		Be-7	<1.20E-01	0.00E+00	1.20E-01
		K-40	7.10E-01	2.67E-01	2.36E-01
367645	2/3/2015 - 2/10/2015	I-131	<1.93E-02	0.00E+00	1.93E-02
		Cs-134	<1.14E-02	0.00E+00	1.14E-02
		Cs-137	<1.54E-02	0.00E+00	1.54E-02
		Be-7	<1.10E-01	0.00E+00	1.10E-01
		K-40	5.30E-01	2.26E-01	2.09E-01
369060	2/10/2015 - 2/17/2015	I-131	<3.18E-02	0.00E+00	3.18E-02
		Cs-134	<1.08E-02	0.00E+00	1.08E-02
		Cs-137	<2.06E-02	0.00E+00	2.06E-02
		Be-7	<9.35E-02	0.00E+00	9.35E-02
		K-40	4.98E-01	2.03E-01	5.40E-02
369771	2/17/2015 - 2/23/2015	I-131	<9.90E-03	0.00E+00	9.90E-03
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<8.14E-03	0.00E+00	8.14E-03
		Be-7	<6.84E-02	0.00E+00	6.84E-02
		K-40	4.55E-01	1.61E-01	9.86E-02
370687	2/23/2015 - 3/2/2015	I-131	<2.82E-02	0.00E+00	2.82E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.27E-02	0.00E+00	1.27E-02
		Be-7	<1.09E-01	0.00E+00	1.09E-01
		K-40	8.39E-01	2.99E-01	2.29E-01
371640	3/2/2015 - 3/9/2015	I-131	<9.84E-03	0.00E+00	9.84E-03
		Cs-134	<9.85E-03	0.00E+00	9.85E-03
		Cs-137	<7.26E-03	0.00E+00	7.26E-03
		Be-7	<5.37E-02	0.00E+00	5.37E-02
		K-40	3.47E-01	1.31E-01	3.14E-02
372000	3/9/2015 - 3/17/2015	I-131	<1.71E-02	0.00E+00	1.71E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<9.32E-03	0.00E+00	9.32E-03
		Be-7	<8.76E-02	0.00E+00	8.76E-02
		K-40	4.53E-01	1.75E-01	4.39E-02
372485	3/17/2015 - 3/24/2015	I-131	<1.27E-02	0.00E+00	1.27E-02
		Cs-134	<1.01E-02	0.00E+00	1.01E-02
		Cs-137	<1.25E-02	0.00E+00	1.25E-02
		Be-7	<9.20E-02	0.00E+00	9.20E-02
		K-40	6.73E-01	2.31E-01	5.07E-02
373952	3/24/2015 - 3/31/2015	I-131	<4.04E-02	0.00E+00	4.04E-02
		Cs-134	<1.32E-02	0.00E+00	1.32E-02
		Cs-137	<1.51E-02	0.00E+00	1.51E-02
		Be-7	<1.23E-01	0.00E+00	1.23E-01
		K-40	5.65E-01	2.24E-01	1.76E-01
374642	3/31/2015 - 4/7/2015	I-131	<2.45E-02	0.00E+00	2.45E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
374642	3/31/2015 - 4/7/2015	Cs-137	<1.73E-02	0.00E+00	1.73E-02
		Be-7	<8.61E-02	0.00E+00	8.61E-02
		K-40	7.42E-01	2.60E-01	2.04E-01
375031	4/7/2015 - 4/14/2015	I-131	<1.55E-02	0.00E+00	1.55E-02
		Cs-134	<9.22E-03	0.00E+00	9.22E-03
		Cs-137	<1.84E-02	0.00E+00	1.84E-02
		Be-7	<9.89E-02	0.00E+00	9.89E-02
		K-40	7.34E-01	2.32E-01	4.63E-02
375707	4/14/2015 - 4/21/2015	I-131	<2.69E-02	0.00E+00	2.69E-02
		Cs-134	<1.12E-02	0.00E+00	1.12E-02
		Cs-137	<9.81E-03	0.00E+00	9.81E-03
		Be-7	<1.17E-01	0.00E+00	1.17E-01
		K-40	5.79E-01	2.04E-01	4.62E-02
376915	4/21/2015 - 4/28/2015	I-131	<7.26E-03	0.00E+00	7.26E-03
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.38E-02	0.00E+00	1.38E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	7.27E-01	2.23E-01	4.29E-02
377576	4/28/2015 - 5/5/2015	I-131	<3.28E-02	0.00E+00	3.28E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<1.38E-02	0.00E+00	1.38E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	5.73E-01	2.23E-01	1.97E-01
378152	5/5/2015 - 5/11/2015	I-131	<2.72E-02	0.00E+00	2.72E-02
		Cs-134	<1.71E-02	0.00E+00	1.71E-02
		Cs-137	<1.17E-02	0.00E+00	1.17E-02
		Be-7	<1.25E-01	0.00E+00	1.25E-01
		K-40	5.70E-01	2.21E-01	5.52E-02
378546	5/11/2015 - 5/18/2015	I-131	<1.83E-02	0.00E+00	1.83E-02
		Cs-134	<1.62E-02	0.00E+00	1.62E-02
		Cs-137	<1.66E-02	0.00E+00	1.66E-02
		Be-7	<7.94E-02	0.00E+00	7.94E-02
		K-40	<4.63E-01	0.00E+00	4.63E-01
379037	5/18/2015 - 5/25/2015	I-131	<3.57E-02	0.00E+00	3.57E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.52E-02	0.00E+00	1.52E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	5.89E-01	2.08E-01	4.70E-02
379542	5/25/2015 - 6/2/2015	I-131	<1.72E-02	0.00E+00	1.72E-02
		Cs-134	<9.55E-03	0.00E+00	9.55E-03
		Cs-137	<1.29E-02	0.00E+00	1.29E-02
		Be-7	<7.83E-02	0.00E+00	7.83E-02
		K-40	4.91E-01	1.81E-01	4.29E-02
380297	6/2/2015 - 6/9/2015	I-131	<1.58E-02	0.00E+00	1.58E-02
		Cs-134	<1.41E-02	0.00E+00	1.41E-02
		Cs-137	<1.32E-02	0.00E+00	1.32E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	6.76E-01	2.40E-01	1.80E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380560	6/9/2015 - 6/15/2015	I-131	<2.06E-02	0.00E+00	2.06E-02
		Cs-134	<1.61E-02	0.00E+00	1.61E-02
		Cs-137	<1.11E-02	0.00E+00	1.11E-02
		Be-7	<9.47E-02	0.00E+00	9.47E-02
		K-40	6.42E-01	2.92E-01	3.52E-01
380887	6/15/2015 - 6/24/2015	I-131	<2.26E-02	0.00E+00	2.26E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<2.45E-03	0.00E+00	2.45E-03
		Be-7	<9.46E-02	0.00E+00	9.46E-02
		K-40	4.68E-01	1.70E-01	3.96E-02
381366	6/24/2015 - 6/29/2015	I-131	<2.18E-02	0.00E+00	2.18E-02
		Cs-134	<1.59E-02	0.00E+00	1.59E-02
		Cs-137	<2.25E-02	0.00E+00	2.25E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	7.75E-01	2.82E-01	6.57E-02
381680	6/29/2015 - 7/6/2015	I-131	<8.25E-03	0.00E+00	8.25E-03
		Cs-134	<8.98E-03	0.00E+00	8.98E-03
		Cs-137	<9.03E-03	0.00E+00	9.03E-03
		Be-7	<3.90E-02	0.00E+00	3.90E-02
		K-40	3.58E-01	1.36E-01	1.05E-01
382252	7/6/2015 - 7/14/2015	I-131	<2.45E-02	0.00E+00	2.45E-02
		Cs-134	<1.43E-02	0.00E+00	1.43E-02
		Cs-137	<2.85E-02	0.00E+00	2.85E-02
		Be-7	<2.11E-01	0.00E+00	2.11E-01
		K-40	1.35E+00	4.22E-01	8.31E-02
382673	7/14/2015 - 7/21/2015	I-131	<1.55E-02	0.00E+00	1.55E-02
		Cs-134	<1.75E-02	0.00E+00	1.75E-02
		Cs-137	<1.82E-02	0.00E+00	1.82E-02
		Be-7	<7.06E-02	0.00E+00	7.06E-02
		K-40	5.99E-01	2.31E-01	1.85E-01
383602	7/21/2015 - 7/27/2015	I-131	<2.01E-02	0.00E+00	2.01E-02
		Cs-134	<1.28E-02	0.00E+00	1.28E-02
		Cs-137	<1.73E-02	0.00E+00	1.73E-02
		Be-7	<1.44E-01	0.00E+00	1.44E-01
		K-40	6.95E-01	2.61E-01	1.83E-01
384174	7/27/2015 - 8/4/2015	I-131	<2.45E-02	0.00E+00	2.45E-02
		Cs-134	<9.46E-03	0.00E+00	9.46E-03
		Cs-137	<1.62E-02	0.00E+00	1.62E-02
		Be-7	<8.17E-02	0.00E+00	8.17E-02
		K-40	<4.35E-01	0.00E+00	4.35E-01
384745	8/4/2015 - 8/11/2015	I-131	<1.52E-02	0.00E+00	1.52E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<1.21E-02	0.00E+00	1.21E-02
		Be-7	<9.31E-02	0.00E+00	9.31E-02
		K-40	5.92E-01	2.14E-01	1.59E-01
385493	8/11/2015 - 8/17/2015	I-131	<2.31E-02	0.00E+00	2.31E-02
		Cs-134	<1.51E-02	0.00E+00	1.51E-02
		Cs-137	<1.69E-02	0.00E+00	1.69E-02
		Be-7	<1.40E-01	0.00E+00	1.40E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
385493	8/11/2015 - 8/17/2015	K-40	6.89E-01	2.31E-01	4.91E-02
386011	8/17/2015 - 8/25/2015	I-131	<7.10E-03	0.00E+00	7.10E-03
		Cs-134	<5.76E-03	0.00E+00	5.76E-03
		Cs-137	<5.72E-03	0.00E+00	5.72E-03
		Be-7	<5.91E-02	0.00E+00	5.91E-02
		K-40	3.37E-01	1.16E-01	8.78E-02
386906	8/25/2015 - 9/1/2015	I-131	<1.64E-02	0.00E+00	1.64E-02
		Cs-134	<1.13E-02	0.00E+00	1.13E-02
		Cs-137	<1.73E-02	0.00E+00	1.73E-02
		Be-7	<7.80E-02	0.00E+00	7.80E-02
		K-40	6.10E-01	2.04E-01	4.35E-02
387489	9/1/2015 - 9/8/2015	I-131	<1.61E-02	0.00E+00	1.61E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.29E-02	0.00E+00	1.29E-02
		Be-7	<9.79E-02	0.00E+00	9.79E-02
		K-40	5.89E-01	2.19E-01	1.90E-01
388851	9/8/2015 - 9/14/2015	I-131	<2.51E-02	0.00E+00	2.51E-02
		Cs-134	<1.44E-02	0.00E+00	1.44E-02
		Cs-137	<1.20E-02	0.00E+00	1.20E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	5.26E-01	2.66E-01	3.38E-01
389491	9/14/2015 - 9/21/2015	I-131	<1.68E-02	0.00E+00	1.68E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.16E-02	0.00E+00	1.16E-02
		Be-7	<9.70E-02	0.00E+00	9.70E-02
		K-40	6.11E-01	2.28E-01	2.19E-01
390092	9/21/2015 - 9/29/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<8.14E-03	0.00E+00	8.14E-03
		Cs-137	<1.01E-02	0.00E+00	1.01E-02
		Be-7	<7.30E-02	0.00E+00	7.30E-02
		K-40	<3.45E-01	0.00E+00	3.45E-01
390733	9/29/2015 - 10/5/2015	I-131	<2.54E-02	0.00E+00	2.54E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<1.70E-02	0.00E+00	1.70E-02
		Be-7	<1.04E-01	0.00E+00	1.04E-01
		K-40	3.46E-01	2.29E-01	3.17E-01
392041	10/5/2015 - 10/12/2015	I-131	<1.32E-02	0.00E+00	1.32E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.38E-02	0.00E+00	1.38E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	5.42E-01	2.08E-01	1.80E-01
392313	10/12/2015 - 10/20/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<8.65E-03	0.00E+00	8.65E-03
		Cs-137	<1.42E-02	0.00E+00	1.42E-02
		Be-7	<7.13E-02	0.00E+00	7.13E-02
		K-40	3.99E-01	1.71E-01	1.75E-01
393512	10/20/2015 - 10/27/2015	I-131	<7.80E-03	0.00E+00	7.80E-03
		Cs-134	<6.73E-03	0.00E+00	6.73E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
393512	10/20/2015 - 10/27/2015	Cs-137	<5.67E-03	0.00E+00	5.67E-03
		Be-7	<5.99E-02	0.00E+00	5.99E-02
		K-40	3.96E-01	1.43E-01	1.38E-01
393909	10/27/2015 - 11/3/2015	I-131	<4.65E-03	0.00E+00	4.65E-03
		Cs-134	<2.92E-03	0.00E+00	2.92E-03
		Cs-137	<3.14E-03	0.00E+00	3.14E-03
		Be-7	<2.51E-02	0.00E+00	2.51E-02
		K-40	3.60E-01	7.29E-02	5.67E-02
394934	11/3/2015 - 11/10/2015	I-131	<2.01E-02	0.00E+00	2.01E-02
		Cs-134	<1.37E-02	0.00E+00	1.37E-02
		Cs-137	<1.17E-02	0.00E+00	1.17E-02
		Be-7	<9.61E-02	0.00E+00	9.61E-02
		K-40	6.43E-01	2.21E-01	1.69E-01
395386	11/10/2015 - 11/16/2015	I-131	<2.85E-02	0.00E+00	2.85E-02
		Cs-134	<1.54E-02	0.00E+00	1.54E-02
		Cs-137	<1.98E-02	0.00E+00	1.98E-02
		Be-7	<9.71E-02	0.00E+00	9.71E-02
		K-40	<5.10E-01	0.00E+00	5.10E-01
395711	11/16/2015 - 11/23/2015	I-131	<2.19E-02	0.00E+00	2.19E-02
		Cs-134	<1.07E-02	0.00E+00	1.07E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<1.05E-01	0.00E+00	1.05E-01
		K-40	3.67E-01	1.66E-01	1.51E-01
396203	11/23/2015 - 11/30/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<1.53E-02	0.00E+00	1.53E-02
		Be-7	<8.33E-02	0.00E+00	8.33E-02
		K-40	3.96E-01	1.72E-01	1.44E-01
396721	11/30/2015 - 12/8/2015	I-131	<1.47E-02	0.00E+00	1.47E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<8.81E-03	0.00E+00	8.81E-03
		Be-7	<7.15E-02	0.00E+00	7.15E-02
		K-40	3.83E-01	1.46E-01	3.58E-02
397272	12/8/2015 - 12/15/2015	I-131	<1.47E-02	0.00E+00	1.47E-02
		Cs-134	<7.90E-03	0.00E+00	7.90E-03
		Cs-137	<7.59E-03	0.00E+00	7.59E-03
		Be-7	<5.65E-02	0.00E+00	5.65E-02
		K-40	2.66E-01	1.23E-01	1.38E-01
397976	12/15/2015 - 12/21/2015	I-131	<2.88E-02	0.00E+00	2.88E-02
		Cs-134	<1.41E-02	0.00E+00	1.41E-02
		Cs-137	<1.55E-02	0.00E+00	1.55E-02
		Be-7	<9.24E-02	0.00E+00	9.24E-02
		K-40	5.84E-01	2.09E-01	4.80E-02
398364	12/21/2015 - 12/28/2015	I-131	<1.68E-02	0.00E+00	1.68E-02
		Cs-134	<9.46E-03	0.00E+00	9.46E-03
		Cs-137	<1.72E-02	0.00E+00	1.72E-02
		Be-7	<1.25E-01	0.00E+00	1.25E-01
		K-40	6.83E-01	2.26E-01	4.74E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364960	12/29/2014 - 1/6/2015	I-131	<2.30E-02	0.00E+00	2.30E-02
		Cs-134	<1.23E-02	0.00E+00	1.23E-02
		Cs-137	<1.37E-02	0.00E+00	1.37E-02
		Be-7	<8.05E-02	0.00E+00	8.05E-02
		K-40	5.05E-01	1.88E-01	1.42E-01
365162	1/6/2015 - 1/13/2015	I-131	<1.94E-02	0.00E+00	1.94E-02
		Cs-134	<9.57E-03	0.00E+00	9.57E-03
		Cs-137	<1.55E-02	0.00E+00	1.55E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	3.86E-01	1.90E-01	6.15E-02
365383	1/13/2015 - 1/20/2015	I-131	<2.19E-02	0.00E+00	2.19E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.72E-02	0.00E+00	1.72E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	6.89E-01	2.32E-01	1.57E-01
366726	1/20/2015 - 1/27/2015	I-131	<1.67E-02	0.00E+00	1.67E-02
		Cs-134	<1.08E-02	0.00E+00	1.08E-02
		Cs-137	<1.91E-02	0.00E+00	1.91E-02
		Be-7	<8.82E-02	0.00E+00	8.82E-02
		K-40	5.90E-01	2.03E-01	4.44E-02
367142	1/27/2015 - 2/3/2015	I-131	<1.79E-02	0.00E+00	1.79E-02
		Cs-134	<1.40E-02	0.00E+00	1.40E-02
		Cs-137	<1.36E-02	0.00E+00	1.36E-02
		Be-7	<9.00E-02	0.00E+00	9.00E-02
		K-40	4.91E-01	2.15E-01	2.24E-01
367641	2/3/2015 - 2/10/2015	I-131	<2.19E-02	0.00E+00	2.19E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<6.29E-02	0.00E+00	6.29E-02
		K-40	4.14E-01	1.86E-01	1.74E-01
369056	2/10/2015 - 2/17/2015	I-131	<2.81E-02	0.00E+00	2.81E-02
		Cs-134	<1.41E-02	0.00E+00	1.41E-02
		Cs-137	<1.12E-02	0.00E+00	1.12E-02
		Be-7	<9.58E-02	0.00E+00	9.58E-02
		K-40	7.54E-01	2.33E-01	4.54E-02
369767	2/17/2015 - 2/23/2015	I-131	<1.92E-02	0.00E+00	1.92E-02
		Cs-134	<1.43E-02	0.00E+00	1.43E-02
		Cs-137	<1.41E-02	0.00E+00	1.41E-02
		Be-7	<8.20E-02	0.00E+00	8.20E-02
		K-40	8.19E-01	2.72E-01	1.91E-01
370683	2/23/2015 - 3/2/2015	I-131	<2.18E-02	0.00E+00	2.18E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	6.66E-01	2.38E-01	1.92E-01
371636	3/2/2015 - 3/9/2015	I-131	<1.75E-02	0.00E+00	1.75E-02
		Cs-134	<1.33E-02	0.00E+00	1.33E-02
		Cs-137	<1.64E-02	0.00E+00	1.64E-02
		Be-7	<9.77E-02	0.00E+00	9.77E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
371636	3/2/2015 - 3/9/2015	K-40	6.25E-01	2.21E-01	1.54E-01
371996	3/9/2015 - 3/17/2015	I-131	<2.09E-02	0.00E+00	2.09E-02
		Cs-134	<1.49E-02	0.00E+00	1.49E-02
		Cs-137	<1.25E-02	0.00E+00	1.25E-02
		Be-7	<8.32E-02	0.00E+00	8.32E-02
		K-40	5.14E-01	1.77E-01	3.87E-02
372481	3/17/2015 - 3/24/2015	I-131	<1.11E-02	0.00E+00	1.11E-02
		Cs-134	<6.58E-03	0.00E+00	6.58E-03
		Cs-137	<9.89E-03	0.00E+00	9.89E-03
		Be-7	<6.12E-02	0.00E+00	6.12E-02
		K-40	4.17E-01	1.49E-01	1.22E-01
373948	3/24/2015 - 3/31/2015	I-131	<1.52E-02	0.00E+00	1.52E-02
		Cs-134	<4.77E-03	0.00E+00	4.77E-03
		Cs-137	<7.62E-03	0.00E+00	7.62E-03
		Be-7	<3.29E-02	0.00E+00	3.29E-02
		K-40	3.80E-01	1.55E-01	1.63E-01
374638	3/31/2015 - 4/7/2015	I-131	<2.40E-02	0.00E+00	2.40E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.10E-02	0.00E+00	1.10E-02
		Be-7	<1.12E-01	0.00E+00	1.12E-01
		K-40	4.08E-01	2.09E-01	2.52E-01
375027	4/7/2015 - 4/14/2015	I-131	<1.89E-02	0.00E+00	1.89E-02
		Cs-134	<1.48E-02	0.00E+00	1.48E-02
		Cs-137	<1.55E-02	0.00E+00	1.55E-02
		Be-7	<9.54E-02	0.00E+00	9.54E-02
		K-40	6.03E-01	2.13E-01	4.81E-02
375703	4/14/2015 - 4/21/2015	I-131	<2.98E-02	0.00E+00	2.98E-02
		Cs-134	<1.40E-02	0.00E+00	1.40E-02
		Cs-137	<1.65E-02	0.00E+00	1.65E-02
		Be-7	<1.15E-01	0.00E+00	1.15E-01
		K-40	4.63E-01	2.06E-01	2.11E-01
376911	4/21/2015 - 4/28/2015	I-131	<1.51E-02	0.00E+00	1.51E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<8.72E-03	0.00E+00	8.72E-03
		Be-7	<9.31E-02	0.00E+00	9.31E-02
		K-40	6.98E-01	2.26E-01	1.60E-01
377572	4/28/2015 - 5/5/2015	I-131	<4.22E-02	0.00E+00	4.22E-02
		Cs-134	<1.39E-02	0.00E+00	1.39E-02
		Cs-137	<1.86E-02	0.00E+00	1.86E-02
		Be-7	<1.11E-01	0.00E+00	1.11E-01
		K-40	6.40E-01	2.74E-01	2.55E-01
378148	5/5/2015 - 5/11/2015	I-131	<2.62E-02	0.00E+00	2.62E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.93E-02	0.00E+00	1.93E-02
		Be-7	<1.12E-01	0.00E+00	1.12E-01
		K-40	7.46E-01	2.67E-01	2.08E-01
378542	5/11/2015 - 5/18/2015	I-131	<2.10E-02	0.00E+00	2.10E-02
		Cs-134	<9.18E-03	0.00E+00	9.18E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
378542	5/11/2015 - 5/18/2015	Cs-137	<9.77E-03	0.00E+00	9.77E-03
		Be-7	<7.57E-02	0.00E+00	7.57E-02
		K-40	6.67E-01	2.32E-01	1.68E-01
379033	5/18/2015 - 5/25/2015	I-131	<2.31E-02	0.00E+00	2.31E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<1.23E-01	0.00E+00	1.23E-01
		K-40	5.92E-01	2.06E-01	4.59E-02
379538	5/25/2015 - 6/2/2015	I-131	<1.85E-02	0.00E+00	1.85E-02
		Cs-134	<1.22E-02	0.00E+00	1.22E-02
		Cs-137	<9.77E-03	0.00E+00	9.77E-03
		Be-7	<1.09E-01	0.00E+00	1.09E-01
		K-40	4.73E-01	1.97E-01	2.01E-01
380293	6/2/2015 - 6/9/2015	I-131	<1.93E-02	0.00E+00	1.93E-02
		Cs-134	<1.35E-02	0.00E+00	1.35E-02
		Cs-137	<1.67E-02	0.00E+00	1.67E-02
		Be-7	<1.21E-01	0.00E+00	1.21E-01
		K-40	6.42E-01	2.23E-01	1.40E-01
380556	6/9/2015 - 6/15/2015	I-131	<1.61E-02	0.00E+00	1.61E-02
		Cs-134	<1.43E-02	0.00E+00	1.43E-02
		Cs-137	<1.57E-02	0.00E+00	1.57E-02
		Be-7	<9.65E-02	0.00E+00	9.65E-02
		K-40	7.37E-01	2.38E-01	4.87E-02
380883	6/15/2015 - 6/24/2015	I-131	<2.34E-02	0.00E+00	2.34E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<8.58E-02	0.00E+00	8.58E-02
		K-40	4.95E-01	1.98E-01	2.00E-01
381362	6/24/2015 - 6/29/2015	I-131	<2.15E-02	0.00E+00	2.15E-02
		Cs-134	<1.05E-02	0.00E+00	1.05E-02
		Cs-137	<1.51E-02	0.00E+00	1.51E-02
		Be-7	<1.21E-01	0.00E+00	1.21E-01
		K-40	5.01E-01	2.42E-01	2.39E-01
381676	6/29/2015 - 7/6/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<1.12E-02	0.00E+00	1.12E-02
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<1.17E-01	0.00E+00	1.17E-01
		K-40	<3.99E-01	0.00E+00	3.99E-01
382248	7/6/2015 - 7/14/2015	I-131	<1.30E-02	0.00E+00	1.30E-02
		Cs-134	<1.13E-02	0.00E+00	1.13E-02
		Cs-137	<1.39E-02	0.00E+00	1.39E-02
		Be-7	<9.25E-02	0.00E+00	9.25E-02
		K-40	5.26E-01	2.08E-01	2.06E-01
382669	7/14/2015 - 7/21/2015	I-131	<1.63E-02	0.00E+00	1.63E-02
		Cs-134	<1.59E-02	0.00E+00	1.59E-02
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<9.78E-02	0.00E+00	9.78E-02
		K-40	<4.55E-01	0.00E+00	4.55E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
383598	7/21/2015 - 7/27/2015	I-131	<1.63E-02	0.00E+00	1.63E-02
		Cs-134	<1.54E-02	0.00E+00	1.54E-02
		Cs-137	<1.57E-02	0.00E+00	1.57E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	<5.54E-01	0.00E+00	5.54E-01
384170	7/27/2015 - 8/4/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<8.25E-02	0.00E+00	8.25E-02
		K-40	4.93E-01	1.74E-01	3.93E-02
384741	8/4/2015 - 8/11/2015	I-131	<1.42E-02	0.00E+00	1.42E-02
		Cs-134	<1.04E-02	0.00E+00	1.04E-02
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<6.39E-02	0.00E+00	6.39E-02
		K-40	4.17E-01	1.72E-01	1.40E-01
385489	8/11/2015 - 8/17/2015	I-131	<1.71E-02	0.00E+00	1.71E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<9.63E-03	0.00E+00	9.63E-03
		Be-7	<9.69E-02	0.00E+00	9.69E-02
		K-40	5.58E-01	2.26E-01	2.23E-01
386007	8/17/2015 - 8/25/2015	I-131	<7.50E-03	0.00E+00	7.50E-03
		Cs-134	<5.20E-03	0.00E+00	5.20E-03
		Cs-137	<6.87E-03	0.00E+00	6.87E-03
		Be-7	<4.21E-02	0.00E+00	4.21E-02
		K-40	2.99E-01	1.06E-01	8.33E-02
386902	8/25/2015 - 9/1/2015	I-131	<1.39E-02	0.00E+00	1.39E-02
		Cs-134	<1.35E-02	0.00E+00	1.35E-02
		Cs-137	<1.07E-02	0.00E+00	1.07E-02
		Be-7	<7.59E-02	0.00E+00	7.59E-02
		K-40	3.58E-01	1.63E-01	1.56E-01
387485	9/1/2015 - 9/8/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<8.90E-03	0.00E+00	8.90E-03
		Cs-137	<1.45E-02	0.00E+00	1.45E-02
		Be-7	<9.60E-02	0.00E+00	9.60E-02
		K-40	3.84E-01	1.71E-01	1.62E-01
388847	9/8/2015 - 9/14/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<1.28E-02	0.00E+00	1.28E-02
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<1.05E-01	0.00E+00	1.05E-01
		K-40	5.14E-01	2.22E-01	2.33E-01
389487	9/14/2015 - 9/21/2015	I-131	<1.57E-02	0.00E+00	1.57E-02
		Cs-134	<9.61E-03	0.00E+00	9.61E-03
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<9.08E-02	0.00E+00	9.08E-02
		K-40	5.81E-01	2.06E-01	1.70E-01
390088	9/21/2015 - 9/29/2015	I-131	<1.10E-02	0.00E+00	1.10E-02
		Cs-134	<1.01E-02	0.00E+00	1.01E-02
		Cs-137	<1.03E-02	0.00E+00	1.03E-02
		Be-7	<8.73E-02	0.00E+00	8.73E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
390088	9/21/2015 - 9/29/2015	K-40	3.83E-01	1.55E-01	1.33E-01
390729	9/29/2015 - 10/5/2015	I-131	<3.64E-02	0.00E+00	3.64E-02
		Cs-134	<1.72E-02	0.00E+00	1.72E-02
		Cs-137	<2.02E-02	0.00E+00	2.02E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	<5.45E-01	0.00E+00	5.45E-01
392037	10/5/2015 - 10/12/2015	I-131	<1.31E-02	0.00E+00	1.31E-02
		Cs-134	<1.60E-02	0.00E+00	1.60E-02
		Cs-137	<1.63E-02	0.00E+00	1.63E-02
		Be-7	<8.49E-02	0.00E+00	8.49E-02
		K-40	5.22E-01	1.87E-01	4.29E-02
392309	10/12/2015 - 10/20/2015	I-131	<1.17E-02	0.00E+00	1.17E-02
		Cs-134	<1.01E-02	0.00E+00	1.01E-02
		Cs-137	<1.25E-02	0.00E+00	1.25E-02
		Be-7	<8.90E-02	0.00E+00	8.90E-02
		K-40	3.90E-01	1.66E-01	1.43E-01
393508	10/20/2015 - 10/27/2015	I-131	<1.48E-02	0.00E+00	1.48E-02
		Cs-134	<1.25E-02	0.00E+00	1.25E-02
		Cs-137	<1.55E-02	0.00E+00	1.55E-02
		Be-7	<6.93E-02	0.00E+00	6.93E-02
		K-40	5.51E-01	2.58E-01	3.28E-01
393905	10/27/2015 - 11/3/2015	I-131	<2.11E-02	0.00E+00	2.11E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.33E-02	0.00E+00	1.33E-02
		Be-7	<8.81E-02	0.00E+00	8.81E-02
		K-40	4.78E-01	2.41E-01	3.06E-01
394930	11/3/2015 - 11/10/2015	I-131	<1.22E-02	0.00E+00	1.22E-02
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<9.37E-03	0.00E+00	9.37E-03
		Be-7	<8.72E-02	0.00E+00	8.72E-02
		K-40	4.97E-01	2.44E-01	3.07E-01
395382	11/10/2015 - 11/16/2015	I-131	<3.51E-02	0.00E+00	3.51E-02
		Cs-134	<1.42E-02	0.00E+00	1.42E-02
		Cs-137	<1.75E-02	0.00E+00	1.75E-02
		Be-7	<1.24E-01	0.00E+00	1.24E-01
		K-40	6.44E-01	2.57E-01	2.52E-01
395707	11/16/2015 - 11/23/2015	I-131	<2.61E-02	0.00E+00	2.61E-02
		Cs-134	<1.08E-02	0.00E+00	1.08E-02
		Cs-137	<9.39E-03	0.00E+00	9.39E-03
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	5.55E-01	1.96E-01	4.42E-02
396199	11/23/2015 - 11/30/2015	I-131	<1.46E-02	0.00E+00	1.46E-02
		Cs-134	<1.24E-02	0.00E+00	1.24E-02
		Cs-137	<1.62E-02	0.00E+00	1.62E-02
		Be-7	<1.01E-01	0.00E+00	1.01E-01
		K-40	4.21E-01	1.81E-01	1.47E-01
396717	11/30/2015 - 12/8/2015	I-131	<1.74E-02	0.00E+00	1.74E-02
		Cs-134	<1.07E-02	0.00E+00	1.07E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
396717	11/30/2015 - 12/8/2015	Cs-137	<1.16E-02	0.00E+00	1.16E-02
		Be-7	<7.08E-02	0.00E+00	7.08E-02
		K-40	3.00E-01	1.33E-01	3.87E-02
397268	12/8/2015 - 12/15/2015	I-131	<1.45E-02	0.00E+00	1.45E-02
		Cs-134	<6.71E-03	0.00E+00	6.71E-03
		Cs-137	<5.13E-03	0.00E+00	5.13E-03
		Be-7	<5.07E-02	0.00E+00	5.07E-02
		K-40	2.77E-01	1.15E-01	1.01E-01
397972	12/15/2015 - 12/21/2015	I-131	<2.70E-02	0.00E+00	2.70E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<1.00E-01	0.00E+00	1.00E-01
		K-40	5.56E-01	2.50E-01	2.71E-01
398360	12/21/2015 - 12/28/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<1.01E-01	0.00E+00	1.01E-01
		K-40	<3.88E-01	0.00E+00	3.88E-01

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364962	12/29/2014 - 1/6/2015	I-131	<2.10E-02	0.00E+00	2.10E-02
		Cs-134	<1.37E-02	0.00E+00	1.37E-02
		Cs-137	<1.31E-02	0.00E+00	1.31E-02
		Be-7	<8.21E-02	0.00E+00	8.21E-02
		K-40	5.40E-01	2.00E-01	1.64E-01
365164	1/6/2015 - 1/13/2015	I-131	<1.59E-02	0.00E+00	1.59E-02
		Cs-134	<1.26E-02	0.00E+00	1.26E-02
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<8.49E-02	0.00E+00	8.49E-02
		K-40	4.27E-01	2.49E-01	2.83E-01
365385	1/13/2015 - 1/20/2015	I-131	<1.37E-02	0.00E+00	1.37E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<1.25E-02	0.00E+00	1.25E-02
		Be-7	<9.58E-02	0.00E+00	9.58E-02
		K-40	4.11E-01	1.87E-01	1.93E-01
366728	1/20/2015 - 1/27/2015	I-131	<2.11E-02	0.00E+00	2.11E-02
		Cs-134	<1.34E-02	0.00E+00	1.34E-02
		Cs-137	<1.25E-02	0.00E+00	1.25E-02
		Be-7	<1.09E-01	0.00E+00	1.09E-01
		K-40	4.03E-01	1.68E-01	4.55E-02
367144	1/27/2015 - 2/3/2015	I-131	<2.07E-02	0.00E+00	2.07E-02
		Cs-134	<1.28E-02	0.00E+00	1.28E-02
		Cs-137	<1.84E-02	0.00E+00	1.84E-02
		Be-7	<9.86E-02	0.00E+00	9.86E-02
		K-40	7.83E-01	2.40E-01	4.61E-02
367643	2/3/2015 - 2/10/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<9.04E-02	0.00E+00	9.04E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
367643	2/3/2015 - 2/10/2015	K-40	7.05E-01	2.25E-01	4.55E-02
369058	2/10/2015 - 2/17/2015	I-131	<3.17E-02	0.00E+00	3.17E-02
		Cs-134	<1.35E-02	0.00E+00	1.35E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	5.15E-01	2.16E-01	1.97E-01
369769	2/17/2015 - 2/23/2015	I-131	<1.83E-02	0.00E+00	1.83E-02
		Cs-134	<2.04E-02	0.00E+00	2.04E-02
		Cs-137	<1.40E-02	0.00E+00	1.40E-02
		Be-7	<7.25E-02	0.00E+00	7.25E-02
		K-40	<5.49E-01	0.00E+00	5.49E-01
370685	2/23/2015 - 3/2/2015	I-131	<2.05E-02	0.00E+00	2.05E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	4.68E-01	2.35E-01	2.89E-01
371638	3/2/2015 - 3/9/2015	I-131	<9.29E-03	0.00E+00	9.29E-03
		Cs-134	<9.37E-03	0.00E+00	9.37E-03
		Cs-137	<7.82E-03	0.00E+00	7.82E-03
		Be-7	<5.56E-02	0.00E+00	5.56E-02
		K-40	3.21E-01	1.29E-01	1.15E-01
371998	3/9/2015 - 3/17/2015	I-131	<1.63E-02	0.00E+00	1.63E-02
		Cs-134	<1.47E-02	0.00E+00	1.47E-02
		Cs-137	<1.35E-02	0.00E+00	1.35E-02
		Be-7	<1.00E-01	0.00E+00	1.00E-01
		K-40	4.36E-01	1.79E-01	1.59E-01
372483	3/17/2015 - 3/24/2015	I-131	<1.79E-02	0.00E+00	1.79E-02
		Cs-134	<1.59E-02	0.00E+00	1.59E-02
		Cs-137	<9.66E-03	0.00E+00	9.66E-03
		Be-7	<9.71E-02	0.00E+00	9.71E-02
		K-40	4.97E-01	2.15E-01	2.18E-01
373950	3/24/2015 - 3/31/2015	I-131	<2.44E-02	0.00E+00	2.44E-02
		Cs-134	<1.17E-02	0.00E+00	1.17E-02
		Cs-137	<1.64E-02	0.00E+00	1.64E-02
		Be-7	<1.02E-01	0.00E+00	1.02E-01
		K-40	5.57E-01	2.15E-01	1.60E-01
374640	3/31/2015 - 4/7/2015	I-131	<3.20E-02	0.00E+00	3.20E-02
		Cs-134	<1.43E-02	0.00E+00	1.43E-02
		Cs-137	<1.27E-02	0.00E+00	1.27E-02
		Be-7	<1.22E-01	0.00E+00	1.22E-01
		K-40	4.12E-01	2.26E-01	2.88E-01
375029	4/7/2015 - 4/14/2015	I-131	<1.97E-02	0.00E+00	1.97E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02
		Cs-137	<1.61E-02	0.00E+00	1.61E-02
		Be-7	<9.89E-02	0.00E+00	9.89E-02
		K-40	3.37E-01	2.19E-01	2.96E-01
375705	4/14/2015 - 4/21/2015	I-131	<2.07E-02	0.00E+00	2.07E-02
		Cs-134	<9.31E-03	0.00E+00	9.31E-03



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
375705	4/14/2015 - 4/21/2015	Cs-137	<1.15E-02	0.00E+00	1.15E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	5.11E-01	2.18E-01	2.17E-01
376913	4/21/2015 - 4/28/2015	I-131	<1.82E-02	0.00E+00	1.82E-02
		Cs-134	<1.34E-02	0.00E+00	1.34E-02
		Cs-137	<1.14E-02	0.00E+00	1.14E-02
		Be-7	<5.83E-02	0.00E+00	5.83E-02
		K-40	4.76E-01	1.91E-01	1.67E-01
377574	4/28/2015 - 5/5/2015	I-131	<3.06E-02	0.00E+00	3.06E-02
		Cs-134	<1.24E-02	0.00E+00	1.24E-02
		Cs-137	<1.53E-02	0.00E+00	1.53E-02
		Be-7	<1.18E-01	0.00E+00	1.18E-01
		K-40	5.41E-01	1.99E-01	4.73E-02
378150	5/5/2015 - 5/11/2015	I-131	<3.48E-02	0.00E+00	3.48E-02
		Cs-134	<9.38E-03	0.00E+00	9.38E-03
		Cs-137	<1.49E-02	0.00E+00	1.49E-02
		Be-7	<1.31E-01	0.00E+00	1.31E-01
		K-40	6.27E-01	2.54E-01	2.33E-01
378544	5/11/2015 - 5/18/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.28E-02	0.00E+00	1.28E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	5.97E-01	2.33E-01	2.16E-01
379035	5/18/2015 - 5/25/2015	I-131	<2.57E-02	0.00E+00	2.57E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.45E-02	0.00E+00	1.45E-02
		Be-7	<1.09E-01	0.00E+00	1.09E-01
		K-40	6.46E-01	2.31E-01	1.86E-01
379540	5/25/2015 - 6/2/2015	I-131	<1.71E-02	0.00E+00	1.71E-02
		Cs-134	<9.89E-03	0.00E+00	9.89E-03
		Cs-137	<1.75E-02	0.00E+00	1.75E-02
		Be-7	<9.29E-02	0.00E+00	9.29E-02
		K-40	5.52E-01	2.08E-01	1.89E-01
380295	6/2/2015 - 6/9/2015	I-131	<8.14E-03	0.00E+00	8.14E-03
		Cs-134	<1.15E-02	0.00E+00	1.15E-02
		Cs-137	<1.73E-02	0.00E+00	1.73E-02
		Be-7	<7.73E-02	0.00E+00	7.73E-02
		K-40	5.67E-01	2.34E-01	2.34E-01
380558	6/9/2015 - 6/15/2015	I-131	<1.86E-02	0.00E+00	1.86E-02
		Cs-134	<1.11E-02	0.00E+00	1.11E-02
		Cs-137	<1.71E-02	0.00E+00	1.71E-02
		Be-7	<9.06E-02	0.00E+00	9.06E-02
		K-40	4.30E-01	1.98E-01	1.79E-01
380885	6/15/2015 - 6/24/2015	I-131	<1.92E-02	0.00E+00	1.92E-02
		Cs-134	<1.02E-02	0.00E+00	1.02E-02
		Cs-137	<1.34E-02	0.00E+00	1.34E-02
		Be-7	<7.46E-02	0.00E+00	7.46E-02
		K-40	3.49E-01	1.79E-01	2.12E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m³

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381364	6/24/2015 - 6/29/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<2.00E-02	0.00E+00	2.00E-02
		Cs-137	<2.48E-02	0.00E+00	2.48E-02
		Be-7	<1.22E-01	0.00E+00	1.22E-01
		K-40	6.43E-01	3.26E-01	4.09E-01
381678	6/29/2015 - 7/6/2015	I-131	<1.97E-02	0.00E+00	1.97E-02
		Cs-134	<1.58E-02	0.00E+00	1.58E-02
		Cs-137	<1.52E-02	0.00E+00	1.52E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	6.36E-01	2.28E-01	1.60E-01
382250	7/6/2015 - 7/14/2015	I-131	<1.68E-02	0.00E+00	1.68E-02
		Cs-134	<1.26E-02	0.00E+00	1.26E-02
		Cs-137	<1.41E-02	0.00E+00	1.41E-02
		Be-7	<9.90E-02	0.00E+00	9.90E-02
		K-40	2.76E-01	1.48E-01	1.54E-01
382671	7/14/2015 - 7/21/2015	I-131	<1.84E-02	0.00E+00	1.84E-02
		Cs-134	<1.16E-02	0.00E+00	1.16E-02
		Cs-137	<1.09E-02	0.00E+00	1.09E-02
		Be-7	<9.50E-02	0.00E+00	9.50E-02
		K-40	6.40E-01	2.12E-01	4.45E-02
383600	7/21/2015 - 7/27/2015	I-131	<2.42E-02	0.00E+00	2.42E-02
		Cs-134	<1.94E-02	0.00E+00	1.94E-02
		Cs-137	<2.07E-02	0.00E+00	2.07E-02
		Be-7	<1.08E-01	0.00E+00	1.08E-01
		K-40	7.34E-01	2.84E-01	2.40E-01
384172	7/27/2015 - 8/4/2015	I-131	<2.16E-02	0.00E+00	2.16E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02
		Cs-137	<1.08E-02	0.00E+00	1.08E-02
		Be-7	<8.26E-02	0.00E+00	8.26E-02
		K-40	4.59E-01	1.91E-01	1.89E-01
384743	8/4/2015 - 8/11/2015	I-131	<1.77E-02	0.00E+00	1.77E-02
		Cs-134	<8.09E-03	0.00E+00	8.09E-03
		Cs-137	<1.62E-02	0.00E+00	1.62E-02
		Be-7	<7.57E-02	0.00E+00	7.57E-02
		K-40	7.28E-01	2.51E-01	2.00E-01
385491	8/11/2015 - 8/17/2015	I-131	<1.86E-02	0.00E+00	1.86E-02
		Cs-134	<8.90E-03	0.00E+00	8.90E-03
		Cs-137	<1.67E-02	0.00E+00	1.67E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	<4.60E-01	0.00E+00	4.60E-01
386009	8/17/2015 - 8/25/2015	I-131	<1.83E-02	0.00E+00	1.83E-02
		Cs-134	<1.29E-02	0.00E+00	1.29E-02
		Cs-137	<2.58E-03	0.00E+00	2.58E-03
		Be-7	<8.31E-02	0.00E+00	8.31E-02
		K-40	<4.28E-01	0.00E+00	4.28E-01
386904	8/25/2015 - 9/1/2015	I-131	<1.26E-02	0.00E+00	1.26E-02
		Cs-134	<1.16E-02	0.00E+00	1.16E-02
		Cs-137	<1.69E-02	0.00E+00	1.69E-02
		Be-7	<1.11E-01	0.00E+00	1.11E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
386904	8/25/2015 - 9/1/2015	K-40	3.47E-01	1.72E-01	1.70E-01
387487	9/1/2015 - 9/8/2015	I-131	<1.40E-02	0.00E+00	1.40E-02
		Cs-134	<1.35E-02	0.00E+00	1.35E-02
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<7.46E-02	0.00E+00	7.46E-02
		K-40	5.25E-01	1.93E-01	4.59E-02
388849	9/8/2015 - 9/14/2015	I-131	<2.42E-02	0.00E+00	2.42E-02
		Cs-134	<1.53E-02	0.00E+00	1.53E-02
		Cs-137	<8.79E-03	0.00E+00	8.79E-03
		Be-7	<1.12E-01	0.00E+00	1.12E-01
		K-40	<5.01E-01	0.00E+00	5.01E-01
389489	9/14/2015 - 9/21/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<1.60E-02	0.00E+00	1.60E-02
		Cs-137	<1.75E-02	0.00E+00	1.75E-02
		Be-7	<1.22E-01	0.00E+00	1.22E-01
		K-40	4.58E-01	1.97E-01	1.79E-01
390090	9/21/2015 - 9/29/2015	I-131	<1.87E-02	0.00E+00	1.87E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.35E-02	0.00E+00	1.35E-02
		Be-7	<7.19E-02	0.00E+00	7.19E-02
		K-40	2.98E-01	1.66E-01	2.01E-01
390731	9/29/2015 - 10/5/2015	I-131	<2.30E-02	0.00E+00	2.30E-02
		Cs-134	<1.36E-02	0.00E+00	1.36E-02
		Cs-137	<2.13E-02	0.00E+00	2.13E-02
		Be-7	<1.17E-01	0.00E+00	1.17E-01
		K-40	6.05E-01	2.46E-01	2.02E-01
392039	10/5/2015 - 10/12/2015	I-131	<1.59E-02	0.00E+00	1.59E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.64E-02	0.00E+00	1.64E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	<4.26E-01	0.00E+00	4.26E-01
392311	10/12/2015 - 10/20/2015	I-131	<1.66E-02	0.00E+00	1.66E-02
		Cs-134	<7.97E-03	0.00E+00	7.97E-03
		Cs-137	<1.10E-02	0.00E+00	1.10E-02
		Be-7	<9.16E-02	0.00E+00	9.16E-02
		K-40	3.45E-01	1.57E-01	1.39E-01
393510	10/20/2015 - 10/27/2015	I-131	<6.86E-03	0.00E+00	6.86E-03
		Cs-134	<6.03E-03	0.00E+00	6.03E-03
		Cs-137	<9.50E-03	0.00E+00	9.50E-03
		Be-7	<4.49E-02	0.00E+00	4.49E-02
		K-40	4.07E-01	1.51E-01	1.48E-01
393907	10/27/2015 - 11/3/2015	I-131	<1.46E-02	0.00E+00	1.46E-02
		Cs-134	<1.45E-02	0.00E+00	1.45E-02
		Cs-137	<1.16E-02	0.00E+00	1.16E-02
		Be-7	<1.29E-01	0.00E+00	1.29E-01
		K-40	5.40E-01	2.13E-01	1.76E-01
394932	11/3/2015 - 11/10/2015	I-131	<1.61E-02	0.00E+00	1.61E-02
		Cs-134	<1.56E-02	0.00E+00	1.56E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 60 [INDICATOR - SE @ 0.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
394932	11/3/2015 - 11/10/2015	Cs-137	<9.84E-03	0.00E+00	9.84E-03
		Be-7	<9.17E-02	0.00E+00	9.17E-02
		K-40	5.58E-01	2.25E-01	2.15E-01
395384	11/10/2015 - 11/16/2015	I-131	<2.69E-02	0.00E+00	2.69E-02
		Cs-134	<1.81E-02	0.00E+00	1.81E-02
		Cs-137	<1.47E-02	0.00E+00	1.47E-02
		Be-7	<1.31E-01	0.00E+00	1.31E-01
		K-40	4.49E-01	2.26E-01	2.48E-01
395709	11/16/2015 - 11/23/2015	I-131	<2.62E-02	0.00E+00	2.62E-02
		Cs-134	<1.30E-02	0.00E+00	1.30E-02
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<1.19E-01	0.00E+00	1.19E-01
		K-40	4.51E-01	1.94E-01	1.67E-01
396201	11/23/2015 - 11/30/2015	I-131	<1.81E-02	0.00E+00	1.81E-02
		Cs-134	<1.13E-02	0.00E+00	1.13E-02
		Cs-137	<1.51E-02	0.00E+00	1.51E-02
		Be-7	<1.06E-01	0.00E+00	1.06E-01
		K-40	<4.94E-01	0.00E+00	4.94E-01
396719	11/30/2015 - 12/8/2015	I-131	<1.33E-02	0.00E+00	1.33E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<7.49E-02	0.00E+00	7.49E-02
		K-40	4.66E-01	1.88E-01	1.67E-01
397270	12/8/2015 - 12/15/2015	I-131	<1.68E-02	0.00E+00	1.68E-02
		Cs-134	<6.67E-03	0.00E+00	6.67E-03
		Cs-137	<6.29E-03	0.00E+00	6.29E-03
		Be-7	<4.92E-02	0.00E+00	4.92E-02
		K-40	4.83E-01	1.46E-01	2.72E-02
397974	12/15/2015 - 12/21/2015	I-131	<3.01E-02	0.00E+00	3.01E-02
		Cs-134	<1.33E-02	0.00E+00	1.33E-02
		Cs-137	<1.98E-02	0.00E+00	1.98E-02
		Be-7	<1.24E-01	0.00E+00	1.24E-01
		K-40	7.25E-01	2.49E-01	5.46E-02
398362	12/21/2015 - 12/28/2015	I-131	<1.82E-02	0.00E+00	1.82E-02
		Cs-134	<1.22E-02	0.00E+00	1.22E-02
		Cs-137	<9.36E-03	0.00E+00	9.36E-03
		Be-7	<1.06E-01	0.00E+00	1.06E-01
		K-40	4.14E-01	1.97E-01	2.15E-01

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364963	12/29/2014 - 1/6/2015	I-131	<1.73E-02	0.00E+00	1.73E-02
		Cs-134	<2.17E-03	0.00E+00	2.17E-03
		Cs-137	<1.19E-02	0.00E+00	1.19E-02
		Be-7	<8.74E-02	0.00E+00	8.74E-02
		K-40	3.83E-01	1.60E-01	4.33E-02
365165	1/6/2015 - 1/13/2015	I-131	<1.52E-02	0.00E+00	1.52E-02
		Cs-134	<1.03E-02	0.00E+00	1.03E-02
		Cs-137	<1.50E-02	0.00E+00	1.50E-02
		Be-7	<1.31E-01	0.00E+00	1.31E-01

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
365165	1/6/2015 - 1/13/2015	K-40	2.45E-01	1.56E-01	6.64E-02
365386	1/13/2015 - 1/20/2015	I-131	<2.31E-02	0.00E+00	2.31E-02
		Cs-134	<1.51E-02	0.00E+00	1.51E-02
		Cs-137	<1.04E-02	0.00E+00	1.04E-02
		Be-7	<8.95E-02	0.00E+00	8.95E-02
		K-40	4.61E-01	1.98E-01	1.58E-01
366729	1/20/2015 - 1/27/2015	I-131	<2.08E-02	0.00E+00	2.08E-02
		Cs-134	<1.33E-02	0.00E+00	1.33E-02
		Cs-137	<1.55E-02	0.00E+00	1.55E-02
		Be-7	<8.74E-02	0.00E+00	8.74E-02
		K-40	4.60E-01	1.84E-01	4.79E-02
367145	1/27/2015 - 2/3/2015	I-131	<1.64E-02	0.00E+00	1.64E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.46E-02	0.00E+00	1.46E-02
		Be-7	<8.87E-02	0.00E+00	8.87E-02
		K-40	5.18E-01	2.19E-01	2.06E-01
367644	2/3/2015 - 2/10/2015	I-131	<2.00E-02	0.00E+00	2.00E-02
		Cs-134	<1.07E-02	0.00E+00	1.07E-02
		Cs-137	<1.18E-02	0.00E+00	1.18E-02
		Be-7	<1.21E-01	0.00E+00	1.21E-01
		K-40	5.80E-01	2.30E-01	2.10E-01
369059	2/10/2015 - 2/17/2015	I-131	<2.47E-02	0.00E+00	2.47E-02
		Cs-134	<1.44E-02	0.00E+00	1.44E-02
		Cs-137	<1.35E-02	0.00E+00	1.35E-02
		Be-7	<9.48E-02	0.00E+00	9.48E-02
		K-40	5.42E-01	2.39E-01	2.59E-01
369770	2/17/2015 - 2/23/2015	I-131	<2.32E-02	0.00E+00	2.32E-02
		Cs-134	<1.26E-02	0.00E+00	1.26E-02
		Cs-137	<1.56E-02	0.00E+00	1.56E-02
		Be-7	<7.85E-02	0.00E+00	7.85E-02
		K-40	<5.65E-01	0.00E+00	5.65E-01
370686	2/23/2015 - 3/2/2015	I-131	<2.15E-02	0.00E+00	2.15E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.86E-02	0.00E+00	1.86E-02
		Be-7	<8.96E-02	0.00E+00	8.96E-02
		K-40	4.14E-01	1.76E-01	4.88E-02
371639	3/2/2015 - 3/9/2015	I-131	<9.08E-03	0.00E+00	9.08E-03
		Cs-134	<8.21E-03	0.00E+00	8.21E-03
		Cs-137	<8.61E-03	0.00E+00	8.61E-03
		Be-7	<5.35E-02	0.00E+00	5.35E-02
		K-40	4.15E-01	1.58E-01	1.56E-01
371999	3/9/2015 - 3/17/2015	I-131	<1.47E-02	0.00E+00	1.47E-02
		Cs-134	<9.29E-03	0.00E+00	9.29E-03
		Cs-137	<1.44E-02	0.00E+00	1.44E-02
		Be-7	<6.86E-02	0.00E+00	6.86E-02
		K-40	4.68E-01	1.99E-01	2.00E-01
372484	3/17/2015 - 3/24/2015	I-131	<1.67E-02	0.00E+00	1.67E-02
		Cs-134	<1.81E-02	0.00E+00	1.81E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372484	3/17/2015 - 3/24/2015	Cs-137	<1.00E-02	0.00E+00	1.00E-02
		Be-7	<9.38E-02	0.00E+00	9.38E-02
		K-40	6.98E-01	2.28E-01	4.73E-02
373951	3/24/2015 - 3/31/2015	I-131	<2.88E-02	0.00E+00	2.88E-02
		Cs-134	<1.14E-02	0.00E+00	1.14E-02
		Cs-137	<1.70E-02	0.00E+00	1.70E-02
		Be-7	<8.23E-02	0.00E+00	8.23E-02
		K-40	5.82E-01	2.31E-01	2.18E-01
374641	3/31/2015 - 4/7/2015	I-131	<2.88E-02	0.00E+00	2.88E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<1.61E-02	0.00E+00	1.61E-02
		Be-7	<1.45E-01	0.00E+00	1.45E-01
		K-40	4.77E-01	2.46E-01	3.11E-01
375030	4/7/2015 - 4/14/2015	I-131	<1.53E-02	0.00E+00	1.53E-02
		Cs-134	<1.09E-02	0.00E+00	1.09E-02
		Cs-137	<1.35E-02	0.00E+00	1.35E-02
		Be-7	<1.40E-01	0.00E+00	1.40E-01
		K-40	5.39E-01	2.25E-01	2.10E-01
375706	4/14/2015 - 4/21/2015	I-131	<2.26E-02	0.00E+00	2.26E-02
		Cs-134	<1.38E-02	0.00E+00	1.38E-02
		Cs-137	<1.44E-02	0.00E+00	1.44E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	6.49E-01	2.23E-01	1.53E-01
376914	4/21/2015 - 4/28/2015	I-131	<1.57E-02	0.00E+00	1.57E-02
		Cs-134	<9.39E-03	0.00E+00	9.39E-03
		Cs-137	<9.53E-03	0.00E+00	9.53E-03
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	3.18E-01	1.51E-01	1.43E-01
377575	4/28/2015 - 5/5/2015	I-131	<3.40E-02	0.00E+00	3.40E-02
		Cs-134	<9.04E-03	0.00E+00	9.04E-03
		Cs-137	<1.64E-02	0.00E+00	1.64E-02
		Be-7	<1.19E-01	0.00E+00	1.19E-01
		K-40	5.72E-01	2.12E-01	1.58E-01
378151	5/5/2015 - 5/11/2015	I-131	<2.91E-02	0.00E+00	2.91E-02
		Cs-134	<1.53E-02	0.00E+00	1.53E-02
		Cs-137	<1.78E-02	0.00E+00	1.78E-02
		Be-7	<1.32E-01	0.00E+00	1.32E-01
		K-40	4.46E-01	2.05E-01	1.87E-01
378545	5/11/2015 - 5/18/2015	I-131	<1.92E-02	0.00E+00	1.92E-02
		Cs-134	<1.47E-02	0.00E+00	1.47E-02
		Cs-137	<1.12E-02	0.00E+00	1.12E-02
		Be-7	<7.49E-02	0.00E+00	7.49E-02
		K-40	5.71E-01	2.01E-01	4.55E-02
379036	5/18/2015 - 5/25/2015	I-131	<3.18E-02	0.00E+00	3.18E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<9.95E-03	0.00E+00	9.95E-03
		Be-7	<9.91E-02	0.00E+00	9.91E-02
		K-40	7.09E-01	2.29E-01	4.69E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
379541	5/25/2015 - 6/2/2015	I-131	<1.64E-02	0.00E+00	1.64E-02
		Cs-134	<9.44E-03	0.00E+00	9.44E-03
		Cs-137	<1.41E-02	0.00E+00	1.41E-02
		Be-7	<8.33E-02	0.00E+00	8.33E-02
		K-40	4.30E-01	1.89E-01	2.03E-01
380296	6/2/2015 - 6/9/2015	I-131	<1.68E-02	0.00E+00	1.68E-02
		Cs-134	<1.64E-02	0.00E+00	1.64E-02
		Cs-137	<7.65E-03	0.00E+00	7.65E-03
		Be-7	<8.25E-02	0.00E+00	8.25E-02
		K-40	5.53E-01	2.16E-01	1.87E-01
380559	6/9/2015 - 6/15/2015	I-131	<1.78E-02	0.00E+00	1.78E-02
		Cs-134	<1.47E-02	0.00E+00	1.47E-02
		Cs-137	<1.17E-02	0.00E+00	1.17E-02
		Be-7	<1.20E-01	0.00E+00	1.20E-01
		K-40	5.89E-01	2.20E-01	1.61E-01
380886	6/15/2015 - 6/24/2015	I-131	<1.86E-02	0.00E+00	1.86E-02
		Cs-134	<1.23E-02	0.00E+00	1.23E-02
		Cs-137	<1.30E-02	0.00E+00	1.30E-02
		Be-7	<7.90E-02	0.00E+00	7.90E-02
		K-40	<3.50E-01	0.00E+00	3.50E-01
381365	6/24/2015 - 6/29/2015	I-131	<2.19E-02	0.00E+00	2.19E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.77E-02	0.00E+00	1.77E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	5.39E-01	2.59E-01	2.79E-01
381679	6/29/2015 - 7/6/2015	I-131	<1.87E-02	0.00E+00	1.87E-02
		Cs-134	<1.31E-02	0.00E+00	1.31E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<8.96E-02	0.00E+00	8.96E-02
		K-40	5.29E-01	1.92E-01	4.48E-02
382251	7/6/2015 - 7/14/2015	I-131	<1.64E-02	0.00E+00	1.64E-02
		Cs-134	<8.88E-03	0.00E+00	8.88E-03
		Cs-137	<1.59E-02	0.00E+00	1.59E-02
		Be-7	<5.65E-02	0.00E+00	5.65E-02
		K-40	4.18E-01	1.72E-01	1.41E-01
382672	7/14/2015 - 7/21/2015	I-131	<1.94E-02	0.00E+00	1.94E-02
		Cs-134	<1.27E-02	0.00E+00	1.27E-02
		Cs-137	<1.30E-02	0.00E+00	1.30E-02
		Be-7	<8.60E-02	0.00E+00	8.60E-02
		K-40	4.64E-01	1.76E-01	4.33E-02
383601	7/21/2015 - 7/27/2015	I-131	<1.82E-02	0.00E+00	1.82E-02
		Cs-134	<1.61E-02	0.00E+00	1.61E-02
		Cs-137	<2.18E-02	0.00E+00	2.18E-02
		Be-7	<8.84E-02	0.00E+00	8.84E-02
		K-40	<5.79E-01	0.00E+00	5.79E-01
384173	7/27/2015 - 8/4/2015	I-131	<2.27E-02	0.00E+00	2.27E-02
		Cs-134	<7.49E-03	0.00E+00	7.49E-03
		Cs-137	<9.22E-03	0.00E+00	9.22E-03
		Be-7	<1.05E-01	0.00E+00	1.05E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
384173	7/27/2015 - 8/4/2015	K-40	4.08E-01	1.63E-01	1.27E-01
384744	8/4/2015 - 8/11/2015	I-131	<1.15E-02	0.00E+00	1.15E-02
		Cs-134	<1.10E-02	0.00E+00	1.10E-02
		Cs-137	<1.12E-02	0.00E+00	1.12E-02
		Be-7	<7.89E-02	0.00E+00	7.89E-02
		K-40	<3.96E-01	0.00E+00	3.96E-01
385492	8/11/2015 - 8/17/2015	I-131	<1.33E-02	0.00E+00	1.33E-02
		Cs-134	<1.26E-02	0.00E+00	1.26E-02
		Cs-137	<1.42E-02	0.00E+00	1.42E-02
		Be-7	<7.78E-02	0.00E+00	7.78E-02
		K-40	4.17E-01	2.02E-01	2.44E-01
386010	8/17/2015 - 8/25/2015	I-131	<1.30E-02	0.00E+00	1.30E-02
		Cs-134	<6.82E-03	0.00E+00	6.82E-03
		Cs-137	<7.55E-03	0.00E+00	7.55E-03
		Be-7	<5.60E-02	0.00E+00	5.60E-02
		K-40	2.94E-01	1.18E-01	3.07E-02
386905	8/25/2015 - 9/1/2015	I-131	<1.25E-02	0.00E+00	1.25E-02
		Cs-134	<6.58E-03	0.00E+00	6.58E-03
		Cs-137	<9.91E-03	0.00E+00	9.91E-03
		Be-7	<8.60E-02	0.00E+00	8.60E-02
		K-40	2.93E-01	1.51E-01	1.81E-01
387488	9/1/2015 - 9/8/2015	I-131	<1.36E-02	0.00E+00	1.36E-02
		Cs-134	<8.10E-03	0.00E+00	8.10E-03
		Cs-137	<1.00E-02	0.00E+00	1.00E-02
		Be-7	<8.78E-02	0.00E+00	8.78E-02
		K-40	3.80E-01	1.68E-01	1.86E-01
388850	9/8/2015 - 9/14/2015	I-131	<1.95E-02	0.00E+00	1.95E-02
		Cs-134	<8.71E-03	0.00E+00	8.71E-03
		Cs-137	<1.26E-02	0.00E+00	1.26E-02
		Be-7	<6.42E-02	0.00E+00	6.42E-02
		K-40	5.35E-01	1.94E-01	1.54E-01
389490	9/14/2015 - 9/21/2015	I-131	<1.57E-02	0.00E+00	1.57E-02
		Cs-134	<8.43E-03	0.00E+00	8.43E-03
		Cs-137	<9.67E-03	0.00E+00	9.67E-03
		Be-7	<6.46E-02	0.00E+00	6.46E-02
		K-40	<3.46E-01	0.00E+00	3.46E-01
390091	9/21/2015 - 9/29/2015	I-131	<1.00E-02	0.00E+00	1.00E-02
		Cs-134	<9.02E-03	0.00E+00	9.02E-03
		Cs-137	<1.11E-02	0.00E+00	1.11E-02
		Be-7	<7.05E-02	0.00E+00	7.05E-02
		K-40	2.66E-01	1.48E-01	1.93E-01
390732	9/29/2015 - 10/5/2015	I-131	<2.62E-02	0.00E+00	2.62E-02
		Cs-134	<1.82E-02	0.00E+00	1.82E-02
		Cs-137	<2.33E-02	0.00E+00	2.33E-02
		Be-7	<1.14E-01	0.00E+00	1.14E-01
		K-40	4.75E-01	2.51E-01	3.06E-01
392040	10/5/2015 - 10/12/2015	I-131	<1.62E-02	0.00E+00	1.62E-02
		Cs-134	<1.21E-02	0.00E+00	1.21E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392040	10/5/2015 - 10/12/2015	Cs-137	<1.49E-02	0.00E+00	1.49E-02
		Be-7	<1.09E-01	0.00E+00	1.09E-01
		K-40	4.64E-01	1.77E-01	4.34E-02
392312	10/12/2015 - 10/20/2015	I-131	<1.52E-02	0.00E+00	1.52E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.15E-02	0.00E+00	1.15E-02
		Be-7	<9.29E-02	0.00E+00	9.29E-02
		K-40	4.60E-01	1.75E-01	1.31E-01
393511	10/20/2015 - 10/27/2015	I-131	<6.57E-03	0.00E+00	6.57E-03
		Cs-134	<7.49E-03	0.00E+00	7.49E-03
		Cs-137	<7.44E-03	0.00E+00	7.44E-03
		Be-7	<4.34E-02	0.00E+00	4.34E-02
		K-40	3.96E-01	1.33E-01	2.83E-02
393908	10/27/2015 - 11/3/2015	I-131	<1.49E-02	0.00E+00	1.49E-02
		Cs-134	<1.07E-02	0.00E+00	1.07E-02
		Cs-137	<1.68E-02	0.00E+00	1.68E-02
		Be-7	<8.05E-02	0.00E+00	8.05E-02
		K-40	4.46E-01	1.87E-01	1.56E-01
394933	11/3/2015 - 11/10/2015	I-131	<1.64E-02	0.00E+00	1.64E-02
		Cs-134	<9.91E-03	0.00E+00	9.91E-03
		Cs-137	<1.10E-02	0.00E+00	1.10E-02
		Be-7	<1.07E-01	0.00E+00	1.07E-01
		K-40	5.20E-01	2.00E-01	1.45E-01
395385	11/10/2015 - 11/16/2015	I-131	<3.81E-02	0.00E+00	3.81E-02
		Cs-134	<1.18E-02	0.00E+00	1.18E-02
		Cs-137	<1.58E-02	0.00E+00	1.58E-02
		Be-7	<1.03E-01	0.00E+00	1.03E-01
		K-40	7.78E-01	2.54E-01	5.27E-02
395710	11/16/2015 - 11/23/2015	I-131	<2.77E-02	0.00E+00	2.77E-02
		Cs-134	<1.72E-02	0.00E+00	1.72E-02
		Cs-137	<1.34E-02	0.00E+00	1.34E-02
		Be-7	<1.30E-01	0.00E+00	1.30E-01
		K-40	5.60E-01	2.18E-01	1.96E-01
396202	11/23/2015 - 11/30/2015	I-131	<1.57E-02	0.00E+00	1.57E-02
		Cs-134	<1.08E-02	0.00E+00	1.08E-02
		Cs-137	<1.23E-02	0.00E+00	1.23E-02
		Be-7	<1.13E-01	0.00E+00	1.13E-01
		K-40	5.83E-01	2.41E-01	2.62E-01
396720	11/30/2015 - 12/8/2015	I-131	<1.70E-02	0.00E+00	1.70E-02
		Cs-134	<1.20E-02	0.00E+00	1.20E-02
		Cs-137	<1.48E-02	0.00E+00	1.48E-02
		Be-7	<5.52E-02	0.00E+00	5.52E-02
		K-40	4.44E-01	1.80E-01	1.61E-01
397271	12/8/2015 - 12/15/2015	I-131	<1.25E-02	0.00E+00	1.25E-02
		Cs-134	<6.95E-03	0.00E+00	6.95E-03
		Cs-137	<7.99E-03	0.00E+00	7.99E-03
		Be-7	<5.10E-02	0.00E+00	5.10E-02
		K-40	4.00E-01	1.33E-01	2.78E-02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: AIR RADIOIODINE Concentration (Activity): pCi/m3

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397975	12/15/2015 - 12/21/2015	I-131	<2.82E-02	0.00E+00	2.82E-02
		Cs-134	<1.25E-02	0.00E+00	1.25E-02
		Cs-137	<1.95E-02	0.00E+00	1.95E-02
		Be-7	<1.16E-01	0.00E+00	1.16E-01
		K-40	6.98E-01	2.37E-01	5.11E-02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398363	12/21/2015 - 12/28/2015	I-131	<1.94E-02	0.00E+00	1.94E-02
		Cs-134	<1.13E-02	0.00E+00	1.13E-02
		Cs-137	<1.57E-02	0.00E+00	1.57E-02
		Be-7	<8.60E-02	0.00E+00	8.60E-02
		K-40	3.67E-01	1.56E-01	4.33E-02

Media Type: AQUATIC VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 41 [CONTROL - NNW @ 7.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380354	5/18/2015 - 5/18/2015	Mn-54	<1.18E+01	0.00E+00	1.18E+01
		Co-58	<1.16E+01	0.00E+00	1.16E+01
		Fe-59	<2.59E+01	0.00E+00	2.59E+01
		Co-60	<1.79E+01	0.00E+00	1.79E+01
		Zn-65	<2.28E+01	0.00E+00	2.28E+01
		Zr-95	<2.63E+01	0.00E+00	2.63E+01
		Nb-95	<1.70E+01	0.00E+00	1.70E+01
		I-131	<1.98E+01	0.00E+00	1.98E+01
		Cs-134	<1.86E+01	0.00E+00	1.86E+01
		Cs-137	<1.67E+01	0.00E+00	1.67E+01
		BaLa-140	<2.12E+01	0.00E+00	2.12E+01
		Be-7	8.86E+01	9.97E+01	1.62E+02
		K-40	7.70E+02	2.23E+02	2.14E+02

Sample Point 45 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380344	5/20/2015 - 5/20/2015	Mn-54	<6.02E+00	0.00E+00	6.02E+00
		Co-58	1.42E+01	3.48E+00	6.00E+00
		Fe-59	<7.88E+00	0.00E+00	7.88E+00
		Co-60	2.05E+01	5.75E+00	7.16E+00
		Zn-65	<1.04E+01	0.00E+00	1.04E+01
		Zr-95	<9.96E+00	0.00E+00	9.96E+00
		Nb-95	<5.54E+00	0.00E+00	5.54E+00
		I-131	<9.11E+00	0.00E+00	9.11E+00
		Cs-134	<7.89E+00	0.00E+00	7.89E+00
		Cs-137	7.24E+00	6.32E+00	1.02E+01
		BaLa-140	<7.29E+00	0.00E+00	7.29E+00
		Be-7	1.39E+03	2.03E+02	4.78E+01
		K-40	3.88E+02	7.71E+01	8.47E+01

Sample Point 46 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380348	5/21/2015 - 5/21/2015	Mn-54	<4.30E+00	0.00E+00	4.30E+00
		Co-58	3.73E+00	3.32E+00	5.39E+00
		Fe-59	<5.24E+00	0.00E+00	5.24E+00
		Co-60	1.37E+01	3.47E+00	4.48E+00
		Zn-65	<6.43E+00	0.00E+00	6.43E+00
		Zr-95	<1.08E+01	0.00E+00	1.08E+01
		Nb-95	<3.96E+00	0.00E+00	3.96E+00
		I-131	<5.54E+00	0.00E+00	5.54E+00
		Cs-134	<6.33E+00	0.00E+00	6.33E+00
		Cs-137	8.35E+00	3.44E+00	5.23E+00
		BaLa-140	<4.52E+00	0.00E+00	4.52E+00
		Be-7	1.01E+03	9.99E+01	4.72E+01
		K-40	5.61E+02	6.83E+01	4.84E+01



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Media Type: AQUATIC VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 66 [INDICATOR - @ 0 miles]

Sample ID:	380352	Sample Dates:	5/21/2015 - 5/21/2015	Nuclide	Activity	2 Sigma Error	LLD
				Mn-54	<1.20E+01	0.00E+00	1.20E+01
				Co-58	<1.14E+01	0.00E+00	1.14E+01
				Fe-59	<1.98E+01	0.00E+00	1.98E+01
				Co-60	<1.19E+01	0.00E+00	1.19E+01
				Zn-65	<2.22E+01	0.00E+00	2.22E+01
				Zr-95	<2.77E+01	0.00E+00	2.77E+01
				Nb-95	<1.22E+01	0.00E+00	1.22E+01
				I-131	<1.38E+01	0.00E+00	1.38E+01
				Cs-134	<1.48E+01	0.00E+00	1.48E+01
				Cs-137	<1.56E+01	0.00E+00	1.56E+01
				BaLa-140	<9.66E+00	0.00E+00	9.66E+00
				Be-7	2.28E+02	1.11E+02	1.64E+02
				K-40	6.61E+02	1.72E+02	1.45E+02

Media Type: CROPS Concentration (Activity): pCi/kg wet

Sample Point 49 [CONTROL - W @ 10 miles]

Sample ID:	384584	Sample Dates:	7/20/2015 - 7/20/2015	COLLARDS	Nuclide	Activity	2 Sigma Error	LLD
					I-131	<7.75E+00	0.00E+00	7.75E+00
					Cs-134	<9.01E+00	0.00E+00	9.01E+00
					Cs-137	8.98E+00	7.16E+00	1.10E+01
					Be-7	1.37E+02	5.95E+01	7.99E+01
					K-40	2.79E+03	3.44E+02	7.81E+01

Sample Point 58 [INDICATOR - @ 0 miles]

Sample ID:	384585	Sample Dates:	7/20/2015 - 7/20/2015	WATERMELLO	Nuclide	Activity	2 Sigma Error	LLD
					I-131	<4.87E+00	0.00E+00	4.87E+00
					Cs-134	<6.30E+00	0.00E+00	6.30E+00
					Cs-137	<4.39E+00	0.00E+00	4.39E+00
					Be-7	<4.25E+01	0.00E+00	4.25E+01
					K-40	9.97E+02	1.74E+02	9.99E+01

Media Type: FISH Concentration (Activity): pCi/kg wet

Sample Point 45 [INDICATOR - @ 0 miles]

Sample ID:	380342	Sample Dates:	5/20/2015 - 5/20/2015	BOTMFEEDER	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.20E+01	0.00E+00	1.20E+01
					Co-58	<1.10E+01	0.00E+00	1.10E+01
					Fe-59	<2.38E+01	0.00E+00	2.38E+01
					Co-60	<1.16E+01	0.00E+00	1.16E+01
					Zn-65	<2.50E+01	0.00E+00	2.50E+01
					Nb-95	<8.59E+00	0.00E+00	8.59E+00
					I-131	<1.39E+01	0.00E+00	1.39E+01
					Cs-134	<1.19E+01	0.00E+00	1.19E+01
					Cs-137	2.10E+01	1.19E+01	1.64E+01
					Be-7	<8.06E+01	0.00E+00	8.06E+01
					K-40	2.46E+03	4.00E+02	2.14E+02
					Ag-110M	<9.92E+00	0.00E+00	9.92E+00
					Sb-122	<8.33E+01	0.00E+00	8.33E+01
					Sb-125	<2.54E+01	0.00E+00	2.54E+01

Sample ID:	380343	Sample Dates:	5/20/2015 - 5/20/2015	FREESWIM	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.48E+01	0.00E+00	1.48E+01
					Co-58	<1.45E+01	0.00E+00	1.45E+01
					Fe-59	<3.54E+01	0.00E+00	3.54E+01
					Co-60	<1.17E+01	0.00E+00	1.17E+01
					Zn-65	<3.54E+01	0.00E+00	3.54E+01
					Nb-95	<1.69E+01	0.00E+00	1.69E+01
					I-131	<1.56E+01	0.00E+00	1.56E+01
					Cs-134	<1.19E+01	0.00E+00	1.19E+01
					Cs-137	2.75E+01	1.40E+01	1.84E+01
					Be-7	<1.04E+02	0.00E+00	1.04E+02
					K-40	3.05E+03	4.63E+02	3.40E+01
					Ag-110M	<1.35E+01	0.00E+00	1.35E+01
					Sb-122	<9.46E+01	0.00E+00	9.46E+01



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Media Type: FISH Concentration (Activity): pCi/kg wet

Sample Point 45 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Location:	Nuclide	Activity	2 Sigma Error	LLD
380343	5/20/2015 - 5/20/2015	FREESWIM	Sb-125	<3.39E+01	0.00E+00	3.39E+01
396343	11/10/2015 - 11/10/2015	BOTMFEEDER	Mn-54	<8.27E+00	0.00E+00	8.27E+00
			Co-58	<8.68E+00	0.00E+00	8.68E+00
			Fe-59	<2.35E+01	0.00E+00	2.35E+01
			Co-60	<1.16E+01	0.00E+00	1.16E+01
			Zn-65	<2.40E+01	0.00E+00	2.40E+01
			Nb-95	<1.17E+01	0.00E+00	1.17E+01
			I-131	<1.74E+01	0.00E+00	1.74E+01
			Cs-134	<1.49E+01	0.00E+00	1.49E+01
			Cs-137	<2.27E+01	0.00E+00	2.27E+01
			Be-7	<1.07E+02	0.00E+00	1.07E+02
			K-40	3.05E+03	4.68E+02	1.45E+02
			Ag-110M	<1.02E+01	0.00E+00	1.02E+01
			Sb-122	<1.55E+02	0.00E+00	1.55E+02
			Sb-125	<2.35E+01	0.00E+00	2.35E+01
396344	11/10/2015 - 11/10/2015	FREESWIM	Mn-54	<1.37E+01	0.00E+00	1.37E+01
			Co-58	<1.69E+01	0.00E+00	1.69E+01
			Fe-59	<3.95E+01	0.00E+00	3.95E+01
			Co-60	<1.48E+01	0.00E+00	1.48E+01
			Zn-65	<3.08E+01	0.00E+00	3.08E+01
			Nb-95	<1.34E+01	0.00E+00	1.34E+01
			I-131	<2.77E+01	0.00E+00	2.77E+01
			Cs-134	<1.18E+01	0.00E+00	1.18E+01
			Cs-137	3.27E+01	1.59E+01	1.95E+01
			Be-7	<1.25E+02	0.00E+00	1.25E+02
			K-40	3.26E+03	5.32E+02	2.03E+02
			Ag-110M	<1.31E+01	0.00E+00	1.31E+01
			Sb-122	<1.99E+02	0.00E+00	1.99E+02
			Sb-125	<3.85E+01	0.00E+00	3.85E+01

Sample Point 46 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Location:	Nuclide	Activity	2 Sigma Error	LLD
380346	5/21/2015 - 5/21/2015	BOTMFEEDER	Mn-54	<1.56E+01	0.00E+00	1.56E+01
			Co-58	<1.84E+01	0.00E+00	1.84E+01
			Fe-59	<3.04E+01	0.00E+00	3.04E+01
			Co-60	<1.82E+01	0.00E+00	1.82E+01
			Zn-65	<2.21E+01	0.00E+00	2.21E+01
			Nb-95	<1.96E+01	0.00E+00	1.96E+01
			I-131	<1.39E+01	0.00E+00	1.39E+01
			Cs-134	<2.22E+01	0.00E+00	2.22E+01
			Cs-137	2.83E+01	1.65E+01	2.23E+01
			Be-7	<1.33E+02	0.00E+00	1.33E+02
			K-40	4.13E+03	6.37E+02	1.92E+02
			Ag-110M	<1.65E+01	0.00E+00	1.65E+01
			Sb-122	<8.64E+01	0.00E+00	8.64E+01
			Sb-125	<3.84E+01	0.00E+00	3.84E+01
380347	5/21/2015 - 5/21/2015	FREESWIM	Mn-54	<1.19E+01	0.00E+00	1.19E+01
			Co-58	<1.53E+01	0.00E+00	1.53E+01
			Fe-59	<3.90E+01	0.00E+00	3.90E+01
			Co-60	<1.68E+01	0.00E+00	1.68E+01
			Zn-65	<3.25E+01	0.00E+00	3.25E+01
			Nb-95	<1.11E+01	0.00E+00	1.11E+01
			I-131	<2.04E+01	0.00E+00	2.04E+01
			Cs-134	<8.16E+00	0.00E+00	8.16E+00
			Cs-137	3.85E+01	1.73E+01	2.20E+01
			Be-7	<6.18E+01	0.00E+00	6.18E+01
			K-40	3.29E+03	5.15E+02	2.27E+02
			Ag-110M	<1.04E+01	0.00E+00	1.04E+01
			Sb-122	<6.41E+01	0.00E+00	6.41E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: FISH Concentration (Activity): pCi/kg wet

Sample Point 46 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Location:	Nuclide	Activity	2 Sigma Error	LLD
380347	5/21/2015 - 5/21/2015	FREESWIM	Sb-125	<3.80E+01	0.00E+00	3.80E+01
396040	11/6/2015 - 11/6/2015	FREESWIM	Mn-54	<1.60E+01	0.00E+00	1.60E+01
			Co-58	<1.58E+01	0.00E+00	1.58E+01
			Fe-59	<4.03E+01	0.00E+00	4.03E+01
			Co-60	<1.93E+01	0.00E+00	1.93E+01
			Zn-65	<4.05E+01	0.00E+00	4.05E+01
			Nb-95	<1.67E+01	0.00E+00	1.67E+01
			I-131	<2.46E+01	0.00E+00	2.46E+01
			Cs-134	<1.79E+01	0.00E+00	1.79E+01
			Cs-137	4.47E+01	1.45E+01	2.95E+00
			Be-7	<1.43E+02	0.00E+00	1.43E+02
			K-40	3.44E+03	5.57E+02	2.01E+02
			Ag-110M	<1.49E+01	0.00E+00	1.49E+01
			Sb-122	<3.01E+02	0.00E+00	3.01E+02
			Sb-125	<4.12E+01	0.00E+00	4.12E+01
396041	11/6/2015 - 11/6/2015	BOTMFEEDER	Mn-54	<2.02E+01	0.00E+00	2.02E+01
			Co-58	<1.55E+01	0.00E+00	1.55E+01
			Fe-59	<3.64E+01	0.00E+00	3.64E+01
			Co-60	<2.04E+01	0.00E+00	2.04E+01
			Zn-65	<3.27E+01	0.00E+00	3.27E+01
			Nb-95	<1.46E+01	0.00E+00	1.46E+01
			I-131	<3.67E+01	0.00E+00	3.67E+01
			Cs-134	<1.62E+01	0.00E+00	1.62E+01
			Cs-137	3.43E+01	1.43E+01	1.28E+01
			Be-7	<1.28E+02	0.00E+00	1.28E+02
			K-40	3.70E+03	6.14E+02	3.79E+02
			Ag-110M	<1.15E+01	0.00E+00	1.15E+01
			Sb-122	<1.93E+02	0.00E+00	1.93E+02
			Sb-125	<3.69E+01	0.00E+00	3.69E+01

Sample Point 47 [CONTROL - @ 0 miles]

Sample ID:	Sample Dates:	Location:	Nuclide	Activity	2 Sigma Error	LLD
380350	5/19/2015 - 5/19/2015	BOTMFEEDER	Mn-54	<1.06E+01	0.00E+00	1.06E+01
			Co-58	<1.11E+01	0.00E+00	1.11E+01
			Fe-59	<4.40E+01	0.00E+00	4.40E+01
			Co-60	<1.93E+01	0.00E+00	1.93E+01
			Zn-65	<4.78E+01	0.00E+00	4.78E+01
			Nb-95	<1.74E+01	0.00E+00	1.74E+01
			I-131	<2.44E+01	0.00E+00	2.44E+01
			Cs-134	<1.19E+01	0.00E+00	1.19E+01
			Cs-137	3.92E+01	1.77E+01	2.17E+01
			Be-7	<1.47E+02	0.00E+00	1.47E+02
			K-40	3.53E+03	5.56E+02	4.35E+01
			Ag-110M	<1.74E+01	0.00E+00	1.74E+01
			Sb-122	<1.49E+02	0.00E+00	1.49E+02
			Sb-125	<3.67E+01	0.00E+00	3.67E+01
380351	5/19/2015 - 5/19/2015	FREESWIM	Mn-54	<2.16E+01	0.00E+00	2.16E+01
			Co-58	<1.97E+01	0.00E+00	1.97E+01
			Fe-59	<4.92E+01	0.00E+00	4.92E+01
			Co-60	<2.17E+01	0.00E+00	2.17E+01
			Zn-65	<3.88E+01	0.00E+00	3.88E+01
			Nb-95	<1.86E+01	0.00E+00	1.86E+01
			I-131	<3.07E+01	0.00E+00	3.07E+01
			Cs-134	<2.67E+01	0.00E+00	2.67E+01
			Cs-137	7.93E+01	2.50E+01	2.29E+01
			Be-7	<1.64E+02	0.00E+00	1.64E+02
			K-40	4.15E+03	6.76E+02	2.04E+02
			Ag-110M	<1.89E+01	0.00E+00	1.89E+01
			Sb-122	<1.17E+02	0.00E+00	1.17E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: FISH Concentration (Activity): pCi/kg wet

Sample Point 47 [CONTROL - @ 0 miles]

Sample ID:	Sample Dates:	Location:	Nuclide	Activity	2 Sigma Error	LLD
380351	5/19/2015 - 5/19/2015	FREESWIM	Sb-125	<4.36E+01	0.00E+00	4.36E+01
396042	11/5/2015 - 11/5/2015	FREESWIM	Mn-54	<2.03E+01	0.00E+00	2.03E+01
			Co-58	<1.27E+01	0.00E+00	1.27E+01
			Fe-59	<3.90E+01	0.00E+00	3.90E+01
			Co-60	<1.94E+01	0.00E+00	1.94E+01
			Zn-65	<3.48E+01	0.00E+00	3.48E+01
			Nb-95	<2.05E+01	0.00E+00	2.05E+01
			I-131	<3.95E+01	0.00E+00	3.95E+01
			Cs-134	<2.58E+01	0.00E+00	2.58E+01
			Cs-137	8.15E+01	2.18E+01	1.13E+01
			Be-7	<1.43E+02	0.00E+00	1.43E+02
			K-40	3.08E+03	5.81E+02	4.21E+02
			Ag-110M	<1.35E+01	0.00E+00	1.35E+01
			Sb-122	<2.90E+02	0.00E+00	2.90E+02
			Sb-125	<3.61E+01	0.00E+00	3.61E+01
396043	11/5/2015 - 11/5/2015	BOTMFEEDER	Mn-54	<1.48E+01	0.00E+00	1.48E+01
			Co-58	<1.92E+01	0.00E+00	1.92E+01
			Fe-59	<4.55E+01	0.00E+00	4.55E+01
			Co-60	<2.30E+01	0.00E+00	2.30E+01
			Zn-65	<4.52E+01	0.00E+00	4.52E+01
			Nb-95	<2.48E+01	0.00E+00	2.48E+01
			I-131	<3.22E+01	0.00E+00	3.22E+01
			Cs-134	<1.65E+01	0.00E+00	1.65E+01
			Cs-137	<3.18E+01	0.00E+00	3.18E+01
			Be-7	<1.46E+02	0.00E+00	1.46E+02
			K-40	3.85E+03	6.22E+02	5.19E+01
			Ag-110M	<1.58E+01	0.00E+00	1.58E+01
			Sb-122	<3.71E+02	0.00E+00	3.71E+02
			Sb-125	<3.92E+01	0.00E+00	3.92E+01

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 42 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364393	1/20/2015 - 1/20/2015	Mn-54	<5.93E+00	0.00E+00	5.93E+00
		Co-58	<4.94E+00	0.00E+00	4.94E+00
		Fe-59	<8.82E+00	0.00E+00	8.82E+00
		Co-60	<5.52E+00	0.00E+00	5.52E+00
		Zn-65	<1.49E+01	0.00E+00	1.49E+01
		Zr-95	<8.59E+00	0.00E+00	8.59E+00
		Nb-95	<6.84E+00	0.00E+00	6.84E+00
		I-131	<5.04E+00	0.00E+00	5.04E+00
		Cs-134	<6.45E+00	0.00E+00	6.45E+00
		Cs-137	<5.79E+00	0.00E+00	5.79E+00
		BaLa-140	<1.59E+00	0.00E+00	1.59E+00
		Be-7	<3.96E+01	0.00E+00	3.96E+01
		K-40	7.31E+01	5.34E+01	7.70E+01
		LLI-131	<6.24E-01	0.00E+00	6.24E-01
		H3GW	1.93E+02	1.15E+02	1.87E+02
372839	4/21/2015 - 4/21/2015	Mn-54	<5.42E+00	0.00E+00	5.42E+00
		Co-58	<4.32E+00	0.00E+00	4.32E+00
		Fe-59	<9.71E+00	0.00E+00	9.71E+00
		Co-60	<5.35E+00	0.00E+00	5.35E+00
		Zn-65	<9.42E+00	0.00E+00	9.42E+00
		Zr-95	<8.70E+00	0.00E+00	8.70E+00
		Nb-95	<5.63E+00	0.00E+00	5.63E+00
		I-131	<4.75E+00	0.00E+00	4.75E+00
		Cs-134	<7.08E+00	0.00E+00	7.08E+00
		Cs-137	<5.48E+00	0.00E+00	5.48E+00
		BaLa-140	<5.06E+00	0.00E+00	5.06E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 42 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372839	4/21/2015 - 4/21/2015	Be-7	<4.25E+01	0.00E+00	4.25E+01
		K-40	<8.46E+01	0.00E+00	8.46E+01
		LLI-131	<5.12E-01	0.00E+00	5.12E-01
		H3GW	<1.85E+02	0.00E+00	1.90E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381916	7/21/2015 - 7/21/2015	Mn-54	<5.54E+00	0.00E+00	5.54E+00
		Co-58	<5.32E+00	0.00E+00	5.32E+00
		Fe-59	<9.94E+00	0.00E+00	9.94E+00
		Co-60	<5.50E+00	0.00E+00	5.50E+00
		Zn-65	<1.11E+01	0.00E+00	1.11E+01
		Zr-95	<7.65E+00	0.00E+00	7.65E+00
		Nb-95	<4.97E+00	0.00E+00	4.97E+00
		I-131	<5.03E+00	0.00E+00	5.03E+00
		Cs-134	<6.00E+00	0.00E+00	6.00E+00
		Cs-137	<6.30E+00	0.00E+00	6.30E+00
		BaLa-140	<7.86E+00	0.00E+00	7.86E+00
		Be-7	<4.53E+01	0.00E+00	4.53E+01
		K-40	6.69E+01	6.00E+01	9.28E+01
		LLI-131	<5.65E-01	0.00E+00	5.65E-01
		H3GW	<7.88E+01	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392043	10/20/2015 - 10/20/2015	Mn-54	<5.27E+00	0.00E+00	5.27E+00
		Co-58	<5.40E+00	0.00E+00	5.40E+00
		Fe-59	<8.17E+00	0.00E+00	8.17E+00
		Co-60	<4.32E+00	0.00E+00	4.32E+00
		Zn-65	<1.05E+01	0.00E+00	1.05E+01
		Zr-95	<9.06E+00	0.00E+00	9.06E+00
		Nb-95	<4.24E+00	0.00E+00	4.24E+00
		I-131	<5.13E+00	0.00E+00	5.13E+00
		Cs-134	<5.93E+00	0.00E+00	5.93E+00
		Cs-137	<7.00E+00	0.00E+00	7.00E+00
		BaLa-140	<4.71E+00	0.00E+00	4.71E+00
		Be-7	<3.80E+01	0.00E+00	3.80E+01
		K-40	8.91E+01	5.35E+01	7.21E+01
		H3GW	<1.67E+02	0.00E+00	1.81E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395136	10/27/2015 - 10/27/2015	LLI-131	<4.06E-01	0.00E+00	4.06E-01

Sample Point 64 [INDICATOR - SE @ 0.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364397	1/20/2015 - 1/20/2015	Mn-54	<4.95E+00	0.00E+00	4.95E+00
		Co-58	<5.75E+00	0.00E+00	5.75E+00
		Fe-59	<8.48E+00	0.00E+00	8.48E+00
		Co-60	<6.33E+00	0.00E+00	6.33E+00
		Zn-65	<6.93E+00	0.00E+00	6.93E+00
		Zr-95	<1.00E+01	0.00E+00	1.00E+01
		Nb-95	<6.77E+00	0.00E+00	6.77E+00
		I-131	<8.66E+00	0.00E+00	8.66E+00
		Cs-134	<5.53E+00	0.00E+00	5.53E+00
		Cs-137	<6.14E+00	0.00E+00	6.14E+00
		BaLa-140	<8.38E+00	0.00E+00	8.38E+00
		Be-7	<4.88E+01	0.00E+00	4.88E+01
		K-40	9.44E+01	6.57E+01	9.64E+01
		H3GW	<4.95E+00	0.00E+00	1.87E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372843	4/21/2015 - 4/21/2015	Mn-54	<5.47E+00	0.00E+00	5.47E+00
		Co-58	<5.08E+00	0.00E+00	5.08E+00
		Fe-59	<1.27E+01	0.00E+00	1.27E+01
		Co-60	<6.37E+00	0.00E+00	6.37E+00
		Zn-65	<9.93E+00	0.00E+00	9.93E+00
		Zr-95	<9.48E+00	0.00E+00	9.48E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 64 [INDICATOR - SE @ 0.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372843	4/21/2015 - 4/21/2015	Nb-95	<6.27E+00	0.00E+00	6.27E+00
		I-131	<5.60E+00	0.00E+00	5.60E+00
		Cs-134	<5.49E+00	0.00E+00	5.49E+00
		Cs-137	<6.45E+00	0.00E+00	6.45E+00
		BaLa-140	<3.94E+00	0.00E+00	3.94E+00
		Be-7	<3.75E+01	0.00E+00	3.75E+01
		K-40	<9.87E+01	0.00E+00	9.87E+01
		H3GW	<-5.1E+01	0.00E+00	1.90E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381920	7/21/2015 - 7/21/2015	Mn-54	<5.01E+00	0.00E+00	5.01E+00
		Co-58	<5.00E+00	0.00E+00	5.00E+00
		Fe-59	<1.12E+01	0.00E+00	1.12E+01
		Co-60	<4.90E+00	0.00E+00	4.90E+00
		Zn-65	<1.14E+01	0.00E+00	1.14E+01
		Zr-95	<5.99E+00	0.00E+00	5.99E+00
		Nb-95	<5.79E+00	0.00E+00	5.79E+00
		I-131	<5.31E+00	0.00E+00	5.31E+00
		Cs-134	<6.51E+00	0.00E+00	6.51E+00
		Cs-137	<5.83E+00	0.00E+00	5.83E+00
		BaLa-140	<8.12E+00	0.00E+00	8.12E+00
		Be-7	<4.43E+01	0.00E+00	4.43E+01
		K-40	<7.95E+01	0.00E+00	7.95E+01
		H3GW	<-3.1E+01	0.00E+00	1.87E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392047	10/20/2015 - 10/20/2015	Mn-54	<4.21E+00	0.00E+00	4.21E+00
		Co-58	<4.88E+00	0.00E+00	4.88E+00
		Fe-59	<9.51E+00	0.00E+00	9.51E+00
		Co-60	<6.03E+00	0.00E+00	6.03E+00
		Zn-65	<1.06E+01	0.00E+00	1.06E+01
		Zr-95	<1.14E+01	0.00E+00	1.14E+01
		Nb-95	<6.69E+00	0.00E+00	6.69E+00
		I-131	<6.49E+00	0.00E+00	6.49E+00
		Cs-134	<6.72E+00	0.00E+00	6.72E+00
		Cs-137	<6.16E+00	0.00E+00	6.16E+00
		BaLa-140	<5.76E+00	0.00E+00	5.76E+00
		Be-7	<3.63E+01	0.00E+00	3.63E+01
		K-40	1.55E+02	6.04E+01	6.30E+01
		H3GW	<4.57E+01	0.00E+00	1.81E+02

Sample Point 68 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364394	1/20/2015 - 1/20/2015	Mn-54	<4.91E+00	0.00E+00	4.91E+00
		Co-58	<5.34E+00	0.00E+00	5.34E+00
		Fe-59	<1.11E+01	0.00E+00	1.11E+01
		Co-60	<5.52E+00	0.00E+00	5.52E+00
		Zn-65	<1.23E+01	0.00E+00	1.23E+01
		Zr-95	<8.91E+00	0.00E+00	8.91E+00
		Nb-95	<5.95E+00	0.00E+00	5.95E+00
		I-131	<5.57E+00	0.00E+00	5.57E+00
		Cs-134	<6.23E+00	0.00E+00	6.23E+00
		Cs-137	<7.74E+00	0.00E+00	7.74E+00
		BaLa-140	<6.83E+00	0.00E+00	6.83E+00
		Be-7	<4.04E+01	0.00E+00	4.04E+01
		K-40	1.18E+02	5.44E+01	5.99E+01
		LLI-131	<6.42E-01	0.00E+00	6.42E-01
		H3GW	2.38E+02	1.17E+02	1.87E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372840	4/21/2015 - 4/21/2015	Mn-54	<5.81E+00	0.00E+00	5.81E+00
		Co-58	<3.67E+00	0.00E+00	3.67E+00
		Fe-59	<1.10E+01	0.00E+00	1.10E+01
		Co-60	<6.03E+00	0.00E+00	6.03E+00
		Zn-65	<1.17E+01	0.00E+00	1.17E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 68 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372840	4/21/2015 - 4/21/2015	Zr-95	<1.04E+01	0.00E+00	1.04E+01
		Nb-95	<5.65E+00	0.00E+00	5.65E+00
		I-131	<5.59E+00	0.00E+00	5.59E+00
		Cs-134	<6.72E+00	0.00E+00	6.72E+00
		Cs-137	<5.85E+00	0.00E+00	5.85E+00
		BaLa-140	<3.94E+00	0.00E+00	3.94E+00
		Be-7	<4.69E+01	0.00E+00	4.69E+01
		K-40	6.98E+01	4.83E+01	6.74E+01
		LLI-131	<5.09E-01	0.00E+00	5.09E-01
		H3GW	2.61E+02	1.21E+02	1.94E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381917	7/21/2015 - 7/21/2015	Mn-54	<5.18E+00	0.00E+00	5.18E+00
		Co-58	<4.52E+00	0.00E+00	4.52E+00
		Fe-59	<8.43E+00	0.00E+00	8.43E+00
		Co-60	<5.77E+00	0.00E+00	5.77E+00
		Zn-65	<1.01E+01	0.00E+00	1.01E+01
		Zr-95	<7.84E+00	0.00E+00	7.84E+00
		Nb-95	<4.39E+00	0.00E+00	4.39E+00
		I-131	<4.69E+00	0.00E+00	4.69E+00
		Cs-134	<4.82E+00	0.00E+00	4.82E+00
		Cs-137	<3.93E+00	0.00E+00	3.93E+00
		BaLa-140	<8.15E+00	0.00E+00	8.15E+00
		Be-7	<4.55E+01	0.00E+00	4.55E+01
		K-40	6.98E+01	5.75E+01	8.72E+01
		LLI-131	<5.84E-01	0.00E+00	5.84E-01
		H3GW	2.07E+02	1.17E+02	1.90E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392044	10/20/2015 - 10/20/2015	Mn-54	<5.74E+00	0.00E+00	5.74E+00
		Co-58	<4.92E+00	0.00E+00	4.92E+00
		Fe-59	<1.19E+01	0.00E+00	1.19E+01
		Co-60	<4.91E+00	0.00E+00	4.91E+00
		Zn-65	<9.37E+00	0.00E+00	9.37E+00
		Zr-95	<7.77E+00	0.00E+00	7.77E+00
		Nb-95	<6.39E+00	0.00E+00	6.39E+00
		I-131	<5.22E+00	0.00E+00	5.22E+00
		Cs-134	<7.03E+00	0.00E+00	7.03E+00
		Cs-137	<6.26E+00	0.00E+00	6.26E+00
		BaLa-140	<7.79E+00	0.00E+00	7.79E+00
		Be-7	<5.07E+01	0.00E+00	5.07E+01
		K-40	<1.19E+02	0.00E+00	1.19E+02
		H3GW	3.36E+02	1.16E+02	1.80E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395137	10/27/2015 - 10/27/2015	LLI-131	<5.08E-01	0.00E+00	5.08E-01

Sample Point 69 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364395	1/20/2015 - 1/20/2015	Mn-54	<5.35E+00	0.00E+00	5.35E+00
		Co-58	<3.82E+00	0.00E+00	3.82E+00
		Fe-59	<8.39E+00	0.00E+00	8.39E+00
		Co-60	<4.75E+00	0.00E+00	4.75E+00
		Zn-65	<9.75E+00	0.00E+00	9.75E+00
		Zr-95	<8.74E+00	0.00E+00	8.74E+00
		Nb-95	<4.80E+00	0.00E+00	4.80E+00
		I-131	<7.58E+00	0.00E+00	7.58E+00
		Cs-134	<6.35E+00	0.00E+00	6.35E+00
		Cs-137	<4.73E+00	0.00E+00	4.73E+00
		BaLa-140	<6.26E+00	0.00E+00	6.26E+00
		Be-7	<3.80E+01	0.00E+00	3.80E+01
		K-40	<9.45E+01	0.00E+00	9.45E+01
		H3GW	<3.70E+01	0.00E+00	1.86E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 69 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372841	4/21/2015 - 4/21/2015	Mn-54	<6.14E+00	0.00E+00	6.14E+00
		Co-58	<4.87E+00	0.00E+00	4.87E+00
		Fe-59	<8.28E+00	0.00E+00	8.28E+00
		Co-60	<4.82E+00	0.00E+00	4.82E+00
		Zn-65	<1.17E+01	0.00E+00	1.17E+01
		Zr-95	<9.14E+00	0.00E+00	9.14E+00
		Nb-95	<4.93E+00	0.00E+00	4.93E+00
		I-131	<5.07E+00	0.00E+00	5.07E+00
		Cs-134	<6.54E+00	0.00E+00	6.54E+00
		Cs-137	<4.78E+00	0.00E+00	4.78E+00
		BaLa-140	<4.93E+00	0.00E+00	4.93E+00
		Be-7	<3.39E+01	0.00E+00	3.39E+01
		K-40	8.77E+01	5.28E+01	7.10E+01
		H3GW	<-3.9E+01	0.00E+00	1.92E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381918	7/21/2015 - 7/21/2015	Mn-54	<4.03E+00	0.00E+00	4.03E+00
		Co-58	<3.42E+00	0.00E+00	3.42E+00
		Fe-59	<9.08E+00	0.00E+00	9.08E+00
		Co-60	<5.37E+00	0.00E+00	5.37E+00
		Zn-65	<1.08E+01	0.00E+00	1.08E+01
		Zr-95	<7.43E+00	0.00E+00	7.43E+00
		Nb-95	<5.57E+00	0.00E+00	5.57E+00
		I-131	<5.56E+00	0.00E+00	5.56E+00
		Cs-134	<5.60E+00	0.00E+00	5.60E+00
		Cs-137	<5.43E+00	0.00E+00	5.43E+00
		BaLa-140	<8.67E+00	0.00E+00	8.67E+00
		Be-7	<4.37E+01	0.00E+00	4.37E+01
		K-40	8.31E+01	4.59E+01	5.46E+01
		H3GW	<-5.3E+01	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392045	10/20/2015 - 10/20/2015	Mn-54	<3.77E+00	0.00E+00	3.77E+00
		Co-58	<4.79E+00	0.00E+00	4.79E+00
		Fe-59	<1.13E+01	0.00E+00	1.13E+01
		Co-60	<4.90E+00	0.00E+00	4.90E+00
		Zn-65	<1.08E+01	0.00E+00	1.08E+01
		Zr-95	<9.06E+00	0.00E+00	9.06E+00
		Nb-95	<3.01E+00	0.00E+00	3.01E+00
		I-131	<5.48E+00	0.00E+00	5.48E+00
		Cs-134	<6.30E+00	0.00E+00	6.30E+00
		Cs-137	<6.47E+00	0.00E+00	6.47E+00
		BaLa-140	<7.66E+00	0.00E+00	7.66E+00
		Be-7	<4.34E+01	0.00E+00	4.34E+01
		K-40	<8.70E+01	0.00E+00	8.70E+01
		H3GW	<4.28E+01	0.00E+00	1.78E+02

Sample Point 70 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364396	1/20/2015 - 1/20/2015	Mn-54	<5.44E+00	0.00E+00	5.44E+00
		Co-58	<5.24E+00	0.00E+00	5.24E+00
		Fe-59	<1.03E+01	0.00E+00	1.03E+01
		Co-60	<4.93E+00	0.00E+00	4.93E+00
		Zn-65	<8.67E+00	0.00E+00	8.67E+00
		Zr-95	<8.38E+00	0.00E+00	8.38E+00
		Nb-95	<5.31E+00	0.00E+00	5.31E+00
		I-131	<5.62E+00	0.00E+00	5.62E+00
		Cs-134	<5.41E+00	0.00E+00	5.41E+00
		Cs-137	<4.93E+00	0.00E+00	4.93E+00
		BaLa-140	<7.26E+00	0.00E+00	7.26E+00
		Be-7	<3.76E+01	0.00E+00	3.76E+01
		K-40	<1.01E+02	0.00E+00	1.01E+02
		H3GW	<1.04E+02	0.00E+00	1.87E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 70 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372842	4/21/2015 - 4/21/2015	Mn-54	<4.34E+00	0.00E+00	4.34E+00
		Co-58	<5.42E+00	0.00E+00	5.42E+00
		Fe-59	<9.12E+00	0.00E+00	9.12E+00
		Co-60	<5.79E+00	0.00E+00	5.79E+00
		Zn-65	<1.08E+01	0.00E+00	1.08E+01
		Zr-95	<7.05E+00	0.00E+00	7.05E+00
		Nb-95	<4.87E+00	0.00E+00	4.87E+00
		I-131	<6.98E+00	0.00E+00	6.98E+00
		Cs-134	<5.41E+00	0.00E+00	5.41E+00
		Cs-137	<5.13E+00	0.00E+00	5.13E+00
		BaLa-140	<7.63E+00	0.00E+00	7.63E+00
		Be-7	<4.65E+01	0.00E+00	4.65E+01
		K-40	<8.77E+01	0.00E+00	8.77E+01
		H3GW	<2.88E+01	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381919	7/21/2015 - 7/21/2015	Mn-54	<5.03E+00	0.00E+00	5.03E+00
		Co-58	<5.02E+00	0.00E+00	5.02E+00
		Fe-59	<1.03E+01	0.00E+00	1.03E+01
		Co-60	<4.93E+00	0.00E+00	4.93E+00
		Zn-65	<1.08E+01	0.00E+00	1.08E+01
		Zr-95	<8.73E+00	0.00E+00	8.73E+00
		Nb-95	<4.68E+00	0.00E+00	4.68E+00
		I-131	<5.63E+00	0.00E+00	5.63E+00
		Cs-134	<6.12E+00	0.00E+00	6.12E+00
		Cs-137	<4.49E+00	0.00E+00	4.49E+00
		BaLa-140	<7.71E+00	0.00E+00	7.71E+00
		Be-7	<3.50E+01	0.00E+00	3.50E+01
		K-40	8.84E+01	5.53E+01	7.62E+01
		H3GW	<1.17E+02	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392046	10/20/2015 - 10/20/2015	Mn-54	<4.83E+00	0.00E+00	4.83E+00
		Co-58	<5.37E+00	0.00E+00	5.37E+00
		Fe-59	<1.18E+01	0.00E+00	1.18E+01
		Co-60	<5.76E+00	0.00E+00	5.76E+00
		Zn-65	<1.21E+01	0.00E+00	1.21E+01
		Zr-95	<1.01E+01	0.00E+00	1.01E+01
		Nb-95	<3.20E+00	0.00E+00	3.20E+00
		I-131	<5.77E+00	0.00E+00	5.77E+00
		Cs-134	<6.11E+00	0.00E+00	6.11E+00
		Cs-137	<5.30E+00	0.00E+00	5.30E+00
		BaLa-140	<6.90E+00	0.00E+00	6.90E+00
		Be-7	<4.71E+01	0.00E+00	4.71E+01
		K-40	<9.16E+01	0.00E+00	9.16E+01
		H3GW	<9.99E+01	0.00E+00	1.78E+02

Sample Point 72 [INDICATOR - E @ 0.1 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364398	1/20/2015 - 1/20/2015	Mn-54	<5.59E+00	0.00E+00	5.59E+00
		Co-58	<5.77E+00	0.00E+00	5.77E+00
		Fe-59	<1.38E+01	0.00E+00	1.38E+01
		Co-60	<6.33E+00	0.00E+00	6.33E+00
		Zn-65	<1.30E+01	0.00E+00	1.30E+01
		Zr-95	<1.11E+01	0.00E+00	1.11E+01
		Nb-95	<6.06E+00	0.00E+00	6.06E+00
		I-131	<8.40E+00	0.00E+00	8.40E+00
		Cs-134	<7.46E+00	0.00E+00	7.46E+00
		Cs-137	<6.14E+00	0.00E+00	6.14E+00
		BaLa-140	<9.99E+00	0.00E+00	9.99E+00
		Be-7	<5.46E+01	0.00E+00	5.46E+01
		K-40	<9.71E+01	0.00E+00	9.71E+01
		H3GW	3.08E+02	1.18E+02	1.86E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 72 [INDICATOR - E @ 0.1 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372844	4/21/2015 - 4/21/2015	Mn-54	<6.64E+00	0.00E+00	6.64E+00
		Co-58	<5.44E+00	0.00E+00	5.44E+00
		Fe-59	<1.08E+01	0.00E+00	1.08E+01
		Co-60	<5.38E+00	0.00E+00	5.38E+00
		Zn-65	<1.15E+01	0.00E+00	1.15E+01
		Zr-95	<1.01E+01	0.00E+00	1.01E+01
		Nb-95	<6.01E+00	0.00E+00	6.01E+00
		I-131	<6.16E+00	0.00E+00	6.16E+00
		Cs-134	<7.11E+00	0.00E+00	7.11E+00
		Cs-137	<6.20E+00	0.00E+00	6.20E+00
		BaLa-140	<8.76E+00	0.00E+00	8.76E+00
		Be-7	<4.58E+01	0.00E+00	4.58E+01
		K-40	<1.03E+02	0.00E+00	1.03E+02
		H3GW	2.01E+02	1.17E+02	1.91E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381921	7/21/2015 - 7/21/2015	Mn-54	<5.34E+00	0.00E+00	5.34E+00
		Co-58	<6.26E+00	0.00E+00	6.26E+00
		Fe-59	<1.11E+01	0.00E+00	1.11E+01
		Co-60	<6.68E+00	0.00E+00	6.68E+00
		Zn-65	<1.11E+01	0.00E+00	1.11E+01
		Zr-95	<1.06E+01	0.00E+00	1.06E+01
		Nb-95	<6.10E+00	0.00E+00	6.10E+00
		I-131	<6.16E+00	0.00E+00	6.16E+00
		Cs-134	<7.24E+00	0.00E+00	7.24E+00
		Cs-137	<7.74E+00	0.00E+00	7.74E+00
		BaLa-140	<7.38E+00	0.00E+00	7.38E+00
		Be-7	<4.14E+01	0.00E+00	4.14E+01
		K-40	<1.15E+02	0.00E+00	1.15E+02
		H3GW	<1.21E+02	0.00E+00	1.88E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392048	10/19/2015 - 10/19/2015	Mn-54	<6.35E+00	0.00E+00	6.35E+00
		Co-58	<6.37E+00	0.00E+00	6.37E+00
		Fe-59	<7.25E+00	0.00E+00	7.25E+00
		Co-60	<5.27E+00	0.00E+00	5.27E+00
		Zn-65	<1.13E+01	0.00E+00	1.13E+01
		Zr-95	<9.90E+00	0.00E+00	9.90E+00
		Nb-95	<6.11E+00	0.00E+00	6.11E+00
		I-131	<8.05E+00	0.00E+00	8.05E+00
		Cs-134	<6.37E+00	0.00E+00	6.37E+00
		Cs-137	<6.45E+00	0.00E+00	6.45E+00
		BaLa-140	<6.17E+00	0.00E+00	6.17E+00
		Be-7	<4.48E+01	0.00E+00	4.48E+01
		K-40	<9.87E+01	0.00E+00	9.87E+01
		H3GW	<1.66E+02	0.00E+00	1.81E+02

Sample Point 73 [INDICATOR - ENE @ 0.11 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364399	1/20/2015 - 1/20/2015	Mn-54	<7.39E+00	0.00E+00	7.39E+00
		Co-58	<6.49E+00	0.00E+00	6.49E+00
		Fe-59	<1.42E+01	0.00E+00	1.42E+01
		Co-60	<9.64E+00	0.00E+00	9.64E+00
		Zn-65	<1.92E+01	0.00E+00	1.92E+01
		Zr-95	<1.17E+01	0.00E+00	1.17E+01
		Nb-95	<9.12E+00	0.00E+00	9.12E+00
		I-131	<7.92E+00	0.00E+00	7.92E+00
		Cs-134	<8.75E+00	0.00E+00	8.75E+00
		Cs-137	<7.37E+00	0.00E+00	7.37E+00
		BaLa-140	<7.74E+00	0.00E+00	7.74E+00
		Be-7	<4.83E+01	0.00E+00	4.83E+01
		K-40	3.13E+02	9.50E+01	8.63E+01
		H3GW	1.21E+03	1.46E+02	1.87E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 73 [INDICATOR - ENE @ 0.11 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372845	4/21/2015 - 4/21/2015	Mn-54	<4.79E+00	0.00E+00	4.79E+00
		Co-58	<5.20E+00	0.00E+00	5.20E+00
		Fe-59	<1.07E+01	0.00E+00	1.07E+01
		Co-60	<3.79E+00	0.00E+00	3.79E+00
		Zn-65	<8.63E+00	0.00E+00	8.63E+00
		Zr-95	<7.03E+00	0.00E+00	7.03E+00
		Nb-95	<5.06E+00	0.00E+00	5.06E+00
		I-131	<5.40E+00	0.00E+00	5.40E+00
		Cs-134	<5.39E+00	0.00E+00	5.39E+00
		Cs-137	<6.32E+00	0.00E+00	6.32E+00
		BaLa-140	<5.80E+00	0.00E+00	5.80E+00
		Be-7	<4.24E+01	0.00E+00	4.24E+01
		K-40	<7.69E+01	0.00E+00	7.69E+01
		H3GW	6.47E+02	1.30E+02	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381922	7/21/2015 - 7/21/2015	Mn-54	<4.53E+00	0.00E+00	4.53E+00
		Co-58	<6.84E+00	0.00E+00	6.84E+00
		Fe-59	<9.06E+00	0.00E+00	9.06E+00
		Co-60	<4.41E+00	0.00E+00	4.41E+00
		Zn-65	<1.14E+01	0.00E+00	1.14E+01
		Zr-95	<8.61E+00	0.00E+00	8.61E+00
		Nb-95	<5.89E+00	0.00E+00	5.89E+00
		I-131	<4.79E+00	0.00E+00	4.79E+00
		Cs-134	<6.26E+00	0.00E+00	6.26E+00
		Cs-137	<5.94E+00	0.00E+00	5.94E+00
		BaLa-140	<7.64E+00	0.00E+00	7.64E+00
		Be-7	<4.54E+01	0.00E+00	4.54E+01
		K-40	<1.03E+02	0.00E+00	1.03E+02
		H3GW	6.20E+02	1.27E+02	1.85E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392049	10/19/2015 - 10/19/2015	Mn-54	<5.97E+00	0.00E+00	5.97E+00
		Co-58	<6.33E+00	0.00E+00	6.33E+00
		Fe-59	<9.96E+00	0.00E+00	9.96E+00
		Co-60	<5.95E+00	0.00E+00	5.95E+00
		Zn-65	<1.05E+01	0.00E+00	1.05E+01
		Zr-95	<8.00E+00	0.00E+00	8.00E+00
		Nb-95	<6.03E+00	0.00E+00	6.03E+00
		I-131	<9.65E+00	0.00E+00	9.65E+00
		Cs-134	<5.79E+00	0.00E+00	5.79E+00
		Cs-137	<5.97E+00	0.00E+00	5.97E+00
		BaLa-140	<8.38E+00	0.00E+00	8.38E+00
		Be-7	<3.88E+01	0.00E+00	3.88E+01
		K-40	9.90E+01	5.20E+01	6.27E+01
		H3GW	9.12E+02	1.34E+02	1.82E+02

Sample Point 75 [INDICATOR - NE @ 0.05 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364580	1/20/2015 - 1/20/2015	Mn-54	<4.82E+00	0.00E+00	4.82E+00
		Co-58	<6.20E+00	0.00E+00	6.20E+00
		Fe-59	<1.10E+01	0.00E+00	1.10E+01
		Co-60	<4.93E+00	0.00E+00	4.93E+00
		Zn-65	<1.31E+01	0.00E+00	1.31E+01
		Zr-95	<1.02E+01	0.00E+00	1.02E+01
		Nb-95	<5.75E+00	0.00E+00	5.75E+00
		I-131	<6.75E+00	0.00E+00	6.75E+00
		Cs-134	<7.64E+00	0.00E+00	7.64E+00
		Cs-137	<3.99E+00	0.00E+00	3.99E+00
		BaLa-140	<6.17E+00	0.00E+00	6.17E+00
		Be-7	<4.43E+01	0.00E+00	4.43E+01
		K-40	5.89E+01	4.81E+01	7.11E+01
		H3GW	2.75E+02	1.18E+02	1.87E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 75 [INDICATOR - NE @ 0.05 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372849	4/21/2015 - 4/21/2015	Mn-54	<5.93E+00	0.00E+00	5.93E+00
		Co-58	<4.76E+00	0.00E+00	4.76E+00
		Fe-59	<1.03E+01	0.00E+00	1.03E+01
		Co-60	<6.15E+00	0.00E+00	6.15E+00
		Zn-65	<9.41E+00	0.00E+00	9.41E+00
		Zr-95	<9.00E+00	0.00E+00	9.00E+00
		Nb-95	<5.42E+00	0.00E+00	5.42E+00
		I-131	<5.88E+00	0.00E+00	5.88E+00
		Cs-134	<6.20E+00	0.00E+00	6.20E+00
		Cs-137	<6.41E+00	0.00E+00	6.41E+00
		BaLa-140	<8.77E+00	0.00E+00	8.77E+00
		Be-7	<4.82E+01	0.00E+00	4.82E+01
		K-40	1.26E+02	5.28E+01	5.18E+01
		H3GW	2.00E+02	1.17E+02	1.90E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381926	7/21/2015 - 7/21/2015	Mn-54	<5.09E+00	0.00E+00	5.09E+00
		Co-58	<4.88E+00	0.00E+00	4.88E+00
		Fe-59	<1.10E+01	0.00E+00	1.10E+01
		Co-60	<6.69E+00	0.00E+00	6.69E+00
		Zn-65	<1.12E+01	0.00E+00	1.12E+01
		Zr-95	<1.12E+01	0.00E+00	1.12E+01
		Nb-95	<5.80E+00	0.00E+00	5.80E+00
		I-131	<6.08E+00	0.00E+00	6.08E+00
		Cs-134	<7.08E+00	0.00E+00	7.08E+00
		Cs-137	<4.57E+00	0.00E+00	4.57E+00
		BaLa-140	<7.00E+00	0.00E+00	7.00E+00
		Be-7	<3.85E+01	0.00E+00	3.85E+01
		K-40	8.19E+01	4.64E+01	5.74E+01
		H3GW	2.23E+02	1.17E+02	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392053	10/19/2015 - 10/19/2015	Mn-54	<4.36E+00	0.00E+00	4.36E+00
		Co-58	<5.41E+00	0.00E+00	5.41E+00
		Fe-59	<1.03E+01	0.00E+00	1.03E+01
		Co-60	<5.76E+00	0.00E+00	5.76E+00
		Zn-65	<7.82E+00	0.00E+00	7.82E+00
		Zr-95	<8.26E+00	0.00E+00	8.26E+00
		Nb-95	<5.48E+00	0.00E+00	5.48E+00
		I-131	<7.99E+00	0.00E+00	7.99E+00
		Cs-134	<6.32E+00	0.00E+00	6.32E+00
		Cs-137	<5.66E+00	0.00E+00	5.66E+00
		BaLa-140	<6.24E+00	0.00E+00	6.24E+00
		Be-7	<4.95E+01	0.00E+00	4.95E+01
		K-40	<1.02E+02	0.00E+00	1.02E+02
		H3GW	<1.48E+02	0.00E+00	1.82E+02

Sample Point 76 [INDICATOR - N @ 0.49 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364581	1/21/2015 - 1/21/2015	Mn-54	<6.03E+00	0.00E+00	6.03E+00
		Co-58	<5.79E+00	0.00E+00	5.79E+00
		Fe-59	<1.02E+01	0.00E+00	1.02E+01
		Co-60	<6.17E+00	0.00E+00	6.17E+00
		Zn-65	<9.54E+00	0.00E+00	9.54E+00
		Zr-95	<8.64E+00	0.00E+00	8.64E+00
		Nb-95	<6.53E+00	0.00E+00	6.53E+00
		I-131	<8.05E+00	0.00E+00	8.05E+00
		Cs-134	<6.55E+00	0.00E+00	6.55E+00
		Cs-137	<4.25E+00	0.00E+00	4.25E+00
		BaLa-140	<9.12E+00	0.00E+00	9.12E+00
		Be-7	<4.13E+01	0.00E+00	4.13E+01
		K-40	<9.23E+01	0.00E+00	9.23E+01
		H3GW	<7.43E+01	0.00E+00	1.87E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 76 [INDICATOR - N @ 0.49 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372850	4/20/2015 - 4/20/2015	Mn-54	<5.35E+00	0.00E+00	5.35E+00
		Co-58	<4.18E+00	0.00E+00	4.18E+00
		Fe-59	<1.12E+01	0.00E+00	1.12E+01
		Co-60	<5.52E+00	0.00E+00	5.52E+00
		Zn-65	<8.89E+00	0.00E+00	8.89E+00
		Zr-95	<1.00E+01	0.00E+00	1.00E+01
		Nb-95	<6.36E+00	0.00E+00	6.36E+00
		I-131	<7.13E+00	0.00E+00	7.13E+00
		Cs-134	<6.86E+00	0.00E+00	6.86E+00
		Cs-137	<5.79E+00	0.00E+00	5.79E+00
		BaLa-140	<7.70E+00	0.00E+00	7.70E+00
		Be-7	<4.49E+01	0.00E+00	4.49E+01
		K-40	<9.48E+01	0.00E+00	9.48E+01
		H3GW	<3.36E+01	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381927	7/21/2015 - 7/21/2015	Mn-54	<6.30E+00	0.00E+00	6.30E+00
		Co-58	<4.88E+00	0.00E+00	4.88E+00
		Fe-59	<8.30E+00	0.00E+00	8.30E+00
		Co-60	<3.73E+00	0.00E+00	3.73E+00
		Zn-65	<1.06E+01	0.00E+00	1.06E+01
		Zr-95	<7.72E+00	0.00E+00	7.72E+00
		Nb-95	<4.75E+00	0.00E+00	4.75E+00
		I-131	<5.47E+00	0.00E+00	5.47E+00
		Cs-134	<5.72E+00	0.00E+00	5.72E+00
		Cs-137	<6.59E+00	0.00E+00	6.59E+00
		BaLa-140	<7.54E+00	0.00E+00	7.54E+00
		Be-7	<3.28E+01	0.00E+00	3.28E+01
		K-40	6.83E+01	5.88E+01	9.05E+01
		H3GW	<2.64E+01	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392054	10/20/2015 - 10/20/2015	Mn-54	<5.77E+00	0.00E+00	5.77E+00
		Co-58	<5.68E+00	0.00E+00	5.68E+00
		Fe-59	<9.09E+00	0.00E+00	9.09E+00
		Co-60	<7.02E+00	0.00E+00	7.02E+00
		Zn-65	<1.30E+01	0.00E+00	1.30E+01
		Zr-95	<9.17E+00	0.00E+00	9.17E+00
		Nb-95	<6.62E+00	0.00E+00	6.62E+00
		I-131	<8.34E+00	0.00E+00	8.34E+00
		Cs-134	<6.25E+00	0.00E+00	6.25E+00
		Cs-137	<6.77E+00	0.00E+00	6.77E+00
		BaLa-140	<7.86E+00	0.00E+00	7.86E+00
		Be-7	<4.06E+01	0.00E+00	4.06E+01
		K-40	3.02E+01	5.01E+01	8.49E+01
		H3GW	<6.31E+01	0.00E+00	1.82E+02

Sample Point 77 [INDICATOR - SSE @ 0.25 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364584	1/20/2015 - 1/20/2015	Mn-54	<7.02E+00	0.00E+00	7.02E+00
		Co-58	<6.76E+00	0.00E+00	6.76E+00
		Fe-59	<1.27E+01	0.00E+00	1.27E+01
		Co-60	<5.93E+00	0.00E+00	5.93E+00
		Zn-65	<1.60E+01	0.00E+00	1.60E+01
		Zr-95	<1.14E+01	0.00E+00	1.14E+01
		Nb-95	<6.47E+00	0.00E+00	6.47E+00
		I-131	<8.58E+00	0.00E+00	8.58E+00
		Cs-134	<7.85E+00	0.00E+00	7.85E+00
		Cs-137	<5.12E+00	0.00E+00	5.12E+00
		BaLa-140	<7.04E+00	0.00E+00	7.04E+00
		Be-7	<4.01E+01	0.00E+00	4.01E+01
		K-40	2.64E+02	8.82E+01	1.08E+02
		H3GW	4.41E+02	1.23E+02	1.87E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 77 [INDICATOR - SSE @ 0.25 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372853	4/21/2015 - 4/21/2015	Mn-54	<4.32E+00	0.00E+00	4.32E+00
		Co-58	<5.41E+00	0.00E+00	5.41E+00
		Fe-59	<1.26E+01	0.00E+00	1.26E+01
		Co-60	<4.39E+00	0.00E+00	4.39E+00
		Zn-65	<1.14E+01	0.00E+00	1.14E+01
		Zr-95	<9.06E+00	0.00E+00	9.06E+00
		Nb-95	<5.45E+00	0.00E+00	5.45E+00
		I-131	<5.48E+00	0.00E+00	5.48E+00
		Cs-134	<4.86E+00	0.00E+00	4.86E+00
		Cs-137	<4.47E+00	0.00E+00	4.47E+00
		BaLa-140	<9.06E+00	0.00E+00	9.06E+00
		Be-7	<4.62E+01	0.00E+00	4.62E+01
		K-40	<8.21E+01	0.00E+00	8.21E+01
		H3GW	2.09E+02	1.18E+02	1.91E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381930	7/21/2015 - 7/21/2015	Mn-54	<5.29E+00	0.00E+00	5.29E+00
		Co-58	<5.44E+00	0.00E+00	5.44E+00
		Fe-59	<1.10E+01	0.00E+00	1.10E+01
		Co-60	<5.80E+00	0.00E+00	5.80E+00
		Zn-65	<1.16E+01	0.00E+00	1.16E+01
		Zr-95	<6.29E+00	0.00E+00	6.29E+00
		Nb-95	<3.65E+00	0.00E+00	3.65E+00
		I-131	<7.97E+00	0.00E+00	7.97E+00
		Cs-134	<4.90E+00	0.00E+00	4.90E+00
		Cs-137	<5.69E+00	0.00E+00	5.69E+00
		BaLa-140	<6.32E+00	0.00E+00	6.32E+00
		Be-7	<3.42E+01	0.00E+00	3.42E+01
		K-40	7.43E+01	4.63E+01	6.03E+01
		H3GW	2.45E+02	1.17E+02	1.88E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392057	10/20/2015 - 10/20/2015	Mn-54	<5.65E+00	0.00E+00	5.65E+00
		Co-58	<3.92E+00	0.00E+00	3.92E+00
		Fe-59	<7.40E+00	0.00E+00	7.40E+00
		Co-60	<5.36E+00	0.00E+00	5.36E+00
		Zn-65	<1.27E+01	0.00E+00	1.27E+01
		Zr-95	<7.83E+00	0.00E+00	7.83E+00
		Nb-95	<5.70E+00	0.00E+00	5.70E+00
		I-131	<5.10E+00	0.00E+00	5.10E+00
		Cs-134	<5.15E+00	0.00E+00	5.15E+00
		Cs-137	<4.90E+00	0.00E+00	4.90E+00
		BaLa-140	<8.10E+00	0.00E+00	8.10E+00
		Be-7	<4.57E+01	0.00E+00	4.57E+01
		K-40	<8.94E+01	0.00E+00	8.94E+01
		H3GW	2.81E+02	1.15E+02	1.81E+02

Sample Point 78 [INDICATOR - SSE @ 0.17 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364585	1/20/2015 - 1/20/2015	Mn-54	<6.29E+00	0.00E+00	6.29E+00
		Co-58	<5.37E+00	0.00E+00	5.37E+00
		Fe-59	<8.81E+00	0.00E+00	8.81E+00
		Co-60	<6.33E+00	0.00E+00	6.33E+00
		Zn-65	<1.04E+01	0.00E+00	1.04E+01
		Zr-95	<1.04E+01	0.00E+00	1.04E+01
		Nb-95	<5.84E+00	0.00E+00	5.84E+00
		I-131	<6.24E+00	0.00E+00	6.24E+00
		Cs-134	<8.44E+00	0.00E+00	8.44E+00
		Cs-137	<6.62E+00	0.00E+00	6.62E+00
		BaLa-140	<4.32E+00	0.00E+00	4.32E+00
		Be-7	<3.84E+01	0.00E+00	3.84E+01
		K-40	<1.24E+02	0.00E+00	1.24E+02
		H3GW	<1.26E+02	0.00E+00	1.99E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 78 [INDICATOR - SSE @ 0.17 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372854	4/21/2015 - 4/21/2015	Mn-54	<5.78E+00	0.00E+00	5.78E+00
		Co-58	<5.40E+00	0.00E+00	5.40E+00
		Fe-59	<1.08E+01	0.00E+00	1.08E+01
		Co-60	<6.47E+00	0.00E+00	6.47E+00
		Zn-65	<8.63E+00	0.00E+00	8.63E+00
		Zr-95	<9.05E+00	0.00E+00	9.05E+00
		Nb-95	<5.44E+00	0.00E+00	5.44E+00
		I-131	<5.07E+00	0.00E+00	5.07E+00
		Cs-134	<5.60E+00	0.00E+00	5.60E+00
		Cs-137	<6.00E+00	0.00E+00	6.00E+00
		BaLa-140	<7.62E+00	0.00E+00	7.62E+00
		Be-7	<4.87E+01	0.00E+00	4.87E+01
		K-40	7.52E+01	3.92E+01	3.83E+01
		H3GW	<1.39E+02	0.00E+00	1.91E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381931	7/20/2015 - 7/20/2015	Mn-54	<6.38E+00	0.00E+00	6.38E+00
		Co-58	<5.12E+00	0.00E+00	5.12E+00
		Fe-59	<1.29E+01	0.00E+00	1.29E+01
		Co-60	<3.74E+00	0.00E+00	3.74E+00
		Zn-65	<8.58E+00	0.00E+00	8.58E+00
		Zr-95	<1.00E+01	0.00E+00	1.00E+01
		Nb-95	<4.52E+00	0.00E+00	4.52E+00
		I-131	<7.09E+00	0.00E+00	7.09E+00
		Cs-134	<6.38E+00	0.00E+00	6.38E+00
		Cs-137	<5.86E+00	0.00E+00	5.86E+00
		BaLa-140	<6.50E+00	0.00E+00	6.50E+00
		Be-7	<4.44E+01	0.00E+00	4.44E+01
		K-40	<1.03E+02	0.00E+00	1.03E+02
		H3GW	<8.35E+01	0.00E+00	1.95E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392058	10/20/2015 - 10/20/2015	Mn-54	<5.22E+00	0.00E+00	5.22E+00
		Co-58	<4.05E+00	0.00E+00	4.05E+00
		Fe-59	<9.70E+00	0.00E+00	9.70E+00
		Co-60	<6.13E+00	0.00E+00	6.13E+00
		Zn-65	<8.63E+00	0.00E+00	8.63E+00
		Zr-95	<8.69E+00	0.00E+00	8.69E+00
		Nb-95	<6.27E+00	0.00E+00	6.27E+00
		I-131	<5.78E+00	0.00E+00	5.78E+00
		Cs-134	<6.89E+00	0.00E+00	6.89E+00
		Cs-137	<6.16E+00	0.00E+00	6.16E+00
		BaLa-140	<7.10E+00	0.00E+00	7.10E+00
		Be-7	<4.62E+01	0.00E+00	4.62E+01
		K-40	<8.21E+01	0.00E+00	8.21E+01
		H3GW	<2.77E+01	0.00E+00	1.92E+02

Sample Point 79 [INDICATOR - N @ 1 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364577	1/20/2015 - 1/20/2015	Mn-54	<5.54E+00	0.00E+00	5.54E+00
		Co-58	<6.08E+00	0.00E+00	6.08E+00
		Fe-59	<7.12E+00	0.00E+00	7.12E+00
		Co-60	<5.52E+00	0.00E+00	5.52E+00
		Zn-65	<1.04E+01	0.00E+00	1.04E+01
		Zr-95	<1.02E+01	0.00E+00	1.02E+01
		Nb-95	<6.07E+00	0.00E+00	6.07E+00
		I-131	<5.13E+00	0.00E+00	5.13E+00
		Cs-134	<7.24E+00	0.00E+00	7.24E+00
		Cs-137	<5.79E+00	0.00E+00	5.79E+00
		BaLa-140	<5.98E+00	0.00E+00	5.98E+00
		Be-7	<4.62E+01	0.00E+00	4.62E+01
		K-40	<9.25E+01	0.00E+00	9.25E+01
		H3GW	1.60E+03	1.61E+02	1.99E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 79 [INDICATOR - N @ 1 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372846	4/20/2015 - 4/20/2015	Mn-54	<5.70E+00	0.00E+00	5.70E+00
		Co-58	<5.71E+00	0.00E+00	5.71E+00
		Fe-59	<1.23E+01	0.00E+00	1.23E+01
		Co-60	<6.38E+00	0.00E+00	6.38E+00
		Zn-65	<7.68E+00	0.00E+00	7.68E+00
		Zr-95	<8.12E+00	0.00E+00	8.12E+00
		Nb-95	<5.82E+00	0.00E+00	5.82E+00
		I-131	<9.43E+00	0.00E+00	9.43E+00
		Cs-134	<6.75E+00	0.00E+00	6.75E+00
		Cs-137	<5.17E+00	0.00E+00	5.17E+00
		BaLa-140	<7.42E+00	0.00E+00	7.42E+00
		Be-7	<4.41E+01	0.00E+00	4.41E+01
		K-40	9.11E+01	4.60E+01	5.12E+01
		H3GW	1.62E+03	1.56E+02	1.87E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381923	7/21/2015 - 7/21/2015	Mn-54	<4.93E+00	0.00E+00	4.93E+00
		Co-58	<5.28E+00	0.00E+00	5.28E+00
		Fe-59	<7.25E+00	0.00E+00	7.25E+00
		Co-60	<4.33E+00	0.00E+00	4.33E+00
		Zn-65	<1.13E+01	0.00E+00	1.13E+01
		Zr-95	<9.22E+00	0.00E+00	9.22E+00
		Nb-95	<6.12E+00	0.00E+00	6.12E+00
		I-131	<7.76E+00	0.00E+00	7.76E+00
		Cs-134	<6.93E+00	0.00E+00	6.93E+00
		Cs-137	<5.35E+00	0.00E+00	5.35E+00
		BaLa-140	<8.00E+00	0.00E+00	8.00E+00
		Be-7	<4.38E+01	0.00E+00	4.38E+01
		K-40	8.72E+01	6.26E+01	9.27E+01
		H3GW	1.26E+03	1.45E+02	1.96E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392050	10/20/2015 - 10/20/2015	Mn-54	<5.61E+00	0.00E+00	5.61E+00
		Co-58	<5.53E+00	0.00E+00	5.53E+00
		Fe-59	<1.18E+01	0.00E+00	1.18E+01
		Co-60	<6.83E+00	0.00E+00	6.83E+00
		Zn-65	<1.02E+01	0.00E+00	1.02E+01
		Zr-95	<1.03E+01	0.00E+00	1.03E+01
		Nb-95	<6.10E+00	0.00E+00	6.10E+00
		I-131	<5.62E+00	0.00E+00	5.62E+00
		Cs-134	<7.74E+00	0.00E+00	7.74E+00
		Cs-137	<5.25E+00	0.00E+00	5.25E+00
		BaLa-140	<8.45E+00	0.00E+00	8.45E+00
		Be-7	<5.34E+01	0.00E+00	5.34E+01
		K-40	<1.01E+02	0.00E+00	1.01E+02
		H3GW	1.47E+03	1.46E+02	1.89E+02

Sample Point 81 [INDICATOR - SSE @ 0.19 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364578	1/20/2015 - 1/20/2015	Mn-54	<4.95E+00	0.00E+00	4.95E+00
		Co-58	<5.32E+00	0.00E+00	5.32E+00
		Fe-59	<1.28E+01	0.00E+00	1.28E+01
		Co-60	<5.07E+00	0.00E+00	5.07E+00
		Zn-65	<1.30E+01	0.00E+00	1.30E+01
		Zr-95	<8.45E+00	0.00E+00	8.45E+00
		Nb-95	<6.59E+00	0.00E+00	6.59E+00
		I-131	<8.04E+00	0.00E+00	8.04E+00
		Cs-134	<4.99E+00	0.00E+00	4.99E+00
		Cs-137	<6.62E+00	0.00E+00	6.62E+00
		BaLa-140	<9.14E+00	0.00E+00	9.14E+00
		Be-7	<4.47E+01	0.00E+00	4.47E+01
		K-40	9.82E+01	6.23E+01	8.80E+01
		H3GW	3.64E+02	1.27E+02	1.99E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 81 [INDICATOR - SSE @ 0.19 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372847	4/21/2015 - 4/21/2015	Mn-54	<5.46E+00	0.00E+00	5.46E+00
		Co-58	<5.40E+00	0.00E+00	5.40E+00
		Fe-59	<1.29E+01	0.00E+00	1.29E+01
		Co-60	<6.48E+00	0.00E+00	6.48E+00
		Zn-65	<1.09E+01	0.00E+00	1.09E+01
		Zr-95	<1.19E+01	0.00E+00	1.19E+01
		Nb-95	<4.24E+00	0.00E+00	4.24E+00
		I-131	<7.00E+00	0.00E+00	7.00E+00
		Cs-134	<6.32E+00	0.00E+00	6.32E+00
		Cs-137	<6.00E+00	0.00E+00	6.00E+00
		BaLa-140	<1.79E+00	0.00E+00	1.79E+00
		Be-7	<4.65E+01	0.00E+00	4.65E+01
		K-40	<8.46E+01	0.00E+00	8.46E+01
		H3GW	5.00E+02	1.26E+02	1.88E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
381924	7/21/2015 - 7/21/2015	Mn-54	<6.27E+00	0.00E+00	6.27E+00
		Co-58	<6.90E+00	0.00E+00	6.90E+00
		Fe-59	<1.45E+01	0.00E+00	1.45E+01
		Co-60	<7.64E+00	0.00E+00	7.64E+00
		Zn-65	<1.44E+01	0.00E+00	1.44E+01
		Zr-95	<9.94E+00	0.00E+00	9.94E+00
		Nb-95	<7.00E+00	0.00E+00	7.00E+00
		I-131	<6.89E+00	0.00E+00	6.89E+00
		Cs-134	<7.61E+00	0.00E+00	7.61E+00
		Cs-137	<5.22E+00	0.00E+00	5.22E+00
		BaLa-140	<1.01E+01	0.00E+00	1.01E+01
		Be-7	<4.02E+01	0.00E+00	4.02E+01
		K-40	1.34E+02	6.15E+01	7.33E+01
		H3GW	1.06E+03	1.39E+02	1.94E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392051	10/20/2015 - 10/20/2015	Mn-54	<6.10E+00	0.00E+00	6.10E+00
		Co-58	<5.51E+00	0.00E+00	5.51E+00
		Fe-59	<9.91E+00	0.00E+00	9.91E+00
		Co-60	<5.94E+00	0.00E+00	5.94E+00
		Zn-65	<1.23E+01	0.00E+00	1.23E+01
		Zr-95	<1.14E+01	0.00E+00	1.14E+01
		Nb-95	<6.22E+00	0.00E+00	6.22E+00
		I-131	<5.77E+00	0.00E+00	5.77E+00
		Cs-134	<6.45E+00	0.00E+00	6.45E+00
		Cs-137	<5.79E+00	0.00E+00	5.79E+00
		BaLa-140	<7.24E+00	0.00E+00	7.24E+00
		Be-7	<4.43E+01	0.00E+00	4.43E+01
		K-40	<1.10E+02	0.00E+00	1.10E+02
		H3GW	9.02E+02	1.31E+02	1.86E+02

Sample Point 82 [INDICATOR - SSE @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364579	1/20/2015 - 1/20/2015	Alpha	1.14E+00	5.27E-01	6.54E-01
		Beta	6.51E-01	7.44E-01	1.23E+00
		Mn-54	<4.78E+00	0.00E+00	4.78E+00
		Co-58	<4.52E+00	0.00E+00	4.52E+00
		Fe-59	<1.13E+01	0.00E+00	1.13E+01
		Co-60	<5.80E+00	0.00E+00	5.80E+00
		Zn-65	<9.53E+00	0.00E+00	9.53E+00
		Zr-95	<6.83E+00	0.00E+00	6.83E+00
		Nb-95	<4.97E+00	0.00E+00	4.97E+00
		I-131	<7.03E+00	0.00E+00	7.03E+00
		Cs-134	<5.87E+00	0.00E+00	5.87E+00
		Cs-137	<5.21E+00	0.00E+00	5.21E+00
		BaLa-140	<7.11E+00	0.00E+00	7.11E+00
		Be-7	<3.37E+01	0.00E+00	3.37E+01
		K-40	<6.93E+01	0.00E+00	6.93E+01
		LLI-131	<4.61E-01	0.00E+00	4.61E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 82 [INDICATOR - SSE @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
364579	1/20/2015 - 1/20/2015	H3GW	<-8.9E+01	0.00E+00	1.99E+02
372381	3/6/2015 - 3/6/2015	Alpha	8.63E-01	6.91E-01	1.09E+00
		Beta	1.16E+00	7.92E-01	1.28E+00
		Mn-54	<6.17E+00	0.00E+00	6.17E+00
		Co-58	<5.15E+00	0.00E+00	5.15E+00
		Fe-59	<1.02E+01	0.00E+00	1.02E+01
		Co-60	<7.00E+00	0.00E+00	7.00E+00
		Zn-65	<1.23E+01	0.00E+00	1.23E+01
		Zr-95	<1.11E+01	0.00E+00	1.11E+01
		Nb-95	<5.27E+00	0.00E+00	5.27E+00
		I-131	<5.47E+00	0.00E+00	5.47E+00
		Cs-134	<5.74E+00	0.00E+00	5.74E+00
		Cs-137	<4.79E+00	0.00E+00	4.79E+00
		BaLa-140	<9.12E+00	0.00E+00	9.12E+00
		Be-7	<4.33E+01	0.00E+00	4.33E+01
		K-40	8.64E+01	4.97E+01	6.39E+01
		LLI-131	<6.24E-01	0.00E+00	6.24E-01
		H3GW	<9.76E+00	0.00E+00	1.84E+02
372848	4/21/2015 - 4/21/2015	Beta	1.67E+00	7.32E-01	1.12E+00
		Mn-54	<7.07E+00	0.00E+00	7.07E+00
		Co-58	<6.58E+00	0.00E+00	6.58E+00
		Fe-59	<1.29E+01	0.00E+00	1.29E+01
		Co-60	<6.68E+00	0.00E+00	6.68E+00
		Zn-65	<1.57E+01	0.00E+00	1.57E+01
		Zr-95	<1.14E+01	0.00E+00	1.14E+01
		Nb-95	<8.14E+00	0.00E+00	8.14E+00
		I-131	<7.64E+00	0.00E+00	7.64E+00
		Cs-134	<7.61E+00	0.00E+00	7.61E+00
		Cs-137	<7.61E+00	0.00E+00	7.61E+00
		BaLa-140	<7.27E+00	0.00E+00	7.27E+00
		Be-7	<4.43E+01	0.00E+00	4.43E+01
		K-40	8.72E+01	7.40E+01	1.15E+02
		LLI-131	<5.09E-01	0.00E+00	5.09E-01
		H3GW	<4.8E+00	0.00E+00	1.86E+02
381925	7/21/2015 - 7/21/2015	Beta	1.06E+00	7.61E-01	1.23E+00
		Mn-54	<4.80E+00	0.00E+00	4.80E+00
		Co-58	<5.96E+00	0.00E+00	5.96E+00
		Fe-59	<1.14E+01	0.00E+00	1.14E+01
		Co-60	<4.92E+00	0.00E+00	4.92E+00
		Zn-65	<9.50E+00	0.00E+00	9.50E+00
		Zr-95	<9.72E+00	0.00E+00	9.72E+00
		Nb-95	<6.02E+00	0.00E+00	6.02E+00
		I-131	<8.06E+00	0.00E+00	8.06E+00
		Cs-134	<4.55E+00	0.00E+00	4.55E+00
		Cs-137	<6.11E+00	0.00E+00	6.11E+00
		BaLa-140	<1.12E+01	0.00E+00	1.12E+01
		Be-7	<4.70E+01	0.00E+00	4.70E+01
		K-40	7.52E+01	5.68E+01	8.39E+01
		LLI-131	<4.14E-01	0.00E+00	4.14E-01
		H3GW	<-6.2E+01	0.00E+00	1.94E+02
392052	10/20/2015 - 10/20/2015	Beta	<3.56E-01	0.00E+00	1.43E+00
		Mn-54	<5.07E+00	0.00E+00	5.07E+00
		Co-58	<5.63E+00	0.00E+00	5.63E+00
		Fe-59	<1.03E+01	0.00E+00	1.03E+01
		Co-60	<6.06E+00	0.00E+00	6.06E+00
		Zn-65	<9.32E+00	0.00E+00	9.32E+00
		Zr-95	<1.06E+01	0.00E+00	1.06E+01
		Nb-95	<5.56E+00	0.00E+00	5.56E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: GROUND WATER Concentration (Activity): pCi/l

Sample Point 82 [INDICATOR - SSE @ 0.3 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
392052	10/20/2015 - 10/20/2015	I-131	<5.83E+00	0.00E+00	5.83E+00
		Cs-134	<6.06E+00	0.00E+00	6.06E+00
		Cs-137	<5.28E+00	0.00E+00	5.28E+00
		BaLa-140	<7.81E+00	0.00E+00	7.81E+00
		Be-7	<5.00E+01	0.00E+00	5.00E+01
		K-40	3.13E+01	4.70E+01	7.84E+01
		LLI-131	<7.58E-01	0.00E+00	7.58E-01
		H3GW	<-7.8E+01	0.00E+00	1.90E+02

Media Type: SEDIMENT_BOTTOM Concentration (Activity): pCi/kg dry

Sample Point 41 [CONTROL - NNW @ 7.2 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380355	5/18/2015 - 5/18/2015	Mn-54	<4.05E+01	0.00E+00	4.05E+01
		Co-58	<3.95E+01	0.00E+00	3.95E+01
		Fe-59	<7.19E+01	0.00E+00	7.19E+01
		Co-60	<3.62E+01	0.00E+00	3.62E+01
		Zn-65	<7.10E+01	0.00E+00	7.10E+01
		Zr-95	<6.29E+01	0.00E+00	6.29E+01
		Nb-95	<4.45E+01	0.00E+00	4.45E+01
		I-131	<1.19E+02	0.00E+00	1.19E+02
		Cs-134	<6.90E+01	0.00E+00	6.90E+01
		Cs-137	5.88E+01	3.60E+01	5.39E+01
		Be-7	<3.25E+02	0.00E+00	3.25E+02
		K-40	2.13E+03	4.99E+02	3.66E+02
		Co-57	<3.19E+01	0.00E+00	3.19E+01
		Mo-99	<9.15E+03	0.00E+00	9.15E+03
		Ag-110M	<2.99E+01	0.00E+00	2.99E+01
		Sb-122	<1.75E+03	0.00E+00	1.75E+03
		Sb-125	<9.30E+01	0.00E+00	9.30E+01

Sample Point 45 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380345	5/20/2015 - 5/20/2015	Mn-54	<1.22E+01	0.00E+00	1.22E+01
		Co-58	<1.11E+01	0.00E+00	1.11E+01
		Fe-59	<2.04E+01	0.00E+00	2.04E+01
		Co-60	<9.97E+00	0.00E+00	9.97E+00
		Zn-65	<2.34E+01	0.00E+00	2.34E+01
		Zr-95	<1.84E+01	0.00E+00	1.84E+01
		Nb-95	<1.06E+01	0.00E+00	1.06E+01
		I-131	<2.59E+01	0.00E+00	2.59E+01
		Cs-134	<1.61E+01	0.00E+00	1.61E+01
		Cs-137	<1.27E+01	0.00E+00	1.27E+01
		Be-7	6.50E+01	9.22E+01	1.53E+02
		K-40	<2.03E+02	0.00E+00	2.03E+02
		Co-57	<9.47E+00	0.00E+00	9.47E+00
		Mo-99	<2.11E+03	0.00E+00	2.11E+03
		Ag-110M	<7.35E+00	0.00E+00	7.35E+00
		Sb-122	<3.63E+02	0.00E+00	3.63E+02
		Sb-125	<2.21E+01	0.00E+00	2.21E+01

Sample Point 46 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380349	5/21/2015 - 5/21/2015	Mn-54	<2.17E+01	0.00E+00	2.17E+01
		Co-58	<2.35E+01	0.00E+00	2.35E+01
		Fe-59	<4.47E+01	0.00E+00	4.47E+01
		Co-60	7.49E+01	2.45E+01	3.45E+01
		Zn-65	<4.32E+01	0.00E+00	4.32E+01
		Zr-95	<6.09E+01	0.00E+00	6.09E+01
		Nb-95	<2.50E+01	0.00E+00	2.50E+01
		I-131	<6.80E+01	0.00E+00	6.80E+01
		Cs-134	<3.59E+01	0.00E+00	3.59E+01
		Cs-137	3.21E+02	3.96E+01	2.79E+01
		Be-7	2.12E+01	1.58E+02	2.67E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SEDIMENT_BOTTOM Concentration (Activity): pCi/kg dry

Sample Point 46 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380349	5/21/2015 - 5/21/2015	K-40	2.15E+03	2.88E+02	2.49E+02
		Co-57	<1.84E+01	0.00E+00	1.84E+01
		Mo-99	<5.04E+03	0.00E+00	5.04E+03
		Ag-110M	<1.91E+01	0.00E+00	1.91E+01
		Sb-122	<8.73E+02	0.00E+00	8.73E+02
		Sb-125	<5.59E+01	0.00E+00	5.59E+01

Sample Point 66 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380353	5/21/2015 - 5/21/2015	Mn-54	<1.23E+01	0.00E+00	1.23E+01
		Co-58	<9.49E+00	0.00E+00	9.49E+00
		Fe-59	<1.65E+01	0.00E+00	1.65E+01
		Co-60	<8.16E+00	0.00E+00	8.16E+00
		Zn-65	<1.47E+01	0.00E+00	1.47E+01
		Zr-95	<3.22E+01	0.00E+00	3.22E+01
		Nb-95	<1.34E+01	0.00E+00	1.34E+01
		I-131	<2.48E+01	0.00E+00	2.48E+01
		Cs-134	<1.61E+01	0.00E+00	1.61E+01
		Cs-137	4.40E+00	4.01E+00	1.03E+01
		Be-7	1.58E+02	9.08E+01	1.44E+02
		K-40	6.67E+02	1.26E+02	1.37E+02
		Co-57	<1.05E+01	0.00E+00	1.05E+01
		Mo-99	<1.50E+03	0.00E+00	1.50E+03
		Ag-110M	<9.43E+00	0.00E+00	9.43E+00
		Sb-122	<2.28E+02	0.00E+00	2.28E+02
		Sb-125	<2.61E+01	0.00E+00	2.61E+01

Media Type: SEDIMENT_SHORE Concentration (Activity): pCi/kg dry

Sample Point 44 [INDICATOR - NNE @ 1.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
371752	2/19/2015 - 2/19/2015	Mn-54	<6.65E+00	0.00E+00	6.65E+00
		Co-58	<5.68E+00	0.00E+00	5.68E+00
		Fe-59	<1.15E+01	0.00E+00	1.15E+01
		Co-60	<5.76E+00	0.00E+00	5.76E+00
		Zn-65	<1.18E+01	0.00E+00	1.18E+01
		Zr-95	<1.24E+01	0.00E+00	1.24E+01
		Nb-95	<8.47E+00	0.00E+00	8.47E+00
		I-131	<1.50E+01	0.00E+00	1.50E+01
		Cs-134	<1.02E+01	0.00E+00	1.02E+01
		Cs-137	3.23E+01	5.28E+00	7.30E+00
		Be-7	8.13E+01	5.64E+01	9.08E+01
		K-40	2.31E+03	2.26E+02	1.02E+02
		Co-57	<5.94E+00	0.00E+00	5.94E+00
		Mo-99	<8.90E+02	0.00E+00	8.90E+02
		Ag-110M	<5.75E+00	0.00E+00	5.75E+00
		Sb-122	<1.62E+02	0.00E+00	1.62E+02
		Sb-125	<1.57E+01	0.00E+00	1.57E+01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
387490	8/20/2015 - 8/20/2015	Mn-54	<1.39E+01	0.00E+00	1.39E+01
		Co-58	<8.21E+00	0.00E+00	8.21E+00
		Fe-59	<1.67E+01	0.00E+00	1.67E+01
		Co-60	<7.83E+00	0.00E+00	7.83E+00
		Zn-65	<2.25E+01	0.00E+00	2.25E+01
		Zr-95	<1.99E+01	0.00E+00	1.99E+01
		Nb-95	<1.46E+01	0.00E+00	1.46E+01
		I-131	<1.73E+01	0.00E+00	1.73E+01
		Cs-134	<1.60E+01	0.00E+00	1.60E+01
		Cs-137	<1.28E+01	0.00E+00	1.28E+01
		Be-7	<1.27E+02	0.00E+00	1.27E+02
		K-40	1.04E+02	1.02E+02	1.56E+02
		Co-57	<8.60E+00	0.00E+00	8.60E+00
		Mo-99	<6.45E+02	0.00E+00	6.45E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SEDIMENT_SHORE Concentration (Activity): pCi/kg dry

Sample Point 44 [INDICATOR - NNE @ 1.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
387490	8/20/2015 - 8/20/2015	Ag-110M	<8.37E+00	0.00E+00	8.37E+00
		Sb-122	<9.19E+01	0.00E+00	9.19E+01
		Sb-125	<2.55E+01	0.00E+00	2.55E+01

Sample Point 57 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
371753	2/19/2015 - 2/19/2015	Mn-54	<1.00E+01	0.00E+00	1.00E+01
		Co-58	<1.12E+01	0.00E+00	1.12E+01
		Fe-59	<2.12E+01	0.00E+00	2.12E+01
		Co-60	<8.38E+00	0.00E+00	8.38E+00
		Zn-65	<1.93E+01	0.00E+00	1.93E+01
		Zr-95	<1.54E+01	0.00E+00	1.54E+01
		Nb-95	<9.36E+00	0.00E+00	9.36E+00
		I-131	<1.62E+01	0.00E+00	1.62E+01
		Cs-134	<1.22E+01	0.00E+00	1.22E+01
		Cs-137	<7.88E+00	0.00E+00	7.88E+00
		Be-7	<8.52E+01	0.00E+00	8.52E+01
		K-40	<1.82E+02	0.00E+00	1.82E+02
		Co-57	<8.21E+00	0.00E+00	8.21E+00
		Mo-99	<9.88E+02	0.00E+00	9.88E+02
		Ag-110M	<7.19E+00	0.00E+00	7.19E+00
		Sb-122	<1.08E+02	0.00E+00	1.08E+02
		Sb-125	<1.75E+01	0.00E+00	1.75E+01

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
387491	8/20/2015 - 8/20/2015	Mn-54	<2.12E+01	0.00E+00	2.12E+01
		Co-58	<1.62E+01	0.00E+00	1.62E+01
		Fe-59	<3.22E+01	0.00E+00	3.22E+01
		Co-60	<1.68E+01	0.00E+00	1.68E+01
		Zn-65	<3.70E+01	0.00E+00	3.70E+01
		Zr-95	<5.20E+01	0.00E+00	5.20E+01
		Nb-95	<2.19E+01	0.00E+00	2.19E+01
		I-131	<2.98E+01	0.00E+00	2.98E+01
		Cs-134	<2.99E+01	0.00E+00	2.99E+01
		Cs-137	<1.88E+01	0.00E+00	1.88E+01
		Be-7	<1.40E+02	0.00E+00	1.40E+02
		K-40	1.41E+04	1.23E+03	2.88E+02
		Co-57	<2.88E+01	0.00E+00	2.88E+01
		Mo-99	<7.81E+02	0.00E+00	7.81E+02
		Ag-110M	<1.75E+01	0.00E+00	1.75E+01
		Sb-122	<1.19E+02	0.00E+00	1.19E+02
		Sb-125	<4.69E+01	0.00E+00	4.69E+01

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 40 [INDICATOR - ESE @ 0.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369616	1/6/2015 - 1/27/2015	Mn-54	<1.14E+00	0.00E+00	1.14E+00
		Co-58	<1.53E+00	0.00E+00	1.53E+00
		Fe-59	<3.06E+00	0.00E+00	3.06E+00
		Co-60	<1.31E+00	0.00E+00	1.31E+00
		Zn-65	<2.48E+00	0.00E+00	2.48E+00
		Zr-95	<2.64E+00	0.00E+00	2.64E+00
		Nb-95	<2.10E+00	0.00E+00	2.10E+00
		I-131	<1.05E+01	0.00E+00	1.05E+01
		Cs-134	<1.34E+00	0.00E+00	1.34E+00
		Cs-137	<1.27E+00	0.00E+00	1.27E+00
		BaLa-140	<4.71E+00	0.00E+00	4.71E+00
		Be-7	<1.31E+01	0.00E+00	1.31E+01
		K-40	3.66E+01	1.41E+01	2.02E+01
		H3SW	4.37E+02	1.28E+02	1.96E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372347	1/27/2015 - 2/23/2015	Mn-54	<1.64E+00	0.00E+00	1.64E+00
		Co-58	<1.83E+00	0.00E+00	1.83E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 40 [INDICATOR - ESE @ 0.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372347	1/27/2015 - 2/23/2015	Fe-59	<3.98E+00	0.00E+00	3.98E+00
		Co-60	<1.43E+00	0.00E+00	1.43E+00
		Zn-65	<3.71E+00	0.00E+00	3.71E+00
		Zr-95	<3.80E+00	0.00E+00	3.80E+00
		Nb-95	<2.42E+00	0.00E+00	2.42E+00
		I-131	<1.19E+01	0.00E+00	1.19E+01
		Cs-134	<1.88E+00	0.00E+00	1.88E+00
		Cs-137	<1.70E+00	0.00E+00	1.70E+00
		BaLa-140	<6.17E+00	0.00E+00	6.17E+00
		Be-7	<1.78E+01	0.00E+00	1.78E+01
		K-40	3.79E+01	1.70E+01	2.37E+01
		H3SW	1.30E+03	1.37E+02	1.79E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
376695	2/23/2015 - 4/7/2015	Mn-54	<8.98E-01	0.00E+00	8.98E-01
		Co-58	<1.10E+00	0.00E+00	1.10E+00
		Fe-59	<2.46E+00	0.00E+00	2.46E+00
		Co-60	<9.15E-01	0.00E+00	9.15E-01
		Zn-65	<1.97E+00	0.00E+00	1.97E+00
		Zr-95	<2.02E+00	0.00E+00	2.02E+00
		Nb-95	<1.59E+00	0.00E+00	1.59E+00
		I-131	<1.07E+01	0.00E+00	1.07E+01
		Cs-134	<1.04E+00	0.00E+00	1.04E+00
		Cs-137	<9.77E-01	0.00E+00	9.77E-01
		BaLa-140	<4.28E+00	0.00E+00	4.28E+00
		Be-7	<1.04E+01	0.00E+00	1.04E+01
		K-40	4.60E+01	1.10E+01	1.37E+01
H3SW	2.47E+03	1.78E+02	1.88E+02		

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
378897	4/7/2015 - 4/28/2015	Mn-54	<1.23E+00	0.00E+00	1.23E+00
		Co-58	<1.54E+00	0.00E+00	1.54E+00
		Fe-59	<3.18E+00	0.00E+00	3.18E+00
		Co-60	<1.40E+00	0.00E+00	1.40E+00
		Zn-65	<2.62E+00	0.00E+00	2.62E+00
		Zr-95	<2.37E+00	0.00E+00	2.37E+00
		Nb-95	<2.00E+00	0.00E+00	2.00E+00
		I-131	<9.30E+00	0.00E+00	9.30E+00
		Cs-134	<1.26E+00	0.00E+00	1.26E+00
		Cs-137	<1.33E+00	0.00E+00	1.33E+00
		BaLa-140	<5.17E+00	0.00E+00	5.17E+00
		Be-7	<1.51E+01	0.00E+00	1.51E+01
		K-40	3.98E+01	1.34E+01	1.76E+01
H3SW	3.43E+03	1.82E+02	1.89E+02		

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380730	4/28/2015 - 5/25/2015	Mn-54	<1.39E+00	0.00E+00	1.39E+00
		Co-58	<1.37E+00	0.00E+00	1.37E+00
		Fe-59	<3.35E+00	0.00E+00	3.35E+00
		Co-60	<1.67E+00	0.00E+00	1.67E+00
		Zn-65	<3.07E+00	0.00E+00	3.07E+00
		Zr-95	<2.88E+00	0.00E+00	2.88E+00
		Nb-95	<2.02E+00	0.00E+00	2.02E+00
		I-131	<9.82E+00	0.00E+00	9.82E+00
		Cs-134	<1.69E+00	0.00E+00	1.69E+00
		Cs-137	<1.57E+00	0.00E+00	1.57E+00
		BaLa-140	<7.26E+00	0.00E+00	7.26E+00
		Be-7	<1.86E+01	0.00E+00	1.86E+01
		K-40	4.51E+01	1.56E+01	1.95E+01
H3SW	4.33E+03	1.96E+02	1.81E+02		

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
383442	5/25/2015 - 6/29/2015	Mn-54	<7.28E-01	0.00E+00	7.28E-01
		Co-58	<8.72E-01	0.00E+00	8.72E-01
		Fe-59	<1.97E+00	0.00E+00	1.97E+00
		Co-60	<6.69E-01	0.00E+00	6.69E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 40 [INDICATOR - ESE @ 0.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
383442	5/25/2015 - 6/29/2015	Zn-65	<1.52E+00	0.00E+00	1.52E+00
		Zr-95	<1.70E+00	0.00E+00	1.70E+00
		Nb-95	<1.88E+00	0.00E+00	1.88E+00
		I-131	<1.08E+01	0.00E+00	1.08E+01
		Cs-134	<8.08E-01	0.00E+00	8.08E-01
		Cs-137	<7.72E-01	0.00E+00	7.72E-01
		BaLa-140	<3.85E+00	0.00E+00	3.85E+00
		Be-7	<8.28E+00	0.00E+00	8.28E+00
		K-40	4.86E+01	8.89E+00	1.00E+01
		H3SW	4.48E+03	2.15E+02	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
385865	6/29/2015 - 7/27/2015	Mn-54	<9.59E-01	0.00E+00	9.59E-01
		Co-58	<1.03E+00	0.00E+00	1.03E+00
		Fe-59	<2.54E+00	0.00E+00	2.54E+00
		Co-60	<9.30E-01	0.00E+00	9.30E-01
		Zn-65	<1.88E+00	0.00E+00	1.88E+00
		Zr-95	<2.09E+00	0.00E+00	2.09E+00
		Nb-95	<1.71E+00	0.00E+00	1.71E+00
		I-131	<1.10E+01	0.00E+00	1.10E+01
		Cs-134	<1.02E+00	0.00E+00	1.02E+00
		Cs-137	<1.01E+00	0.00E+00	1.01E+00
		BaLa-140	<3.94E+00	0.00E+00	3.94E+00
		Be-7	<1.06E+01	0.00E+00	1.06E+01
		K-40	4.26E+01	1.13E+01	1.48E+01
		H3SW	3.71E+03	1.85E+02	1.85E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
389746	7/27/2015 - 9/1/2015	Mn-54	<8.50E-01	0.00E+00	8.50E-01
		Co-58	<1.05E+00	0.00E+00	1.05E+00
		Fe-59	<2.52E+00	0.00E+00	2.52E+00
		Co-60	<8.53E-01	0.00E+00	8.53E-01
		Zn-65	<1.95E+00	0.00E+00	1.95E+00
		Zr-95	<2.03E+00	0.00E+00	2.03E+00
		Nb-95	<1.47E+00	0.00E+00	1.47E+00
		I-131	<1.20E+01	0.00E+00	1.20E+01
		Cs-134	<9.19E-01	0.00E+00	9.19E-01
		Cs-137	<9.09E-01	0.00E+00	9.09E-01
		BaLa-140	<4.96E+00	0.00E+00	4.96E+00
		Be-7	<1.05E+01	0.00E+00	1.05E+01
		K-40	5.37E+01	1.20E+01	1.50E+01
		H3SW	3.14E+03	1.91E+02	1.97E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
393513	9/1/2015 - 9/29/2015	Mn-54	<8.84E-01	0.00E+00	8.84E-01
		Co-58	<1.12E+00	0.00E+00	1.12E+00
		Fe-59	<1.63E+00	0.00E+00	1.63E+00
		Co-60	<9.10E-01	0.00E+00	9.10E-01
		Zn-65	<1.79E+00	0.00E+00	1.79E+00
		Zr-95	<1.92E+00	0.00E+00	1.92E+00
		Nb-95	<1.57E+00	0.00E+00	1.57E+00
		I-131	<1.16E+01	0.00E+00	1.16E+01
		Cs-134	<1.01E+00	0.00E+00	1.01E+00
		Cs-137	<9.65E-01	0.00E+00	9.65E-01
		BaLa-140	<4.29E+00	0.00E+00	4.29E+00
		Be-7	<1.02E+01	0.00E+00	1.02E+01
		K-40	4.47E+01	2.04E+01	1.10E+01
		H3SW	3.02E+03	1.86E+02	1.90E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395560	9/29/2015 - 10/27/2015	Mn-54	<1.87E+00	0.00E+00	1.87E+00
		Co-58	<2.64E+00	0.00E+00	2.64E+00
		Fe-59	<4.60E+00	0.00E+00	4.60E+00
		Co-60	<2.35E+00	0.00E+00	2.35E+00
		Zn-65	<4.84E+00	0.00E+00	4.84E+00
		Zr-95	<4.57E+00	0.00E+00	4.57E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 40 [INDICATOR - ESE @ 0.6 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395560	9/29/2015 - 10/27/2015	Nb-95	<3.08E+00	0.00E+00	3.08E+00
		I-131	<1.14E+01	0.00E+00	1.14E+01
		Cs-134	<2.76E+00	0.00E+00	2.76E+00
		Cs-137	<2.40E+00	0.00E+00	2.40E+00
		BaLa-140	<7.89E+00	0.00E+00	7.89E+00
		Be-7	<2.32E+01	0.00E+00	2.32E+01
		K-40	4.29E+01	2.23E+01	2.93E+01
		H3SW	1.53E+03	1.51E+02	1.84E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397152	10/27/2015 - 11/30/2015	Mn-54	<2.29E+00	0.00E+00	2.29E+00
		Co-58	<2.79E+00	0.00E+00	2.79E+00
		Fe-59	<4.74E+00	0.00E+00	4.74E+00
		Co-60	<2.35E+00	0.00E+00	2.35E+00
		Zn-65	<3.62E+00	0.00E+00	3.62E+00
		Zr-95	<4.66E+00	0.00E+00	4.66E+00
		Nb-95	<3.26E+00	0.00E+00	3.26E+00
		I-131	<1.17E+01	0.00E+00	1.17E+01
		Cs-134	<1.87E+00	0.00E+00	1.87E+00
		Cs-137	<2.38E+00	0.00E+00	2.38E+00
		BaLa-140	<7.76E+00	0.00E+00	7.76E+00
		Be-7	<1.78E+01	0.00E+00	1.78E+01
		K-40	4.10E+01	2.48E+01	3.62E+01
		H3SW	1.04E+03	1.38E+02	1.84E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398820	11/30/2015 - 12/28/2015	Mn-54	<9.55E-01	0.00E+00	9.55E-01
		Co-58	<1.33E+00	0.00E+00	1.33E+00
		Fe-59	<3.23E+00	0.00E+00	3.23E+00
		Co-60	<1.01E+00	0.00E+00	1.01E+00
		Zn-65	<2.11E+00	0.00E+00	2.11E+00
		Zr-95	<2.90E+00	0.00E+00	2.90E+00
		Nb-95	<1.81E+00	0.00E+00	1.81E+00
		I-131	<1.19E+01	0.00E+00	1.19E+01
		Cs-134	<1.12E+00	0.00E+00	1.12E+00
		Cs-137	<1.11E+00	0.00E+00	1.11E+00
		BaLa-140	<5.56E+00	0.00E+00	5.56E+00
		Be-7	<1.10E+01	0.00E+00	1.10E+01
		K-40	4.19E+01	1.36E+01	1.86E+01
		H3SW	1.87E+03	1.54E+02	1.76E+02

Sample Point 41 [CONTROL - N @ 8 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369617	1/6/2015 - 1/27/2015	Mn-54	<1.16E+00	0.00E+00	1.16E+00
		Co-58	<1.45E+00	0.00E+00	1.45E+00
		Fe-59	<2.99E+00	0.00E+00	2.99E+00
		Co-60	<1.06E+00	0.00E+00	1.06E+00
		Zn-65	<2.26E+00	0.00E+00	2.26E+00
		Zr-95	<2.17E+00	0.00E+00	2.17E+00
		Nb-95	<1.62E+00	0.00E+00	1.62E+00
		I-131	<1.05E+01	0.00E+00	1.05E+01
		Cs-134	<1.35E+00	0.00E+00	1.35E+00
		Cs-137	<1.05E+00	0.00E+00	1.05E+00
		BaLa-140	<5.39E+00	0.00E+00	5.39E+00
		Be-7	<1.19E+01	0.00E+00	1.19E+01
		K-40	3.36E+01	1.18E+01	1.58E+01
		H3SW	<-7.2E+01	0.00E+00	1.95E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372348	1/27/2015 - 2/23/2015	Mn-54	<1.54E+00	0.00E+00	1.54E+00
		Co-58	<1.70E+00	0.00E+00	1.70E+00
		Fe-59	<3.49E+00	0.00E+00	3.49E+00
		Co-60	<1.53E+00	0.00E+00	1.53E+00
		Zn-65	<3.01E+00	0.00E+00	3.01E+00
		Zr-95	<2.63E+00	0.00E+00	2.63E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 41 [CONTROL - N @ 8 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372348	1/27/2015 - 2/23/2015	Nb-95	<2.13E+00	0.00E+00	2.13E+00
		I-131	<1.08E+01	0.00E+00	1.08E+01
		Cs-134	<1.72E+00	0.00E+00	1.72E+00
		Cs-137	<1.28E+00	0.00E+00	1.28E+00
		BaLa-140	<5.55E+00	0.00E+00	5.55E+00
		Be-7	<1.54E+01	0.00E+00	1.54E+01
		K-40	3.44E+01	1.65E+01	2.36E+01
		H3SW	<-2.9E+01	0.00E+00	1.79E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
376696	2/23/2015 - 4/7/2015	Mn-54	<9.78E-01	0.00E+00	9.78E-01
		Co-58	<1.22E+00	0.00E+00	1.22E+00
		Fe-59	<2.58E+00	0.00E+00	2.58E+00
		Co-60	<1.06E+00	0.00E+00	1.06E+00
		Zn-65	<2.07E+00	0.00E+00	2.07E+00
		Zr-95	<2.21E+00	0.00E+00	2.21E+00
		Nb-95	<1.60E+00	0.00E+00	1.60E+00
		I-131	<1.02E+01	0.00E+00	1.02E+01
		Cs-134	<1.06E+00	0.00E+00	1.06E+00
		Cs-137	<1.01E+00	0.00E+00	1.01E+00
		BaLa-140	<4.96E+00	0.00E+00	4.96E+00
		Be-7	<1.31E+01	0.00E+00	1.31E+01
		K-40	3.13E+01	9.81E+00	1.21E+01
		H3SW	<-1.2E+01	0.00E+00	1.87E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
378898	4/7/2015 - 4/28/2015	Mn-54	<1.53E+00	0.00E+00	1.53E+00
		Co-58	<1.85E+00	0.00E+00	1.85E+00
		Fe-59	<3.59E+00	0.00E+00	3.59E+00
		Co-60	<1.25E+00	0.00E+00	1.25E+00
		Zn-65	<2.82E+00	0.00E+00	2.82E+00
		Zr-95	<3.30E+00	0.00E+00	3.30E+00
		Nb-95	<2.46E+00	0.00E+00	2.46E+00
		I-131	<1.17E+01	0.00E+00	1.17E+01
		Cs-134	<1.72E+00	0.00E+00	1.72E+00
		Cs-137	<1.48E+00	0.00E+00	1.48E+00
		BaLa-140	<5.43E+00	0.00E+00	5.43E+00
		Be-7	<1.63E+01	0.00E+00	1.63E+01
		K-40	4.55E+01	1.69E+01	2.19E+01
		H3SW	<-2.7E+01	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380731	4/28/2015 - 5/25/2015	Mn-54	<1.35E+00	0.00E+00	1.35E+00
		Co-58	<1.64E+00	0.00E+00	1.64E+00
		Fe-59	<3.57E+00	0.00E+00	3.57E+00
		Co-60	<1.51E+00	0.00E+00	1.51E+00
		Zn-65	<3.02E+00	0.00E+00	3.02E+00
		Zr-95	<2.97E+00	0.00E+00	2.97E+00
		Nb-95	<2.63E+00	0.00E+00	2.63E+00
		I-131	<1.05E+01	0.00E+00	1.05E+01
		Cs-134	<1.65E+00	0.00E+00	1.65E+00
		Cs-137	<1.75E+00	0.00E+00	1.75E+00
		BaLa-140	<6.78E+00	0.00E+00	6.78E+00
		Be-7	2.81E+00	9.48E+00	1.43E+01
		K-40	4.82E+01	1.55E+01	1.85E+01
		H3SW	<8.11E+01	0.00E+00	1.83E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
383443	5/25/2015 - 6/29/2015	Mn-54	<1.17E+00	0.00E+00	1.17E+00
		Co-58	<1.21E+00	0.00E+00	1.21E+00
		Fe-59	<2.61E+00	0.00E+00	2.61E+00
		Co-60	<1.18E+00	0.00E+00	1.18E+00
		Zn-65	<2.28E+00	0.00E+00	2.28E+00
		Zr-95	<2.28E+00	0.00E+00	2.28E+00
		Nb-95	<1.98E+00	0.00E+00	1.98E+00
		I-131	<1.09E+01	0.00E+00	1.09E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 41 [CONTROL - N @ 8 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
383443	5/25/2015 - 6/29/2015	Cs-134	<1.30E+00	0.00E+00	1.30E+00
		Cs-137	<1.16E+00	0.00E+00	1.16E+00
		BaLa-140	<5.75E+00	0.00E+00	5.75E+00
		Be-7	<1.21E+01	0.00E+00	1.21E+01
		K-40	4.68E+01	1.27E+01	1.59E+01
		H3SW	<3.38E+01	0.00E+00	1.91E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
385866	6/29/2015 - 7/27/2015	Mn-54	<1.13E+00	0.00E+00	1.13E+00
		Co-58	<1.21E+00	0.00E+00	1.21E+00
		Fe-59	<2.81E+00	0.00E+00	2.81E+00
		Co-60	<1.08E+00	0.00E+00	1.08E+00
		Zn-65	<2.39E+00	0.00E+00	2.39E+00
		Zr-95	<2.50E+00	0.00E+00	2.50E+00
		Nb-95	<1.77E+00	0.00E+00	1.77E+00
		I-131	<1.07E+01	0.00E+00	1.07E+01
		Cs-134	<1.04E+00	0.00E+00	1.04E+00
		Cs-137	<1.17E+00	0.00E+00	1.17E+00
		BaLa-140	<5.63E+00	0.00E+00	5.63E+00
		Be-7	<1.44E+01	0.00E+00	1.44E+01
		K-40	3.12E+01	1.32E+01	1.91E+01
		H3SW	<5.79E+00	0.00E+00	1.86E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
389747	7/27/2015 - 9/1/2015	Mn-54	<8.60E-01	0.00E+00	8.60E-01
		Co-58	<9.89E-01	0.00E+00	9.89E-01
		Fe-59	<2.36E+00	0.00E+00	2.36E+00
		Co-60	<8.93E-01	0.00E+00	8.93E-01
		Zn-65	<1.81E+00	0.00E+00	1.81E+00
		Zr-95	<1.84E+00	0.00E+00	1.84E+00
		Nb-95	<1.62E+00	0.00E+00	1.62E+00
		I-131	<1.12E+01	0.00E+00	1.12E+01
		Cs-134	<9.28E-01	0.00E+00	9.28E-01
		Cs-137	<8.36E-01	0.00E+00	8.36E-01
		BaLa-140	<4.79E+00	0.00E+00	4.79E+00
		Be-7	<1.14E+01	0.00E+00	1.14E+01
		K-40	3.48E+01	1.06E+01	1.43E+01
		H3SW	<-2.0E+02	0.00E+00	1.97E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
393514	9/1/2015 - 9/29/2015	Mn-54	<1.02E+00	0.00E+00	1.02E+00
		Co-58	<1.28E+00	0.00E+00	1.28E+00
		Fe-59	<2.88E+00	0.00E+00	2.88E+00
		Co-60	<9.65E-01	0.00E+00	9.65E-01
		Zn-65	<2.09E+00	0.00E+00	2.09E+00
		Zr-95	<2.34E+00	0.00E+00	2.34E+00
		Nb-95	<1.82E+00	0.00E+00	1.82E+00
		I-131	<1.20E+01	0.00E+00	1.20E+01
		Cs-134	<1.14E+00	0.00E+00	1.14E+00
		Cs-137	<1.08E+00	0.00E+00	1.08E+00
		BaLa-140	<5.31E+00	0.00E+00	5.31E+00
		Be-7	<1.13E+01	0.00E+00	1.13E+01
		K-40	5.28E+01	1.24E+01	1.50E+01
		H3SW	<-1.0E+02	0.00E+00	1.91E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395561	9/29/2015 - 10/27/2015	Mn-54	<1.58E+00	0.00E+00	1.58E+00
		Co-58	<2.08E+00	0.00E+00	2.08E+00
		Fe-59	<5.30E+00	0.00E+00	5.30E+00
		Co-60	<2.02E+00	0.00E+00	2.02E+00
		Zn-65	<3.35E+00	0.00E+00	3.35E+00
		Zr-95	<5.12E+00	0.00E+00	5.12E+00
		Nb-95	<2.63E+00	0.00E+00	2.63E+00
		I-131	<1.17E+01	0.00E+00	1.17E+01
		Cs-134	<1.65E+00	0.00E+00	1.65E+00
		Cs-137	<2.11E+00	0.00E+00	2.11E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 41 [CONTROL - N @ 8 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395561	9/29/2015 - 10/27/2015	BaLa-140	<5.24E+00	0.00E+00	5.24E+00
		Be-7	<1.74E+01	0.00E+00	1.74E+01
		K-40	2.84E+01	1.56E+01	2.06E+01
		H3SW	<-5.8E+01	0.00E+00	1.86E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
397153	10/27/2015 - 11/30/2015	Mn-54	<2.82E+00	0.00E+00	2.82E+00
		Co-58	<3.30E+00	0.00E+00	3.30E+00
		Fe-59	<6.45E+00	0.00E+00	6.45E+00
		Co-60	<2.97E+00	0.00E+00	2.97E+00
		Zn-65	<4.82E+00	0.00E+00	4.82E+00
		Zr-95	<5.75E+00	0.00E+00	5.75E+00
		Nb-95	<3.40E+00	0.00E+00	3.40E+00
		I-131	<1.15E+01	0.00E+00	1.15E+01
		Cs-134	<2.80E+00	0.00E+00	2.80E+00
		Cs-137	<2.29E+00	0.00E+00	2.29E+00
		BaLa-140	<8.49E+00	0.00E+00	8.49E+00
		Be-7	<2.45E+01	0.00E+00	2.45E+01
		K-40	3.89E+01	2.60E+01	3.80E+01
		H3SW	<-4.2E+01	0.00E+00	1.85E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
398821	11/30/2015 - 12/28/2015	Mn-54	<8.76E-01	0.00E+00	8.76E-01
		Co-58	<9.49E-01	0.00E+00	9.49E-01
		Fe-59	<2.08E+00	0.00E+00	2.08E+00
		Co-60	<8.59E-01	0.00E+00	8.59E-01
		Zn-65	<1.66E+00	0.00E+00	1.66E+00
		Zr-95	<1.89E+00	0.00E+00	1.89E+00
		Nb-95	<1.33E+00	0.00E+00	1.33E+00
		I-131	<9.55E+00	0.00E+00	9.55E+00
		Cs-134	<9.14E-01	0.00E+00	9.14E-01
		Cs-137	<8.22E-01	0.00E+00	8.22E-01
		BaLa-140	<4.29E+00	0.00E+00	4.29E+00
		Be-7	<1.01E+01	0.00E+00	1.01E+01
		K-40	3.14E+01	1.02E+01	1.45E+01
		H3SW	<5.61E+01	0.00E+00	1.74E+02

Sample Point 57 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369618	1/6/2015 - 1/27/2015	Mn-54	<1.57E+00	0.00E+00	1.57E+00
		Co-58	<1.85E+00	0.00E+00	1.85E+00
		Fe-59	<3.89E+00	0.00E+00	3.89E+00
		Co-60	<1.38E+00	0.00E+00	1.38E+00
		Zn-65	<2.96E+00	0.00E+00	2.96E+00
		Zr-95	<3.66E+00	0.00E+00	3.66E+00
		Nb-95	<2.96E+00	0.00E+00	2.96E+00
		I-131	<1.11E+01	0.00E+00	1.11E+01
		Cs-134	<1.65E+00	0.00E+00	1.65E+00
		Cs-137	<1.69E+00	0.00E+00	1.69E+00
		BaLa-140	<4.81E+00	0.00E+00	4.81E+00
		Be-7	<1.46E+01	0.00E+00	1.46E+01
		K-40	4.74E+01	1.75E+01	2.29E+01
		H3SW	<-1.3E+02	0.00E+00	1.96E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372349	1/27/2015 - 2/23/2015	Mn-54	<8.63E-01	0.00E+00	8.63E-01
		Co-58	<1.10E+00	0.00E+00	1.10E+00
		Fe-59	<2.40E+00	0.00E+00	2.40E+00
		Co-60	<8.70E-01	0.00E+00	8.70E-01
		Zn-65	<1.69E+00	0.00E+00	1.69E+00
		Zr-95	<1.69E+00	0.00E+00	1.69E+00
		Nb-95	<1.35E+00	0.00E+00	1.35E+00
		I-131	<1.08E+01	0.00E+00	1.08E+01
		Cs-134	<1.04E+00	0.00E+00	1.04E+00
		Cs-137	<8.69E-01	0.00E+00	8.69E-01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 57 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372349	1/27/2015 - 2/23/2015	BaLa-140	<4.01E+00	0.00E+00	4.01E+00
		Be-7	<1.02E+01	0.00E+00	1.02E+01
		K-40	2.80E+01	1.07E+01	1.54E+01
		H3SW	<2.93E+01	0.00E+00	1.79E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
376697	2/23/2015 - 4/7/2015	Mn-54	<9.29E-01	0.00E+00	9.29E-01
		Co-58	<1.18E+00	0.00E+00	1.18E+00
		Fe-59	<2.55E+00	0.00E+00	2.55E+00
		Co-60	<9.41E-01	0.00E+00	9.41E-01
		Zn-65	<2.12E+00	0.00E+00	2.12E+00
		Zr-95	<2.14E+00	0.00E+00	2.14E+00
		Nb-95	<1.59E+00	0.00E+00	1.59E+00
		I-131	<1.09E+01	0.00E+00	1.09E+01
		Cs-134	<1.16E+00	0.00E+00	1.16E+00
		Cs-137	<1.04E+00	0.00E+00	1.04E+00
		BaLa-140	<5.21E+00	0.00E+00	5.21E+00
		Be-7	<1.25E+01	0.00E+00	1.25E+01
		K-40	4.01E+01	1.16E+01	1.50E+01
		H3SW	<-3.7E+01	0.00E+00	1.88E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
378899	4/7/2015 - 4/28/2015	Mn-54	<1.11E+00	0.00E+00	1.11E+00
		Co-58	<1.51E+00	0.00E+00	1.51E+00
		Fe-59	<3.32E+00	0.00E+00	3.32E+00
		Co-60	<1.18E+00	0.00E+00	1.18E+00
		Zn-65	<2.72E+00	0.00E+00	2.72E+00
		Zr-95	<2.76E+00	0.00E+00	2.76E+00
		Nb-95	<2.16E+00	0.00E+00	2.16E+00
		I-131	<9.25E+00	0.00E+00	9.25E+00
		Cs-134	<1.44E+00	0.00E+00	1.44E+00
		Cs-137	<1.35E+00	0.00E+00	1.35E+00
		BaLa-140	<4.81E+00	0.00E+00	4.81E+00
		Be-7	<1.32E+01	0.00E+00	1.32E+01
		K-40	5.31E+01	1.45E+01	1.76E+01
		H3SW	<-9.2E+01	0.00E+00	1.89E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
380732	4/28/2015 - 5/25/2015	Mn-54	<1.54E+00	0.00E+00	1.54E+00
		Co-58	<2.26E+00	0.00E+00	2.26E+00
		Fe-59	<3.56E+00	0.00E+00	3.56E+00
		Co-60	<1.95E+00	0.00E+00	1.95E+00
		Zn-65	<3.65E+00	0.00E+00	3.65E+00
		Zr-95	<4.14E+00	0.00E+00	4.14E+00
		Nb-95	<2.81E+00	0.00E+00	2.81E+00
		I-131	<1.17E+01	0.00E+00	1.17E+01
		Cs-134	<1.77E+00	0.00E+00	1.77E+00
		Cs-137	<2.29E+00	0.00E+00	2.29E+00
		BaLa-140	<8.91E+00	0.00E+00	8.91E+00
		Be-7	<2.48E+01	0.00E+00	2.48E+01
		K-40	3.26E+01	1.81E+01	2.42E+01
		H3SW	<1.19E+02	0.00E+00	1.80E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395562	10/5/2015 - 10/5/2015	Mn-54	<5.50E-01	0.00E+00	5.50E-01
		Co-58	<8.61E-01	0.00E+00	8.61E-01
		Fe-59	<1.90E+00	0.00E+00	1.90E+00
		Co-60	<7.10E-01	0.00E+00	7.10E-01
		Zn-65	<1.44E+00	0.00E+00	1.44E+00
		Zr-95	<1.72E+00	0.00E+00	1.72E+00
		Nb-95	<1.35E+00	0.00E+00	1.35E+00
		I-131	<1.11E+01	0.00E+00	1.11E+01
		Cs-134	<8.29E-01	0.00E+00	8.29E-01
		Cs-137	<8.36E-01	0.00E+00	8.36E-01
		BaLa-140	<3.95E+00	0.00E+00	3.95E+00
		Be-7	<8.30E+00	0.00E+00	8.30E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 57 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
395562	10/5/2015 - 10/5/2015	K-40	5.58E+01	1.07E+01	1.30E+01
		H3SW	<-8.9E+01	0.00E+00	1.86E+02

Sample Point 66 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
369619	1/6/2015 - 1/27/2015	Mn-54	<1.76E+00	0.00E+00	1.76E+00
		Co-58	<1.91E+00	0.00E+00	1.91E+00
		Fe-59	<3.33E+00	0.00E+00	3.33E+00
		Co-60	<1.50E+00	0.00E+00	1.50E+00
		Zn-65	<3.40E+00	0.00E+00	3.40E+00
		Zr-95	<3.59E+00	0.00E+00	3.59E+00
		Nb-95	<2.47E+00	0.00E+00	2.47E+00
		I-131	<1.18E+01	0.00E+00	1.18E+01
		Cs-134	<1.72E+00	0.00E+00	1.72E+00
		Cs-137	<1.73E+00	0.00E+00	1.73E+00
		BaLa-140	<5.40E+00	0.00E+00	5.40E+00
		Be-7	<1.68E+01	0.00E+00	1.68E+01
		K-40	3.62E+01	1.70E+01	2.43E+01
		H3SW	3.46E+02	1.24E+02	1.95E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
372350	1/27/2015 - 2/23/2015	Mn-54	<1.01E+00	0.00E+00	1.01E+00
		Co-58	<1.17E+00	0.00E+00	1.17E+00
		Fe-59	<2.91E+00	0.00E+00	2.91E+00
		Co-60	<1.19E+00	0.00E+00	1.19E+00
		Zn-65	<1.88E+00	0.00E+00	1.88E+00
		Zr-95	<2.44E+00	0.00E+00	2.44E+00
		Nb-95	<1.91E+00	0.00E+00	1.91E+00
		I-131	<1.16E+01	0.00E+00	1.16E+01
		Cs-134	<1.25E+00	0.00E+00	1.25E+00
		Cs-137	<1.20E+00	0.00E+00	1.20E+00
		BaLa-140	<4.34E+00	0.00E+00	4.34E+00
		Be-7	<1.22E+01	0.00E+00	1.22E+01
		K-40	2.58E+01	1.25E+01	1.86E+01
		H3SW	9.95E+02	1.31E+02	1.79E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
376698	2/23/2015 - 4/7/2015	Mn-54	<7.25E-01	0.00E+00	7.25E-01
		Co-58	<9.16E-01	0.00E+00	9.16E-01
		Fe-59	<2.06E+00	0.00E+00	2.06E+00
		Co-60	<7.02E-01	0.00E+00	7.02E-01
		Zn-65	<1.49E+00	0.00E+00	1.49E+00
		Zr-95	<1.80E+00	0.00E+00	1.80E+00
		Nb-95	<1.28E+00	0.00E+00	1.28E+00
		I-131	<1.06E+01	0.00E+00	1.06E+01
		Cs-134	<8.76E-01	0.00E+00	8.76E-01
		Cs-137	<8.23E-01	0.00E+00	8.23E-01
		BaLa-140	<4.42E+00	0.00E+00	4.42E+00
		Be-7	<9.87E+00	0.00E+00	9.87E+00
		K-40	2.95E+01	1.78E+01	9.73E+00
		H3SW	1.92E+03	1.65E+02	1.88E+02

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
378900	4/7/2015 - 4/28/2015	Mn-54	<1.37E+00	0.00E+00	1.37E+00
		Co-58	<1.71E+00	0.00E+00	1.71E+00
		Fe-59	<4.15E+00	0.00E+00	4.15E+00
		Co-60	<1.45E+00	0.00E+00	1.45E+00
		Zn-65	<2.82E+00	0.00E+00	2.82E+00
		Zr-95	<3.33E+00	0.00E+00	3.33E+00
		Nb-95	<2.31E+00	0.00E+00	2.31E+00
		I-131	<1.18E+01	0.00E+00	1.18E+01
		Cs-134	<1.72E+00	0.00E+00	1.72E+00
		Cs-137	<1.81E+00	0.00E+00	1.81E+00
		BaLa-140	<6.85E+00	0.00E+00	6.85E+00
		Be-7	<1.90E+01	0.00E+00	1.90E+01



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Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 66 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
378900	4/7/2015 - 4/28/2015	K-40	4.04E+01	1.78E+01	2.49E+01
		H3SW	2.90E+03	1.74E+02	1.90E+02
380733	4/28/2015 - 5/25/2015	Mn-54	<1.32E+00	0.00E+00	1.32E+00
		Co-58	<1.66E+00	0.00E+00	1.66E+00
		Fe-59	<3.43E+00	0.00E+00	3.43E+00
		Co-60	<1.31E+00	0.00E+00	1.31E+00
		Zn-65	<3.21E+00	0.00E+00	3.21E+00
		Zr-95	<2.72E+00	0.00E+00	2.72E+00
		Nb-95	<2.04E+00	0.00E+00	2.04E+00
		I-131	<1.05E+01	0.00E+00	1.05E+01
		Cs-134	<1.49E+00	0.00E+00	1.49E+00
		Cs-137	<1.58E+00	0.00E+00	1.58E+00
		BaLa-140	<6.56E+00	0.00E+00	6.56E+00
		Be-7	<1.62E+01	0.00E+00	1.62E+01
		K-40	4.12E+01	1.56E+01	2.00E+01
H3SW	3.92E+03	1.89E+02	1.81E+02		
383445	5/25/2015 - 6/29/2015	Mn-54	<1.27E+00	0.00E+00	1.27E+00
		Co-58	<1.50E+00	0.00E+00	1.50E+00
		Fe-59	<3.32E+00	0.00E+00	3.32E+00
		Co-60	<1.17E+00	0.00E+00	1.17E+00
		Zn-65	<2.35E+00	0.00E+00	2.35E+00
		Zr-95	<2.90E+00	0.00E+00	2.90E+00
		Nb-95	<2.03E+00	0.00E+00	2.03E+00
		I-131	<1.15E+01	0.00E+00	1.15E+01
		Cs-134	<1.27E+00	0.00E+00	1.27E+00
		Cs-137	<1.17E+00	0.00E+00	1.17E+00
		BaLa-140	<5.52E+00	0.00E+00	5.52E+00
		Be-7	<1.28E+01	0.00E+00	1.28E+01
		K-40	4.40E+01	1.57E+01	2.20E+01
H3SW	3.86E+03	2.05E+02	1.90E+02		
385868	6/29/2015 - 7/27/2015	Mn-54	<9.15E-01	0.00E+00	9.15E-01
		Co-58	<1.12E+00	0.00E+00	1.12E+00
		Fe-59	<2.59E+00	0.00E+00	2.59E+00
		Co-60	<9.33E-01	0.00E+00	9.33E-01
		Zn-65	<1.72E+00	0.00E+00	1.72E+00
		Zr-95	<1.97E+00	0.00E+00	1.97E+00
		Nb-95	<1.60E+00	0.00E+00	1.60E+00
		I-131	<1.06E+01	0.00E+00	1.06E+01
		Cs-134	<9.84E-01	0.00E+00	9.84E-01
		Cs-137	<1.00E+00	0.00E+00	1.00E+00
		BaLa-140	<5.24E+00	0.00E+00	5.24E+00
		Be-7	<1.11E+01	0.00E+00	1.11E+01
		K-40	3.28E+01	1.13E+01	1.60E+01
H3SW	2.97E+03	1.74E+02	1.87E+02		
389749	7/27/2015 - 9/1/2015	Mn-54	<8.38E-01	0.00E+00	8.38E-01
		Co-58	<9.81E-01	0.00E+00	9.81E-01
		Fe-59	<2.22E+00	0.00E+00	2.22E+00
		Co-60	<8.53E-01	0.00E+00	8.53E-01
		Zn-65	<1.92E+00	0.00E+00	1.92E+00
		Zr-95	<1.92E+00	0.00E+00	1.92E+00
		Nb-95	<1.50E+00	0.00E+00	1.50E+00
		I-131	<1.19E+01	0.00E+00	1.19E+01
		Cs-134	<9.75E-01	0.00E+00	9.75E-01
		Cs-137	<8.86E-01	0.00E+00	8.86E-01
		BaLa-140	<4.02E+00	0.00E+00	4.02E+00
		Be-7	<9.70E+00	0.00E+00	9.70E+00
		K-40	4.32E+01	9.77E+00	1.16E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: SURFACE WATER Concentration (Activity): pCi/l

Sample Point 66 [INDICATOR - @ 0 miles]

Sample ID:	Sample Dates:	Nuclide	Activity	2 Sigma Error	LLD
389749	7/27/2015 - 9/1/2015	H3SW	2.40E+03	1.77E+02	1.98E+02
393516	9/1/2015 - 9/29/2015	Mn-54	<1.15E+00	0.00E+00	1.15E+00
		Co-58	<1.01E+00	0.00E+00	1.01E+00
		Fe-59	<2.91E+00	0.00E+00	2.91E+00
		Co-60	<1.19E+00	0.00E+00	1.19E+00
		Zn-65	<1.73E+00	0.00E+00	1.73E+00
		Zr-95	<2.50E+00	0.00E+00	2.50E+00
		Nb-95	<1.96E+00	0.00E+00	1.96E+00
		I-131	<1.20E+01	0.00E+00	1.20E+01
		Cs-134	<1.22E+00	0.00E+00	1.22E+00
		Cs-137	<1.26E+00	0.00E+00	1.26E+00
		BaLa-140	<6.30E+00	0.00E+00	6.30E+00
		Be-7	<1.47E+01	0.00E+00	1.47E+01
		K-40	2.74E+01	1.23E+01	1.79E+01
		H3SW	1.93E+03	1.63E+02	1.90E+02
395563	9/29/2015 - 10/27/2015	Mn-54	<2.43E+00	0.00E+00	2.43E+00
		Co-58	<2.94E+00	0.00E+00	2.94E+00
		Fe-59	<6.34E+00	0.00E+00	6.34E+00
		Co-60	<2.34E+00	0.00E+00	2.34E+00
		Zn-65	<5.17E+00	0.00E+00	5.17E+00
		Zr-95	<5.25E+00	0.00E+00	5.25E+00
		Nb-95	<3.96E+00	0.00E+00	3.96E+00
		I-131	<1.18E+01	0.00E+00	1.18E+01
		Cs-134	<2.76E+00	0.00E+00	2.76E+00
		Cs-137	<2.24E+00	0.00E+00	2.24E+00
		BaLa-140	<1.01E+01	0.00E+00	1.01E+01
		Be-7	<2.86E+01	0.00E+00	2.86E+01
		K-40	<3.77E+01	0.00E+00	3.77E+01
		H3SW	1.14E+03	1.44E+02	1.89E+02
397155	10/27/2015 - 11/30/2015	Mn-54	<2.08E+00	0.00E+00	2.08E+00
		Co-58	<2.50E+00	0.00E+00	2.50E+00
		Fe-59	<4.32E+00	0.00E+00	4.32E+00
		Co-60	<1.95E+00	0.00E+00	1.95E+00
		Zn-65	<4.20E+00	0.00E+00	4.20E+00
		Zr-95	<4.87E+00	0.00E+00	4.87E+00
		Nb-95	<3.32E+00	0.00E+00	3.32E+00
		I-131	<1.04E+01	0.00E+00	1.04E+01
		Cs-134	<1.87E+00	0.00E+00	1.87E+00
		Cs-137	<2.14E+00	0.00E+00	2.14E+00
		BaLa-140	<7.47E+00	0.00E+00	7.47E+00
		Be-7	<2.39E+01	0.00E+00	2.39E+01
		K-40	<3.34E+01	0.00E+00	3.34E+01
		H3SW	7.58E+02	1.31E+02	1.85E+02
398823	11/30/2015 - 12/28/2015	Mn-54	<9.68E-01	0.00E+00	9.68E-01
		Co-58	<1.14E+00	0.00E+00	1.14E+00
		Fe-59	<2.72E+00	0.00E+00	2.72E+00
		Co-60	<1.06E+00	0.00E+00	1.06E+00
		Zn-65	<1.93E+00	0.00E+00	1.93E+00
		Zr-95	<2.21E+00	0.00E+00	2.21E+00
		Nb-95	<1.69E+00	0.00E+00	1.69E+00
		I-131	<1.20E+01	0.00E+00	1.20E+01
		Cs-134	<1.04E+00	0.00E+00	1.04E+00
		Cs-137	<1.02E+00	0.00E+00	1.02E+00
		BaLa-140	<5.00E+00	0.00E+00	5.00E+00
		Be-7	<1.11E+01	0.00E+00	1.11E+01
		K-40	5.84E+01	1.30E+01	1.60E+01
		H3SW	1.57E+03	1.47E+02	1.76E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 1 [CONTROL - ESE @ 24.4 miles]

TLD RING TLD_CTRL

Sample ID:	371443	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	15.59
Sample ID:	380094	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	12.85
Sample ID:	388042	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	14.30
Sample ID:	397017	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	12.81

Sample Point 2 [INDICATOR - S @ 0.2 miles]

TLD RING TLD_INNER

Sample ID:	371454	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	15.86
Sample ID:	380105	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	15.92
Sample ID:	388053	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	13.57
Sample ID:	397028	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	14.90

Sample Point 3 [INDICATOR - N @ 0.5 miles]

TLD RING TLD_INNER

Sample ID:	371465	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	16.96
Sample ID:	380116	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	15.61
Sample ID:	388064	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	15.07
Sample ID:	397039	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	15.08

Sample Point 4 [INDICATOR - ESE @ 0.4 miles]

TLD RING TLD_INNER

Sample ID:	371476	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	13.53
Sample ID:	380127	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	11.33
Sample ID:	388075	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	10.52
Sample ID:	397050	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	11.87

Sample Point 5 [INDICATOR - ENE @ 0.9 miles]

TLD RING TLD_INNER

Sample ID:	371477	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	15.10
Sample ID:	380128	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	14.09
Sample ID:	388076	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	13.18
Sample ID:	397051	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	14.87

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

TLD RING TLD_INNER

Sample ID:	371480	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	17.26

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 6 [INDICATOR - SSW @ 0.2 miles]

TLD RING TLD_INNER

Sample ID:	380131	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	14.76
Sample ID:	388079	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	15.22
Sample ID:	397054	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	16.14

Sample Point 7 [INDICATOR - ESE @ 6.4 miles]

TLD RING TLD_OUTER

Sample ID:	371483	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	14.56
Sample ID:	380134	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	14.37
Sample ID:	388082	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	14.21
Sample ID:	397057	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	14.06

Sample Point 8 [INDICATOR - SSE @ 0.8 miles]

TLD RING TLD_INNER

Sample ID:	371484	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	12.21
Sample ID:	380135	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	12.66
Sample ID:	388083	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	11.81
Sample ID:	397058	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	10.95

Sample Point 9 [INDICATOR - S @ 1 miles]

TLD RING TLD_INNER

Sample ID:	371485	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	11.74
Sample ID:	380136	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	11.14
Sample ID:	388084	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	12.39
Sample ID:	397059	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	11.68

Sample Point 10 [INDICATOR - WSW @ 1 miles]

TLD RING TLD_INNER

Sample ID:	371444	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	15.84
Sample ID:	380095	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	13.84
Sample ID:	388043	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	13.09
Sample ID:	397018	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	13.25

Sample Point 11 [INDICATOR - SW @ 1 miles]

TLD RING TLD_INNER

Sample ID:	371445	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	14.80
Sample ID:	380096	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	13.76

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 11 [INDICATOR - SW @ 1 miles]

TLD RING TLD_INNER

Sample ID:	388044	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	12.20

Sample ID:	397019	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	13.59

Sample Point 12 [INDICATOR - SSW @ 1.2 miles]

TLD RING TLD_INNER

Sample ID:	371446	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	22.42

Sample ID:	380097	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	19.70

Sample ID:	388045	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	16.52

Sample ID:	397020	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	17.37

Sample Point 13 [INDICATOR - W @ 0.7 miles]

TLD RING TLD_INNER

Sample ID:	371447	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	16.15

Sample ID:	380098	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	16.62

Sample ID:	388046	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	15.52

Sample ID:	397021	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	14.99

Sample Point 14 [INDICATOR - WNW @ 0.8 miles]

TLD RING TLD_INNER

Sample ID:	371448	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	20.96

Sample ID:	380099	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	18.11

Sample ID:	388047	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	17.65

Sample ID:	397022	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	17.61

Sample Point 15 [INDICATOR - NW @ 0.7 miles]

TLD RING TLD_INNER

Sample ID:	371449	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	17.50

Sample ID:	380100	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	12.58

Sample ID:	388048	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	13.66

Sample ID:	397023	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	13.81

Sample Point 16 [INDICATOR - NNW @ 1 miles]

TLD RING TLD_INNER

Sample ID:	371450	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	17.69

Sample ID:	380101	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	13.54

Sample ID:	388049	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	12.23

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 16 [INDICATOR - NNW @ 1 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
397024	10/22/2015 - 1/12/2016	mR/Std Qtr	13.13

Sample Point 17 [INDICATOR - N @ 1.2 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371451	1/16/2015 - 4/20/2015	mR/Std Qtr	19.04

Sample ID:	Sample Dates:	Nuclide	Activity
380102	4/20/2015 - 7/14/2015	mR/Std Qtr	17.37

Sample ID:	Sample Dates:	Nuclide	Activity
388050	7/14/2015 - 10/22/2015	mR/Std Qtr	17.04

Sample ID:	Sample Dates:	Nuclide	Activity
397025	10/22/2015 - 1/12/2016	mR/Std Qtr	19.29

Sample Point 18 [INDICATOR - SE @ 0.7 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
380103	4/20/2015 - 7/14/2015	mR/Std Qtr	17.04

Sample ID:	Sample Dates:	Nuclide	Activity
388051	7/14/2015 - 10/22/2015	mR/Std Qtr	16.12

Sample ID:	Sample Dates:	Nuclide	Activity
397026	10/22/2015 - 1/12/2016	mR/Std Qtr	14.97

Sample Point 19 [INDICATOR - E @ 1 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371453	1/16/2015 - 4/20/2015	mR/Std Qtr	15.62

Sample ID:	Sample Dates:	Nuclide	Activity
380104	4/20/2015 - 7/14/2015	mR/Std Qtr	15.35

Sample ID:	Sample Dates:	Nuclide	Activity
388052	7/14/2015 - 10/22/2015	mR/Std Qtr	16.54

Sample ID:	Sample Dates:	Nuclide	Activity
397027	10/22/2015 - 1/12/2016	mR/Std Qtr	12.47

Sample Point 20 [INDICATOR - ENE @ 1 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371455	1/16/2015 - 4/20/2015	mR/Std Qtr	16.77

Sample ID:	Sample Dates:	Nuclide	Activity
380106	4/20/2015 - 7/14/2015	mR/Std Qtr	15.36

Sample ID:	Sample Dates:	Nuclide	Activity
388054	7/14/2015 - 10/22/2015	mR/Std Qtr	15.34

Sample ID:	Sample Dates:	Nuclide	Activity
397029	10/22/2015 - 1/12/2016	mR/Std Qtr	14.63

Sample Point 21 [INDICATOR - NE @ 1.4 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371456	1/16/2015 - 4/20/2015	mR/Std Qtr	17.39

Sample ID:	Sample Dates:	Nuclide	Activity
380107	4/20/2015 - 7/14/2015	mR/Std Qtr	15.10

Sample ID:	Sample Dates:	Nuclide	Activity
388055	7/14/2015 - 10/22/2015	mR/Std Qtr	14.98

Sample ID:	Sample Dates:	Nuclide	Activity
397030	10/22/2015 - 1/12/2016	mR/Std Qtr	14.84

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 22 [INDICATOR - NNE @ 1.7 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371457	1/16/2015 - 4/20/2015	mR/Std Qtr	15.97
380108	4/20/2015 - 7/14/2015	mR/Std Qtr	15.13
388056	7/14/2015 - 10/22/2015	mR/Std Qtr	15.65
397031	10/22/2015 - 1/12/2016	mR/Std Qtr	15.76

Sample Point 23 [INDICATOR - ESE @ 1 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371458	1/16/2015 - 4/20/2015	mR/Std Qtr	20.76
380109	4/20/2015 - 7/14/2015	mR/Std Qtr	16.59
388057	7/14/2015 - 10/22/2015	mR/Std Qtr	17.06
397032	10/22/2015 - 1/12/2016	mR/Std Qtr	17.72

Sample Point 24 [INDICATOR - NW @ 4.6 miles]

TLD RING TLD_OUTER

Sample ID:	Sample Dates:	Nuclide	Activity
371459	1/16/2015 - 4/20/2015	mR/Std Qtr	21.03
380110	4/20/2015 - 7/14/2015	mR/Std Qtr	18.85
388058	7/14/2015 - 10/22/2015	mR/Std Qtr	18.17
397033	10/22/2015 - 1/12/2016	mR/Std Qtr	15.84

Sample Point 25 [INDICATOR - NNW @ 4 miles]

TLD RING TLD_OUTER

Sample ID:	Sample Dates:	Nuclide	Activity
371460	1/16/2015 - 4/20/2015	mR/Std Qtr	19.22
380111	4/20/2015 - 7/14/2015	mR/Std Qtr	13.08
388059	7/14/2015 - 10/22/2015	mR/Std Qtr	14.89
397034	10/22/2015 - 1/12/2016	mR/Std Qtr	15.60

Sample Point 26 [INDICATOR - N @ 5 miles]

TLD RING TLD_OUTER

Sample ID:	Sample Dates:	Nuclide	Activity
371461	1/16/2015 - 4/20/2015	mR/Std Qtr	16.61
388060	7/14/2015 - 10/22/2015	mR/Std Qtr	14.30
397035	10/22/2015 - 1/12/2016	mR/Std Qtr	16.36

Sample Point 27 [INDICATOR - NNE @ 5.4 miles]

TLD RING TLD_OUTER

Sample ID:	Sample Dates:	Nuclide	Activity
371462	1/16/2015 - 4/20/2015	mR/Std Qtr	15.94
380113	4/20/2015 - 7/14/2015	mR/Std Qtr	12.62

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 27 [INDICATOR - NNE @ 5.4 miles]

TLD RING TLD_OUTER

Sample ID:	388061	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	12.05

Sample ID:	397036	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	14.33

Sample Point 28 [INDICATOR - NE @ 4.3 miles]

TLD RING TLD_OUTER

Sample ID:	371463	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	21.51

Sample ID:	380114	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	18.25

Sample ID:	388062	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	18.90

Sample ID:	397037	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	18.03

Sample Point 29 [INDICATOR - ENE @ 4 miles]

TLD RING TLD_OUTER

Sample ID:	371464	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	12.53

Sample ID:	380115	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	12.06

Sample ID:	388063	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	12.40

Sample ID:	397038	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	11.42

Sample Point 30 [INDICATOR - E @ 4.4 miles]

TLD RING TLD_OUTER

Sample ID:	371466	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	17.30

Sample ID:	380117	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	17.00

Sample ID:	388065	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	15.47

Sample ID:	397040	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	15.69

Sample Point 31 [INDICATOR - ESE @ 4.6 miles]

TLD RING TLD_OUTER

Sample ID:	371467	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	17.78

Sample ID:	380118	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	17.35

Sample ID:	388066	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	17.56

Sample ID:	397041	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	14.91

Sample Point 32 [INDICATOR - SE @ 4 miles]

TLD RING TLD_OUTER

Sample ID:	371468	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	17.31

Sample ID:	380119	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	17.56

Sample ID:	388067	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	17.34

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Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 32 [INDICATOR - SE @ 4 miles]

TLD RING TLD_OUTER

Sample ID:	397042	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	13.65

Sample Point 33 [INDICATOR - SSE @ 4.5 miles]

TLD RING TLD_OUTER

Sample ID:	371469	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	16.45

Sample ID:	380120	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	15.56

Sample ID:	388068	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	16.55

Sample ID:	397043	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	15.67

Sample Point 34 [INDICATOR - S @ 4.7 miles]

TLD RING TLD_OUTER

Sample ID:	371470	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	13.03

Sample ID:	380121	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	11.55

Sample ID:	388069	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	11.48

Sample ID:	397044	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	10.51

Sample Point 35 [INDICATOR - SSW @ 4.5 miles]

TLD RING TLD_OUTER

Sample ID:	371471	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	24.16

Sample ID:	380122	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	24.53

Sample ID:	388070	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	22.09

Sample ID:	397045	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	21.69

Sample Point 36 [INDICATOR - SW @ 5 miles]

TLD RING TLD_OUTER

Sample ID:	371472	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	23.88

Sample ID:	380123	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	23.62

Sample ID:	388071	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	20.12

Sample ID:	397046	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	19.59

Sample Point 37 [INDICATOR - WSW @ 5 miles]

TLD RING TLD_OUTER

Sample ID:	371473	Sample Dates:	1/16/2015 - 4/20/2015	Nuclide	Activity
				mR/Std Qtr	24.81

Sample ID:	380124	Sample Dates:	4/20/2015 - 7/14/2015	Nuclide	Activity
				mR/Std Qtr	23.16

Sample ID:	388072	Sample Dates:	7/14/2015 - 10/22/2015	Nuclide	Activity
				mR/Std Qtr	21.25

Sample ID:	397047	Sample Dates:	10/22/2015 - 1/12/2016	Nuclide	Activity
				mR/Std Qtr	22.22

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Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 38 [INDICATOR - W @ 4.9 miles]

TLD RING TLD_OUTER

Sample ID:	Sample Dates:	Nuclide	Activity
371474	1/16/2015 - 4/20/2015	mR/Std Qtr	19.77
380125	4/20/2015 - 7/14/2015	mR/Std Qtr	17.87
388073	7/14/2015 - 10/22/2015	mR/Std Qtr	17.76
397048	10/22/2015 - 1/12/2016	mR/Std Qtr	14.65

Sample Point 39 [INDICATOR - WNW @ 5.1 miles]

TLD RING TLD_OUTER

Sample ID:	Sample Dates:	Nuclide	Activity
371475	1/16/2015 - 4/20/2015	mR/Std Qtr	17.70
380126	4/20/2015 - 7/14/2015	mR/Std Qtr	18.40
388074	7/14/2015 - 10/22/2015	mR/Std Qtr	13.65
397049	10/22/2015 - 1/12/2016	mR/Std Qtr	15.93

Sample Point 55 [INDICATOR - SSE @ 0.2 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371478	1/16/2015 - 4/20/2015	mR/Std Qtr	18.48
380129	4/20/2015 - 7/14/2015	mR/Std Qtr	15.86
388077	7/14/2015 - 10/22/2015	mR/Std Qtr	14.68
397052	10/22/2015 - 1/12/2016	mR/Std Qtr	14.95

Sample Point 56 [INDICATOR - NNW @ 0.4 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371479	1/16/2015 - 4/20/2015	mR/Std Qtr	19.16
380130	4/20/2015 - 7/14/2015	mR/Std Qtr	18.81
397053	10/22/2015 - 1/12/2016	mR/Std Qtr	14.46

Sample Point 61 [INDICATOR - WSW @ 0.3 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371481	1/16/2015 - 4/20/2015	mR/Std Qtr	21.72
380132	4/20/2015 - 7/14/2015	mR/Std Qtr	20.71
388080	7/14/2015 - 10/22/2015	mR/Std Qtr	19.59
397055	10/22/2015 - 1/12/2016	mR/Std Qtr	17.90

Sample Point 65 [INDICATOR - WNW @ 0.3 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
371482	1/16/2015 - 4/20/2015	mR/Std Qtr	24.96
380133	4/20/2015 - 7/14/2015	mR/Std Qtr	19.51

ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: TLD Concentration (Activity): mR/Standard Quarter

Sample Point 65 [INDICATOR - WNW @ 0.3 miles]

TLD RING TLD_INNER

Sample ID:	Sample Dates:	Nuclide	Activity
388081	7/14/2015 - 10/22/2015	mR/Std Qtr	19.78
397056	10/22/2015 - 1/12/2016	mR/Std Qtr	18.37

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 50 [INDICATOR - SSE @ 0 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
378196	4/23/2015 - 4/23/2015		Mn-54	<1.32E+01	0.00E+00	1.32E+01
			Co-58	<1.37E+01	0.00E+00	1.37E+01
			Fe-59	<2.82E+01	0.00E+00	2.82E+01
			Co-60	<1.68E+01	0.00E+00	1.68E+01
			Zn-65	<3.38E+01	0.00E+00	3.38E+01
			Zr-95	<2.19E+01	0.00E+00	2.19E+01
			Nb-95	<1.28E+01	0.00E+00	1.28E+01
			I-131	<2.03E+01	0.00E+00	2.03E+01
			Cs-134	<1.83E+01	0.00E+00	1.83E+01
			Cs-137	<1.41E+01	0.00E+00	1.41E+01
			BaLa-140	<1.70E+01	0.00E+00	1.70E+01
			Be-7	2.95E+02	1.07E+02	1.30E+02
			K-40	3.13E+03	4.52E+02	1.59E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
378197	4/23/2015 - 4/23/2015		Mn-54	<1.31E+01	0.00E+00	1.31E+01
			Co-58	<1.43E+01	0.00E+00	1.43E+01
			Fe-59	<2.98E+01	0.00E+00	2.98E+01
			Co-60	<2.67E+01	0.00E+00	2.67E+01
			Zn-65	<4.58E+01	0.00E+00	4.58E+01
			Zr-95	<2.61E+01	0.00E+00	2.61E+01
			Nb-95	<1.66E+01	0.00E+00	1.66E+01
			I-131	<2.49E+01	0.00E+00	2.49E+01
			Cs-134	<1.17E+01	0.00E+00	1.17E+01
			Cs-137	4.12E+01	1.68E+01	2.10E+01
			BaLa-140	<2.01E+01	0.00E+00	2.01E+01
			Be-7	2.36E+02	8.66E+01	1.31E+02
			K-40	4.07E+03	5.81E+02	2.42E+02

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
378198	4/23/2015 - 4/23/2015		Mn-54	<1.41E+01	0.00E+00	1.41E+01
			Co-58	<1.15E+01	0.00E+00	1.15E+01
			Fe-59	<3.09E+01	0.00E+00	3.09E+01
			Co-60	<1.72E+01	0.00E+00	1.72E+01
			Zn-65	<2.00E+01	0.00E+00	2.00E+01
			Zr-95	<2.00E+01	0.00E+00	2.00E+01
			Nb-95	<1.07E+01	0.00E+00	1.07E+01
			I-131	<2.24E+01	0.00E+00	2.24E+01
			Cs-134	<1.64E+01	0.00E+00	1.64E+01
			Cs-137	<1.41E+01	0.00E+00	1.41E+01
			BaLa-140	<5.71E+00	0.00E+00	5.71E+00
			Be-7	2.83E+03	3.68E+02	1.73E+02
			K-40	1.08E+03	2.57E+02	1.63E+02

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
380647	5/29/2015 - 5/29/2015		Mn-54	<2.23E+01	0.00E+00	2.23E+01
			Co-58	<1.88E+01	0.00E+00	1.88E+01
			Fe-59	<4.39E+01	0.00E+00	4.39E+01
			Co-60	<3.07E+01	0.00E+00	3.07E+01
			Zn-65	<4.70E+01	0.00E+00	4.70E+01
			Zr-95	<4.15E+01	0.00E+00	4.15E+01
			Nb-95	<3.06E+01	0.00E+00	3.06E+01
			I-131	<3.13E+01	0.00E+00	3.13E+01
			Cs-134	<2.85E+01	0.00E+00	2.85E+01
			Cs-137	<3.18E+01	0.00E+00	3.18E+01
			BaLa-140	<3.00E+01	0.00E+00	3.00E+01
			Be-7	2.49E+02	1.90E+02	2.93E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 50 [INDICATOR - SSE @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
380647	5/29/2015 - 5/29/2015	BLKCHERRY	K-40	3.38E+03	6.39E+02	4.37E+02
380648	5/29/2015 - 5/29/2015	SASSAFRAS	Mn-54	<2.23E+01	0.00E+00	2.23E+01
			Co-58	<2.16E+01	0.00E+00	2.16E+01
			Fe-59	<5.54E+01	0.00E+00	5.54E+01
			Co-60	<2.33E+01	0.00E+00	2.33E+01
			Zn-65	<3.67E+01	0.00E+00	3.67E+01
			Zr-95	<4.29E+01	0.00E+00	4.29E+01
			Nb-95	<1.79E+01	0.00E+00	1.79E+01
			I-131	<2.75E+01	0.00E+00	2.75E+01
			Cs-134	<1.96E+01	0.00E+00	1.96E+01
			Cs-137	<3.15E+01	0.00E+00	3.15E+01
			BaLa-140	<2.25E+01	0.00E+00	2.25E+01
			Be-7	6.17E+02	1.97E+02	2.22E+02
			K-40	3.32E+03	5.95E+02	2.91E+02
380649	5/29/2015 - 5/29/2015	WAXMYRTLE	Mn-54	<1.81E+01	0.00E+00	1.81E+01
			Co-58	<1.66E+01	0.00E+00	1.66E+01
			Fe-59	<4.09E+01	0.00E+00	4.09E+01
			Co-60	<1.69E+01	0.00E+00	1.69E+01
			Zn-65	<3.89E+01	0.00E+00	3.89E+01
			Zr-95	<3.49E+01	0.00E+00	3.49E+01
			Nb-95	<2.30E+01	0.00E+00	2.30E+01
			I-131	<2.15E+01	0.00E+00	2.15E+01
			Cs-134	<1.93E+01	0.00E+00	1.93E+01
			Cs-137	<1.97E+01	0.00E+00	1.97E+01
			BaLa-140	<1.82E+01	0.00E+00	1.82E+01
			Be-7	5.01E+02	1.71E+02	2.09E+02
			K-40	2.48E+03	4.74E+02	3.06E+02
383631	7/7/2015 - 7/7/2015	SASSAFRAS	Mn-54	<8.42E+00	0.00E+00	8.42E+00
			Co-58	<1.46E+01	0.00E+00	1.46E+01
			Fe-59	<2.26E+01	0.00E+00	2.26E+01
			Co-60	<1.59E+01	0.00E+00	1.59E+01
			Zn-65	<3.61E+01	0.00E+00	3.61E+01
			Zr-95	<2.33E+01	0.00E+00	2.33E+01
			Nb-95	<1.47E+01	0.00E+00	1.47E+01
			I-131	<1.89E+01	0.00E+00	1.89E+01
			Cs-134	<1.31E+01	0.00E+00	1.31E+01
			Cs-137	<1.56E+01	0.00E+00	1.56E+01
			BaLa-140	<2.25E+01	0.00E+00	2.25E+01
			Be-7	9.80E+02	2.02E+02	2.03E+02
			K-40	3.60E+03	5.10E+02	2.11E+02
383632	7/7/2015 - 7/7/2015	BLKCHERRY	Mn-54	<1.66E+01	0.00E+00	1.66E+01
			Co-58	<1.70E+01	0.00E+00	1.70E+01
			Fe-59	<2.39E+01	0.00E+00	2.39E+01
			Co-60	<1.44E+01	0.00E+00	1.44E+01
			Zn-65	<3.63E+01	0.00E+00	3.63E+01
			Zr-95	<2.63E+01	0.00E+00	2.63E+01
			Nb-95	<1.53E+01	0.00E+00	1.53E+01
			I-131	<1.64E+01	0.00E+00	1.64E+01
			Cs-134	<1.80E+01	0.00E+00	1.80E+01
			Cs-137	<1.59E+01	0.00E+00	1.59E+01
			BaLa-140	<1.34E+01	0.00E+00	1.34E+01
			Be-7	1.09E+03	1.97E+02	1.63E+02
			K-40	4.56E+03	5.94E+02	2.18E+02
383633	7/7/2015 - 7/7/2015	WAXMYRTLE	Mn-54	<1.50E+01	0.00E+00	1.50E+01
			Co-58	<1.46E+01	0.00E+00	1.46E+01
			Fe-59	<3.41E+01	0.00E+00	3.41E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 50 [INDICATOR - SSE @ 0 miles]

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
383633	7/7/2015 - 7/7/2015		Co-60	<1.64E+01	0.00E+00	1.64E+01
			Zn-65	<3.61E+01	0.00E+00	3.61E+01
			Zr-95	<3.50E+01	0.00E+00	3.50E+01
			Nb-95	<1.38E+01	0.00E+00	1.38E+01
			I-131	<1.69E+01	0.00E+00	1.69E+01
			Cs-134	<2.19E+01	0.00E+00	2.19E+01
			Cs-137	<1.88E+01	0.00E+00	1.88E+01
			BaLa-140	<1.66E+01	0.00E+00	1.66E+01
			Be-7	9.52E+02	2.05E+02	1.90E+02
			K-40	2.22E+03	4.19E+02	2.84E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
384569	7/20/2015 - 7/20/2015		Mn-54	<1.80E+01	0.00E+00	1.80E+01
			Co-58	<1.36E+01	0.00E+00	1.36E+01
			Fe-59	<3.22E+01	0.00E+00	3.22E+01
			Co-60	<1.88E+01	0.00E+00	1.88E+01
			Zn-65	<3.54E+01	0.00E+00	3.54E+01
			Zr-95	<3.16E+01	0.00E+00	3.16E+01
			Nb-95	<1.80E+01	0.00E+00	1.80E+01
			I-131	<2.60E+01	0.00E+00	2.60E+01
			Cs-134	<1.71E+01	0.00E+00	1.71E+01
			Cs-137	<1.88E+01	0.00E+00	1.88E+01
			BaLa-140	<2.64E+01	0.00E+00	2.64E+01
			Be-7	1.01E+03	2.15E+02	2.06E+02
			K-40	2.79E+03	4.89E+02	3.48E+02

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
384570	7/20/2015 - 7/20/2015		Mn-54	<1.11E+01	0.00E+00	1.11E+01
			Co-58	<1.26E+01	0.00E+00	1.26E+01
			Fe-59	<2.58E+01	0.00E+00	2.58E+01
			Co-60	<7.17E+00	0.00E+00	7.17E+00
			Zn-65	<2.28E+01	0.00E+00	2.28E+01
			Zr-95	<1.84E+01	0.00E+00	1.84E+01
			Nb-95	<1.23E+01	0.00E+00	1.23E+01
			I-131	<1.76E+01	0.00E+00	1.76E+01
			Cs-134	<1.49E+01	0.00E+00	1.49E+01
			Cs-137	1.99E+01	1.13E+01	1.63E+01
			BaLa-140	<1.88E+01	0.00E+00	1.88E+01
			Be-7	5.16E+02	1.33E+02	1.59E+02
			K-40	2.75E+03	3.77E+02	1.60E+02

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
384571	7/20/2015 - 7/20/2015		Mn-54	<1.91E+01	0.00E+00	1.91E+01
			Co-58	<1.89E+01	0.00E+00	1.89E+01
			Fe-59	<4.25E+01	0.00E+00	4.25E+01
			Co-60	<1.17E+01	0.00E+00	1.17E+01
			Zn-65	<3.94E+01	0.00E+00	3.94E+01
			Zr-95	<3.59E+01	0.00E+00	3.59E+01
			Nb-95	<1.64E+01	0.00E+00	1.64E+01
			I-131	<3.53E+01	0.00E+00	3.53E+01
			Cs-134	<2.22E+01	0.00E+00	2.22E+01
			Cs-137	<2.04E+01	0.00E+00	2.04E+01
			BaLa-140	<3.36E+01	0.00E+00	3.36E+01
			Be-7	1.10E+03	2.52E+02	2.61E+02
			K-40	2.22E+03	4.69E+02	3.92E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
389165	8/28/2015 - 8/28/2015		Mn-54	<1.56E+01	0.00E+00	1.56E+01
			Co-58	<1.48E+01	0.00E+00	1.48E+01
			Fe-59	<3.56E+01	0.00E+00	3.56E+01
			Co-60	<2.18E+01	0.00E+00	2.18E+01
			Zn-65	<3.43E+01	0.00E+00	3.43E+01
			Zr-95	<3.38E+01	0.00E+00	3.38E+01
			Nb-95	<1.71E+01	0.00E+00	1.71E+01
			I-131	<3.27E+01	0.00E+00	3.27E+01
			Cs-134	<1.73E+01	0.00E+00	1.73E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 50 [INDICATOR - SSE @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
389165	8/28/2015 - 8/28/2015	SASSAFRAS	Cs-137	<1.79E+01	0.00E+00	1.79E+01
			BaLa-140	<2.37E+01	0.00E+00	2.37E+01
			Be-7	8.33E+02	1.92E+02	2.15E+02
			K-40	3.91E+03	5.19E+02	1.48E+02
389166	8/28/2015 - 8/28/2015	BLKCHERRY	Mn-54	<2.05E+01	0.00E+00	2.05E+01
			Co-58	<2.00E+01	0.00E+00	2.00E+01
			Fe-59	<3.36E+01	0.00E+00	3.36E+01
			Co-60	<2.98E+01	0.00E+00	2.98E+01
			Zn-65	<3.96E+01	0.00E+00	3.96E+01
			Zr-95	<2.78E+01	0.00E+00	2.78E+01
			Nb-95	<2.14E+01	0.00E+00	2.14E+01
			I-131	<2.64E+01	0.00E+00	2.64E+01
			Cs-134	<2.62E+01	0.00E+00	2.62E+01
			Cs-137	<2.65E+01	0.00E+00	2.65E+01
			BaLa-140	<8.50E+00	0.00E+00	8.50E+00
			Be-7	3.27E+02	1.42E+02	1.72E+02
			K-40	3.08E+03	5.57E+02	2.48E+02
389167	8/28/2015 - 8/28/2015	WAXMYRTLE	Mn-54	<1.89E+01	0.00E+00	1.89E+01
			Co-58	<1.82E+01	0.00E+00	1.82E+01
			Fe-59	<4.81E+01	0.00E+00	4.81E+01
			Co-60	<2.19E+01	0.00E+00	2.19E+01
			Zn-65	<5.08E+01	0.00E+00	5.08E+01
			Zr-95	<4.07E+01	0.00E+00	4.07E+01
			Nb-95	<2.28E+01	0.00E+00	2.28E+01
			I-131	<2.17E+01	0.00E+00	2.17E+01
			Cs-134	<3.07E+01	0.00E+00	3.07E+01
			Cs-137	<3.13E+01	0.00E+00	3.13E+01
			BaLa-140	<3.65E+01	0.00E+00	3.65E+01
			Be-7	7.17E+02	2.32E+02	2.90E+02
			K-40	2.78E+03	5.18E+02	2.37E+02
391595	9/22/2015 - 9/22/2015	SASSAFRAS	Mn-54	<1.35E+01	0.00E+00	1.35E+01
			Co-58	<2.11E+01	0.00E+00	2.11E+01
			Fe-59	<4.97E+01	0.00E+00	4.97E+01
			Co-60	<1.95E+01	0.00E+00	1.95E+01
			Zn-65	<4.54E+01	0.00E+00	4.54E+01
			Zr-95	<3.37E+01	0.00E+00	3.37E+01
			Nb-95	<1.56E+01	0.00E+00	1.56E+01
			I-131	<2.30E+01	0.00E+00	2.30E+01
			Cs-134	<2.59E+01	0.00E+00	2.59E+01
			Cs-137	7.93E+01	2.40E+01	2.43E+01
			BaLa-140	<3.08E+01	0.00E+00	3.08E+01
			Be-7	7.42E+02	1.50E+02	1.56E+02
			K-40	3.29E+03	5.54E+02	2.66E+02
391596	9/22/2015 - 9/22/2015	WAXMYRTLE	Mn-54	<2.29E+01	0.00E+00	2.29E+01
			Co-58	<2.37E+01	0.00E+00	2.37E+01
			Fe-59	<3.80E+01	0.00E+00	3.80E+01
			Co-60	<2.25E+01	0.00E+00	2.25E+01
			Zn-65	<6.68E+01	0.00E+00	6.68E+01
			Zr-95	<4.73E+01	0.00E+00	4.73E+01
			Nb-95	<2.30E+01	0.00E+00	2.30E+01
			I-131	<2.97E+01	0.00E+00	2.97E+01
			Cs-134	<2.27E+01	0.00E+00	2.27E+01
			Cs-137	<2.69E+01	0.00E+00	2.69E+01
			BaLa-140	<3.43E+01	0.00E+00	3.43E+01
			Be-7	1.32E+03	3.03E+02	2.97E+02
			K-40	2.05E+03	5.06E+02	4.45E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 50 [INDICATOR - SSE @ 0 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
391597	9/22/2015 - 9/22/2015		Mn-54	<1.33E+01	0.00E+00	1.33E+01
			Co-58	<1.39E+01	0.00E+00	1.39E+01
			Fe-59	<2.17E+01	0.00E+00	2.17E+01
			Co-60	<1.79E+01	0.00E+00	1.79E+01
			Zn-65	<3.41E+01	0.00E+00	3.41E+01
			Zr-95	<2.72E+01	0.00E+00	2.72E+01
			Nb-95	<1.69E+01	0.00E+00	1.69E+01
			I-131	<2.30E+01	0.00E+00	2.30E+01
			Cs-134	<1.83E+01	0.00E+00	1.83E+01
			Cs-137	<1.76E+01	0.00E+00	1.76E+01
			BaLa-140	<2.67E+01	0.00E+00	2.67E+01
			Be-7	1.65E+03	2.66E+02	1.70E+02
			K-40	1.88E+03	3.95E+02	3.19E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
395102	10/24/2015 - 10/24/2015		Mn-54	<1.09E+01	0.00E+00	1.09E+01
			Co-58	<1.37E+01	0.00E+00	1.37E+01
			Fe-59	<2.89E+01	0.00E+00	2.89E+01
			Co-60	<1.05E+01	0.00E+00	1.05E+01
			Zn-65	<3.29E+01	0.00E+00	3.29E+01
			Zr-95	<2.83E+01	0.00E+00	2.83E+01
			Nb-95	<1.41E+01	0.00E+00	1.41E+01
			I-131	<1.67E+01	0.00E+00	1.67E+01
			Cs-134	<1.90E+01	0.00E+00	1.90E+01
			Cs-137	<1.68E+01	0.00E+00	1.68E+01
			BaLa-140	<1.82E+01	0.00E+00	1.82E+01
			Be-7	<5.65E+02	0.00E+00	5.65E+02
			K-40	<1.49E+02	0.00E+00	1.49E+02

Sample ID:	Sample Dates:	PERSIMLEAF	Nuclide	Activity	2 Sigma Error	LLD
395103	10/24/2015 - 10/24/2015		Mn-54	<1.68E+01	0.00E+00	1.68E+01
			Co-58	<1.70E+01	0.00E+00	1.70E+01
			Fe-59	<3.56E+01	0.00E+00	3.56E+01
			Co-60	<2.20E+01	0.00E+00	2.20E+01
			Zn-65	<4.07E+01	0.00E+00	4.07E+01
			Zr-95	<2.95E+01	0.00E+00	2.95E+01
			Nb-95	<1.69E+01	0.00E+00	1.69E+01
			I-131	<1.80E+01	0.00E+00	1.80E+01
			Cs-134	<1.69E+01	0.00E+00	1.69E+01
			Cs-137	<2.07E+01	0.00E+00	2.07E+01
			BaLa-140	<5.94E+00	0.00E+00	5.94E+00
			Be-7	2.44E+03	3.49E+02	2.12E+02
			K-40	3.53E+03	5.65E+02	3.15E+02

Sample ID:	Sample Dates:	PEARLEAF	Nuclide	Activity	2 Sigma Error	LLD
395104	10/24/2015 - 10/24/2015		Mn-54	<1.79E+01	0.00E+00	1.79E+01
			Co-58	<1.61E+01	0.00E+00	1.61E+01
			Fe-59	<3.82E+01	0.00E+00	3.82E+01
			Co-60	<1.71E+01	0.00E+00	1.71E+01
			Zn-65	<4.55E+01	0.00E+00	4.55E+01
			Zr-95	<3.15E+01	0.00E+00	3.15E+01
			Nb-95	<1.72E+01	0.00E+00	1.72E+01
			I-131	<1.73E+01	0.00E+00	1.73E+01
			Cs-134	<2.36E+01	0.00E+00	2.36E+01
			Cs-137	<1.90E+01	0.00E+00	1.90E+01
			BaLa-140	<1.18E+01	0.00E+00	1.18E+01
			Be-7	2.33E+03	3.16E+02	2.10E+02
			K-40	7.98E+03	8.76E+02	2.28E+02

Sample Point 51 [INDICATOR - SSW @ 0 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
378199	4/23/2015 - 4/23/2015		Mn-54	<1.12E+01	0.00E+00	1.12E+01
			Co-58	<1.01E+01	0.00E+00	1.01E+01
			Fe-59	<2.38E+01	0.00E+00	2.38E+01
			Co-60	<1.80E+01	0.00E+00	1.80E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 51 [INDICATOR - SSW @ 0 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
378199	4/23/2015 - 4/23/2015		Zn-65	<3.45E+01	0.00E+00	3.45E+01
			Zr-95	<2.86E+01	0.00E+00	2.86E+01
			Nb-95	<1.31E+01	0.00E+00	1.31E+01
			I-131	<1.99E+01	0.00E+00	1.99E+01
			Cs-134	<1.56E+01	0.00E+00	1.56E+01
			Cs-137	<1.92E+01	0.00E+00	1.92E+01
			BaLa-140	<2.02E+01	0.00E+00	2.02E+01
			Be-7	8.90E+02	1.83E+02	1.76E+02
			K-40	3.31E+03	4.82E+02	2.39E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
378200	4/23/2015 - 4/23/2015		Mn-54	<1.33E+01	0.00E+00	1.33E+01
			Co-58	<1.31E+01	0.00E+00	1.31E+01
			Fe-59	<2.54E+01	0.00E+00	2.54E+01
			Co-60	<1.62E+01	0.00E+00	1.62E+01
			Zn-65	<3.37E+01	0.00E+00	3.37E+01
			Zr-95	<2.28E+01	0.00E+00	2.28E+01
			Nb-95	<1.52E+01	0.00E+00	1.52E+01
			I-131	<2.19E+01	0.00E+00	2.19E+01
			Cs-134	<1.61E+01	0.00E+00	1.61E+01
			Cs-137	<1.63E+01	0.00E+00	1.63E+01
			BaLa-140	<2.14E+01	0.00E+00	2.14E+01
			Be-7	7.51E+02	1.71E+02	1.72E+02
			K-40	3.22E+03	4.81E+02	1.89E+02

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
378201	4/23/2015 - 4/23/2015		Mn-54	<1.63E+01	0.00E+00	1.63E+01
			Co-58	<2.19E+01	0.00E+00	2.19E+01
			Fe-59	<3.96E+01	0.00E+00	3.96E+01
			Co-60	<2.60E+01	0.00E+00	2.60E+01
			Zn-65	<3.89E+01	0.00E+00	3.89E+01
			Zr-95	<3.55E+01	0.00E+00	3.55E+01
			Nb-95	<1.82E+01	0.00E+00	1.82E+01
			I-131	<2.75E+01	0.00E+00	2.75E+01
			Cs-134	<2.36E+01	0.00E+00	2.36E+01
			Cs-137	<2.03E+01	0.00E+00	2.03E+01
			BaLa-140	<2.00E+01	0.00E+00	2.00E+01
			Be-7	1.86E+03	3.26E+02	2.85E+02
			K-40	2.75E+03	4.95E+02	2.96E+02

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
380650	5/29/2015 - 5/29/2015		Mn-54	<1.92E+01	0.00E+00	1.92E+01
			Co-58	<1.82E+01	0.00E+00	1.82E+01
			Fe-59	<3.41E+01	0.00E+00	3.41E+01
			Co-60	<1.77E+01	0.00E+00	1.77E+01
			Zn-65	<3.40E+01	0.00E+00	3.40E+01
			Zr-95	<2.18E+01	0.00E+00	2.18E+01
			Nb-95	<1.89E+01	0.00E+00	1.89E+01
			I-131	<2.10E+01	0.00E+00	2.10E+01
			Cs-134	<2.56E+01	0.00E+00	2.56E+01
			Cs-137	7.61E+01	2.37E+01	2.61E+01
			BaLa-140	<6.28E+00	0.00E+00	6.28E+00
			Be-7	3.43E+02	1.39E+02	1.76E+02
			K-40	3.98E+03	6.02E+02	3.06E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
380651	5/29/2015 - 5/29/2015		Mn-54	<6.73E+00	0.00E+00	6.73E+00
			Co-58	<7.87E+00	0.00E+00	7.87E+00
			Fe-59	<1.53E+01	0.00E+00	1.53E+01
			Co-60	<8.65E+00	0.00E+00	8.65E+00
			Zn-65	<1.87E+01	0.00E+00	1.87E+01
			Zr-95	<1.24E+01	0.00E+00	1.24E+01
			Nb-95	<8.06E+00	0.00E+00	8.06E+00
			I-131	<1.36E+01	0.00E+00	1.36E+01
			Cs-134	<9.13E+00	0.00E+00	9.13E+00
			Cs-137	1.01E+01	6.38E+00	9.85E+00



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 51 [INDICATOR - SSW @ 0 miles]

Sample ID:	Sample Dates:	Plant Species:	Nuclide	Activity	2 Sigma Error	LLD
380651	5/29/2015 - 5/29/2015	SASSAFRAS	BaLa-140	<1.36E+01	0.00E+00	1.36E+01
			Be-7	4.34E+02	8.53E+01	1.01E+02
			K-40	3.49E+03	3.56E+02	1.14E+02
380652	5/29/2015 - 5/29/2015	WAXMYRTLE	Mn-54	<1.91E+01	0.00E+00	1.91E+01
			Co-58	<1.50E+01	0.00E+00	1.50E+01
			Fe-59	<3.06E+01	0.00E+00	3.06E+01
			Co-60	<1.53E+01	0.00E+00	1.53E+01
			Zn-65	<3.52E+01	0.00E+00	3.52E+01
			Zr-95	<3.03E+01	0.00E+00	3.03E+01
			Nb-95	<1.59E+01	0.00E+00	1.59E+01
			I-131	<2.14E+01	0.00E+00	2.14E+01
			Cs-134	<2.46E+01	0.00E+00	2.46E+01
			Cs-137	<2.06E+01	0.00E+00	2.06E+01
			BaLa-140	<2.70E+01	0.00E+00	2.70E+01
			Be-7	4.46E+02	1.48E+02	1.74E+02
K-40	3.12E+03	5.02E+02	1.94E+02			
383634	7/7/2015 - 7/7/2015	SASSAFRAS	Mn-54	<1.99E+01	0.00E+00	1.99E+01
			Co-58	<1.92E+01	0.00E+00	1.92E+01
			Fe-59	<3.26E+01	0.00E+00	3.26E+01
			Co-60	<2.21E+01	0.00E+00	2.21E+01
			Zn-65	<4.08E+01	0.00E+00	4.08E+01
			Zr-95	<3.22E+01	0.00E+00	3.22E+01
			Nb-95	<1.87E+01	0.00E+00	1.87E+01
			I-131	<2.20E+01	0.00E+00	2.20E+01
			Cs-134	<1.86E+01	0.00E+00	1.86E+01
			Cs-137	4.96E+01	2.07E+01	2.71E+01
			BaLa-140	<2.76E+01	0.00E+00	2.76E+01
			Be-7	6.47E+02	1.76E+02	1.93E+02
K-40	3.11E+03	5.26E+02	3.56E+02			
383635	7/7/2015 - 7/7/2015	BLKCHERRY	Mn-54	<1.28E+01	0.00E+00	1.28E+01
			Co-58	<1.33E+01	0.00E+00	1.33E+01
			Fe-59	<2.78E+01	0.00E+00	2.78E+01
			Co-60	<1.65E+01	0.00E+00	1.65E+01
			Zn-65	<3.44E+01	0.00E+00	3.44E+01
			Zr-95	<2.43E+01	0.00E+00	2.43E+01
			Nb-95	<1.55E+01	0.00E+00	1.55E+01
			I-131	<2.10E+01	0.00E+00	2.10E+01
			Cs-134	<1.92E+01	0.00E+00	1.92E+01
			Cs-137	<1.78E+01	0.00E+00	1.78E+01
			BaLa-140	<1.50E+01	0.00E+00	1.50E+01
			Be-7	2.96E+02	1.17E+02	1.49E+02
K-40	2.72E+03	4.31E+02	1.86E+02			
383636	7/7/2015 - 7/7/2015	WAXMYRTLE	Mn-54	<1.73E+01	0.00E+00	1.73E+01
			Co-58	<1.19E+01	0.00E+00	1.19E+01
			Fe-59	<3.04E+01	0.00E+00	3.04E+01
			Co-60	<1.48E+01	0.00E+00	1.48E+01
			Zn-65	<4.05E+01	0.00E+00	4.05E+01
			Zr-95	<2.73E+01	0.00E+00	2.73E+01
			Nb-95	<1.32E+01	0.00E+00	1.32E+01
			I-131	<2.14E+01	0.00E+00	2.14E+01
			Cs-134	<2.33E+01	0.00E+00	2.33E+01
			Cs-137	<1.95E+01	0.00E+00	1.95E+01
			BaLa-140	<1.75E+01	0.00E+00	1.75E+01
			Be-7	9.32E+02	2.10E+02	2.11E+02
K-40	2.25E+03	4.09E+02	2.05E+02			
384572	7/20/2015 - 7/20/2015	SASSAFRAS	Mn-54	<2.25E+01	0.00E+00	2.25E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 51 [INDICATOR - SSW @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
384572	7/20/2015 - 7/20/2015	SASSAFRAS	Co-58	<2.08E+01	0.00E+00	2.08E+01
			Fe-59	<3.54E+01	0.00E+00	3.54E+01
			Co-60	<2.59E+01	0.00E+00	2.59E+01
			Zn-65	<2.83E+01	0.00E+00	2.83E+01
			Zr-95	<3.79E+01	0.00E+00	3.79E+01
			Nb-95	<2.24E+01	0.00E+00	2.24E+01
			I-131	<3.04E+01	0.00E+00	3.04E+01
			Cs-134	<2.12E+01	0.00E+00	2.12E+01
			Cs-137	<2.57E+01	0.00E+00	2.57E+01
			BaLa-140	<2.94E+01	0.00E+00	2.94E+01
			Be-7	5.63E+02	2.01E+02	2.54E+02
			K-40	3.40E+03	5.80E+02	3.10E+02

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
384573	7/20/2015 - 7/20/2015	BLKCHERRY	Mn-54	<1.73E+01	0.00E+00	1.73E+01
			Co-58	<1.42E+01	0.00E+00	1.42E+01
			Fe-59	<2.99E+01	0.00E+00	2.99E+01
			Co-60	<1.62E+01	0.00E+00	1.62E+01
			Zn-65	<3.48E+01	0.00E+00	3.48E+01
			Zr-95	<2.61E+01	0.00E+00	2.61E+01
			Nb-95	<1.39E+01	0.00E+00	1.39E+01
			I-131	<2.31E+01	0.00E+00	2.31E+01
			Cs-134	<1.60E+01	0.00E+00	1.60E+01
			Cs-137	<1.90E+01	0.00E+00	1.90E+01
			BaLa-140	<2.10E+01	0.00E+00	2.10E+01
			Be-7	6.19E+02	1.62E+02	1.72E+02
			K-40	2.68E+03	4.51E+02	2.91E+02

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
384574	7/20/2015 - 7/20/2015	WAXMYRTLE	Mn-54	<1.39E+01	0.00E+00	1.39E+01
			Co-58	<1.45E+01	0.00E+00	1.45E+01
			Fe-59	<2.26E+01	0.00E+00	2.26E+01
			Co-60	<1.71E+01	0.00E+00	1.71E+01
			Zn-65	<3.30E+01	0.00E+00	3.30E+01
			Zr-95	<2.68E+01	0.00E+00	2.68E+01
			Nb-95	<1.38E+01	0.00E+00	1.38E+01
			I-131	<2.16E+01	0.00E+00	2.16E+01
			Cs-134	<1.65E+01	0.00E+00	1.65E+01
			Cs-137	<1.71E+01	0.00E+00	1.71E+01
			BaLa-140	<3.12E+01	0.00E+00	3.12E+01
			Be-7	8.40E+02	1.91E+02	1.75E+02
			K-40	1.91E+03	3.95E+02	2.85E+02

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
389168	8/28/2015 - 8/28/2015	SASSAFRAS	Mn-54	<1.98E+01	0.00E+00	1.98E+01
			Co-58	<2.50E+01	0.00E+00	2.50E+01
			Fe-59	<3.95E+01	0.00E+00	3.95E+01
			Co-60	<1.95E+01	0.00E+00	1.95E+01
			Zn-65	<5.54E+01	0.00E+00	5.54E+01
			Zr-95	<4.34E+01	0.00E+00	4.34E+01
			Nb-95	<2.16E+01	0.00E+00	2.16E+01
			I-131	<3.04E+01	0.00E+00	3.04E+01
			Cs-134	<2.21E+01	0.00E+00	2.21E+01
			Cs-137	2.80E+01	1.79E+01	2.53E+01
			BaLa-140	<3.61E+01	0.00E+00	3.61E+01
			Be-7	7.82E+02	2.12E+02	2.22E+02
			K-40	3.65E+03	6.17E+02	3.09E+02

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
389169	8/28/2015 - 8/28/2015	BLKCHERRY	Mn-54	<2.77E+01	0.00E+00	2.77E+01
			Co-58	<2.01E+01	0.00E+00	2.01E+01
			Fe-59	<5.97E+01	0.00E+00	5.97E+01
			Co-60	<1.78E+01	0.00E+00	1.78E+01
			Zn-65	<4.10E+01	0.00E+00	4.10E+01
			Zr-95	<5.01E+01	0.00E+00	5.01E+01
			Nb-95	<2.52E+01	0.00E+00	2.52E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 51 [INDICATOR - SSW @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
389169	8/28/2015 - 8/28/2015	BLKCHERRY	I-131	<4.34E+01	0.00E+00	4.34E+01
			Cs-134	<2.79E+01	0.00E+00	2.79E+01
			Cs-137	<3.48E+01	0.00E+00	3.48E+01
			BaLa-140	<4.43E+01	0.00E+00	4.43E+01
			Be-7	1.55E+02	1.59E+02	2.53E+02
			K-40	4.86E+03	7.43E+02	3.07E+02
389170	8/28/2015 - 8/28/2015	WAXMYRTLE	Mn-54	<2.06E+01	0.00E+00	2.06E+01
			Co-58	<2.47E+01	0.00E+00	2.47E+01
			Fe-59	<4.92E+01	0.00E+00	4.92E+01
			Co-60	<3.16E+01	0.00E+00	3.16E+01
			Zn-65	<4.49E+01	0.00E+00	4.49E+01
			Zr-95	<6.11E+01	0.00E+00	6.11E+01
			Nb-95	<2.75E+01	0.00E+00	2.75E+01
			I-131	<4.74E+01	0.00E+00	4.74E+01
			Cs-134	<4.21E+01	0.00E+00	4.21E+01
			Cs-137	<2.79E+01	0.00E+00	2.79E+01
			BaLa-140	<5.42E+01	0.00E+00	5.42E+01
			Be-7	1.33E+03	3.26E+02	3.54E+02
K-40	3.00E+03	5.71E+02	2.47E+02			
391598	9/22/2015 - 9/22/2015	SASSAFRAS	Mn-54	<2.42E+01	0.00E+00	2.42E+01
			Co-58	<1.55E+01	0.00E+00	1.55E+01
			Fe-59	<2.85E+01	0.00E+00	2.85E+01
			Co-60	<2.16E+01	0.00E+00	2.16E+01
			Zn-65	<4.48E+01	0.00E+00	4.48E+01
			Zr-95	<3.18E+01	0.00E+00	3.18E+01
			Nb-95	<2.22E+01	0.00E+00	2.22E+01
			I-131	<2.82E+01	0.00E+00	2.82E+01
			Cs-134	<2.41E+01	0.00E+00	2.41E+01
			Cs-137	5.26E+01	2.18E+01	2.66E+01
			BaLa-140	<4.29E+01	0.00E+00	4.29E+01
			Be-7	6.94E+02	2.03E+02	2.20E+02
K-40	2.17E+03	4.78E+02	3.80E+02			
391599	9/22/2015 - 9/22/2015	WAXMYRTLE	Mn-54	<2.17E+01	0.00E+00	2.17E+01
			Co-58	<1.97E+01	0.00E+00	1.97E+01
			Fe-59	<5.35E+01	0.00E+00	5.35E+01
			Co-60	<2.24E+01	0.00E+00	2.24E+01
			Zn-65	<4.42E+01	0.00E+00	4.42E+01
			Zr-95	<4.92E+01	0.00E+00	4.92E+01
			Nb-95	<2.32E+01	0.00E+00	2.32E+01
			I-131	<4.07E+01	0.00E+00	4.07E+01
			Cs-134	<2.91E+01	0.00E+00	2.91E+01
			Cs-137	<2.94E+01	0.00E+00	2.94E+01
			BaLa-140	<2.80E+01	0.00E+00	2.80E+01
			Be-7	8.82E+02	2.37E+02	2.37E+02
K-40	1.67E+03	4.32E+02	3.31E+02			
391600	9/22/2015 - 9/22/2015	BLKCHERRY	Mn-54	<1.42E+01	0.00E+00	1.42E+01
			Co-58	<1.69E+01	0.00E+00	1.69E+01
			Fe-59	<1.97E+01	0.00E+00	1.97E+01
			Co-60	<1.68E+01	0.00E+00	1.68E+01
			Zn-65	<3.62E+01	0.00E+00	3.62E+01
			Zr-95	<3.42E+01	0.00E+00	3.42E+01
			Nb-95	<1.39E+01	0.00E+00	1.39E+01
			I-131	<2.91E+01	0.00E+00	2.91E+01
			Cs-134	<2.10E+01	0.00E+00	2.10E+01
			Cs-137	3.30E+01	1.62E+01	2.05E+01
			BaLa-140	<2.66E+01	0.00E+00	2.66E+01
			Be-7	2.24E+03	3.35E+02	1.84E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 51 [INDICATOR - SSW @ 0 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
391600	9/22/2015 - 9/22/2015		K-40	1.76E+03	3.96E+02	3.05E+02
395105	10/24/2015 - 10/24/2015	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
			Mn-54	<1.26E+01	0.00E+00	1.26E+01
			Co-58	<1.28E+01	0.00E+00	1.28E+01
			Fe-59	<2.51E+01	0.00E+00	2.51E+01
			Co-60	<1.55E+01	0.00E+00	1.55E+01
			Zn-65	<2.53E+01	0.00E+00	2.53E+01
			Zr-95	<2.22E+01	0.00E+00	2.22E+01
			Nb-95	<1.20E+01	0.00E+00	1.20E+01
			I-131	<1.43E+01	0.00E+00	1.43E+01
			Cs-134	<1.70E+01	0.00E+00	1.70E+01
			Cs-137	<1.42E+01	0.00E+00	1.42E+01
			BaLa-140	<1.52E+01	0.00E+00	1.52E+01
			Be-7	3.70E+03	4.30E+02	1.76E+02
			K-40	2.48E+03	4.09E+02	2.41E+02
395106	10/24/2015 - 10/24/2015	PERSIMLEAF	Nuclide	Activity	2 Sigma Error	LLD
			Mn-54	<1.32E+01	0.00E+00	1.32E+01
			Co-58	<1.50E+01	0.00E+00	1.50E+01
			Fe-59	<3.48E+01	0.00E+00	3.48E+01
			Co-60	<1.92E+01	0.00E+00	1.92E+01
			Zn-65	<4.32E+01	0.00E+00	4.32E+01
			Zr-95	<2.74E+01	0.00E+00	2.74E+01
			Nb-95	<1.94E+01	0.00E+00	1.94E+01
			I-131	<2.05E+01	0.00E+00	2.05E+01
			Cs-134	<1.74E+01	0.00E+00	1.74E+01
			Cs-137	<1.81E+01	0.00E+00	1.81E+01
			BaLa-140	<1.50E+01	0.00E+00	1.50E+01
			Be-7	<4.32E+02	0.00E+00	4.32E+02
			K-40	<2.58E+02	0.00E+00	2.58E+02
395107	10/24/2015 - 10/24/2015	PEARLEAF	Nuclide	Activity	2 Sigma Error	LLD
			Mn-54	<2.43E+01	0.00E+00	2.43E+01
			Co-58	<2.03E+01	0.00E+00	2.03E+01
			Fe-59	<3.95E+01	0.00E+00	3.95E+01
			Co-60	<1.60E+01	0.00E+00	1.60E+01
			Zn-65	<4.15E+01	0.00E+00	4.15E+01
			Zr-95	<3.60E+01	0.00E+00	3.60E+01
			Nb-95	<1.88E+01	0.00E+00	1.88E+01
			I-131	<1.68E+01	0.00E+00	1.68E+01
			Cs-134	<2.30E+01	0.00E+00	2.30E+01
			Cs-137	1.37E+01	1.31E+01	2.06E+01
			BaLa-140	<1.69E+01	0.00E+00	1.69E+01
			Be-7	7.74E+02	1.85E+02	2.03E+02
			K-40	6.21E+03	7.63E+02	2.70E+02

Sample Point 52 [CONTROL - W @ 10 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
378202	4/23/2015 - 4/23/2015		Mn-54	<8.38E+00	0.00E+00	8.38E+00
			Co-58	<9.09E+00	0.00E+00	9.09E+00
			Fe-59	<1.83E+01	0.00E+00	1.83E+01
			Co-60	<8.06E+00	0.00E+00	8.06E+00
			Zn-65	<1.91E+01	0.00E+00	1.91E+01
			Zr-95	<1.31E+01	0.00E+00	1.31E+01
			Nb-95	<8.18E+00	0.00E+00	8.18E+00
			I-131	<1.19E+01	0.00E+00	1.19E+01
			Cs-134	<1.14E+01	0.00E+00	1.14E+01
			Cs-137	1.82E+01	7.82E+00	1.03E+01
			BaLa-140	<1.01E+01	0.00E+00	1.01E+01
			Be-7	4.77E+02	9.96E+01	1.03E+02
			K-40	2.59E+03	3.22E+02	1.24E+02
378203	4/23/2015 - 4/23/2015	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
			Mn-54	<1.26E+01	0.00E+00	1.26E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 52 [CONTROL - W @ 10 miles]

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
378203	4/23/2015 - 4/23/2015		Co-58	<1.17E+01	0.00E+00	1.17E+01
			Fe-59	<2.59E+01	0.00E+00	2.59E+01
			Co-60	<1.17E+01	0.00E+00	1.17E+01
			Zn-65	<3.49E+01	0.00E+00	3.49E+01
			Zr-95	<2.26E+01	0.00E+00	2.26E+01
			Nb-95	<1.50E+01	0.00E+00	1.50E+01
			I-131	<1.76E+01	0.00E+00	1.76E+01
			Cs-134	<1.69E+01	0.00E+00	1.69E+01
			Cs-137	1.07E+02	2.48E+01	2.51E+01
			BaLa-140	<2.05E+01	0.00E+00	2.05E+01
			Be-7	4.13E+02	1.50E+02	2.02E+02
			K-40	3.84E+03	5.31E+02	2.35E+02

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
378204	4/23/2015 - 4/23/2015		Mn-54	<2.22E+01	0.00E+00	2.22E+01
			Co-58	<2.03E+01	0.00E+00	2.03E+01
			Fe-59	<3.75E+01	0.00E+00	3.75E+01
			Co-60	<2.69E+01	0.00E+00	2.69E+01
			Zn-65	<3.59E+01	0.00E+00	3.59E+01
			Zr-95	<3.53E+01	0.00E+00	3.53E+01
			Nb-95	<2.42E+01	0.00E+00	2.42E+01
			I-131	<3.04E+01	0.00E+00	3.04E+01
			Cs-134	<2.08E+01	0.00E+00	2.08E+01
			Cs-137	<2.41E+01	0.00E+00	2.41E+01
			BaLa-140	<3.54E+01	0.00E+00	3.54E+01
			Be-7	3.36E+03	4.63E+02	2.72E+02
			K-40	2.24E+03	4.40E+02	1.66E+02

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
380653	5/29/2015 - 5/29/2015		Mn-54	<2.19E+01	0.00E+00	2.19E+01
			Co-58	<1.52E+01	0.00E+00	1.52E+01
			Fe-59	<4.62E+01	0.00E+00	4.62E+01
			Co-60	<2.40E+01	0.00E+00	2.40E+01
			Zn-65	<5.57E+01	0.00E+00	5.57E+01
			Zr-95	<4.09E+01	0.00E+00	4.09E+01
			Nb-95	<3.17E+01	0.00E+00	3.17E+01
			I-131	<2.57E+01	0.00E+00	2.57E+01
			Cs-134	<2.91E+01	0.00E+00	2.91E+01
			Cs-137	<2.91E+01	0.00E+00	2.91E+01
			BaLa-140	<4.13E+01	0.00E+00	4.13E+01
			Be-7	2.59E+02	1.67E+02	2.47E+02
			K-40	3.63E+03	6.38E+02	3.00E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
380655	5/29/2015 - 5/29/2015		Mn-54	<1.74E+01	0.00E+00	1.74E+01
			Co-58	<1.64E+01	0.00E+00	1.64E+01
			Fe-59	<3.09E+01	0.00E+00	3.09E+01
			Co-60	<1.60E+01	0.00E+00	1.60E+01
			Zn-65	<3.90E+01	0.00E+00	3.90E+01
			Zr-95	<2.15E+01	0.00E+00	2.15E+01
			Nb-95	<1.84E+01	0.00E+00	1.84E+01
			I-131	<2.16E+01	0.00E+00	2.16E+01
			Cs-134	<2.07E+01	0.00E+00	2.07E+01
			Cs-137	5.74E+01	1.43E+01	1.69E+01
			BaLa-140	<1.55E+01	0.00E+00	1.55E+01
			Be-7	4.48E+02	1.56E+02	1.97E+02
			K-40	2.83E+03	4.55E+02	1.49E+02

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
380656	5/29/2015 - 5/29/2015		Mn-54	<1.60E+01	0.00E+00	1.60E+01
			Co-58	<1.78E+01	0.00E+00	1.78E+01
			Fe-59	<2.47E+01	0.00E+00	2.47E+01
			Co-60	<1.30E+01	0.00E+00	1.30E+01
			Zn-65	<2.64E+01	0.00E+00	2.64E+01
			Zr-95	<2.56E+01	0.00E+00	2.56E+01
			Nb-95	<1.91E+01	0.00E+00	1.91E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 52 [CONTROL - W @ 10 miles]

Sample ID:	Sample Dates:	Plant Name:	Nuclide	Activity	2 Sigma Error	LLD
380656	5/29/2015 - 5/29/2015	WAXMYRTLE	I-131	<1.93E+01	0.00E+00	1.93E+01
			Cs-134	<1.79E+01	0.00E+00	1.79E+01
			Cs-137	2.54E+01	1.49E+01	2.07E+01
			BaLa-140	<1.62E+01	0.00E+00	1.62E+01
			Be-7	2.09E+02	1.30E+02	1.92E+02
			K-40	2.23E+03	4.23E+02	2.70E+02
383637	7/7/2015 - 7/7/2015	SASSAFRAS	Mn-54	<1.32E+01	0.00E+00	1.32E+01
			Co-58	<1.45E+01	0.00E+00	1.45E+01
			Fe-59	<2.73E+01	0.00E+00	2.73E+01
			Co-60	<1.62E+01	0.00E+00	1.62E+01
			Zn-65	<2.21E+01	0.00E+00	2.21E+01
			Zr-95	<2.02E+01	0.00E+00	2.02E+01
			Nb-95	<1.29E+01	0.00E+00	1.29E+01
			I-131	<2.17E+01	0.00E+00	2.17E+01
			Cs-134	<1.25E+01	0.00E+00	1.25E+01
			Cs-137	4.12E+01	1.60E+01	1.84E+01
			BaLa-140	<2.51E+01	0.00E+00	2.51E+01
			Be-7	6.68E+02	1.81E+02	2.03E+02
			K-40	2.35E+03	4.38E+02	3.05E+02
383638	7/7/2015 - 7/7/2015	BLKCHERRY	Mn-54	<1.53E+01	0.00E+00	1.53E+01
			Co-58	<1.83E+01	0.00E+00	1.83E+01
			Fe-59	<3.92E+01	0.00E+00	3.92E+01
			Co-60	<1.36E+01	0.00E+00	1.36E+01
			Zn-65	<3.65E+01	0.00E+00	3.65E+01
			Zr-95	<3.68E+01	0.00E+00	3.68E+01
			Nb-95	<2.09E+01	0.00E+00	2.09E+01
			I-131	<2.71E+01	0.00E+00	2.71E+01
			Cs-134	<1.70E+01	0.00E+00	1.70E+01
			Cs-137	<2.29E+01	0.00E+00	2.29E+01
			BaLa-140	<2.37E+01	0.00E+00	2.37E+01
			Be-7	5.28E+02	1.70E+02	2.02E+02
			K-40	3.37E+03	5.35E+02	2.31E+02
383639	7/7/2015 - 7/7/2015	WAXMYRTLE	Mn-54	<9.66E+00	0.00E+00	9.66E+00
			Co-58	<9.14E+00	0.00E+00	9.14E+00
			Fe-59	<1.66E+01	0.00E+00	1.66E+01
			Co-60	<1.31E+01	0.00E+00	1.31E+01
			Zn-65	<2.09E+01	0.00E+00	2.09E+01
			Zr-95	<1.74E+01	0.00E+00	1.74E+01
			Nb-95	<1.13E+01	0.00E+00	1.13E+01
			I-131	<1.54E+01	0.00E+00	1.54E+01
			Cs-134	<1.08E+01	0.00E+00	1.08E+01
			Cs-137	6.37E+00	6.12E+00	9.58E+00
			BaLa-140	<3.12E+00	0.00E+00	3.12E+00
			Be-7	6.12E+02	1.30E+02	1.42E+02
			K-40	1.91E+03	2.90E+02	1.81E+02
384575	7/20/2015 - 7/20/2015	SASSAFRAS	Mn-54	<1.72E+01	0.00E+00	1.72E+01
			Co-58	<1.62E+01	0.00E+00	1.62E+01
			Fe-59	<3.34E+01	0.00E+00	3.34E+01
			Co-60	<2.10E+01	0.00E+00	2.10E+01
			Zn-65	<4.59E+01	0.00E+00	4.59E+01
			Zr-95	<3.41E+01	0.00E+00	3.41E+01
			Nb-95	<1.85E+01	0.00E+00	1.85E+01
			I-131	<2.55E+01	0.00E+00	2.55E+01
			Cs-134	<1.92E+01	0.00E+00	1.92E+01
			Cs-137	4.12E+01	1.59E+01	1.68E+01
			BaLa-140	<3.59E+01	0.00E+00	3.59E+01
			Be-7	1.27E+03	2.42E+02	1.90E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 52 [CONTROL - W @ 10 miles]

Sample ID:	Sample Dates:	Plant Species:	Nuclide	Activity	2 Sigma Error	LLD
384575	7/20/2015 - 7/20/2015	SASSAFRAS	K-40	3.09E+03	5.13E+02	2.44E+02
384576	7/20/2015 - 7/20/2015	BLKCHERRY	Mn-54	<1.09E+01	0.00E+00	1.09E+01
			Co-58	<1.25E+01	0.00E+00	1.25E+01
			Fe-59	<1.92E+01	0.00E+00	1.92E+01
			Co-60	<1.26E+01	0.00E+00	1.26E+01
			Zn-65	<2.14E+01	0.00E+00	2.14E+01
			Zr-95	<1.68E+01	0.00E+00	1.68E+01
			Nb-95	<1.15E+01	0.00E+00	1.15E+01
			I-131	<1.61E+01	0.00E+00	1.61E+01
			Cs-134	<1.33E+01	0.00E+00	1.33E+01
			Cs-137	7.38E+00	9.32E+00	1.53E+01
			BaLa-140	<8.80E+00	0.00E+00	8.80E+00
			Be-7	6.79E+02	1.39E+02	1.53E+02
			K-40	2.47E+03	2.60E+02	7.82E+01
384577	7/20/2015 - 7/20/2015	WAXMYRTLE	Mn-54	<1.61E+01	0.00E+00	1.61E+01
			Co-58	<1.39E+01	0.00E+00	1.39E+01
			Fe-59	<2.71E+01	0.00E+00	2.71E+01
			Co-60	<1.58E+01	0.00E+00	1.58E+01
			Zn-65	<3.66E+01	0.00E+00	3.66E+01
			Zr-95	<2.77E+01	0.00E+00	2.77E+01
			Nb-95	<8.03E+00	0.00E+00	8.03E+00
			I-131	<2.67E+01	0.00E+00	2.67E+01
			Cs-134	<2.13E+01	0.00E+00	2.13E+01
			Cs-137	<2.29E+01	0.00E+00	2.29E+01
			BaLa-140	<2.91E+01	0.00E+00	2.91E+01
			Be-7	2.23E+03	3.29E+02	1.83E+02
			K-40	1.94E+03	3.82E+02	1.73E+02
389171	8/28/2015 - 8/28/2015	SASSAFRAS	Mn-54	<1.62E+01	0.00E+00	1.62E+01
			Co-58	<1.60E+01	0.00E+00	1.60E+01
			Fe-59	<4.68E+01	0.00E+00	4.68E+01
			Co-60	<1.53E+01	0.00E+00	1.53E+01
			Zn-65	<3.53E+01	0.00E+00	3.53E+01
			Zr-95	<3.01E+01	0.00E+00	3.01E+01
			Nb-95	<2.26E+01	0.00E+00	2.26E+01
			I-131	<3.94E+01	0.00E+00	3.94E+01
			Cs-134	<2.31E+01	0.00E+00	2.31E+01
			Cs-137	3.95E+01	2.03E+01	2.78E+01
			BaLa-140	<3.28E+01	0.00E+00	3.28E+01
			Be-7	8.41E+02	2.02E+02	1.75E+02
			K-40	2.45E+03	4.59E+02	1.87E+02
389172	8/28/2015 - 8/28/2015	BLKCHERRY	Mn-54	<2.33E+01	0.00E+00	2.33E+01
			Co-58	<2.24E+01	0.00E+00	2.24E+01
			Fe-59	<5.08E+01	0.00E+00	5.08E+01
			Co-60	<2.41E+01	0.00E+00	2.41E+01
			Zn-65	<5.04E+01	0.00E+00	5.04E+01
			Zr-95	<3.91E+01	0.00E+00	3.91E+01
			Nb-95	<2.23E+01	0.00E+00	2.23E+01
			I-131	<4.75E+01	0.00E+00	4.75E+01
			Cs-134	<2.58E+01	0.00E+00	2.58E+01
			Cs-137	<1.99E+01	0.00E+00	1.99E+01
			BaLa-140	<4.68E+01	0.00E+00	4.68E+01
			Be-7	1.86E+03	3.58E+02	3.12E+02
			K-40	3.82E+03	6.72E+02	4.06E+02
389173	8/28/2015 - 8/28/2015	WAXMYRTLE	Mn-54	<1.67E+01	0.00E+00	1.67E+01
			Co-58	<1.67E+01	0.00E+00	1.67E+01
			Fe-59	<3.44E+01	0.00E+00	3.44E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 52 [CONTROL - W @ 10 miles]

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
389173	8/28/2015 - 8/28/2015	WAXMYRTLE	Co-60	<4.32E+00	0.00E+00	4.32E+00
			Zn-65	<4.27E+01	0.00E+00	4.27E+01
			Zr-95	<2.23E+01	0.00E+00	2.23E+01
			Nb-95	<2.19E+01	0.00E+00	2.19E+01
			I-131	<3.18E+01	0.00E+00	3.18E+01
			Cs-134	<1.74E+01	0.00E+00	1.74E+01
			Cs-137	<1.84E+01	0.00E+00	1.84E+01
			BaLa-140	<3.73E+01	0.00E+00	3.73E+01
			Be-7	6.59E+02	1.86E+02	1.93E+02
			K-40	2.14E+03	4.30E+02	2.62E+02
391601	9/22/2015 - 9/22/2015	SASSAFRAS	Mn-54	<1.56E+01	0.00E+00	1.56E+01
			Co-58	<2.38E+01	0.00E+00	2.38E+01
			Fe-59	<3.28E+01	0.00E+00	3.28E+01
			Co-60	<2.39E+01	0.00E+00	2.39E+01
			Zn-65	<2.62E+01	0.00E+00	2.62E+01
			Zr-95	<3.34E+01	0.00E+00	3.34E+01
			Nb-95	<1.88E+01	0.00E+00	1.88E+01
			I-131	<2.90E+01	0.00E+00	2.90E+01
			Cs-134	<2.05E+01	0.00E+00	2.05E+01
			Cs-137	6.05E+01	2.35E+01	2.97E+01
391602	9/22/2015 - 9/22/2015	WAXMYRTLE	BaLa-140	<3.84E+01	0.00E+00	3.84E+01
			Be-7	2.18E+03	3.37E+02	2.14E+02
			K-40	2.79E+03	5.06E+02	3.07E+02
			Mn-54	<2.86E+01	0.00E+00	2.86E+01
			Co-58	<2.59E+01	0.00E+00	2.59E+01
			Fe-59	<3.79E+01	0.00E+00	3.79E+01
			Co-60	<2.90E+01	0.00E+00	2.90E+01
			Zn-65	<3.91E+01	0.00E+00	3.91E+01
			Zr-95	<4.69E+01	0.00E+00	4.69E+01
			Nb-95	<2.30E+01	0.00E+00	2.30E+01
391603	9/22/2015 - 9/22/2015	BLKCHERRY	I-131	<3.29E+01	0.00E+00	3.29E+01
			Cs-134	<2.51E+01	0.00E+00	2.51E+01
			Cs-137	<2.47E+01	0.00E+00	2.47E+01
			BaLa-140	<4.07E+01	0.00E+00	4.07E+01
			Be-7	9.66E+02	2.33E+02	1.96E+02
			K-40	2.24E+03	4.68E+02	5.58E+01
			Mn-54	<1.93E+01	0.00E+00	1.93E+01
			Co-58	<2.34E+01	0.00E+00	2.34E+01
			Fe-59	<5.06E+01	0.00E+00	5.06E+01
			Co-60	<2.23E+01	0.00E+00	2.23E+01
395108	10/24/2015 - 10/24/2015	SASSAFRAS	Zn-65	<4.63E+01	0.00E+00	4.63E+01
			Zr-95	<4.07E+01	0.00E+00	4.07E+01
			Nb-95	<2.08E+01	0.00E+00	2.08E+01
			I-131	<3.31E+01	0.00E+00	3.31E+01
			Cs-134	<2.49E+01	0.00E+00	2.49E+01
			Cs-137	<2.55E+01	0.00E+00	2.55E+01
			BaLa-140	<3.69E+01	0.00E+00	3.69E+01
			Be-7	5.69E+02	2.04E+02	2.55E+02
			K-40	3.14E+03	5.49E+02	5.04E+01
			395108	10/24/2015 - 10/24/2015	SASSAFRAS	Mn-54
Co-58	<1.64E+01	0.00E+00				1.64E+01
Fe-59	<2.44E+01	0.00E+00				2.44E+01
Co-60	<1.69E+01	0.00E+00				1.69E+01
Zn-65	<3.70E+01	0.00E+00				3.70E+01
Zr-95	<2.71E+01	0.00E+00				2.71E+01
Nb-95	<1.83E+01	0.00E+00				1.83E+01
I-131	<1.75E+01	0.00E+00				1.75E+01
Cs-134	<1.90E+01	0.00E+00				1.90E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 52 [CONTROL - W @ 10 miles]

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
395108	10/24/2015 - 10/24/2015		Cs-137	5.94E+01	1.99E+01	2.22E+01
			BaLa-140	<1.93E+01	0.00E+00	1.93E+01
			Be-7	4.11E+03	4.91E+02	1.87E+02
			K-40	1.40E+03	3.36E+02	2.81E+02

Sample ID:	Sample Dates:	PERSIMLEAF	Nuclide	Activity	2 Sigma Error	LLD
395109	10/24/2015 - 10/24/2015		Mn-54	<9.12E+00	0.00E+00	9.12E+00
			Co-58	<9.22E+00	0.00E+00	9.22E+00
			Fe-59	<1.92E+01	0.00E+00	1.92E+01
			Co-60	<1.75E+01	0.00E+00	1.75E+01
			Zn-65	<3.51E+01	0.00E+00	3.51E+01
			Zr-95	<1.88E+01	0.00E+00	1.88E+01
			Nb-95	<1.43E+01	0.00E+00	1.43E+01
			I-131	<1.34E+01	0.00E+00	1.34E+01
			Cs-134	<1.65E+01	0.00E+00	1.65E+01
			Cs-137	<1.52E+01	0.00E+00	1.52E+01
			BaLa-140	<2.14E+01	0.00E+00	2.14E+01
			Be-7	1.32E+03	2.17E+02	1.61E+02
			K-40	8.65E+02	2.15E+02	1.14E+02

Sample ID:	Sample Dates:	PEARLEAF	Nuclide	Activity	2 Sigma Error	LLD
395110	10/24/2015 - 10/24/2015		Mn-54	<3.09E+01	0.00E+00	3.09E+01
			Co-58	<2.31E+01	0.00E+00	2.31E+01
			Fe-59	<5.36E+01	0.00E+00	5.36E+01
			Co-60	<2.40E+01	0.00E+00	2.40E+01
			Zn-65	<7.03E+01	0.00E+00	7.03E+01
			Zr-95	<4.45E+01	0.00E+00	4.45E+01
			Nb-95	<2.90E+01	0.00E+00	2.90E+01
			I-131	<2.75E+01	0.00E+00	2.75E+01
			Cs-134	<2.97E+01	0.00E+00	2.97E+01
			Cs-137	<2.73E+01	0.00E+00	2.73E+01
			BaLa-140	<2.00E+01	0.00E+00	2.00E+01
			Be-7	3.36E+03	4.71E+02	2.98E+02
			K-40	1.19E+04	1.38E+03	4.36E+02

Sample Point 62 [INDICATOR - SE @ 0 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
378208	4/23/2015 - 4/23/2015		Mn-54	<1.83E+01	0.00E+00	1.83E+01
			Co-58	<1.82E+01	0.00E+00	1.82E+01
			Fe-59	<3.45E+01	0.00E+00	3.45E+01
			Co-60	<2.52E+01	0.00E+00	2.52E+01
			Zn-65	<4.46E+01	0.00E+00	4.46E+01
			Zr-95	<3.03E+01	0.00E+00	3.03E+01
			Nb-95	<1.39E+01	0.00E+00	1.39E+01
			I-131	<2.43E+01	0.00E+00	2.43E+01
			Cs-134	<1.78E+01	0.00E+00	1.78E+01
			Cs-137	<1.88E+01	0.00E+00	1.88E+01
			BaLa-140	<2.35E+01	0.00E+00	2.35E+01
			Be-7	2.31E+02	1.38E+02	2.01E+02
			K-40	3.97E+03	6.07E+02	3.55E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
378209	4/23/2015 - 4/23/2015		Mn-54	<1.19E+01	0.00E+00	1.19E+01
			Co-58	<1.23E+01	0.00E+00	1.23E+01
			Fe-59	<2.78E+01	0.00E+00	2.78E+01
			Co-60	<1.30E+01	0.00E+00	1.30E+01
			Zn-65	<2.90E+01	0.00E+00	2.90E+01
			Zr-95	<1.74E+01	0.00E+00	1.74E+01
			Nb-95	<1.36E+01	0.00E+00	1.36E+01
			I-131	<1.80E+01	0.00E+00	1.80E+01
			Cs-134	<1.27E+01	0.00E+00	1.27E+01
			Cs-137	7.40E+00	9.74E+00	1.60E+01
			BaLa-140	<4.71E+00	0.00E+00	4.71E+00
			Be-7	1.32E+02	9.51E+01	1.45E+02
			K-40	3.25E+03	4.49E+02	2.69E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 62 [INDICATOR - SE @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
378210	4/23/2015 - 4/23/2015	WAXMYRTLE	Mn-54	<1.17E+01	0.00E+00	1.17E+01
			Co-58	<1.27E+01	0.00E+00	1.27E+01
			Fe-59	<2.87E+01	0.00E+00	2.87E+01
			Co-60	<1.46E+01	0.00E+00	1.46E+01
			Zn-65	<2.87E+01	0.00E+00	2.87E+01
			Zr-95	<2.37E+01	0.00E+00	2.37E+01
			Nb-95	<1.24E+01	0.00E+00	1.24E+01
			I-131	<1.99E+01	0.00E+00	1.99E+01
			Cs-134	<1.19E+01	0.00E+00	1.19E+01
			Cs-137	<1.30E+01	0.00E+00	1.30E+01
			BaLa-140	<1.84E+01	0.00E+00	1.84E+01
			Be-7	1.77E+03	2.44E+02	1.24E+02
			K-40	2.51E+03	3.90E+02	2.04E+02
			380657	5/29/2015 - 5/29/2015	BLKCHERRY	Mn-54
Co-58	<1.67E+01	0.00E+00				1.67E+01
Fe-59	<2.64E+01	0.00E+00				2.64E+01
Co-60	<1.61E+01	0.00E+00				1.61E+01
Zn-65	<3.15E+01	0.00E+00				3.15E+01
Zr-95	<3.04E+01	0.00E+00				3.04E+01
Nb-95	<1.67E+01	0.00E+00				1.67E+01
I-131	<2.01E+01	0.00E+00				2.01E+01
Cs-134	<2.39E+01	0.00E+00				2.39E+01
Cs-137	<2.17E+01	0.00E+00				2.17E+01
BaLa-140	<6.41E+00	0.00E+00				6.41E+00
Be-7	3.95E+02	1.51E+02				1.91E+02
K-40	3.41E+03	5.49E+02				2.67E+02
380658	5/29/2015 - 5/29/2015	SASSAFRAS				Mn-54
			Co-58	<1.78E+01	0.00E+00	1.78E+01
			Fe-59	<4.35E+01	0.00E+00	4.35E+01
			Co-60	<2.38E+01	0.00E+00	2.38E+01
			Zn-65	<4.19E+01	0.00E+00	4.19E+01
			Zr-95	<3.54E+01	0.00E+00	3.54E+01
			Nb-95	<2.12E+01	0.00E+00	2.12E+01
			I-131	<2.32E+01	0.00E+00	2.32E+01
			Cs-134	<1.85E+01	0.00E+00	1.85E+01
			Cs-137	<2.89E+01	0.00E+00	2.89E+01
			BaLa-140	<2.33E+01	0.00E+00	2.33E+01
			Be-7	3.84E+02	1.55E+02	2.00E+02
			K-40	3.49E+03	5.69E+02	2.40E+02
			380659	5/29/2015 - 5/29/2015	WAXMYRTLE	Mn-54
Co-58	<1.44E+01	0.00E+00				1.44E+01
Fe-59	<3.77E+01	0.00E+00				3.77E+01
Co-60	<1.55E+01	0.00E+00				1.55E+01
Zn-65	<3.81E+01	0.00E+00				3.81E+01
Zr-95	<2.96E+01	0.00E+00				2.96E+01
Nb-95	<2.18E+01	0.00E+00				2.18E+01
I-131	<1.88E+01	0.00E+00				1.88E+01
Cs-134	<1.86E+01	0.00E+00				1.86E+01
Cs-137	<1.68E+01	0.00E+00				1.68E+01
BaLa-140	<2.46E+01	0.00E+00				2.46E+01
Be-7	2.77E+02	1.25E+02				1.64E+02
K-40	2.63E+03	4.64E+02				2.63E+02
383640	7/7/2015 - 7/7/2015	SASSAFRAS				Mn-54
			Co-58	<1.53E+01	0.00E+00	1.53E+01
			Fe-59	<2.59E+01	0.00E+00	2.59E+01
			Co-60	<2.21E+01	0.00E+00	2.21E+01
			Zn-65	<4.04E+01	0.00E+00	4.04E+01
			Zr-95	<2.85E+01	0.00E+00	2.85E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 62 [INDICATOR - SE @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
383640	7/7/2015 - 7/7/2015	SASSAFRAS	Nb-95	<2.01E+01	0.00E+00	2.01E+01
			I-131	<2.29E+01	0.00E+00	2.29E+01
			Cs-134	<1.51E+01	0.00E+00	1.51E+01
			Cs-137	<1.84E+01	0.00E+00	1.84E+01
			BaLa-140	<1.89E+01	0.00E+00	1.89E+01
			Be-7	<1.52E+02	0.00E+00	1.52E+02
			K-40	5.23E+03	6.65E+02	2.42E+02
383641	7/7/2015 - 7/7/2015	BLKCHERRY	Mn-54	<1.77E+01	0.00E+00	1.77E+01
			Co-58	<2.58E+01	0.00E+00	2.58E+01
			Fe-59	<4.49E+01	0.00E+00	4.49E+01
			Co-60	<2.15E+01	0.00E+00	2.15E+01
			Zn-65	<4.89E+01	0.00E+00	4.89E+01
			Zr-95	<3.33E+01	0.00E+00	3.33E+01
			Nb-95	<1.78E+01	0.00E+00	1.78E+01
			I-131	<2.95E+01	0.00E+00	2.95E+01
			Cs-134	<2.66E+01	0.00E+00	2.66E+01
			Cs-137	<2.29E+01	0.00E+00	2.29E+01
			BaLa-140	<1.95E+01	0.00E+00	1.95E+01
			Be-7	2.51E+02	1.52E+02	2.25E+02
			K-40	3.62E+03	5.66E+02	2.43E+02
383642	7/7/2015 - 7/7/2015	WAXMYRTLE	Mn-54	<1.43E+01	0.00E+00	1.43E+01
			Co-58	<1.38E+01	0.00E+00	1.38E+01
			Fe-59	<3.48E+01	0.00E+00	3.48E+01
			Co-60	<1.01E+01	0.00E+00	1.01E+01
			Zn-65	<4.22E+01	0.00E+00	4.22E+01
			Zr-95	<3.22E+01	0.00E+00	3.22E+01
			Nb-95	<1.41E+01	0.00E+00	1.41E+01
			I-131	<1.92E+01	0.00E+00	1.92E+01
			Cs-134	<1.59E+01	0.00E+00	1.59E+01
			Cs-137	<1.71E+01	0.00E+00	1.71E+01
			BaLa-140	<2.21E+01	0.00E+00	2.21E+01
			Be-7	6.27E+02	1.70E+02	1.82E+02
			K-40	2.33E+03	4.32E+02	2.77E+02
384578	7/20/2015 - 7/20/2015	SASSAFRAS	Mn-54	<1.82E+01	0.00E+00	1.82E+01
			Co-58	<1.41E+01	0.00E+00	1.41E+01
			Fe-59	<2.52E+01	0.00E+00	2.52E+01
			Co-60	<1.73E+01	0.00E+00	1.73E+01
			Zn-65	<2.84E+01	0.00E+00	2.84E+01
			Zr-95	<2.33E+01	0.00E+00	2.33E+01
			Nb-95	<1.59E+01	0.00E+00	1.59E+01
			I-131	<2.41E+01	0.00E+00	2.41E+01
			Cs-134	<1.58E+01	0.00E+00	1.58E+01
			Cs-137	3.51E+01	1.50E+01	1.87E+01
			BaLa-140	<1.65E+01	0.00E+00	1.65E+01
			Be-7	1.64E+03	2.56E+02	1.50E+02
			K-40	1.89E+03	3.56E+02	2.03E+02
384579	7/20/2015 - 7/20/2015	BLKCHERRY	Mn-54	<1.88E+01	0.00E+00	1.88E+01
			Co-58	<2.71E+01	0.00E+00	2.71E+01
			Fe-59	<4.65E+01	0.00E+00	4.65E+01
			Co-60	<3.11E+01	0.00E+00	3.11E+01
			Zn-65	<5.17E+01	0.00E+00	5.17E+01
			Zr-95	<4.13E+01	0.00E+00	4.13E+01
			Nb-95	<2.44E+01	0.00E+00	2.44E+01
			I-131	<3.65E+01	0.00E+00	3.65E+01
			Cs-134	<2.66E+01	0.00E+00	2.66E+01
			Cs-137	<3.36E+01	0.00E+00	3.36E+01
			BaLa-140	<1.03E+01	0.00E+00	1.03E+01
			Be-7	7.01E+02	2.27E+02	2.65E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 62 [INDICATOR - SE @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
384579	7/20/2015 - 7/20/2015	BLKCHERRY	K-40	2.61E+03	5.25E+02	2.39E+02
384580	7/20/2015 - 7/20/2015	WAXMYRTLE	Mn-54	<2.14E+01	0.00E+00	2.14E+01
			Co-58	<1.91E+01	0.00E+00	1.91E+01
			Fe-59	<2.91E+01	0.00E+00	2.91E+01
			Co-60	<2.07E+01	0.00E+00	2.07E+01
			Zn-65	<3.01E+01	0.00E+00	3.01E+01
			Zr-95	<2.62E+01	0.00E+00	2.62E+01
			Nb-95	<1.97E+01	0.00E+00	1.97E+01
			I-131	<2.42E+01	0.00E+00	2.42E+01
			Cs-134	<1.84E+01	0.00E+00	1.84E+01
			Cs-137	2.69E+01	1.77E+01	2.58E+01
			BaLa-140	<2.70E+01	0.00E+00	2.70E+01
			Be-7	1.65E+03	2.93E+02	2.27E+02
			K-40	1.76E+03	4.06E+02	3.44E+02
389174	8/28/2015 - 8/28/2015	SASSAFRAS	Mn-54	<2.37E+01	0.00E+00	2.37E+01
			Co-58	<2.01E+01	0.00E+00	2.01E+01
			Fe-59	<4.85E+01	0.00E+00	4.85E+01
			Co-60	<2.36E+01	0.00E+00	2.36E+01
			Zn-65	<4.21E+01	0.00E+00	4.21E+01
			Zr-95	<3.31E+01	0.00E+00	3.31E+01
			Nb-95	<2.59E+01	0.00E+00	2.59E+01
			I-131	<4.17E+01	0.00E+00	4.17E+01
			Cs-134	<2.43E+01	0.00E+00	2.43E+01
			Cs-137	<3.05E+01	0.00E+00	3.05E+01
			BaLa-140	<4.22E+01	0.00E+00	4.22E+01
			Be-7	9.94E+02	2.41E+02	2.29E+02
			K-40	3.37E+03	5.76E+02	2.39E+02
389175	8/28/2015 - 8/28/2015	BLKCHERRY	Mn-54	<2.34E+01	0.00E+00	2.34E+01
			Co-58	<2.28E+01	0.00E+00	2.28E+01
			Fe-59	<6.97E+01	0.00E+00	6.97E+01
			Co-60	<3.07E+01	0.00E+00	3.07E+01
			Zn-65	<6.24E+01	0.00E+00	6.24E+01
			Zr-95	<5.35E+01	0.00E+00	5.35E+01
			Nb-95	<2.87E+01	0.00E+00	2.87E+01
			I-131	<4.57E+01	0.00E+00	4.57E+01
			Cs-134	<3.43E+01	0.00E+00	3.43E+01
			Cs-137	<2.72E+01	0.00E+00	2.72E+01
			BaLa-140	<5.07E+01	0.00E+00	5.07E+01
			Be-7	2.77E+03	4.45E+02	3.22E+02
			K-40	3.03E+03	5.88E+02	4.16E+02
389176	8/28/2015 - 8/28/2015	WAXMYRTLE	Mn-54	<2.29E+01	0.00E+00	2.29E+01
			Co-58	<2.44E+01	0.00E+00	2.44E+01
			Fe-59	<5.27E+01	0.00E+00	5.27E+01
			Co-60	<2.03E+01	0.00E+00	2.03E+01
			Zn-65	<4.24E+01	0.00E+00	4.24E+01
			Zr-95	<5.15E+01	0.00E+00	5.15E+01
			Nb-95	<2.22E+01	0.00E+00	2.22E+01
			I-131	<4.65E+01	0.00E+00	4.65E+01
			Cs-134	<3.44E+01	0.00E+00	3.44E+01
			Cs-137	<2.17E+01	0.00E+00	2.17E+01
			BaLa-140	<5.18E+01	0.00E+00	5.18E+01
			Be-7	1.37E+03	2.89E+02	2.83E+02
			K-40	3.16E+03	5.64E+02	3.64E+02
391604	9/22/2015 - 9/22/2015	SASSAFRAS	Mn-54	<2.09E+01	0.00E+00	2.09E+01
			Co-58	<2.18E+01	0.00E+00	2.18E+01
			Fe-59	<4.41E+01	0.00E+00	4.41E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 62 [INDICATOR - SE @ 0 miles]

Sample ID:	391604	Sample Dates:	9/22/2015 - 9/22/2015	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
					Co-60	<1.99E+01	0.00E+00	1.99E+01
					Zn-65	<5.34E+01	0.00E+00	5.34E+01
					Zr-95	<3.53E+01	0.00E+00	3.53E+01
					Nb-95	<2.25E+01	0.00E+00	2.25E+01
					I-131	<3.70E+01	0.00E+00	3.70E+01
					Cs-134	<2.61E+01	0.00E+00	2.61E+01
					Cs-137	4.80E+01	2.51E+01	3.41E+01
					BaLa-140	<4.26E+01	0.00E+00	4.26E+01
					Be-7	6.84E+02	2.49E+02	3.19E+02
					K-40	2.12E+03	5.05E+02	3.98E+02

Sample ID:	391605	Sample Dates:	9/22/2015 - 9/22/2015	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.93E+01	0.00E+00	1.93E+01
					Co-58	<1.54E+01	0.00E+00	1.54E+01
					Fe-59	<5.11E+01	0.00E+00	5.11E+01
					Co-60	<1.84E+01	0.00E+00	1.84E+01
					Zn-65	<2.58E+01	0.00E+00	2.58E+01
					Zr-95	<3.75E+01	0.00E+00	3.75E+01
					Nb-95	<2.68E+01	0.00E+00	2.68E+01
					I-131	<3.08E+01	0.00E+00	3.08E+01
					Cs-134	<3.16E+01	0.00E+00	3.16E+01
					Cs-137	<2.37E+01	0.00E+00	2.37E+01
					BaLa-140	<4.41E+01	0.00E+00	4.41E+01
					Be-7	7.71E+02	2.19E+02	2.28E+02
					K-40	1.86E+03	4.80E+02	4.55E+02

Sample ID:	391606	Sample Dates:	9/22/2015 - 9/22/2015	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.19E+01	0.00E+00	1.19E+01
					Co-58	<1.25E+01	0.00E+00	1.25E+01
					Fe-59	<3.50E+01	0.00E+00	3.50E+01
					Co-60	<2.02E+01	0.00E+00	2.02E+01
					Zn-65	<3.58E+01	0.00E+00	3.58E+01
					Zr-95	<2.88E+01	0.00E+00	2.88E+01
					Nb-95	<1.88E+01	0.00E+00	1.88E+01
					I-131	<2.94E+01	0.00E+00	2.94E+01
					Cs-134	<2.15E+01	0.00E+00	2.15E+01
					Cs-137	2.64E+01	1.74E+01	2.56E+01
					BaLa-140	<7.42E+00	0.00E+00	7.42E+00
					Be-7	2.19E+03	3.19E+02	1.58E+02
					K-40	2.48E+03	4.29E+02	3.88E+01

Sample ID:	395111	Sample Dates:	10/24/2015 - 10/24/2015	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.71E+01	0.00E+00	1.71E+01
					Co-58	<1.95E+01	0.00E+00	1.95E+01
					Fe-59	<4.94E+01	0.00E+00	4.94E+01
					Co-60	<2.30E+01	0.00E+00	2.30E+01
					Zn-65	<5.13E+01	0.00E+00	5.13E+01
					Zr-95	<3.87E+01	0.00E+00	3.87E+01
					Nb-95	<2.12E+01	0.00E+00	2.12E+01
					I-131	<2.78E+01	0.00E+00	2.78E+01
					Cs-134	<2.17E+01	0.00E+00	2.17E+01
					Cs-137	4.12E+01	2.41E+01	3.49E+01
					BaLa-140	<2.80E+01	0.00E+00	2.80E+01
					Be-7	2.52E+03	3.75E+02	2.18E+02
					K-40	1.98E+03	4.39E+02	3.28E+02

Sample ID:	395112	Sample Dates:	10/24/2015 - 10/24/2015	PERSIMLEAF	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.62E+01	0.00E+00	1.62E+01
					Co-58	<1.64E+01	0.00E+00	1.64E+01
					Fe-59	<3.37E+01	0.00E+00	3.37E+01
					Co-60	<2.36E+01	0.00E+00	2.36E+01
					Zn-65	<3.67E+01	0.00E+00	3.67E+01
					Zr-95	<3.25E+01	0.00E+00	3.25E+01
					Nb-95	<1.62E+01	0.00E+00	1.62E+01
					I-131	<2.41E+01	0.00E+00	2.41E+01
					Cs-134	<1.61E+01	0.00E+00	1.61E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 62 [INDICATOR - SE @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
395112	10/24/2015 - 10/24/2015	PERSIMLEAF	Cs-137	<3.13E+01	0.00E+00	3.13E+01
			BaLa-140	<2.65E+01	0.00E+00	2.65E+01
			Be-7	4.10E+03	5.06E+02	2.63E+02
			K-40	3.69E+03	5.91E+02	3.61E+02

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
395113	10/24/2015 - 10/24/2015	PEARLEAF	Mn-54	<2.40E+01	0.00E+00	2.40E+01
			Co-58	<2.20E+01	0.00E+00	2.20E+01
			Fe-59	<5.28E+01	0.00E+00	5.28E+01
			Co-60	<2.94E+01	0.00E+00	2.94E+01
			Zn-65	<5.93E+01	0.00E+00	5.93E+01
			Zr-95	<5.37E+01	0.00E+00	5.37E+01
			Nb-95	<2.95E+01	0.00E+00	2.95E+01
			I-131	<2.81E+01	0.00E+00	2.81E+01
			Cs-134	<4.44E+01	0.00E+00	4.44E+01
			Cs-137	<2.95E+01	0.00E+00	2.95E+01
			BaLa-140	<2.70E+01	0.00E+00	2.70E+01
			Be-7	<3.88E+02	0.00E+00	3.88E+02
			K-40	<3.41E+02	0.00E+00	3.41E+02

Sample Point 67 [INDICATOR - S @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
378205	4/23/2015 - 4/23/2015	BLKCHERRY	Mn-54	<2.26E+01	0.00E+00	2.26E+01
			Co-58	<1.55E+01	0.00E+00	1.55E+01
			Fe-59	<4.28E+01	0.00E+00	4.28E+01
			Co-60	<2.16E+01	0.00E+00	2.16E+01
			Zn-65	<5.03E+01	0.00E+00	5.03E+01
			Zr-95	<3.36E+01	0.00E+00	3.36E+01
			Nb-95	<1.41E+01	0.00E+00	1.41E+01
			I-131	<3.83E+01	0.00E+00	3.83E+01
			Cs-134	<1.66E+01	0.00E+00	1.66E+01
			Cs-137	3.59E+01	2.10E+01	2.97E+01
			BaLa-140	<8.54E+00	0.00E+00	8.54E+00
			Be-7	4.06E+02	1.82E+02	2.45E+02
			K-40	3.67E+03	6.22E+02	3.37E+02

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
378206	4/23/2015 - 4/23/2015	SASSAFRAS	Mn-54	<1.41E+01	0.00E+00	1.41E+01
			Co-58	<9.81E+00	0.00E+00	9.81E+00
			Fe-59	<3.20E+01	0.00E+00	3.20E+01
			Co-60	<1.37E+01	0.00E+00	1.37E+01
			Zn-65	<3.08E+01	0.00E+00	3.08E+01
			Zr-95	<2.85E+01	0.00E+00	2.85E+01
			Nb-95	<1.38E+01	0.00E+00	1.38E+01
			I-131	<1.94E+01	0.00E+00	1.94E+01
			Cs-134	<1.67E+01	0.00E+00	1.67E+01
			Cs-137	7.81E+01	2.00E+01	2.03E+01
			BaLa-140	<1.70E+01	0.00E+00	1.70E+01
			Be-7	3.19E+02	1.14E+02	1.42E+02
			K-40	3.37E+03	4.88E+02	2.69E+02

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
378207	4/23/2015 - 4/23/2015	WAXMYRTLE	Mn-54	<1.58E+01	0.00E+00	1.58E+01
			Co-58	<1.64E+01	0.00E+00	1.64E+01
			Fe-59	<2.25E+01	0.00E+00	2.25E+01
			Co-60	<1.54E+01	0.00E+00	1.54E+01
			Zn-65	<3.04E+01	0.00E+00	3.04E+01
			Zr-95	<2.85E+01	0.00E+00	2.85E+01
			Nb-95	<2.05E+01	0.00E+00	2.05E+01
			I-131	<2.46E+01	0.00E+00	2.46E+01
			Cs-134	<2.17E+01	0.00E+00	2.17E+01
			Cs-137	<2.29E+01	0.00E+00	2.29E+01
			BaLa-140	<1.84E+01	0.00E+00	1.84E+01
			Be-7	1.88E+03	3.06E+02	2.36E+02
			K-40	2.30E+03	4.49E+02	3.33E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 67 [INDICATOR - S @ 0 miles]

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
380660	5/29/2015 - 5/29/2015		Mn-54	<2.23E+01	0.00E+00	2.23E+01
			Co-58	<1.99E+01	0.00E+00	1.99E+01
			Fe-59	<4.14E+01	0.00E+00	4.14E+01
			Co-60	<1.92E+01	0.00E+00	1.92E+01
			Zn-65	<5.23E+01	0.00E+00	5.23E+01
			Zr-95	<4.39E+01	0.00E+00	4.39E+01
			Nb-95	<2.19E+01	0.00E+00	2.19E+01
			I-131	<2.76E+01	0.00E+00	2.76E+01
			Cs-134	<2.93E+01	0.00E+00	2.93E+01
			Cs-137	<2.65E+01	0.00E+00	2.65E+01
			BaLa-140	<3.39E+01	0.00E+00	3.39E+01
			Be-7	2.72E+02	1.57E+02	2.26E+02
			K-40	2.92E+03	5.64E+02	4.17E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
380661	5/29/2015 - 5/29/2015		Mn-54	<2.06E+01	0.00E+00	2.06E+01
			Co-58	<2.21E+01	0.00E+00	2.21E+01
			Fe-59	<4.44E+01	0.00E+00	4.44E+01
			Co-60	<2.14E+01	0.00E+00	2.14E+01
			Zn-65	<3.77E+01	0.00E+00	3.77E+01
			Zr-95	<2.89E+01	0.00E+00	2.89E+01
			Nb-95	<1.80E+01	0.00E+00	1.80E+01
			I-131	<2.54E+01	0.00E+00	2.54E+01
			Cs-134	<2.50E+01	0.00E+00	2.50E+01
			Cs-137	<3.03E+01	0.00E+00	3.03E+01
			BaLa-140	<7.89E+00	0.00E+00	7.89E+00
			Be-7	3.15E+02	1.67E+02	2.36E+02
			K-40	3.98E+03	6.39E+02	2.94E+02

Sample ID:	Sample Dates:	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
380662	5/29/2015 - 5/29/2015		Mn-54	<1.73E+01	0.00E+00	1.73E+01
			Co-58	<1.77E+01	0.00E+00	1.77E+01
			Fe-59	<4.80E+01	0.00E+00	4.80E+01
			Co-60	<2.77E+01	0.00E+00	2.77E+01
			Zn-65	<4.39E+01	0.00E+00	4.39E+01
			Zr-95	<2.69E+01	0.00E+00	2.69E+01
			Nb-95	<1.98E+01	0.00E+00	1.98E+01
			I-131	<2.70E+01	0.00E+00	2.70E+01
			Cs-134	<2.96E+01	0.00E+00	2.96E+01
			Cs-137	<2.42E+01	0.00E+00	2.42E+01
			BaLa-140	<7.35E+00	0.00E+00	7.35E+00
			Be-7	2.46E+02	1.72E+02	2.63E+02
			K-40	2.84E+03	5.05E+02	2.05E+02

Sample ID:	Sample Dates:	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
383643	7/7/2015 - 7/7/2015		Mn-54	<1.75E+01	0.00E+00	1.75E+01
			Co-58	<1.44E+01	0.00E+00	1.44E+01
			Fe-59	<4.10E+01	0.00E+00	4.10E+01
			Co-60	<1.61E+01	0.00E+00	1.61E+01
			Zn-65	<4.12E+01	0.00E+00	4.12E+01
			Zr-95	<2.51E+01	0.00E+00	2.51E+01
			Nb-95	<1.28E+01	0.00E+00	1.28E+01
			I-131	<2.24E+01	0.00E+00	2.24E+01
			Cs-134	<1.72E+01	0.00E+00	1.72E+01
			Cs-137	5.31E+01	2.10E+01	2.70E+01
			BaLa-140	<2.52E+01	0.00E+00	2.52E+01
			Be-7	1.13E+03	2.17E+02	1.81E+02
			K-40	1.89E+03	3.98E+02	3.37E+02

Sample ID:	Sample Dates:	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
383644	7/7/2015 - 7/7/2015		Mn-54	<1.70E+01	0.00E+00	1.70E+01
			Co-58	<2.04E+01	0.00E+00	2.04E+01
			Fe-59	<3.82E+01	0.00E+00	3.82E+01
			Co-60	<1.95E+01	0.00E+00	1.95E+01
			Zn-65	<3.44E+01	0.00E+00	3.44E+01
			Zr-95	<2.95E+01	0.00E+00	2.95E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 67 [INDICATOR - S @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
383644	7/7/2015 - 7/7/2015	BLKCHERRY	Nb-95	<1.25E+01	0.00E+00	1.25E+01
			I-131	<2.35E+01	0.00E+00	2.35E+01
			Cs-134	<1.89E+01	0.00E+00	1.89E+01
			Cs-137	<2.03E+01	0.00E+00	2.03E+01
			BaLa-140	<2.10E+01	0.00E+00	2.10E+01
			Be-7	3.40E+02	1.50E+02	2.08E+02
			K-40	3.73E+03	5.57E+02	3.03E+02
383645	7/7/2015 - 7/7/2015	WAXMYRTLE	Mn-54	<1.48E+01	0.00E+00	1.48E+01
			Co-58	<1.89E+01	0.00E+00	1.89E+01
			Fe-59	<3.35E+01	0.00E+00	3.35E+01
			Co-60	<1.82E+01	0.00E+00	1.82E+01
			Zn-65	<3.77E+01	0.00E+00	3.77E+01
			Zr-95	<2.27E+01	0.00E+00	2.27E+01
			Nb-95	<1.45E+01	0.00E+00	1.45E+01
			I-131	<2.67E+01	0.00E+00	2.67E+01
			Cs-134	<1.75E+01	0.00E+00	1.75E+01
			Cs-137	<2.70E+01	0.00E+00	2.70E+01
			BaLa-140	<2.45E+01	0.00E+00	2.45E+01
			Be-7	1.31E+03	2.58E+02	2.36E+02
			K-40	2.47E+03	4.57E+02	2.55E+02
384581	7/20/2015 - 7/20/2015	SASSAFRAS	Mn-54	<1.68E+01	0.00E+00	1.68E+01
			Co-58	<2.20E+01	0.00E+00	2.20E+01
			Fe-59	<4.32E+01	0.00E+00	4.32E+01
			Co-60	<1.67E+01	0.00E+00	1.67E+01
			Zn-65	<3.90E+01	0.00E+00	3.90E+01
			Zr-95	<3.41E+01	0.00E+00	3.41E+01
			Nb-95	<1.72E+01	0.00E+00	1.72E+01
			I-131	<2.38E+01	0.00E+00	2.38E+01
			Cs-134	<2.02E+01	0.00E+00	2.02E+01
			Cs-137	<2.07E+01	0.00E+00	2.07E+01
			BaLa-140	<1.89E+01	0.00E+00	1.89E+01
			Be-7	1.01E+03	2.06E+02	1.74E+02
			K-40	3.75E+03	5.67E+02	2.60E+02
384582	7/20/2015 - 7/20/2015	BLKCHERRY	Mn-54	<2.39E+01	0.00E+00	2.39E+01
			Co-58	<1.43E+01	0.00E+00	1.43E+01
			Fe-59	<4.54E+01	0.00E+00	4.54E+01
			Co-60	<1.99E+01	0.00E+00	1.99E+01
			Zn-65	<3.74E+01	0.00E+00	3.74E+01
			Zr-95	<4.17E+01	0.00E+00	4.17E+01
			Nb-95	<1.66E+01	0.00E+00	1.66E+01
			I-131	<3.09E+01	0.00E+00	3.09E+01
			Cs-134	<2.18E+01	0.00E+00	2.18E+01
			Cs-137	<2.14E+01	0.00E+00	2.14E+01
			BaLa-140	<3.41E+01	0.00E+00	3.41E+01
			Be-7	5.62E+02	1.77E+02	2.13E+02
			K-40	3.46E+03	5.60E+02	3.53E+02
384583	7/20/2015 - 7/20/2015	WAXMYRTLE	Mn-54	<1.82E+01	0.00E+00	1.82E+01
			Co-58	<2.23E+01	0.00E+00	2.23E+01
			Fe-59	<3.94E+01	0.00E+00	3.94E+01
			Co-60	<1.74E+01	0.00E+00	1.74E+01
			Zn-65	<4.65E+01	0.00E+00	4.65E+01
			Zr-95	<2.58E+01	0.00E+00	2.58E+01
			Nb-95	<2.03E+01	0.00E+00	2.03E+01
			I-131	<2.23E+01	0.00E+00	2.23E+01
			Cs-134	<2.39E+01	0.00E+00	2.39E+01
			Cs-137	<1.53E+01	0.00E+00	1.53E+01
			BaLa-140	<1.96E+01	0.00E+00	1.96E+01
			Be-7	1.41E+03	2.62E+02	2.23E+02



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 67 [INDICATOR - S @ 0 miles]

Sample ID:	Sample Dates:	Indicator	Nuclide	Activity	2 Sigma Error	LLD
384583	7/20/2015 - 7/20/2015	WAXMYRTLE	K-40	3.63E+03	5.67E+02	2.96E+02
389177	8/28/2015 - 8/28/2015	SASSAFRAS	Mn-54	<2.45E+01	0.00E+00	2.45E+01
			Co-58	<2.25E+01	0.00E+00	2.25E+01
			Fe-59	<6.30E+01	0.00E+00	6.30E+01
			Co-60	<2.42E+01	0.00E+00	2.42E+01
			Zn-65	<4.31E+01	0.00E+00	4.31E+01
			Zr-95	<3.70E+01	0.00E+00	3.70E+01
			Nb-95	<2.65E+01	0.00E+00	2.65E+01
			I-131	<4.79E+01	0.00E+00	4.79E+01
			Cs-134	<2.93E+01	0.00E+00	2.93E+01
			Cs-137	<3.70E+01	0.00E+00	3.70E+01
			BaLa-140	<5.79E+01	0.00E+00	5.79E+01
			Be-7	9.47E+02	2.62E+02	2.83E+02
			K-40	3.37E+03	6.33E+02	4.26E+02
389178	8/28/2015 - 8/28/2015	BLKCHERRY	Mn-54	<1.76E+01	0.00E+00	1.76E+01
			Co-58	<1.45E+01	0.00E+00	1.45E+01
			Fe-59	<4.39E+01	0.00E+00	4.39E+01
			Co-60	<2.06E+01	0.00E+00	2.06E+01
			Zn-65	<3.67E+01	0.00E+00	3.67E+01
			Zr-95	<3.29E+01	0.00E+00	3.29E+01
			Nb-95	<1.54E+01	0.00E+00	1.54E+01
			I-131	<3.60E+01	0.00E+00	3.60E+01
			Cs-134	<2.04E+01	0.00E+00	2.04E+01
			Cs-137	<2.15E+01	0.00E+00	2.15E+01
			BaLa-140	<3.06E+01	0.00E+00	3.06E+01
			Be-7	4.48E+02	1.75E+02	2.37E+02
			K-40	2.88E+03	4.77E+02	2.82E+02
389179	8/28/2015 - 8/28/2015	WAXMYRTLE	Mn-54	<2.36E+01	0.00E+00	2.36E+01
			Co-58	<2.20E+01	0.00E+00	2.20E+01
			Fe-59	<3.11E+01	0.00E+00	3.11E+01
			Co-60	<2.24E+01	0.00E+00	2.24E+01
			Zn-65	<4.36E+01	0.00E+00	4.36E+01
			Zr-95	<4.73E+01	0.00E+00	4.73E+01
			Nb-95	<2.97E+01	0.00E+00	2.97E+01
			I-131	<4.32E+01	0.00E+00	4.32E+01
			Cs-134	<2.81E+01	0.00E+00	2.81E+01
			Cs-137	<3.15E+01	0.00E+00	3.15E+01
			BaLa-140	<2.99E+01	0.00E+00	2.99E+01
			Be-7	<3.68E+02	0.00E+00	3.68E+02
			K-40	2.45E+03	4.87E+02	2.43E+02
391607	9/22/2015 - 9/22/2015	SASSAFRAS	Mn-54	<1.18E+01	0.00E+00	1.18E+01
			Co-58	<1.56E+01	0.00E+00	1.56E+01
			Fe-59	<3.32E+01	0.00E+00	3.32E+01
			Co-60	<1.59E+01	0.00E+00	1.59E+01
			Zn-65	<3.30E+01	0.00E+00	3.30E+01
			Zr-95	<2.98E+01	0.00E+00	2.98E+01
			Nb-95	<1.45E+01	0.00E+00	1.45E+01
			I-131	<2.48E+01	0.00E+00	2.48E+01
			Cs-134	<1.81E+01	0.00E+00	1.81E+01
			Cs-137	1.64E+01	1.29E+01	2.01E+01
			BaLa-140	<2.22E+01	0.00E+00	2.22E+01
			Be-7	8.30E+02	1.78E+02	1.99E+02
			K-40	3.30E+03	4.54E+02	2.45E+02
391608	9/22/2015 - 9/22/2015	WAXMYRTLE	Mn-54	<1.78E+01	0.00E+00	1.78E+01
			Co-58	<1.98E+01	0.00E+00	1.98E+01
			Fe-59	<4.73E+01	0.00E+00	4.73E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 67 [INDICATOR - S @ 0 miles]

Sample ID:	391608	Sample Dates:	9/22/2015 - 9/22/2015	WAXMYRTLE	Nuclide	Activity	2 Sigma Error	LLD
					Co-60	<2.38E+01	0.00E+00	2.38E+01
					Zn-65	<4.54E+01	0.00E+00	4.54E+01
					Zr-95	<4.77E+01	0.00E+00	4.77E+01
					Nb-95	<2.18E+01	0.00E+00	2.18E+01
					I-131	<3.23E+01	0.00E+00	3.23E+01
					Cs-134	<2.73E+01	0.00E+00	2.73E+01
					Cs-137	<2.76E+01	0.00E+00	2.76E+01
					BaLa-140	<9.47E+00	0.00E+00	9.47E+00
					Be-7	1.15E+03	2.57E+02	2.36E+02
					K-40	1.60E+03	3.66E+02	4.93E+01

Sample ID:	391609	Sample Dates:	9/22/2015 - 9/22/2015	BLKCHERRY	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.81E+01	0.00E+00	1.81E+01
					Co-58	<1.79E+01	0.00E+00	1.79E+01
					Fe-59	<3.74E+01	0.00E+00	3.74E+01
					Co-60	<1.53E+01	0.00E+00	1.53E+01
					Zn-65	<3.13E+01	0.00E+00	3.13E+01
					Zr-95	<2.73E+01	0.00E+00	2.73E+01
					Nb-95	<2.33E+01	0.00E+00	2.33E+01
					I-131	<3.11E+01	0.00E+00	3.11E+01
					Cs-134	<2.21E+01	0.00E+00	2.21E+01
					Cs-137	3.34E+01	1.93E+01	2.73E+01
					BaLa-140	<3.79E+01	0.00E+00	3.79E+01
					Be-7	1.61E+03	2.59E+02	1.60E+02
					K-40	1.50E+03	3.82E+02	3.41E+02

Sample ID:	395114	Sample Dates:	10/24/2015 - 10/24/2015	SASSAFRAS	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.99E+01	0.00E+00	1.99E+01
					Co-58	<1.58E+01	0.00E+00	1.58E+01
					Fe-59	<5.07E+01	0.00E+00	5.07E+01
					Co-60	<1.28E+01	0.00E+00	1.28E+01
					Zn-65	<4.29E+01	0.00E+00	4.29E+01
					Zr-95	<3.80E+01	0.00E+00	3.80E+01
					Nb-95	<2.40E+01	0.00E+00	2.40E+01
					I-131	<2.41E+01	0.00E+00	2.41E+01
					Cs-134	<2.23E+01	0.00E+00	2.23E+01
					Cs-137	<2.17E+01	0.00E+00	2.17E+01
					BaLa-140	<2.40E+01	0.00E+00	2.40E+01
					Be-7	<8.26E+02	0.00E+00	8.26E+02
					K-40	<1.88E+02	0.00E+00	1.88E+02

Sample ID:	395115	Sample Dates:	10/24/2015 - 10/24/2015	PERSIMLEAF	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<1.22E+01	0.00E+00	1.22E+01
					Co-58	<1.35E+01	0.00E+00	1.35E+01
					Fe-59	<2.70E+01	0.00E+00	2.70E+01
					Co-60	<1.57E+01	0.00E+00	1.57E+01
					Zn-65	<2.56E+01	0.00E+00	2.56E+01
					Zr-95	<2.13E+01	0.00E+00	2.13E+01
					Nb-95	<1.28E+01	0.00E+00	1.28E+01
					I-131	<1.63E+01	0.00E+00	1.63E+01
					Cs-134	<1.29E+01	0.00E+00	1.29E+01
					Cs-137	<1.49E+01	0.00E+00	1.49E+01
					BaLa-140	<1.22E+01	0.00E+00	1.22E+01
					Be-7	2.42E+03	3.19E+02	1.79E+02
					K-40	2.65E+03	4.34E+02	2.79E+02

Sample ID:	395116	Sample Dates:	10/24/2015 - 10/24/2015	PEARLEAF	Nuclide	Activity	2 Sigma Error	LLD
					Mn-54	<2.13E+01	0.00E+00	2.13E+01
					Co-58	<1.69E+01	0.00E+00	1.69E+01
					Fe-59	<3.67E+01	0.00E+00	3.67E+01
					Co-60	<1.25E+01	0.00E+00	1.25E+01
					Zn-65	<5.22E+01	0.00E+00	5.22E+01
					Zr-95	<3.61E+01	0.00E+00	3.61E+01
					Nb-95	<1.72E+01	0.00E+00	1.72E+01
					I-131	<1.74E+01	0.00E+00	1.74E+01
					Cs-134	<2.57E+01	0.00E+00	2.57E+01



ROBINSON Radiological Environmental Monitoring Analysis Report - 2015 (Appendix E)

Media Type: VEGETATION Concentration (Activity): pCi/kg wet

Sample Point 67 [INDICATOR - S @ 0 miles]

Sample ID:	395116	Sample Dates:	10/24/2015 - 10/24/2015	PEARLEAF	Nuclide	Activity	2 Sigma Error	LLD
					Cs-137	<2.06E+01	0.00E+00	2.06E+01
					BaLa-140	<2.43E+01	0.00E+00	2.43E+01
					Be-7	1.13E+03	2.11E+02	1.90E+02
					K-40	8.47E+03	9.39E+02	2.99E+02



APPENDIX F

**ERRATA TO
PREVIOUS REPORTS**

APPENDIX F

ERRATA TO THE 2015 AREOR

There are no errata to be appended to the 2015 RNP AREOR.

United States Nuclear Regulatory Commission
Enclosure II to Serial: RNP-RA/16-0034
272 pages (including this cover sheet)

**H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261 / RENEWED LICENSE NO. DPR-23**

OFFSITE DOSE CALCULATION MANUAL, CURRENT REVISION 34

H.B. Robinson Steam Electric Plant Unit 2



ODCM

Offsite Dose
Calculation Manual

Docket No. 50-261



H.B. Robinson Steam Electric Plant
Unit 2

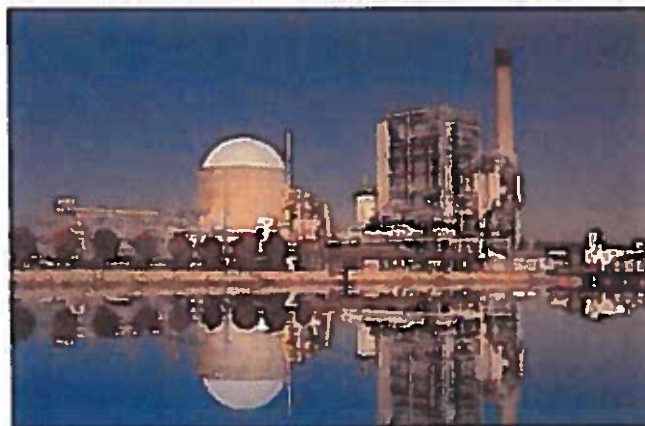
**OFFSITE DOSE CALCULATION MANUAL
(ODCM)**

Revision 34

Docket Number: 50-261

Effective Date: 1/22/2016

Prepared By: Christopher C. Courtenay Fleet Scientific Services RP		12/3/2015
	Signature	Date
Reviewed By: Dennis R. Mitton RNP Chemistry		12/7/15
	Signature	Date
Reviewed By (Print): RNP PNSC Chairman		1/20/16
	Signature	Date
Approved By: John A. Krakuszeski RNP Plant Manager		1/22/16
	Signature	Date



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Revision

All 34

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H.B. Robinson Steam Electric Plant Unit 2
 Offsite Dose Calculation Manual (ODCM)

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1.0 INTRODUCTION

The Off-Site Dose Calculation Manual (ODCM) provides the information and methodologies to be used by H. B. Robinson Steam Electric Plant Unit 2 (HBR) to assure compliance with 10 CFR 20, Appendix I of 10 CFR 50, and 40 CFR 190.

The ODCM is based on "Radiological Effluent Technical Specifications for PWRs (NUREG 0472, Rev. 3, Draft 7), "Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants" (NUREG 0133), and guidance from the United States Nuclear Regulatory Commission (NRC). Specific plant procedures for implementation of this manual are presented in H. B. Robinson Unit 2 Plant Operating Manual. These procedures will be utilized by the operating staff of HBR to assure compliance with technical specifications.

Changes to the ODCM which affect the methodologies showing compliance with 10 CFR 20, Appendix I of 10 CFR 50, and 40 CFR 190 will be properly reviewed and approved as indicated in the Administrative Control Section of Plant Technical Specifications. Site specific parameters such as vent fractions, dilution water flow rates (gpm), and liquid/gaseous discharge flow rates are listed in this document as typical system values. Actual values derived from actual operating Plant conditions should be used in lieu of these typical values. Specific Plant procedures control the values of the above parameters; therefore, minimizing the need for frequent revisions to the ODCM.

The Annual Radioactive Effluent Release Report will be prepared as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Waste and Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants" (Revision 1, June 1974) with data summarized on a quarterly basis following the format of Appendix B thereof. This report will be inclusive of the requirements as outlined in the HBR Technical Specifications.

Deleted.

2.0 LIQUID EFFLUENTS

2.1 Monitor Alarm Setpoint Determination

This methodology determines the monitor alarm setpoint that indicates if the concentration of radionuclides in the liquid effluent released from the site to unrestricted areas exceeds 10 times the concentrations specified in 10 CFR 20, Appendix B, Table 2, Column 2, for radionuclides other than dissolved or entrained noble gases or exceeds a concentration 2E-04 $\mu\text{Ci/ml}$ for dissolved or entrained noble gases. Two methodologies may be utilized to calculate monitor alarm setpoints. Section 2.1.1 determines a fixed setpoint based on the worst case assumptions that Cs-134 is the only nuclide being discharged. This is consistent with the limit of 10 CFR 20, Appendix B, Note 2. Section 2.1.2 methodology determines the setpoint based on the radionuclide mix via analysis prior to release to demonstrate compliance with 10 CFR 20, Appendix B, limits and may also be used as an alternative method for calculating setpoints.

2.1.1 Setpoint Based on Cs-134

The following method applies to liquid releases via the discharge canal when determining the alarm/trip setpoint for the Condensate Polisher Liquid Waste Monitor (R-37) and the Steam Generator Blowdown Monitor (R-19A, R-19B, and R-19C) during operational conditions when there is no primary to secondary leaks. The Condensate Polisher Sump discharge (monitored by R-37) discharges to the Settling Ponds prior to release via the discharge canal. Even though the Settling Ponds provide additional dilution prior to discharge, no dilution from the Settling Ponds is used in calculating setpoints for R-37. The setpoint for R-37 is calculated using only circulating water for dilution. This methodology complies with Specification 2.2.1 of the ODCM by satisfying the following equation:

$$\frac{c * f}{f + F} \leq C$$

where:

- C = The effluent concentration (EC) limit (Specification 2.2.1) implementing 10 CFR 20 for the site ($\mu\text{Ci/ml}$).
- c = The setpoint of the radioactivity monitor measuring the radioactivity concentration in the effluent line prior to dilution and subsequent release; the setpoint represents a value which, if exceeded, would result in concentrations exceeding 10 times the limits of 10 CFR 20 in the unrestricted area. ($\mu\text{Ci/ml}$)
- f = The waste effluent flow rate (gpm).
- F = The dilution water flow rate (gpm).

2.1.1.1 Determine 'c' (the effluent monitor setpoint) in $\mu\text{Ci/ml}$ for each of the dilution water flow rates.

$$c = \frac{C * (F + f)}{f} * S$$

where:

C = 9E-07, the effluent concentration limit based on 10 CFR 20, Appendix B, for Cs-134 ($\mu\text{Ci/ml}$).

F = Dilution water flow rate (gpm).
= 160,000 gpm from one circulating water pump¹, Unit 2.
= 250,000 gpm from two circulating water pumps¹, Unit 2.
= 400,000 gpm from three circulating water pumps¹, Unit 2.

OR

= 50,000 gpm from one circulating water pump², Unit 1.
= 80,000 gpm from two circulating water pumps², Unit 1.

f = The maximum acceptable discharge flow rate prior to dilution (gpm).
= 60 gpm for the Waste Disposal System Liquid Effluent Monitor³.
= 160 gpm for each Steam Generator Blowdown Monitor.
= 130 gpm for each Steam Generator Blowdown Monitor while draining a steam generator.
= 300 gpm for the Condensate Polisher Liquid Waste Monitor.

S = 0.5, safety factor used as a conservatism to assure that the radionuclide concentrations are less than the limits specified in 10 CFR 20, Appendix B, at the point of discharge (dimensionless).

2.1.1.2 Determine 'CR' (calculated monitor count rate in corrected counts per minute ccpm) attributed to the radionuclides for each of the dilution water flow rates.

$$CR = c * E$$

where:

E = The applicable effluent monitor efficiency located in the Station Curve Book. Use the radioactivity concentration 'c' to find CR.

2.1.1.3 Determine 'SP' (the monitor alarm/trip setpoint including background cpm) for each of the dilution water flow rates.

$$SP = (T_m * CR) + Bkg$$

where:

T_m = Fraction of the radioactivity from the site that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from several pathways (dimensionless).
 = 0.16 for each Steam Generator Blowdown Monitor (R-19A, R-19B, and R-19C).
 = 0.25 for the Condensate Polisher Liquid Waste (R-37).

Bkg = the monitor background (cpm).

2.1.2 Setpoint Based on an Analysis of Liquid Prior to Discharge.

The following method applies to liquid releases via the discharge canal when determining the alarm setpoint for the Waste Disposal System liquid Effluent Monitor (R-18), the Steam Generator Blowdown Monitors (R-19A, R-19B, and R-19C), and the Condensate Polisher Liquid Waste Monitor (R-37) when an analysis of the activity of the principal gamma emitters has been made prior to or during the release. The Condensate Polisher Sump discharge (monitored by R-37) discharges to the Settling Ponds prior to release via the discharge canal. Even though the Settling Ponds provide additional dilution prior to discharge, no dilution from the Settling Ponds is used in calculating setpoints for R-37. The setpoint for R-37 is calculated using only circulating water for dilution.

2.1.2.1 Determine D_{req} (the minimum acceptable dilution factor).

$$D_{req} = D_{req,g} + D_{req,ng}$$

$$D_{req,g} = \frac{\sum_{i=g} \frac{C_i}{ECL_i}}{S * R_{max}} \quad D_{req,ng} = \frac{\sum_{i=ng} \frac{C_i}{ECL_i}}{S * R_{max}}$$

where:

$D_{req,g}$ = Required dilution factor for gamma-emitters (dimensionless).

$D_{req,ng}$ = Required dilution factor for non-gamma-emitters, e.g. Gross Alpha, H-3, Sr-89, Sr-90, and Fe-55 (dimensionless).

ECL_i = Effluent concentration limit of nuclide 'i' ($\mu\text{Ci/ml}$).

C_i = The concentration of nuclide 'i', if all gamma-emitting are < LLD (as defined in ODCM Table 2.8-1), C_i may be assumed to consist only of Cs-134 at concentration of $9.0E-07$ $\mu\text{Ci/ml}$. This nuclide has the lowest ECL of any nuclides to be found in liquid effluents and provides a conservative basis for a monitor setpoint ($\mu\text{Ci/ml}$).

S = 0.5, a safety factor used for conservatism to assure that the radionuclide concentrations are less than the limits specified in 10 CFR Part 20 Appendix B, at the point of discharge (dimensionless).

R_{max} = The maximum ECL ratio limit (dimensionless).

2.1.2.2 Determine the maximum waste flow, R_{cwmax} .

$$R_{\text{cwmax}} = \frac{F_{\text{avail}} * F_{\text{alloc}}}{(D_{\text{req}} - 1.0)}$$

where:

R_{cwmax} = Maximum allowable release flowrate from the waste source (gpm).

F_{avail} = Available dilution flow (gpm).
 = 160,000 gpm from one circulating water pump¹, Unit 2.
 = 250,000 gpm from two circulating water pumps¹, Unit 2.
 = 400,000 gpm from three circulating water pumps¹, Unit 2.

OR

= 50,000 gpm from one circulating water pump², Unit 1.
 = 80,000 gpm from two circulating water pumps², Unit 1.

F_{alloc} = Fraction of the radioactivity from the site that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from more than one pathway (dimensionless).
 = 0.25 for the Waste Disposal System Liquid Effluent Monitor (R-18).
 = 0.16 for each of the Steam Generator Blowdown Monitor (R-19A, R-19B or R-19C).
 = 0.25 for the Condensate Polisher Liquid Waste (R-37)

If it is determined that:

$$\frac{(F_{avail} + F_{waste})}{D_{req} * F_{waste}} < 1$$

where:

- F_{waste} = Waste flow anticipated for this release (gpm).
- = 60 gpm for the Waste Disposal System Liquid Effluent Monitor³.
- = 160 gpm for each Steam Generator Blowdown Monitor.
- = 130 gpm for each Steam Generator Blowdown Monitor while draining a steam generator.
- = 300 gpm for the Condensate Polisher Liquid Waste Monitor

Then the release cannot be made.

If it is determined that:

$$\frac{(F_{avail} + F_{waste})}{D_{req} * F_{waste}} > 1$$

Then the release can be made.

2.1.2.3 Determine the setpoint adjustment factor, S_{adj}.

$$S_{adj} = \frac{[(F_{alloc} * F_{avail}) + F_{waste}] - D_{req,ng}}{D_{req,g}}$$

2.1.2.4 Determine S_{max} monitor alarm setpoint (μCi/ml).

$$S_{max} = S_{adj} * \sum_i C_i$$

where:

- C_i = Concentration of gamma emitting nuclide 'i' (μCi/ml).

2.1.2.5 Determine the monitor alarm setpoint, S_{maxcpm} (cpm).

$$S_{maxcpm} = (S_{max} * E_m) + Bkg$$

where:

- E_m = The applicable effluent monitor efficiency based on S_{max} from the efficiency curves located in the Station Curve Book.
- Bkg = The monitor background (cpm).

Section 2.1 References

1. Carolina Power & Light Company Drawing Number G-190825. Using the System Q-H Curve for Emergency Low Water Level.
2. Carolina Power & Light Company, Darlington County S.E. Plant. 1960-182 MW Installation, Unit 1. SYSTEM HEAD CURVES Unit 1 Circulating Water System Draining Quosig.
3. H.B. Robinson Electric Plant Unit 2, Updated Final Safety Analysis Report.

2.2 Requirements for Compliance with 10 CFR Part 20 (Liquids)

Applicability

Applies to radioactive material in liquid effluents released from the site to unrestricted areas.

Objective

To define the concentration limits of 10 CFR 20 for radioactive material in liquid effluents released to unrestricted areas.

Specification

CONTROLS

2.2.1 The concentration of radioactive material in liquid effluents released at any time from the site to unrestricted areas (see Figure 7-1) shall be limited to 10 times the concentrations specified in 10 CFR 20, Appendix B, Table 2, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to $2E-04$ $\mu\text{Ci/ml}$ total activity.

ACTIONS

2.2.2 With the concentration of radioactive material in liquid effluents released from the site to unrestricted areas exceeding the above limits, without delay restore the concentration to within the above limits. In addition, notification must be made to the Commission in accordance with 10 CFR 50.72 and 10 CFR 50.73.

2.2.3 The provisions of Specification 8.1 are not applicable.

Bases

Compliance With 10 CFR Part 20 - Radioactive Materials in Liquid Effluents

This specification is provided to ensure that the concentration of radioactive materials in liquid effluents released from the site to unrestricted areas will be less than 10 times the concentrations specified in 10 CFR Part 20, Appendix B, Table 2, Column 2. This limitation provides the additional assurance that the concentrations of radioactive materials in bodies of water outside the site will result in exposures within the limits of 10 CFR Part 20.1302 to the population. The concentration limit for dissolved or entrained noble gases is based upon the assumption that Xe-135 is the controlling radionuclide and its EC in air (submersion) was converted to an equivalent concentration in water using the methods described in International Commission on Radiological Protection (ICRP) Publication 2.

The required detection capabilities for radioactive materials in liquid waste samples are tabulated in terms of the lower limits of detection (LLDs). Detailed discussion of the LLD, and other detection limits can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L.A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry", *Anal. Chem.* 40, 586-93 (1968), and Hartwell, J. K., "Detection limits for Radioanalytical Counting Techniques", Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

2.3 Compliance with 10 CFR 20 (Liquids)

Liquid effluents from H.B. Robinson Unit 2 (HBR) will occur both continuously and on a batch basis. The following sections discuss the methodology which will be utilized by the HBR to show compliance with 10 CFR 20.

2.3.1 Continuous Releases

Steam generator blowdown may be a continuous release from HBR. During release periods grab samples will be taken of steam generator blowdown and analyzed for I-131, fission, activation, and corrosion products as outlined in Table 2.8-1 of the ODCM for HBR. These samples are then composited at a rate using the following equation:

$$V_{up} = V_{cp} * \frac{V_a}{V_t}$$

where:

V_{up} = Volume to be replaced/updated (milliliters).

V_{cp} = Volume of the composite (milliliters).

V_a = Actual volume released from grab sample (gallons).

V_t = Total waste volume released to date, including volume V_a , within the compositing period (gallons).

Compliance with 10 CFR 20 during actual release is established through the steam generator blowdown effluent monitor alarm setpoint. This setpoint is based upon Cs-134 as noted in Section 2.1. However, if a continuous release should occur in which the effluent monitor alarm setpoint is exceeded, then actual compliance with 10 CFR 20 may be determined utilizing the actual radionuclide mix and the following equation:

$$Conc_i = \frac{C_{ic} * V_c}{V_{dc}} \tag{2.3-1}$$

where:

$Conc_i$ = Concentration of radionuclide 'i' at the unrestricted area (μ Ci/ml).

C_{ic} = Concentration of radionuclide 'i' in the continuous release (μ Ci/ml).

V_c = Volume of continuous effluent released (gallons).

V_{dc} = Volume of dilution flow during release (gallons).

2.3.2 Batch Releases

Batch releases will occur during normal operation. When this does occur at HBR, a continuous release will usually be occurring at the same time. However, during certain shutdown conditions, only batch releases may occur at HBR. Therefore, both situations are treated here to provide the methodology to show compliance with 10 CFR 20.

2.3.2.1 Pre-release

The radioactivity content of each batch release will be determined prior to release in accordance with Table 2.8-1 of the ODCM for HBR. HBR will show compliance with 10 CFR 20 in the following manner:

For the case where only a batch release is to occur, the concentration of the various radionuclides in the batch release, determined in accordance with Table 2.8-1 of the ODCM for HBR, is multiplied by the ratio of the maximum release rate of the potential batch release to the dilution flow rate to obtain the concentration at the unrestricted area. This calculation is shown in the following equation:

$$Conc_i = \frac{C_{ib} * R_b}{D_{fr} * T_m} \quad (2.3-2)$$

where:

- Conc_i = Concentration of radionuclide 'i' at the unrestricted area (μCi/ml).
- C_{ib} = Concentration of radionuclide 'i' in the potential batch release (μCi/ml).
- R_b = Release rate of the potential batch release (gpm).
- D_{fr} = The dilution flow rate based upon the number of circulating water pumps in service during the release (gpm).
- = 160,000 gpm from one circulating water pump, Unit 2.
 - = 250,000 gpm from two circulating water pumps, Unit 2.
 - = 400,000 gpm from three circulating water pumps, Unit 2.
- OR
- = 50,000 gpm from one circulating water pump, Unit 1.
 - = 80,000 gpm from two circulating water pumps, Unit 1.
- T_m = Fraction of dilution flow allocated to this release (dimensionless).

The concentration in the unrestricted area is compared to 10 times the concentrations in Appendix B, Table 2, Column 2, of 10 CFR 20. Before release may occur, the mixture of radionuclides released must be of such concentration that Equation 2.3-3 is met:

$$\sum_i \frac{Conc_i}{10 * EC_i} \leq 1 \quad (2.3-3)$$

where:

EC_i = Effluent Concentration Limit of radionuclide 'i' from Appendix B, Table 2, Column 2 of 10 CFR 20 ($\mu\text{Ci/ml}$).

For those cases where batch releases may be occurring at the same time that continuous releases are occurring, the concentration in the unrestricted area will be calculated by the following equation:

$$Conc_i = \frac{(C_{ib} * R_b) + (C_{ic} * R_c)}{D_{fr} * \sum T_m} \quad (2.3-4)$$

where:

R_c = Maximum continuous liquid effluent release rate (gpm).

$\sum T_m$ = Summation of allocation fractions for those concurrent releases (dimensionless).

The mixture of radionuclides released must be of such concentrations that Equation 2.3-3 must be met.

For HBR, the liquid radwaste effluent line discharges to the circulating water system. Therefore, the dilution flow rate (D_{fr}) is a function of the number of circulating water pumps operating. At least one circulating water pump must be operating during any liquid waste discharge.

Batch releases from the HBR liquid radwaste system may occur from the waste condensate tanks, the monitor tanks, and the steam generators (during drainage). Continuous release may occur from Steam Generator Blowdown and the Condensate Polisher Liquid Waste. The maximum administrative release rate (R_b) is 160 gpm for each of the steam generators during blowdown, 60 gpm from the monitor and waste condensate tanks, and 300 gpm for the Condensate Polisher Liquid Wastes, and 130 gpm for each of the steam generators during drainage.

2.3.2.2 Post-release

The Steam Generation Blowdown Monitor (R-19A, R-19B, and R-19C), the Waste Disposal System Liquid Monitor (R-18), and the Condensate Polisher Liquid Waste Monitor (R-37) setpoint will each be limited to 50 percent of 10 times the 10 CFR 20 limits. These setpoints will ensure that 10 times the 10 CFR 20 limits are met. However, because they are based upon a given mix, the possibility exists that the alarm trip setpoints may be exceeded, while 10 times the 10 CFR 20 limits are not exceeded. The following methodology is provided to determine whether actual releases exceeded 10 times the 10 CFR 20 limits.

The concentration of each radionuclide in the unrestricted area following release from a batch tank will be calculated in the following manner:

For the case where only batch releases are occurring, the total activity of radionuclide 'i' released is divided by the actual dilution flow to obtain the concentration in the unrestricted area. This calculation is shown in the following equation:

$$Conc_{ik} = \frac{C_{ikb} * V_{kb}}{V_{kd}} \quad (2.3-5)$$

where:

Conc_{ik} = The concentration of radionuclide 'i' at the unrestricted area during release 'k' (μCi/ml).

C_{ikb} = Concentration of radionuclide 'i' in the batch release 'k' (μCi/ml).

V_{kb} = Volume of batch release 'k' (gal).

V_{kd} = Actual volume of dilution during release 'k' (gal).

To show compliance with 10 CFR 20, the following relationship must hold:

$$\sum_i \frac{Conc_{ik}}{10 * EC_i} \leq 1 \quad (2.3-6)$$

The actual dilution volume during release 'k' (V_{kd}) is calculated by the following equation:

$$V_{kd} = 60 * \sum_k D_{fr} * t_k \quad (2.3-7)$$

where :

60 = Conversion factor (min/hr).

t_k = Duration of release 'k' (hr).

D_{fr} = Dilution flow rate from circulating water pumps during release 'k' (gpm).

The circulating water pump flow rates were given in Section 2.3.2.1 above.

For the case where a batch release is occurring at the same time that a continuous release is occurring, the compliance with 10 CFR 20 limits may be determined by the following equation:

$$Conc_{ik} = \frac{(C_{ikb} * V_{kb}) + (C_{ikc} * V_{kc})}{V_{kd}} \quad (2.3-8)$$

where:

C_{ikc} = Concentration of radionuclide 'i' in continuous releases during release period 'k' ($\mu\text{Ci/ml}$).

V_{kc} = Volume of continuous release during period 'k' (gal).

Calculated concentrations are to be compared to 10 times the concentrations in Appendix B, Table 2, Column 2, of 10 CFR 20.

2.4 Requirements for Compliance with 10 CFR 50 (Liquids)

Applicability

Applies to radioactive material in liquid effluents released from the site to unrestricted areas.

Objective

To define the calculated dose limits of 10 CFR 50 for radioactive materials in liquid effluents released to unrestricted areas.

Specification

CONTROLS

2.4.1 The dose commitment at all times to a member of the public from radioactive material in liquid effluents released to unrestricted areas (See Figure 7-1) shall be limited:

- a. During any calendar quarter to ≤ 1.5 mrem to the total body and to ≤ 5 mrem to any organ.

AND

- b. During any calendar year to ≤ 3 mrem to the total body and to ≤ 10 mrem to any organ.

ACTIONS

2.4.2 With the calculated dose commitment from the release of radioactive materials in liquid effluents exceeding any of the limits prescribed by ODCM Specification 2.4.1 above, prepare and submit a report to the Commission in accordance with the ODCM Specification 9.3.

Bases

Compliance With 10 CFR Part 50 - Radioactive Materials in Liquid Effluents

This specification is provided to implement the requirements of Sections II.A, and III.A and IV.A of Appendix I, 10 CFR Part 50. The Control implements the guides set forth in Section II.A of Appendix I. The action statement provides the required operating flexibility and at the same time implements the guides set forth in Section IV.A of Appendix I of 10 CFR Part 50 to assure that the release of radioactive material in liquid effluents will be kept "as low as is reasonably achievable." The dose calculations in the ODCM implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculative procedures based on models and data, such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. The equations specified in the ODCM for calculating the doses due to the actual release rates of radioactive materials in liquid effluents are consistent with the methodology provided in the Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I," Revision 1, October 1977 and Regulatory Guide 1.113, "Estimating Aquatic Dispersion of Effluents from Accidental and Routine Reactor Releases for the Purpose of Implementing Appendix I," April, 1977.

2.5 Compliance with 10 CFR 50 (Liquids)

2.5.1 Cumulation of Doses

The dose contribution from the release of liquid effluents will be calculated once per month, and a cumulative summation of these total body and any organ doses should be maintained for each calendar quarter. The dose contribution for all batch releases will be calculated using the following equation:

$$D_{\tau b} = \sum_k \sum_i A_{i\tau} * t_{kb} * C_{ikb} * F_{kb} \quad (2.5-1)$$

where:

$A_{i\tau}$ = The site-related dose commitment factor to the total body or any organ τ for each identified principal gamma and beta emitter based on ingestion of aquatic food and shore line sediment exposure (mrem/hr per $\mu\text{Ci/ml}$).

t_{kb} = The length of time of batch release 'k' over which C_{ikb} and F_{kb} are averaged for each batch liquid release (hr).

C_{ikb} = The average concentration of radionuclide 'i' in undiluted batch liquid effluent during batch release 'k' ($\mu\text{Ci/ml}$).

F_{kb} = The near-field average dilution factor for C_{ikb} during any batch liquid effluent release 'k'. Defined as the ratio of the volume of undiluted liquid waste released to the product of the dilution volume from the site discharge structure to unrestricted receiving waters times 1.0. (1.0 is the site-specific applicable factor for the mixing effect of the HBR discharge structure as defined in NUREG-0133, October 1978).

$$F_{kb} = \frac{V_{kb}}{V_{kd} * 1.0}$$

where V_{kb} and V_{kd} are as defined in Equation 2.3-5.

The dose factor $A_{i\tau}$ was calculated for an adult for each isotope using the following equation:

$$A_{i\tau} = (1.14 \times 10^5 * 21 * BF_i * DF_{i\tau}) + [1.14 \times 10^5 * 100 * 12 * 0.3 * T_i * e^{-\lambda_i * t_p} * (1 - e^{-\lambda_i * t_b}) * DFG_i] \quad (2.5-2)$$

where:

- 1.14×10^5 = $\frac{10^6 \text{ pCi}}{\mu\text{Ci}} * \frac{10^3 \text{ ml}}{\text{l}} * \frac{1 \text{ yr}}{8760 \text{ hr}}$
- 21 = Adult fish consumption rate from Table E-5 of Regulatory Guide 1.109, Revision 1 (kg/yr).
- BF_i = Bioaccumulation factor for radionuclide 'i' in fish from Table A-1 of Regulatory Guide 1.109, Revision 1 ($\rho\text{Ci/kg}$ per $\rho\text{Ci/l}$).
- $DF_{i\tau}$ = Dose conversion factor for radionuclide 'i' for adults for a particular organ τ from Table E-11 of Regulatory Guide 1.109, Revision 1 (mrem/ ρCi).
- 100 = Sediment proportionality constant from Regulatory Guide 1.109, Revision 1 (liters per m^2 -day).
- 12 = Adult shoreline exposure rate from Table E-5 of Regulatory Guide 1.109, Revision 1 (hrs/yr).
- 0.3 = Shoreline width factor from Table A-2 of Regulatory Guide 1.109, Revision 1.
- T_i = Nuclide half-life for radionuclide 'i' (days).
- λ_i = Nuclide decay constant for radionuclide 'i' (sec^{-1}).
- t_p = Average transit time to point of exposure (0 seconds).
- t_b = Sediment exposure time of $4.73\text{E}+08$ seconds (15 years) from page 1.109-14 of Regulatory Guide 1.109, Revision 1.
- DFG_i = The ground plane dose conversion factor for radionuclide 'i' from Table E-6 of Regulatory Guide 1.109, Revision 1 (mrem/hr per pCi/m^2).

The potable water pathway does not exist either within Lake Robinson or downstream of the Lake Robinson dam. Therefore, the potable water term was excluded from the calculation of $A_{i\tau}$ values. Table 2.5-1 presents $A_{i\tau}$ values for an adult at HBR.

As noted in Section 2.3.1, steam generator blowdown is continuously released from HBR. The dose from continuous releases will be calculated using the following equation:

$$D_{\tau c} = \sum_k \sum_i A_{i\tau} * t_{kc} * C_{ikc} * F_{kc} \quad (2.5-3)$$

where:

- $D_{\tau c}$ = The cumulative dose commitment to the total body or any organ τ , from liquid effluents for continuous releases (mrem).
- t_{kc} = The length of time of continuous release period 'k' over which C_{ikc} and F_{kc} are averaged for all continuous liquid releases (hours).
- C_{ikc} = The average concentration of radionuclide 'i' in undiluted liquid effluent during continuous release period 'k' from any continuous liquid release ($\mu\text{Ci/ml}$).
- F_{kc} = The near-field average dilution factor for C_{ikc} during continuous liquid effluent release 'k'. Defined as the ratio of the volume of undiluted liquid waste released to the product of the dilution volume from the site discharge structure to unrestricted receiving waters times 1.0. (1.0 is the site-specific applicable factor for the mixing effect of the HBR discharge structure as defined in NUREG-0133, October 1978).

$$F_{kc} = \frac{V_{kc}}{V_{kd} * 1.0}$$

where V_{kc} and V_{kd} are as defined in Equation 2.3-8 and Equation 2.3-5, respectively, only now distinguished for continuous releases.

The sum of the cumulative dose from all batch and continuous releases for a quarter are compared to one half the design objectives for total body and any organ. The sum of the cumulative doses from all batch and continuous releases for a calendar year are compared to the design objective doses. The following relationships should hold for HBR to show compliance with Specification 2.4.1 of the ODCM for H.B. Robinson Unit 2.

For the calendar quarter:

$$D_{\tau} \leq 1.5 \text{ mrem total body} \quad (2.5-4)$$

$$D_{\tau} \leq 5 \text{ mrem any organ} \quad (2.5-5)$$

For the calendar year:

$$D_{\tau} \leq 3 \text{ mrem total body} \quad (2.5-6)$$

$$D_{\tau} \leq 10 \text{ mrem any organ} \quad (2.5-7)$$

where:

$$\begin{aligned} D_{\tau} &= \text{Cumulative total dose to any organ } \tau \text{ or the total body from continuous and batch} \\ &\quad \text{releases (mrem).} \\ &= D_{\text{tb}} + D_{\text{tc}} \end{aligned}$$

The quarterly limits given above represent one half the annual design objective of Section II.A of Appendix I of 10 CFR 50. If any of the limits in Expressions 2.5-4 through 2.5-7 are exceeded, a special report pursuant to ODCM Specification 9.3 must be filed with the NRC. This report complies with Section IV.A, of Appendix I of 10 CFR 50.

2.5.2 Projection of Doses

Doses resulting from the release of liquid effluents will be projected once per 31 days. These projections will include a safety margin, based upon expected operational conditions, which will take into consideration both planned and unplanned releases. Projected dose will be calculated as follows:

$$PD = \frac{92 * (DA + DB)}{TE} + M \quad (2.5-8)$$

where:

- PD = projected doses (mrem).
- 92 = time in quarter (days).
- DA = dose accumulated during current quarter (mrem).
- DB = projected dose from this release (mrem).
- TE = time elapsed in quarter (days).
- M = safety margin (mrem).

If the projected doses exceed 0.2 mrem to the whole body or 0.6 mrem to any organ when averaged over a calendar quarter, the liquid radwaste equipment will be operated to reduce the radioactive materials in the liquid effluent.

2.5.3 Dose from Evaporation of Lake Robinson

Dose resulting from the evaporation of previously discharged liquids to Lake Robinson shall be calculated annually for inclusion in the Annual Effluent Report. The curies released by evaporation from Lake Robinson will be calculated based on annual meteorological data, lake temperature, and the monthly lake composite tritium data. Due to the size and length of Lake Robinson, the lake was split into five sections to more accurately quantify the resulting dose (Refer to figure D-3). To show compliance with 10 CFR 50, Equation 2.5-9 is evaluated at the limiting pathway location. The limiting location is defined as a resident with a vegetable garden and beef animal present at 3.96 miles in the north sector. The critical receptor is a child.

H. B. Robinson air dispersion and deposition factors are calculated annually from annual averaged air concentrations and deposition values obtained during routine releases. The methodology for calculating air dispersion and deposition factors are discussed in Appendix A. Five year climatology (2005 – 2009) data was used to generated air dispersion factors listed below. Annually, air dispersion factors are compared to the five year data for each of the Lake Sections. If the newly calculated annual air dispersion and deposition factors do not result in a significant increase in the calculated offsite dose relative to the 10CFR50, Appendix I dose objectives then the 5-year χ/Q and D/Q factors are not revised. An increase in calculated offsite dose that is greater than five percent of the 10CFR50, Appendix I dose objectives would be considered significant enough to warrant a change in the χ/Q and D/Q factors. If an increasing trend in the annual χ/Q and D/Q factors compared to the 5-year values is noted then a revised set of 5-year χ/Q and D/Q factors will be generated.

X/Q values were obtained based on 2005 through 2009 meteorological data.

Lake Section	X/Q (sec/m ³)
1	1.33E-6
2	2.61E-6
3	7.97E-6
4	1.26E-4
5	1.52E-6

$$D_{\tau} = 3.17 \times 10^{-8} * (R_{TB} + R_{TI} + R_{TV}) * \sum_{i=1}^5 [(\overline{\chi/Q})_i * Q_i] \quad (2.5-9)$$

where:

D_{τ} = Dose to any organ τ from tritium (mrem).

3.17×10^{-8} = Inverse of the number of seconds in a year (sec/year)⁻¹.

R_{TB} = Organ dose factor for tritium meat pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

R_{TI} = Organ dose factor for tritium inhalation pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

R_{TV} = Organ dose factor for tritium vegetation pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

$(\overline{\chi/Q})_i$ = Relative concentration from Lake Section 'i' (sec/m³).

Q_i = Release of tritium from Lake Section 'i' (μCi).

H.B. Robinson Steam Electric Plant Unit 2
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TABLE 2.5-1
A_{it} VALUES FOR THE ADULT FOR THE
H.B. ROBINSON STEAM ELECTRIC PLANT
 (mrem/hr per µCi/ml)

<u>Nuclide</u>	<u>Bone</u>	<u>Liver</u>	<u>T.Body</u>	<u>Thyroid</u>	<u>Kidney</u>	<u>Lung</u>	<u>GI-LLI</u>	<u>Skin</u>
H-3	0.00E+00	2.27E-01	2.27E-01	2.27E-01	2.27E-01	2.27E-01	2.27E-01	2.27E-01
F-18	2.30E-02	2.13E-02	2.15E-02	2.13E-02	2.13E-02	2.13E-02	2.13E-02	2.51E-02
NA-24	1.35E+02	1.35E+02	1.35E+02	1.35E+02	1.35E+02	1.35E+02	1.35E+02	7.45E-01
CR-51	2.51E-01	2.51E-01	1.49E+00	9.94E-01	5.25E-01	1.90E+00	3.13E+02	2.96E-01
MN-54	7.45E+01	4.45E+03	9.09E+02	7.45E+01	1.38E+03	7.45E+01	1.35E+04	8.74E+01
MN-56	4.86E-02	2.23E-01	7.94E-02	4.86E-02	2.69E-01	4.86E-02	5.60E+00	5.74E-02
FE-55	6.59E+02	4.55E+02	1.06E+02	0.00E+00	0.00E+00	2.54E+02	2.61E+02	0.00E+00
FE-59	1.04E+03	2.42E+03	9.38E+02	1.47E+01	1.47E+01	6.88E+02	8.04E+03	1.72E+01
CO-57	1.01E+01	2.89E+01	4.49E+01	1.01E+01	1.01E+01	1.01E+01	5.41E+02	1.11E+01
CO-58	2.04E+01	1.09E+02	2.19E+02	2.04E+01	2.04E+01	2.04E+01	1.81E+03	2.39E+01
CO-60	1.16E+03	1.41E+03	1.72E+03	1.16E+03	1.16E+03	1.16E+03	5.98E+03	1.36E+03
NI-63	3.12E+04	2.16E+03	1.05E+03	0.00E+00	0.00E+00	0.00E+00	4.51E+02	0.00E+00
NI-65	1.88E-01	3.83E-02	2.62E-02	1.60E-02	1.60E-02	1.60E-02	5.83E-01	1.86E-02
CU-64	3.26E-02	2.73E+00	1.30E+00	3.26E-02	6.83E+00	3.26E-02	2.30E+02	3.70E-02
ZN-65	2.32E+04	7.37E+04	3.33E+04	4.02E+01	4.93E+04	4.02E+01	4.64E+04	4.62E+01
BR-82	1.15E+00	1.15E+00	1.42E+03	1.15E+00	1.15E+00	1.15E+00	1.63E+03	1.33E+00
BR-83	2.62E-04	2.62E-04	3.87E-02	2.62E-04	2.62E-04	2.62E-04	5.56E-02	3.81E-04
BR-84	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.09E-02	1.27E-02
RB-86	4.83E-01	9.75E+04	4.54E+04	4.83E-01	4.83E-01	4.83E-01	1.92E+04	5.52E-01
RB-88	1.78E-03	1.78E-03	1.78E-03	1.78E-03	1.78E-03	1.78E-03	1.78E-03	2.03E-03
RB-89	6.61E-03	6.61E-03	6.61E-03	6.61E-03	6.61E-03	6.61E-03	6.61E-03	7.93E-03
SR-89	2.19E+04	1.16E-03	6.27E+02	1.16E-03	1.16E-03	1.16E-03	3.51E+03	1.35E-03
SR-90	5.45E+05	0.00E+00	1.34E+05	0.00E+00	0.00E+00	0.00E+00	1.58E+04	0.00E+00
SR-91	7.09E+01	1.16E-01	2.98E+00	1.16E-01	1.16E-01	1.16E-01	3.37E+02	1.35E-01
SR-92	3.76E-01	4.18E-02	5.62E-02	4.18E-02	4.18E-02	4.18E-02	6.66E+00	4.64E-02
Y-91M	5.39E-03	5.39E-03	5.39E-03	5.39E-03	5.39E-03	5.39E-03	5.39E-03	6.24E-03
Y-91	8.41E+00	5.77E-02	2.81E-01	5.77E-02	5.77E-02	5.77E-02	4.60E+03	6.49E-02
Y-92	1.02E-02	9.70E-03	9.72E-03	9.70E-03	9.70E-03	9.70E-03	8.09E+00	1.15E-02
Y-93	4.08E-02	9.86E-03	1.07E-02	9.86E-03	9.86E-03	9.86E-03	9.82E+02	1.35E-02
ZR-95	1.34E+01	1.32E+01	1.32E+01	1.32E+01	1.33E+01	1.32E+01	2.55E+02	1.53E+01
ZR-97	1.64E-01	1.60E-01	1.60E-01	1.59E-01	1.61E-01	1.59E-01	3.11E+02	1.85E-01
NB-95	4.46E+02	2.51E+02	1.39E+02	7.35E+00	2.49E+02	7.35E+00	1.48E+06	8.65E+00
NB-97	9.47E-03	9.47E-03	9.47E-03	9.47E-03	9.47E-03	9.47E-03	1.29E-02	1.11E-02
MO-99	2.15E-01	8.06E+01	1.55E+01	2.15E-01	1.82E+02	2.15E-01	1.86E+02	2.49E-01
TC-99M	1.05E-02	1.15E-02	3.01E-02	9.90E-03	3.40E-02	1.07E-02	9.47E-01	1.13E-02
TC-101	1.09E-03	1.09E-03	1.09E-03	1.09E-03	1.09E-03	1.09E-03	1.09E-03	1.22E-03
RU-103	1.02E+01	5.82E+00	7.70E+00	5.82E+00	2.25E+01	5.82E+00	5.15E+02	6.79E+00
RU-105	4.29E-02	3.42E-02	3.77E-02	3.42E-02	1.47E-01	3.42E-02	5.36E+00	3.88E-02
RU-106	8.85E+01	2.27E+01	3.10E+01	2.27E+01	1.50E+02	2.27E+01	4.28E+03	2.72E+01
AG-110M	1.86E+02	1.86E+02	1.85E+02	1.85E+02	1.86E+02	1.85E+02	5.17E+02	2.16E+02
SN-113	2.00E+03	7.80E+01	1.90E+03	2.80E+01	5.75E+01	7.66E-01	3.50E+04	2.19E+00
SB-124	3.88E+01	3.23E+01	3.48E+01	3.22E+01	3.22E+01	3.73E+01	2.21E+02	3.71E+01
SB-125	1.30E+02	1.26E+02	1.27E+02	1.26E+02	1.26E+02	1.29E+02	1.73E+02	1.42E+02
TE-129M	1.08E+04	4.03E+03	1.71E+03	3.71E+03	4.51E+04	1.06E+00	5.44E+04	1.24E+00
TE-129	1.43E-03	1.42E-03	1.42E-03	1.42E-03	1.49E-03	1.41E-03	1.42E-03	1.67E-03
TE-131M	9.54E+02	4.67E+02	3.89E+02	7.39E+02	4.72E+03	4.32E-01	4.63E+04	5.09E-01
TE-132	1.95E+03	1.26E+03	1.19E+03	1.40E+03	1.22E+04	2.28E-01	5.98E+04	2.68E-01
I-131	1.38E+02	1.97E+02	1.13E+02	6.44E+04	3.38E+02	9.25E-01	5.27E+01	1.12E+00
I-132	7.23E-02	8.11E-02	7.19E-02	5.61E-01	8.95E-02	6.70E-02	6.96E-02	7.88E-02
I-133	2.31E+01	4.01E+01	1.23E+01	5.87E+03	6.98E+01	1.32E-01	3.60E+01	1.60E-01
I-134	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.40E-02	2.85E-02
I-135	1.42E+00	3.50E+00	1.38E+00	2.22E+02	5.54E+00	1.36E-01	3.94E+00	1.59E-01

TABLE 2.5-1 (continued)
 A_{it} VALUES FOR THE ADULT FOR THE
H.B. ROBINSON STEAM ELECTRIC PLANT
 (mrem/hr per $\mu\text{Ci/ml}$)

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-LLI	Skin
CS-134	2.98E+05	7.10E+05	5.80E+05	3.69E+02	2.30E+05	7.66E+04	1.28E+04	4.30E+02
CS-136	2.96E+04	1.17E+05	8.42E+04	8.12E+00	6.51E+04	8.93E+03	1.33E+04	9.20E+00
CS-137	3.83E+05	5.23E+05	3.43E+05	5.55E+02	1.78E+05	5.95E+04	1.07E+04	6.47E+02
CS-138	1.93E-02	1.93E-02	1.93E-02	1.93E-02	1.93E-02	1.93E-02	1.93E-02	2.21E-02
BA-139	5.70E-03	5.69E-03	5.69E-03	5.69E-03	5.69E-03	5.69E-03	5.70E-03	6.41E-03
BA-140	1.86E+02	1.34E+00	1.32E+01	1.10E+00	1.18E+00	1.24E+00	3.81E+02	1.26E+00
BA-142	2.41E-03	2.41E-03	2.41E-03	2.41E-03	2.41E-03	2.41E-03	2.41E-03	2.75E-03
LA-140	1.13E+00	1.08E+00	1.05E+00	1.03E+00	1.03E+00	1.03E+00	3.67E+03	1.17E+00
LA-142	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.09E-02	4.16E-02	4.90E-02
CE-141	7.57E-01	7.50E-01	7.37E-01	7.35E-01	7.42E-01	7.35E-01	5.75E+01	8.28E-01
CE-143	1.27E-01	1.89E+00	1.25E-01	1.24E-01	1.25E-01	1.24E-01	6.62E+01	1.41E-01
CE-144	4.91E+00	4.23E+00	3.80E+00	3.74E+00	4.03E+00	3.74E+00	3.98E+02	4.32E+00
PR-144	9.87E-05	9.87E-05	9.87E-05	9.87E-05	9.87E-05	9.87E-05	9.87E-05	1.13E-04
HF-181	1.33E+01	1.06E+01	1.09E+01	1.06E+01	1.06E+01	1.06E+01	2.12E+02	1.50E+01
W-187	1.48E+02	1.23E+02	4.32E+01	1.26E-01	1.26E-01	1.26E-01	4.04E+04	1.47E-01
NP-239	1.13E-01	9.41E-02	9.31E-02	9.20E-02	9.85E-02	9.20E-02	4.29E+02	1.06E-01

2.6 Radioactive Liquid Effluent Monitoring Instrumentation

Applicability

Applies to the radioactive liquid effluent instrumentation system.

Objective

To define the operating requirements for the radioactive liquid effluent instrumentation system.

Specification

CONTROLS

2.6.1 The radioactive liquid effluent monitoring instrumentation channels shown in Table 2.6-1 shall be operable with their alarm/trip setpoint set to ensure that the limits of ODCM Specification 2.2.1 are not exceeded. The alarm/trip setpoints shall be determined in accordance with the ODCM.

ACTIONS

- 2.6.2 With the calculated dose commitment from the release of radioactive materials in liquid effluents exceeding any of the limits prescribed by ODCM Specification 2.4.1 above, prepare and submit a report to the Commission in accordance with the ODCM Specification 9.3.
- 2.6.3 With less than the minimum number of radioactive liquid effluent monitoring instrumentation operable, take the action shown in Table 2.6-1.
- 2.6.4 The provisions of Specification 8.1 are not applicable.

Bases

Radioactive Liquid Effluent Instrumentation

The radioactive liquid effluent monitoring instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in liquid effluents during actual or potential releases of liquid effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with the procedures in the ODCM to ensure that the alarm/trip will occur prior to exceeding 10 times the limits of 10 CFR Part 20, Appendix B, Table 2, Column 2. The operability and use of this instrumentation are consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

TABLE 2.6-1
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Release Pathway / Instrumentation	MCO*	Compensatory Measures
1. Liquid Radwaste Effluent Discharge Line a. Monitor (R-18) provides automatic termination of release upon exceeding alarm/trip setpoint.	1	With the number of channels operable less than the MCO requirements: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that prior to initiating a release: 1. Two independent samples are analyzed in accordance with the Surveillance Requirements of ODCM Specification 2.2.1 and; 2. Two members of the facility staff independently verify the release rate calculations and the discharge line valving.
b. Flow rate measurement device	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may be continued, provided that the flow rate is estimated at least once per 4 hours during actual releases. Pump performance curves generated "in situ" and tank volumes may be used to estimate flow.

*MCO - Minimum Channels Operable

TABLE 2.6-1 (continued)
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Release Pathway / Instrumentation	MCO*	Compensatory Measures
<p>2. Steam Generator Blowdown Effluent Line</p> <p>a. Monitor (R-19A,B, and C) provides automatic termination of blowdown from the affected Steam Generators upon exceeding alarm/trip setpoint.</p>	<p>1 per S/G</p>	<p>With the number of channels operable less than the MCO requirement:</p> <p>a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and,</p> <p>b. Effluent releases via this pathway may continue provided that grab samples are analyzed for gross radioactivity (beta or gamma) with a lower limit of detection of at least 1.0E-07μCi/ml or are analyzed for principle gamma emitters consistent with Table 2.8-1;</p> <p>1. Once per 24 hours when the specific activity of the secondary coolant is ≤ 0.01 μCi/ml Dose Equivalent I-131, or;</p> <p>2. Once per 12 hours when the specific activity of the secondary coolant is >0.01 μCi/ml dose Equivalent I-131.</p>
<p>b. Flow rate measurement devices - each Steam Generator has its own blowdown flow rate measuring device. These devices only measure flow directed through the heat recovery system, and will not measure flow which bypasses the heat recovery system.</p>	<p>1 per S/G</p>	<p>With the number of channels operable less than the MCO requirement due to inoperable equipment:</p> <p>a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 AND,</p> <p>With the number of channels operable less than the MCO requirement due to inoperable equipment, OR if the steam generator blowdown system is aligned such that any flow bypasses the flow measurement device(s) (i.e. heat recovery is not in service):</p> <p>b. Effluent releases via this pathway may continue provided that the flow rate for the affected blowdown line(s) is estimated at least once per 24 hours.</p>

*MCO - Minimum Channels Operable

TABLE 2.6-1 (continued)
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
2. Steam Generator Blowdown Effluent Line (continued) c. R-19A, B and C flow measurement device – each monitor has its own flow rate measurement device	1 per S/G	With the number of channels operable less than the MCO requirement due to inoperable equipment: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that the flow rate for the affected monitor line(s) is estimated at least once per 24 hours.
3. Discharge Canal Flow	Note 1	With the number of channels operable less than the MCO requirement suspend effluent release via this pathway.
4. Tank Level Indicating Devices a. Refueling Water Storage Tank b. Monitor Tanks Tank A Tank B c. Waste Condensate Tanks Tank C Tank D Tank E d. Deleted	1 1 1 1 1 1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Liquid additions to the affected tank(s) may continue provided that the liquid level for the affected tanks is estimated during all liquid additions to the affected tank(s).

*MCO - Minimum Channels Operable

TABLE 2.6-1 (continued)
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
5. Containment Fan Cooling Water Monitor (Service Water Effluent Line) a. Monitor (R-16) does not provide automatic termination of release upon exceeding alarm setpoint.	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that, once per 24 hours, grab samples are collected and analyzed for gross radioactivity (beta or gamma) with a lower limit of detection of at least 1.0E-07 µCi/ml or are analyzed for principal gamma emitters consistent with Table 2.8-1.
6. Composite Sampler for Settling Ponds	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that, grab samples are collected and composited three times per week and analyzed in accordance with Table 2.8-1.

*MCO - Minimum Channels Operable

TABLE 2.6-1 (continued)
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
7. Condensate Polisher Liquid Waste Monitor a. Monitor (R-37) provides automatic termination of release upon exceeding alarm/trip setpoint	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that, once per 24 hours, grab samples are collected and analyzed for gross radioactivity (beta or gamma) with a lower limit of detection of at least 1.0E-07 µCi/ml or are analyzed for principal gamma emitters consistent with Table 2.8-1.

*MCO - Minimum Channels Operable

NOTES TO TABLE 2.6-1

- Note 1 Pump curves for Unit 2 operating circulating water pumps may be used to satisfy this MCO. If no Unit 2 circulating water pumps are operating the pump curves for circulating water pumps operating in Unit 1 may be used to satisfy this MCO.
- Note 2 Deleted

2.7 Radioactive Liquid Effluent Monitoring Instrumentation - Surveillance Requirements

Applicability

Applies to the radioactive liquid effluent instrumentation system.

Objective

To ascertain that the radioactive liquid effluent instrumentation system is functioning properly in order to accurately monitor radioactive liquid effluent releases.

Specification

SURVEILLANCE REQUIREMENTS

- 2.7.1 Each radioactive liquid effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and Channel Operational Test operations at the frequencies shown in Table 2.7-1.

TABLE 2.7-1
RADIOACTIVE LIQUID EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pathway/Instruments	Channel Check	Source Check	Channel Calibration	Channel Operational Test
1. Liquid Radwaste Effluent Line a. Monitor (R-18)	D (Note 1)	P	R (Note 3)	Q (Note 4)
b. Flow rate measurement device		N.A.	R	N.A.
2. Steam Generator Blowdown Effluent Line a. Monitor (R-19A) (R-19B) (R-19C)	D D D	M M M	R (Note 3) R (Note 3) R (Note 3)	Q (Note 4) Q (Note 4) Q (Note 4)
b. Flow rate measurement devices for measuring flow of sample to R-19	(Note 2)	N.A.	N.A.	N.A.
c. Flow rate measuring devices for each steam generator blowdown line	(Note 2)	N.A.	R	N.A.
3. Containment Fan Cooling Water Monitor (Service Water Effluent Line) a. Monitor (R-16)	D	M	R (Note 3)	Q (Note 5)
4. Tank Level Indicating Devices a. Refueling Water Storage Tank b. Monitor Tanks A & B	D D*	N.A. N.A.	R R	Q Q
c. Waste Condensate Tanks C D & E	D*	N.A.	R	Q
5. Condensate Polisher Waste Monitor (R-37)	D	M	R	Q

* During liquid additions to the tank

NOTES TO TABLE 2.7-1

- Note 1 The channel check shall consist of verifying indication of flow at least once during each batch type release or shall consist of verifying indication of flow at least once per 24 hours for continuous type releases.
- Note 2 The channel check shall consist of verifying indication of flow at least once during each batch type release or shall consist of verifying indication of flow at least once per 24 hours for continuous releases, except during steam generator drain at cold shutdown.
- Note 3 The channel calibration shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities or otherwise NIST traceable.
- Note 4 The Channel Operational Test shall also demonstrate that automatic isolation of this pathway and Control Room alarm annunciation occur if any of the following conditions exists:
1. Instrument indicates measured levels above the alarm/trip setpoint.
 2. Power failure.
 3. Instrument controls not set in operate mode.
- Note 5 The Channel Operational Test shall also demonstrate that Control Room alarm annunciation occurs if any of the following conditions exists:
1. Instrument indicates measured levels above the alarm setpoint.
 2. Power failure.
 3. Instrument indicates a downscale failure.
 4. Instrument controls not set in operate mode.

NOTATION

- P Completed prior to making a radioactive materials release
D At least once per 24 hours
W At least once per 7 days
N.A. Not applicable
M At least once per 31 days
R At least once per 18 months
Q At least once per 92 days

2.8 Radioactive Liquid Effluents Sampling and Analysis Requirements

Applicability

Applies to the monitoring of radioactive liquid effluents.

Objective

To ascertain that radioactive liquid effluent releases are being maintained as low as reasonably achievable and within allowable limits.

Specification

SURVEILLANCE REQUIREMENTS

- 2.8.1 The radioactivity content of each batch of radioactive liquid waste to be discharge shall be determined prior to release by sampling and analysis in accordance with Table 2.8-1. The results of pre-release analyses shall be used with the calculative methods in the ODCM to assure that the concentration at the point of release to the unrestricted area is maintained within the limits of Specification 2.2.1.
- 2.8.2 Analyses of samples composited from batch releases shall be performed in accordance with Table 2.8-1. The results of the post-release analyses shall be used with the calculative methods in the ODCM to assure that the concentrations at the point of release were maintained within the limits of Specification 2.2.1.
- 2.8.3 The concentration of radioactive materials in liquid effluents discharged from continuous release points shall be determined by collection and analysis of samples in accordance with Table 2.8-1. The results of the analyses shall be used with the calculative methods in the ODCM to assure that the concentrations at the point of release are maintained within the limits of Specification 2.2.1.
- 2.8.4 Dose Calculations: Cumulative dose commitments for the current calendar quarter and calendar year from liquid effluents shall be determined in accordance with the ODCM once per 31 days.

TABLE 2.8-1
RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Type of Release	Sampling Frequency	Minimum Analysis Frequency	Required Activity Analysis	Required LLD ^a μCi/ml	
<u>Batch Waste Releases</u> ^b	P Grab Sample	P on Grab Sample	Principal Gamma Emitters ^c	5E-07	
			I-131	1E-06	
	1. Monitor Tanks	P Grab Sample One Batch/M	M on Grab Sample	Dissolved and Entrained Gases (gamma emitters)	1E-05
				2. Waste Condensate Tanks	P Grab Sample Each Batch and Composited ^d
	Gross Alpha	1E-07			
	3. Drainage of Systems	P Grab Sample Each Batch and Composited ^d	Q on Composite	Sr-89, Sr-90	5E-08
				Fe-55	1E-06
	<u>Continuous Releases</u> ^e	3/W Grab Sample	W on Composite	Principal Gamma Emitters ^{c, i}	5E-07
				I-131 ⁱ	1E-06
		1. Steam Generator Blowdown	M Grab Sample	M on Grab Sample	Dissolved and Entrained Gases (gamma emitters)
2. Condensate Polisher Waste Water Discharge ^g					3/W Grab Sample and Composited ^{d, f}
		Gross Alpha	1E-07		
3. Settling Ponds ^g		3/W Grab Sample and Composited ^{d, f}	Q on Composite	Sr-89, Sr-90	5E-08
				Fe-55	1E-06

TABLE NOTATION

- a. The LLD is defined, for purposes of these specifications, 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% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 * S_b}{E * V * 2.22 \times 10^6 * Y * e^{-\lambda \Delta t}}$$

where:

LLD is the "a priori" lower limit of detection as defined above, as microcuries 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,

2.22×10^6 is the number of disintegrations per minute per microcurie,

Y is the fractional radiochemical yield, when applicable,

λ is the radioactive decay constant for the particular radionuclide, and

Δt for plant effluents is the elapsed time between the midpoint of sample collection and time of counting.

Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay correction time (Δt) are to be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

- b. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses each batch shall be isolated and thoroughly mixed whenever possible, to assure representative sampling. Residual liquids in systems such as feedwater heaters and lines cannot be thoroughly mixed for representative samples of their respective system. Grab samples from these systems will be accepted as representative of their respective system.

- c. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported.
- d. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen which is representative of the liquids released.
- e. A continuous release is the discharge of liquid wastes of a nondiscrete volume; e.g., from a system that has an input flow during the continuous release.
- f. Grab sample of continuous flows taken for compositing purposes will be taken in volumes proportional to the existing flow rate of the system in a manner described in the ODCM.
- g. Normal grab sampling for the Condensate Polisher Waste Water Discharge & Settling Ponds is performed by an automatic composite sampler on the discharge line in lieu of three times per week sampling. If composite sampler is rendered inoperable, manual grab samples should be collected and composited.
- h. In lieu of a tritium analysis being performed on a batch tank composite sample, each individual release may be analyzed for tritium.
- i. For continuous releases, where a periodic grab sample is performed, a gamma or tritium analysis may be performed on each sample in lieu of a composite analysis.

NOTATION

P	Completed prior to making a radioactive materials release
W	At least once per 7 days
M	At least once per 31 days
Q	At least once per 92 days
3/W	3 times per week

2.9 Liquid Radwaste Treatment System

Applicability

Applies to the liquid radwaste treatment system.

Objective

To define the operating requirements for the liquid radwaste treatment system and to ascertain that the concentration of radioactive materials in the liquid waste treatment system is maintained as low as reasonably achievable and within allowable limits.

Specification

CONTROLS

2.9.1 The appropriate portions of the Liquid Radwaste Treatment System shall be maintained and used to reduce the concentrations of radioactive materials in liquid wastes prior to their discharge when the projected dose commitments, due to the release of radioactive liquid effluents to unrestricted areas (See Figure 7-1) when averaged over a calendar quarter, would exceed 0.2 mrem to the total body or 0.6 mrem to any organ.

ACTIONS

2.9.2 With radioactive liquid wastes being discharged without treatment while in excess of the limits of ODCM Specification 2.9.1 above, prepare and submit a report to the Commission in accordance with ODCM Specification 9.3.b.

SURVEILLANCE REQUIREMENTS

2.9.3 Dose commitments from liquid releases shall be projected at least once per 31 days, in accordance with the ODCM to ensure the provisions of ODCM Specification 2.9.1 are satisfied when the Liquid Radwaste Treatment System is not in use.

Bases

Liquid Radwaste Treatment System

The requirements that the appropriate portions of this system be maintained and used when specified provides assurance that the releases of radioactive materials in liquid effluents will be kept "as low as reasonably achievable".

This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50 and the design objective given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the Liquid Radwaste Treatment System were specified as the dose design objective set forth in Section II.A of Appendix I, 10 CFR Part 50, for liquid effluents.

3.0 GASEOUS EFFLUENTS

3.1 Monitor Alarm Setpoint Determination

This methodology determines the monitor alarm setpoint if the dose rate in the unrestricted areas due to radionoble gases in the gaseous effluent released from the site to areas at and beyond the site boundary exceeds 500 mrem/year to the whole body or exceeds 3000 mrem/year to the skin using a conservative mix (GALE Code).

The methodology described in Section 3.1.2 provides an alternative means to determine monitor alarm setpoints when an analysis is performed prior to release.

3.1.1 Setpoint Based on Conservative Radionuclide Mix (Ground and Mixed Mode Releases)

Releases through the steam generator flash tank vent can only occur through this vent when significant primary-to-secondary leakage exists within the steam generators and the blowdown is not going through heat recovery. Steam generator blowdown is continuously monitored by R-19A, R-19B, and R-19C as a liquid pathway. The condenser vacuum pump vent discharges via plant vent which is monitored by R-14.

The following method applies to gaseous releases via the plant vent when determining the high-alarm setpoint for the plant vent gas monitor (R-14C) and the Fuel Handling Basement Exhaust Monitor (R-20), using the GALE code during the following operational conditions:

- Continuous release via the plant vent (R-14C).
- Continuous release via the Fuel Handling Basement Exhaust (R-20).

3.1.1.1 Determine the "mix" (noble gas radionuclides and composition) of the gaseous effluent.

$$S_i = \frac{A_i}{\sum_i A_i} \quad (3.1-1)$$

where:

S_i	=	The fraction of the total noble gas radioactivity in the gaseous effluent comprised by noble gas radionuclide 'i' for each individual noble gas radionuclide in the gaseous effluent or the S_i from Table 3.1-1 when using GALE Code.
A_i	=	The radioactivity of noble gas radionuclide 'i' in the gaseous effluent from Table 3.1-1 (Ci/yr).

3.1.1.2 Determine the Q_m , the maximum acceptable total release rate ($\mu\text{Ci}/\text{sec}$) of all noble gas radionuclides in the gaseous effluent based upon the whole body exposure limit of 500 mrem/year by:

$$Q_m = \frac{500}{(\overline{\chi/Q}) * \sum_i (K_i * S_i)} \quad (3.1-2)$$

where:

- $(\overline{\chi/Q})$ = The highest calculated annual average relative dispersion factor for any area at or beyond the unrestricted area boundary for all sectors (sec/m^3).
- = 8.1E-05 sec/m^3 (Continuous Ground Release) from Table A-1, Appendix A.
- = 9.9E-07 sec/m^3 (Mixed Mode Release) from Table A-10, Appendix A.
- K_i = The total whole body dose factor due to gamma emissions from noble gas radionuclide 'i' from Table 3.1-2 (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

3.1.1.3 Determine the Q_m , the maximum acceptable release rate ($\mu\text{Ci}/\text{sec}$) of all gas radionuclides in the gaseous effluent based upon the skin exposure limit of 3000 mrem/year by:

$$Q_m = \frac{3000}{(\overline{\chi/Q}) * \sum_i [(L_i + 1.11M_i) * S_i]} \quad (3.1-3)$$

where:

- $L_i + 1.11M_i$ = The total skin dose factor due to emissions from noble gas radionuclide 'i' from Table 3.1-2 (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

3.1.1.4 Determine the C_m , the maximum acceptable total radioactivity concentration ($\mu\text{Ci}/\text{cm}^3$) of all noble gas radionuclides in the gaseous effluent.

$$C_m = \frac{2.12 \times 10^{-3} * Q_m}{F} * T_m * S \quad (3.1-4)$$

NOTE: Use the lower of the Q_m values obtained in Sections 3.1.1.2 and 3.1.1.3. This will protect both the skin and total body from being exposed to the limit.

where:

- T_m = Fraction of the radioactivity from the site that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from several pathways (dimensionless).
- = 0.92 for Plant Vent Gas Monitor (R-14C).
- = 0.05 for the Fuel Handling Basement Exhaust Monitor (R-20).

- F = The maximum acceptable effluent flow rate at the point of release (cfm).
= 60,600 cfm for plant vent.
= 10,200 cfm for the fuel-handling building.
- 2.12×10^{-3} = Unit conversion constant to convert $\mu\text{Ci}/\text{sec}/\text{cfm}$ to $\mu\text{Ci}/\text{cm}^3$.
= $\frac{\text{sec}-\text{ft}^3}{\text{min}-\text{cm}^3}$
- S = 0.5, an engineering factor used to provide a margin of safety for cumulated measurement uncertainties (dimensionless).

3.1.1.5 Determine CR, the calculated monitor count rate above background attributed to the noble gas radionuclides (cpm) by:

$$CR = C_m * E_m \quad (3.1-5)$$

where:

- E_m = Obtained from the applicable effluent monitor efficiency curve located in the Station Curve Book. Use the radioactivity concentration ' C_m ' to find CR.

3.1.1.6 Determine HSP, the monitor high-alarm setpoint including background (cpm) by:

$$HSP = CR + background \quad (3.1-6)$$

3.1.2 Setpoint Based on Sample Analysis Prior to Release

The following method applies to gaseous releases when determining the high-alarm setpoint with prior sample analysis and using the maximum acceptable effluent flow rate at the point of release. The method applies to the following conditions.

Batch Releases

- Containment purge.*
- Containment pressure relief.
- Waste gas decay tanks.

Continuous Releases

- Plant vent.
- Fuel handling basement exhaust.
- Environmental and Radiation Control Building Hood Exhaust.
- Containment purge.
- Radwaste Building exhaust vent.

* Batch containment purge is considered as one volume of containment air removed.

3.1.2.1 Determine R_i , the noble gas release rate ($\mu\text{Ci}/\text{sec}$) for radionuclide 'i':

$$R_i = 472 * C_i * F \tag{3.1-7}$$

where:

472 = A conversion factor to convert cfm to cm^3/sec .

C_i = The radioactivity concentration of noble gas radionuclide 'i' from analysis of gaseous effluent from the Plant Vent (stack), Fuel Handling Basement Exhaust, Environmental & Radiation Control (E&RC) Building Hood Exhaust, Radwaste Building Exhaust Vent and the Containment Vessel when R-12 is sampling from the Containment. If there are no isotopes identified in the sample, the EC for Xe-133 may be used as an actual value for the purpose of the setpoint calculation ($\mu\text{Ci}/\text{cm}^3$).

Containment Purge: Used for R-14 or R-12 when R-11/12 aligned to the Plant Vent.

$$= \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Containment Vent} * 0.366 \right) + \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Plant Vent} * 0.634 \right)$$

0.366 = Dilution correction factor for C.V. Purge.
 $= \frac{35,000 \text{ cfm}}{(60,600+35,000) \text{ cfm}}$

0.634 = Dilution correction factor for Plant Vent during C.V. Purge.
 $= \frac{60,600 \text{ cfm}}{(60,600+35,000) \text{ cfm}}$

Containment Pressure Relief: Used for R-14 or R-12 when R-11/12 aligned to the Plant Vent.

$$= \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Containment Vent} * 0.040 \right) + \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Plant Vent} * 0.960 \right)$$

0.040 = Dilution correction factor for C.V. Pressure Relief.
 $= \frac{2,500^\dagger \text{ cfm}}{(60,600+2,500^\dagger) \text{ cfm}}$

0.960 = Dilution correction factor for Plant Vent during C.V. Pressure Relief.
 $= \frac{60,600 \text{ cfm}}{(60,600+2,500^\dagger) \text{ cfm}}$

[†] 2,500 CFM - Refer to Appendix B.3 for additional information

Waste Gas Decay Tanks (WGDT).

$$= \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of WGDT} * 0.0016 \right) + \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Plant Vent} * 0.9984 \right)$$

0.0016 = Dilution correction factor for WGDT.

$$= \frac{100 \text{ cfm}}{(60,600+100) \text{ cfm}}$$

0.9984 = Dilution correction factor for Plant Vent during WGDT Release.

$$= \frac{60,600 \text{ cfm}}{(60,600+100) \text{ cfm}}$$

WGDT during Containment Purge.

$$= \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of WGDT} * 0.001 \right) + \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Plant Vent} * 0.633 \right) + \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of C. V.} * 0.366 \right)$$

0.001 = Dilution correction factor for WGDT during a Continuous C.V. Purge and Plant Vent Release.

$$= \frac{100 \text{ cfm}}{(60,600+35,000+100) \text{ cfm}}$$

0.633 = Dilution correction factor for Plant Vent during a Continuous C.V. Purge and Plant Vent Release.

$$= \frac{60,600 \text{ cfm}}{(60,600+35,000+100) \text{ cfm}}$$

0.366 = Dilution correction factor for Continuous C.V. Purge during WGDT Release.

$$= \frac{35,000 \text{ cfm}}{(60,600+35,000+100) \text{ cfm}}$$

F = The maximum acceptable effluent flow rate at the point of release (cfm)

- = 60,600 CFM for the plant vent
- = 10,200 CFM for the fuel handling basement exhaust
- = 11,500 CFM for the E&RC building hood exhaust
- = 15,000 CFM for the Radwaste Building exhaust vent
- = 60,700 CFM for the waste gas decay tank
- = 95,700 CFM for the WGDT during a continuous containment vessel purge
- = 95,600 CFM for the containment vessel purge plus plant vent (R-14 or R-12 when R-11/12 is sampling from the Plant Vent)
- = 63,100 CFM for the containment vessel pressure relief (R-14 or R-12 when R-11/12 is sampling from the Plant Vent)
- = 35,000 CFM for containment vessel purge or continuous release (R-12 when R-11/12 is sampling from the Containment Vessel)
- = 2,500 CFM for containment vessel pressure relief releases (R-12 when R-11/12 is sampling from the Containment Vessel)

† 2,500 CFM - Refer to Appendix B.3 for additional information

3.1.2.2 Determine the monitor alarm setpoint based on total body and skin dose rate:

a. Determine dose rate for total body (mrem/yr).

$$DR_{TB} = (\overline{\chi/Q}) * \sum_i (K_i * R_i) \tag{3.1-8}$$

where:

- $(\overline{\chi/Q})$ = The highest calculated annual average relative dispersion factor for any area at or beyond the unrestricted area boundary for all sectors from Appendix A (sec/m^3).
- = $8.1\text{E-}05 \text{ sec/m}^3$ (continuous ground release) from Table A-1, Appendix A. To be conservative this can be used for all releases.
- = $9.9\text{E-}07 \text{ sec/m}^3$ (continuous mixed mode release) from Table A-10, Appendix A, only with upper wind speeds of ≤ 9 mph.
- = $5.1\text{E-}05 \text{ sec/m}^3$ (batch ground release) from Table A-7, Appendix A.
- = $2.9\text{E-}06 \text{ sec/m}^3$ (batch mixed mode release) from Table A-16, Appendix A.
- K_i = The total whole body dose factor due to gamma emissions from noble gas radionuclide 'i' from Table 3.1-2 (mrem/yr per $\mu\text{Ci/m}^3$).

b. Determine dose rate for skin (mrem/yr).

$$DR_{SK} = (\overline{\chi/Q}) * \sum_i [(L_i + 1.11M_i) * R_i] \tag{3.1-9}$$

where:

- $L_i + 1.11M_i$ = The total skin dose factor for noble gas emission 'i' radionuclide from Table 3.1-2 (mrem/yr per $\mu\text{Ci/m}^3$).

- c. Determine the noble gas emission Projected Dose Rate Ratio (PDRR) for Total Body and Skin.

$$PDRR_{TB} = \frac{DR_{TB}}{500} \quad (3.1-10)$$

$$PDRR_{SK} = \frac{DR_{SK}}{3000} \quad (3.1-11)$$

where:

- 500 = The allowable total body dose rate due to noble gas gamma emissions (mrem/yr).
 3000 = The allowable skin dose rate due to noble gas beta emissions (mrem/yr).

- d. Determine the maximum monitor setpoint concentration ($\mu\text{Ci}/\text{cm}^3$) for total body and skin.

$$\text{Maximum Monitor Total Body Setpoint} = \frac{\sum_i C_i}{PDRR_{TB}} * S * T_m \quad (3.1-12)$$

$$\text{Maximum Monitor Skin Setpoint} = \frac{\sum_i C_i}{PDRR_{SK}} * S * T_m \quad (3.1-13)$$

where:

- S = 0.5, an engineering factor used to provide a margin of safety for cumulative uncertainties of measurements (dimensionless).
 T_m = Fraction of the radioactivity from the site that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from several pathways (dimensionless).
 = 0.92 for the Plant Vent Gas Monitor (R-14C).
 = 0.05 for the Fuel Handling Basement Exhaust Monitor (R-20).
 = 0.01 for other potential release points.
 = 0.01 for the E&RC Building Hood Exhaust Monitor (R-22).
 = 0.01 for the Radwaste Building exhaust vent Monitor (R-23).
 = 0.81 for C.V. releases via R-11 and R-12.
 [This indicates 0.81 of 10 CFR 20 limits for Containment releases and is also monitored by R-14C. 0.92 = 0.81 + 0.11 (Normal Plant Releases)]

- e. Determine the maximum monitor setpoint (cpm) for total body (S_t) and skin (S_s).

$$S_t = \frac{\text{Maximum Monitor Total Body Setpoint}}{\text{Monitor Efficiency}} + Bkg \quad (3.1-14)$$

$$S_s = \frac{\text{Maximum Monitor Skin Setpoint}}{\text{Monitor Efficiency}} + Bkg \quad (3.1-15)$$

where:

Monitor Efficiency = Obtained from the applicable effluent monitor efficiency curve located in the Station Curve Book. Use the radioactivity concentration ($\mu\text{Ci/cc}$) to find (CPM).

Bkg = The monitor background (CPM)

- f. Determine the actual gaseous monitor setpoint:

The setpoints that were determined based on the dose rate limits to the total body (S_t) and to the skin (S_s) are compared and the lesser value is used as the actual setpoint.

TABLE 3.1-1
GASEOUS SOURCE TERMS*

<u>Radionuclide</u>	<u>Plant Vent Release¹</u>		<u>Condenser Vacuum Pump Vent²</u>		<u>Containment Purge or Pressure Relief</u>		<u>Waste Gas Decay Tanks³</u>	
	A _i (Ci/yr)	S _i	A _i (Ci/yr)	S _i	A _i (Ci/yr)	S _i	A _i (Ci/yr)	S _i
Kr-85m	2.0E+00	5.26E-02	1.0E+00	4.35E-02	0.00	0.00	0.00	0.00
Kr-85	0.00	0.00	0.00	0.00	0.00	0.00	1.6E+02	8.00E-01
Kr-87	1.0E+00	2.63E-02	0.00	0.00	0.00	0.00	0.00	0.00
Kr-88	3.0E+00	7.89E-02	2.0E+00	8.70E-02	1.0E+00	2.90E-03	0.00	0.00
Xe-131m	0.00	0.00	0.00	0.00	1.0E+00	2.90E-03	9.0E+00	4.50E-02
Xe-133m	0.00	0.00	0.00	0.00	4.0E+00	1.16E-02	0.00	0.00
Xe-133	2.8E+01	7.37E-01	1.8E+01	7.83E-01	3.1E+02	8.99E-01	3.1E+01	1.55E-01
Xe-135	4.0E+00	1.05E-01	2.0E+00	8.70E-02	4.0E+00	1.16E-02	0.00	0.00
Ar-41	0.00	0.00	0.00	0.00	2.5E+01	7.25E-02	0.00	0.00
TOTAL	3.8E+01		2.3E+01		3.45E+02		2.0E+02	

* Source terms are based upon GALE Code (not actual releases) from the evaluation of H.B. Robinson Unit 2 to demonstrate conformance to the design objectives of 10 CFR 50, Appendix I, Table 2-4. These values are only for routine releases and not for a complete inventory of gases in an emergency.

¹ These values are used to determine the monitor alarm setpoints for the Plant Vent Gas Monitor (R-14C).

² These values are used to determine the monitor alarm setpoint for the Condenser Vacuum Pump Vent Monitor (R-15). R-15 is a process monitor and its effluents are monitored by R-14C. This column is intentionally left for reference.

³ These values are used to determine the monitor alarm setpoint for the Fuel Handling Basement Exhaust Monitor (R-20).

TABLE 3.1-2
DOSE FACTORS AND CONSTANTS*

<u>Radionuclide</u>	<u>Total Whole Body Dose Factor (K_p) (mrem/yr per $\mu\text{Ci}/\text{m}^3$)</u>	<u>Total Skin Dose Factor ($L_1 + 1.11 M_1$) (mrem/yr per $\mu\text{Ci}/\text{m}^3$)</u>
Kr-83m	7.56E-02	2.12E+01
Kr-85m	1.17E+03	2.81E+03
Kr-85	1.61E+01	1.36E+03
Kr-87	5.92E+03	1.65E+04
Kr-88	1.47E+04	1.91E+04
Kr-89	1.66E+04	2.91E+04
Kr-90	1.56E+04	2.52E+04
Xe-131m	9.15E+01	6.48E+02
Xe-133m	2.51E+02	1.35E+03
Xe-133	2.94E+02	6.94E+02
Xe-135m	3.12E+03	4.41E+03
Xe-135	1.81E+03	3.97E+03
Xe-137	1.42E+03	1.39E+04
Xe-138	8.83E+03	1.43E+04
Xe-139	0.00	0.00
Ar-41	8.84E+03	1.29E+04

*Regulatory Guide 1.109, October 1977, Table B-1, times (1.0E+06 $\rho\text{Ci}/\mu\text{Ci}$).

3.2 Requirements for Compliance with 10 CFR 20 (Gaseous)

Applicability

Applies to radioactive materials in gaseous effluents released from the site to unrestricted areas.

Objective

To define the dose rate limits for radioactive materials in gaseous effluents released to unrestricted areas.

Specification

CONTROLS

3.2.1 The dose rate due to radioactive materials in gaseous effluents released from the site boundary (see Figure 7-1) shall be limited to the following:

- a. For radionoble gases: ≤ 500 mrem/yr to total body, ≤ 3000 mrem/yr to skin

AND

- b. For I-131, I-133, and tritium, and for all radioactive materials in particulate form, inhalation pathway only, with half-lives greater than 8 days: ≤ 1500 mrem/yr to any organ.

ACTIONS

3.2.2 With the dose rate(s) exceeding the above limits, without delay decrease the release rate to within the above limits. In addition, a notification must be made to the Commission in accordance with 10 CFR 50.72 and 10 CFR 50.73.

BASES

Compliance With 10 CFR Part 20 - Radioactive Materials in Gaseous Effluents

This specification is provided to ensure that the dose rate at any time at the site boundary from gaseous effluents from H. B. Robinson Unit No. 2 will be within the annual dose limits of 10 CFR Part 20 for unrestricted areas. The annual dose limits are the doses associated with the concentrations of 10 CFR Part 20 Appendix B, Table 2, Column 1. These limits provide reasonable assurance that radioactive material discharged in gaseous effluents will result in the exposure of individuals outside the site boundary, to annual average concentrations within the limits specified in Appendix B Table 2 of 10 CFR Part 20, (10 CFR Part 20.1302). For individuals who may at times be within the site boundary, the occupancy of the individual will be sufficiently low to compensate for any increase in the atmospheric diffusion factor above that for the site boundary unrestricted area. The specified release rate limits restrict, at all times, the corresponding gamma and beta dose rate equivalents above background to an individual in unrestricted areas to ≤ 500 mrem/year to the total body or to ≤ 3000 mrem/year to the skin.

3.3 Compliance with 10 CFR 20 (Gaseous)

3.3.1 Noble Gases

The gaseous effluent monitors setpoints are utilized to show compliance with 10 CFR 20 for noble gases. However, because they are based upon a conservative mix of radionuclides, the possibility exists that the setpoints could be exceeded and yet 10 CFR 20 limits may actually be met. Therefore, the following methodology has been provided in the event that if the alarm trip setpoints are exceeded, a determination may be made as to whether the actual releases have exceeded 10 CFR 20.

The dose rate in unrestricted areas resulting from noble gas effluents is limited to 500 mrem/year to the total body and 3000 mrem/year to the skin. Based upon NRC Regulatory Guide 1.109, Revision 1, and NUREG 0133, the following are used to show compliance with 10 CFR 20.

$$S_F * \sum_i \left[K_i * \left(\overline{(\chi/Q)}_v * \dot{Q}_{iv} + \overline{(\chi/Q)}_e * \dot{Q}_{ie} \right) \right] \leq 500 \text{ mrem/yr} \quad (3.3-1)$$

$$S_F * \sum_i \left[(L_i + 1.11M_i) * \left(\overline{(\chi/Q)}_v * \dot{Q}_{iv} + \overline{(\chi/Q)}_e * \dot{Q}_{ie} \right) \right] \leq 3000 \text{ mrem/yr} \quad (3.3-2)$$

where:

- $\overline{(\chi/Q)}_v$ = Annual average relative dilution for plant vent releases at the site boundary (sec/m³).
 = From Table A-1 for ground level releases used for additional conservatism.
 = From Table A-10 for mixed mode releases.
- $\overline{(\chi/Q)}_e$ = Annual average relative dilution for the Fuel Handling Basement Exhaust, the Environmental and Radiation Control Building Exhaust, and Radwaste Building Exhaust releases at the site boundary (sec/m³).
 = From Table A-1 for ground level releases.
- K_i = The total body dose factor due to gamma emissions for noble gas radionuclide 'i' (mrem/year per $\mu\text{Ci}/\text{m}^3$).
- L_i = The skin dose factor due to beta emissions for noble gas radionuclide 'i' (mrem/year per $\mu\text{Ci}/\text{m}^3$).
- M_i = The air dose factor due to gamma emissions for noble gas radionuclide 'i' (mrad/year per $\mu\text{Ci}/\text{m}^3$).
- 1.11 = The ratio of the tissue to air absorption coefficients over the energy range of the photon of interest (mrem/mrad). (reference NRC Regulatory Guide 1.109, Revision 1)

- \dot{Q}_{ie} = The release rate of noble gas radionuclide 'i' in gaseous effluents from the radwaste building exhaust vent, fuel handling basement exhaust, and the environmental and radiation control building hood exhaust ($\mu\text{Ci}/\text{sec}$).
- \dot{Q}_{iv} = The release rate of noble gas radionuclide 'i' in gaseous effluents from the plant vent ($\mu\text{Ci}/\text{sec}$).
- S_F = 1.0, shielding factor accounting for the dose reduction due to shielding provided by residential structures (dimensionless).

The determination of limiting location for implementation of 10CFR20 for noble gases is a function of the radionuclide mix, release rate, and the meteorology. For the most limiting location, the radionuclide mix will be based on sample analysis of the effluent gases.

The χ/Q value utilized in the equations for implementation of 10 CFR 20 is based upon the maximum long-term annual average ($\overline{\chi/Q}$) in the unrestricted area. Table 3.3-2 presents the distances from HBR to the nearest area for each of the 16 sectors as well as to the nearest residence, vegetable garden, cow, goat, and beef animal. Long-term annual average ($\overline{\chi/Q}$) values for the HBR release points to the special locations in Table 3.3-2 are presented in Appendix A. A description of their derivation is also provided in this appendix.

To select the limiting location, the highest annual average ($\overline{\chi/Q}$) value for the ground level releases and the mixed mode releases was used. Since mixed mode releases may not necessarily decrease with distance (i.e., the site boundary may not have the highest ($\overline{\chi/Q}$) value), long-term annual average ($\overline{\chi/Q}$) values, calculated at the midpoint of 10 standard distances as given in Appendix A were also considered. For HBR, mixed mode release χ/Q values decrease with distance for all directions except the WNW, NW, and NNW so that the maximum site boundary χ/Q is usually greater at the site boundary than at distances greater than the site boundary. In addition, the maximum site boundary χ/Q for both the ground level and mixed mode releases occurs at the SSE site boundary. Therefore, the limiting location for implementation of 10 CFR 20 for noble gases is the SSE site boundary.

Values for K_i , L_i , and M_i , which were used in the determination of the limiting location and which are to be used by HBR in Expressions 3.3-1 and 3.3-2 to show compliance with 10CFR20, are presented in Table 3.3-3. These values were taken from Table B-1 of NRC Regulatory Guide 1.109, Revision 1. The values have been multiplied by $1.0\text{E}+06$ to convert picocuries to microcuries for use in equations 3.3-1 and 3.3-2.

3.3.2 Radioiodines, Particulates, and Tritium

The dose rate in an unrestricted area resulting from the release of radioiodines, tritium, and particulates with half-lives > 8 days is limited to 1500 mrem/yr to any organ. Based upon NUREG 0133, the following is used to show compliance with 10 CFR 20:

$$\sum_i \left[P_{ii} * \left((\overline{\chi/Q})_v * \dot{Q}_{iv} + (\overline{\chi/Q})_e * \dot{Q}_{ie} \right) \right] \leq 1500 \text{ mrem/yr} \quad (3.3-3)$$

where:

P_{ii} = The dose parameter for Iodine-131, Iodine-133, tritium, and all radionuclides in particulate form with half-lives > 8 days for the inhalation pathway only in the most restrictive sector. The dose factor is based on the most restrictive group (child) and most restrictive organ at the SITE BOUNDARY (see Table 3.3-4) (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

$(\overline{\chi/Q})_v$ = Annual average relative dilution for plant vent releases at the site boundary (sec/m^3).

\dot{Q}_{iv} = Release rate of radionuclide 'i' from the plant vent ($\mu\text{Ci}/\text{sec}$).

$(\overline{\chi/Q})_e$ = Annual average relative dilution for fuel handling building basement exhaust, environmental and radiation control building exhaust, and radwaste building exhaust vent releases at the site boundary (sec/m^3).

\dot{Q}_{ie} = The release rate of radionuclide 'i' from the radwaste building exhaust vent, fuel handling basement exhaust, and the environmental and radiation control building hood exhaust ($\mu\text{Ci}/\text{sec}$).

In the calculation to show compliance with 10 CFR 20, only the inhalation is considered. A description of the methodology used in calculating the P_i values is presented in Appendix B. Compliance with 10 CFR 20 is achieved if the dose rate via inhalation pathway to a child is ≤ 1500 mrem/year.

TABLE 3.3-1
RELEASES FROM H.B. ROBINSON UNIT NO. 2*
 (Ci/yr)

<u>Isotope</u>	<u>Plant Vent</u>	<u>Condenser Vacuum</u>	<u>Total</u>
	(Q) _v	Pump Vent (Q) _c	
Kr-85m	2.0E+00	1.0E+00	3.0E+00
Kr-85	1.6E+02	0.00	1.6E+02
Kr-87	1.0E+00	0.00	1.0E+00
Kr-88	4.0E+00	2.0E+00	6.0E+00
Xe-131m	1.0E+01	0.00	1.0E+01
Xe-133m	4.0E+00	0.00	4.0E+00
Xe-133	3.7E+02	1.8E+01	3.9E+02
Xe-135	8.0E+00	2.0E+00	1.0E+01
I-131	3.6E-02	2.3E-02	5.9E-02
I-133	5.4E-02	3.4E-02	9.8E-02
Mn-54	4.7E-03	0.00	4.7E-03
Fe-59	1.6E-03	0.00	1.6E-03
Co-58	1.6E-02	0.00	1.6E-02
Co-60	7.3E-03	0.00	7.3E-03
Sr-89	3.4E-04	0.00	3.4E-04
Sr-90	6.3E-05	0.00	6.3E-05
Cs-134	4.7E-03	0.00	4.7E-03
Cs-137	7.8E-03	0.00	7.8E-03

* Calculations based upon GALE Code and do not reflect actual release data from the Evaluation Conformance to the Design Objectives of 10CFR50, Appendix I. These values are only for routine releases and not for a complete inventory of gases in an emergency. Condenser vacuum pump vent is intentionally left in for reference.

TABLE 3.3-2
DISTANCE TO SPECIAL LOCATIONS FOR THE H.B. ROBINSON PLANT (MILES)

<u>Sector</u>	<u>Site Boundary</u>	<u>Milk Cow</u>	<u>Milk Goat</u>	<u>Meat Animal</u>	<u>Nearest Resident</u>	<u>Nearest Garden</u>
NNE	1.26	-	-	1.65	1.3	1.4
NE	1.01	-	-	1.16	1.2	1.3
ENE	0.86	-	-	2.41	0.9	2.2
E	0.61	4.2	-	3.12	0.8	2.8
ESE	0.50	-	-	1.99	0.6	0.6
SE	0.29	-	-	-	0.3	0.3
SSE	0.26	-	-	-	0.3	0.3
S	0.28	-	-	2.32	0.3	0.4
SSW	0.29	-	-	2.08	0.3	0.5
SW	0.36	-	2.5*	2.27	0.4	0.5
WSW	0.36	-	-	2.69	0.4	0.6
W	0.50	-	-	3.97	0.6	0.6
WNW	0.55	-	-	4.07	0.7	0.9
NW	1.23	-	-	1.60	1.3	1.3
NNW	1.89	-	-	2.84	2.9	3.0
N	1.94	-	-	2.93	2.9	2.9

* Milk is not presently used for human consumption.

TABLE 3.3-3
DOSE FACTORS FOR NOBLE GASES AND DAUGHTERS*

<u>Radionuclide</u>	<u>Total Body Dose Factor</u>	<u>Skin Dose Factor</u>	<u>Gamma Air Dose Factor</u>	<u>Beta Air Dose Factor</u>
	$\frac{K_i}{(\text{mrem/yr per } \mu\text{Ci/m}^3)}$	$\frac{L_i}{(\text{mrem/yr per } \mu\text{Ci/m}^3)}$	$\frac{M_i}{(\text{mrad/yr per } \mu\text{Ci/m}^3)}$	$\frac{N_i}{(\text{mrad/yr per } \mu\text{Ci/m}^3)}$
Kr-83m	7.56E-02	---	1.93E+01	2.88E+02
Kr-85m	1.17E+03	1.46E+03	1.23E+03	1.97E+03
Kr-85	1.61E+01	1.34E+03	1.72E+01	1.95E+03
Kr-87	5.92E+03	9.73E+03	6.17E+03	1.03E+04
Kr-88	1.47E+04	2.37E+03	1.52E+04	2.93E+03
Kr-89	1.66E+04	1.01E+04	1.73E+04	1.06E+04
Kr-90	1.56E+04	7.29E+03	1.63E+04	7.83E+03
Xe-131m	9.15E+01	4.76E+02	1.56E+02	1.11E+03
Xe-133m	2.51E+02	9.94E+02	3.27E+02	1.48E+03
Xe-133	2.94E+02	3.06E+02	3.53E+02	1.05E+03
Xe-135m	3.12E+03	7.11E+02	3.36E+03	7.39E+02
Xe-135	1.81E+03	1.86E+03	1.92E+03	2.46E+03
Xe-137	1.42E+03	1.22E+04	1.51E+03	1.27E+04
Xe-138	8.83E+03	4.13E+03	9.21E+03	4.75E+03
Ar-41	8.84E+03	2.69E+03	9.30E+03	3.28E+03

* The listed dose factors are for radionuclides that may be detected in gaseous effluents.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.3-4
P_i VALUES FOR A CHILD FOR H.B. ROBINSON UNIT NO. 2¹

Nuclide	P _i Bone	P _i Liver	P _i T.Body	P _i Thyroid	P _i Kidney	P _i Lung	P _i GI-Tract	P _i Skin
H-3	0.00E+00	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03
F-18	6.96E+03	0.00E+00	6.85E+02	0.00E+00	0.00E+00	0.00E+00	1.25E+03	0.00E+00
NA-24	1.61E+04	1.61E+04	1.61E+04	1.61E+04	1.61E+04	1.61E+04	1.61E+04	0.00E+00
CR-51	0.00E+00	0.00E+00	1.54E+02	8.55E+01	2.43E+01	1.70E+04	1.08E+03	0.00E+00
MN-54	0.00E+00	4.29E+04	9.51E+03	0.00E+00	1.00E+04	1.58E+06	2.29E+04	0.00E+00
MN-56	0.00E+00	1.66E+00	3.12E-01	0.00E+00	1.67E+00	1.31E+04	1.23E+05	0.00E+00
FE-55	4.74E+04	2.52E+04	7.77E+03	0.00E+00	0.00E+00	1.11E+05	2.87E+03	0.00E+00
FE-59	2.07E+04	3.34E+04	1.67E+04	0.00E+00	0.00E+00	1.27E+06	7.07E+04	0.00E+00
CO-57	0.00E+00	9.03E+02	1.07E+03	0.00E+00	0.00E+00	5.07E+05	1.32E+04	0.00E+00
CO-58	0.00E+00	1.77E+03	3.16E+03	0.00E+00	0.00E+00	1.11E+06	3.44E+04	0.00E+00
CO-60	0.00E+00	1.31E+04	2.26E+04	0.00E+00	0.00E+00	7.07E+06	9.62E+04	0.00E+00
NI-65	2.99E+00	2.96E-01	1.64E-01	0.00E+00	0.00E+00	8.18E+03	8.40E+04	0.00E+00
CU-64	0.00E+00	1.99E+00	1.07E+00	0.00E+00	6.03E+00	9.58E+03	3.67E+04	0.00E+00
ZN-65	4.26E+04	1.13E+05	7.03E+04	0.00E+00	7.14E+04	9.95E+05	1.63E+04	0.00E+00
BR-82	0.00E+00	0.00E+00	2.09E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	4.74E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	5.48E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	1.98E+05	1.14E+05	0.00E+00	0.00E+00	0.00E+00	7.99E+03	0.00E+00
RB-88	0.00E+00	5.62E+02	3.66E+02	0.00E+00	0.00E+00	0.00E+00	1.72E+01	0.00E+00
RB-89	0.00E+00	3.45E+02	2.90E+02	0.00E+00	0.00E+00	0.00E+00	1.89E+00	0.00E+00
SR-89	5.99E+05	0.00E+00	1.72E+04	0.00E+00	0.00E+00	2.16E+06	1.67E+05	0.00E+00
SR-90	1.01E+08	0.00E+00	6.44E+06	0.00E+00	0.00E+00	1.48E+07	3.43E+05	0.00E+00
SR-91	1.21E+02	0.00E+00	4.59E+00	0.00E+00	0.00E+00	5.33E+04	1.74E+05	0.00E+00
SR-92	1.31E+01	0.00E+00	5.25E-01	0.00E+00	0.00E+00	2.40E+04	2.42E+05	0.00E+00
Y-91M	5.07E-01	0.00E+00	1.84E-02	0.00E+00	0.00E+00	2.81E+03	1.72E+03	0.00E+00
Y-91	9.14E+05	0.00E+00	2.44E+04	0.00E+00	0.00E+00	2.63E+06	1.84E+05	0.00E+00
Y-92	2.04E+01	0.00E+00	5.81E-01	0.00E+00	0.00E+00	2.39E+04	2.39E+05	0.00E+00
Y-93	1.86E+02	0.00E+00	5.11E+00	0.00E+00	0.00E+00	7.44E+04	3.89E+05	0.00E+00
ZR-95	1.90E+05	4.18E+04	3.70E+04	0.00E+00	5.96E+04	2.23E+06	6.11E+04	0.00E+00
ZR-97	1.88E+02	2.72E+01	1.60E+01	0.00E+00	3.88E+01	1.13E+05	3.51E+05	0.00E+00
NB-95	2.35E+04	9.18E+03	6.55E+03	0.00E+00	8.62E+03	6.14E+05	3.70E+04	0.00E+00
NB-97	4.29E-01	7.70E-02	3.50E-02	0.00E+00	8.55E-02	3.42E+03	2.78E+16	0.00E+00
MO-99	0.00E+00	1.72E+02	4.25E+01	0.00E+00	3.92E+02	1.35E+05	1.27E+05	0.00E+00
TC-99M	1.78E-03	3.48E-03	5.77E-02	0.00E+00	5.07E-02	9.51E+02	4.81E+03	0.00E+00
TC-101	8.10E-05	8.51E-05	1.08E-03	0.00E+00	1.45E-03	5.85E+02	1.63E+01	0.00E+00
RU-103	2.79E+03	0.00E+00	1.07E+03	0.00E+00	7.03E+03	6.62E+05	4.48E+04	0.00E+00
RU-105	1.53E+00	0.00E+00	5.55E-01	0.00E+00	1.34E+00	1.59E+04	9.95E+04	0.00E+00
RU-106	1.36E+05	0.00E+00	1.69E+04	0.00E+00	1.84E+05	1.43E+07	4.29E+05	0.00E+00
AG-110M	1.69E+04	1.14E+04	9.14E+03	0.00E+00	2.12E+04	5.48E+06	1.00E+05	0.00E+00
SN-113	8.99E+03	2.90E+02	9.81E+03	1.19E+02	2.03E+02	3.40E+05	7.44E+03	0.00E+00
SB-124	5.74E+04	7.40E+02	2.00E+04	1.26E+02	0.00E+00	3.24E+06	1.64E+05	0.00E+00
SB-125	9.84E+04	7.59E+02	2.07E+04	9.10E+01	0.00E+00	2.32E+06	4.03E+04	0.00E+00
TE-129M	1.92E+04	6.85E+03	3.04E+03	6.33E+03	5.03E+04	1.76E+06	1.82E+05	0.00E+00
TE-129	9.77E-02	3.50E-02	2.38E-02	7.14E-02	2.57E-01	2.93E+03	2.55E+04	0.00E+00
TE-131M	1.34E+02	5.92E+01	5.07E+01	9.77E+01	4.00E+02	2.06E+05	3.08E+05	0.00E+00
TE-132	4.81E+02	2.72E+02	2.63E+02	3.17E+02	1.77E+03	3.77E+05	1.38E+05	0.00E+00
I-131	4.81E+04	4.81E+04	2.73E+04	1.62E+07	7.88E+04	0.00E+00	2.84E+03	0.00E+00
I-132	2.12E+03	4.07E+03	1.88E+03	1.94E+05	6.25E+03	0.00E+00	3.20E+03	0.00E+00
I-133	1.66E+04	2.03E+04	7.70E+03	3.85E+06	3.38E+04	0.00E+00	5.48E+03	0.00E+00
I-134	1.17E+03	2.16E+03	9.95E+02	5.07E+04	3.30E+03	0.00E+00	9.55E+02	0.00E+00
I-135	4.92E+03	8.73E+03	4.14E+03	7.92E+05	1.34E+04	0.00E+00	4.44E+03	0.00E+00
CS-134	6.51E+05	1.01E+06	2.25E+05	0.00E+00	3.30E+05	1.21E+05	3.85E+03	0.00E+00
CS-136	6.51E+04	1.71E+05	1.16E+05	0.00E+00	9.55E+04	1.45E+04	4.18E+03	0.00E+00
CS-137	9.07E+05	8.25E+05	1.28E+05	0.00E+00	2.82E+05	1.04E+05	3.62E+03	0.00E+00
CS-138	6.33E+02	8.40E+02	5.55E+02	0.00E+00	6.22E+02	6.81E+01	2.70E+02	0.00E+00
BA-139	1.84E+00	9.84E-04	5.36E-02	0.00E+00	8.62E-04	5.77E+03	5.77E+04	0.00E+00
BA-140	7.40E+04	6.48E+01	4.33E+03	0.00E+00	2.11E+01	1.74E+06	1.02E+05	0.00E+00
BA-142	4.99E-02	3.60E-05	2.79E-03	0.00E+00	2.91E-05	1.64E+03	2.74E+00	0.00E+00
LA-140	6.44E+02	2.25E+02	7.55E+01	0.00E+00	0.00E+00	1.83E+05	2.26E+05	0.00E+00
LA-142	1.29E+00	4.11E-01	1.29E-01	0.00E+00	0.00E+00	8.70E+03	7.59E+04	0.00E+00
CE-141	3.92E+04	1.95E+04	2.90E+03	0.00E+00	8.55E+03	5.44E+05	5.66E+04	0.00E+00
CE-143	3.66E+02	1.99E+02	2.87E+01	0.00E+00	8.36E+01	1.15E+05	1.27E+05	0.00E+00

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TABLE 3.3-4 (continued)
P_i VALUES FOR A CHILD FOR H.B. ROBINSON UNIT NO. 2¹

<u>Nuclide</u>	<u>P_i Bone</u>	<u>P_i Liver</u>	<u>P_i T.Body</u>	<u>P_i Thyroid</u>	<u>P_i Kidney</u>	<u>P_i Lung</u>	<u>P_i GI-Tract</u>	<u>P_i Skin</u>
CE-144	6.77E+06	2.12E+06	3.61E+05	0.00E+00	1.17E+06	1.20E+07	3.89E+05	0.00E+00
PR-144	5.96E-02	1.85E-02	3.00E-03	0.00E+00	9.77E-03	1.57E+03	1.97E+02	0.00E+00
HF-181	8.33E+04	3.28E+02	8.47E+03	2.76E+02	2.63E+02	7.96E+05	5.29E+04	0.00E+00
W-187	1.63E+01	9.66E+00	4.33E+00	0.00E+00	0.00E+00	4.11E+04	9.10E+04	0.00E+00
NP-239	4.66E+02	3.34E+01	2.35E+01	0.00E+00	9.73E+01	5.81E+04	6.40E+04	0.00E+00

- ¹
- (a) NUREG 0133, Section 5.2.1.1 (Calculation of P_i (Inhalation)).
 - (b) Regulatory Guide 1.109, Table E-5 and Table E-9 (Breathing Rate Constant and Inhalation dose factors).
 - (c) Units are mrem/yr per μCi/m³.

3.4 Requirements for Compliance with 10 CFR 50 (Gaseous)

Applicability

Applies to radionoble gases released in gaseous effluents to unrestricted areas.

Objective

To define the air dose limits of 10 CFR 50 Appendix I for radionoble gases released in gaseous effluents to unrestricted areas.

Specification

CONTROLS

- 3.4.1 The air dose commitment due to radionoble gases released in gaseous effluents to areas at and beyond the site boundary (See Figure 7-1) shall be limited, at all times, to the following:
- a. During any calendar quarter, to ≤ 5 mrad for gamma radiation and ≤ 10 mrad for beta radiation;
 - b. During any calendar year, to ≤ 10 mrad for gamma radiation and ≤ 20 mrad for beta radiation.

ACTIONS

- 3.4.2 With the calculated air dose commitment from radioactive noble gases in gaseous effluents exceeding any of the limits, prescribed by ODCM Specification 3.4.1 above, prepare and submit a report to the Commission in accordance with the ODCM Specification 9.3.

Bases

Compliance With 10 CFR part 50 - Radionoble Gases

This specification is provided to implement the requirements of Section II.B, III.A and IV.A of Appendix I, 10 CFR Part 50. The Control implementing the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive material in gaseous effluents will be kept "as low as reasonable achievable". The Surveillance Requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculative procedures based on models and data such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. The methods established in the ODCM for calculating the doses due to the actual release rates of radioactive noble gases in gaseous effluents are consistent with the methodology provided in the Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water Cooled Reactors", Revision 1, July, 1977. The ODCM equations provided for determining the air dose commitments at the site boundary are based upon historical average atmospheric conditions.

3.5 Compliance with 10 CFR 50 (Gaseous)

3.5.1 Noble Gases

3.5.1.1 Cumulation of Doses

Based upon NUREG 0133, the air dose in the unrestricted area due to noble gases released in gaseous effluents can be determined by the following equations:

$$D_{\gamma} = 3.17 \times 10^{-8} * \sum_i \left[M_i * \left[\left(\overline{(\chi/Q)}_v * \bar{Q}_{iv} \right) + \left(\overline{(\chi/q)}_v * \bar{q}_{iv} \right) + \left(\overline{(\chi/Q)}_e * \bar{Q}_{ie} \right) \right] \right] \quad (3.5-1)$$

$$D_{\beta} = 3.17 \times 10^{-8} * \sum_i \left[N_i * \left[\left(\overline{(\chi/Q)}_v * \bar{Q}_{iv} \right) + \left(\overline{(\chi/q)}_v * \bar{q}_{iv} \right) + \left(\overline{(\chi/Q)}_e * \bar{Q}_{ie} \right) \right] \right] \quad (3.5-2)$$

where:

- D_{γ} = The air dose from gamma radiation (mrad).
- D_{β} = The air dose from beta radiation (mrad).
- M_i = The air dose factor due to gamma emissions for each identified noble gas radionuclide 'i' (mrad/year per $\mu\text{Ci}/\text{m}^3$).
- N_i = The air dose factor due to beta emissions for each identified noble gas radionuclide 'i' (mrad/year per $\mu\text{Ci}/\text{m}^3$).
- $\overline{(\chi/Q)}_v$ = The annual average dilution for areas at or beyond the unrestricted area boundary for long-term plant vent releases, > 500 hrs/year (sec/m^3).
 = From Table A-1 for ground level releases used for conservatism.
 = From Table A-10 for mixed mode releases.
- $\overline{(\chi/q)}_v$ = The dilution for areas at or beyond the unrestricted area boundary for short-term plant vent releases, < 500 hrs/year (sec/m^3).
 = From Table A-1 for ground level continuous release for conservatism.
 = From Table A-7 for ground level releases.
 = From Table A-16 for mixed mode releases.
- $\overline{(\chi/Q)}_e$ = Annual average relative dilution for fuel handling basement exhaust, the environmental and radiation control building exhaust, and radwaste building exhaust vent releases at the site boundary, > 500 hrs/year (sec/m^3).
 = From Table A-1 for ground level releases.
- \bar{Q}_{iv} = The average release of noble gas radionuclide 'i' in gaseous effluents for long-term vent releases, > 500 hrs/year (μCi).

\bar{Q}_{iv} = The average release of noble gas radionuclide 'i' in gaseous releases for short-term plant releases, < 500 hrs/year (μCi).

\bar{Q}_{ie} = The average release of noble gas radionuclide 'i' in gaseous releases for long-term fuel handling basement exhaust, the environmental and radiation control building exhaust, and radwaste building exhaust, > 500 hrs/year (μCi).

3.17×10^{-8} = The inverse of the number of seconds in a year (sec/year)⁻¹.

At HBR the limiting location is 0.26 miles SSE. Based upon the tables presented in Appendix A, substitution of the short-term χ/Q value into Equation 3.5-1 yields lower dose value than the long-term χ/Q values used. In order to be conservative, for purposes of this document only, long-term annual average ($\overline{\chi/Q}$) values will be used. Should the calculated doses exceed 10 CFR 50 limits, recalculation of doses may be performed using short-term X/Q values for batch releases.

To select the limiting location, the highest annual average ($\overline{\chi/Q}$) value for ground level and mixed mode releases and the highest short-term χ/Q value for ground level and mixed mode releases were considered. Since mixed mode releases may increase and then decrease with distance (i.e., the site boundary may not have the highest χ/Q value), long-term χ/Q values were calculated at the midpoint of 10 standard distances as given in Appendix A. The calculated values decreased with the distance for all but the WNW, NW, and NNW sectors. The values for these sectors were not found to be limiting such that the maximum site boundary χ/Q for both long-term and short-term ground level and mixed mode releases occurred at the SSE site boundary. The limiting location for implementation of 10 CFR 20 for noble gases is the SSE site boundary.

Values for M_i and N_i which are utilized in the calculation of the gamma air and beta air doses in Equation 3.5-1 to show compliance with 10 CFR 50 were presented in Table 3.3-3. These values originate from NUREG 0472, Revision 0, and were taken from Table B-1 of the NRC Regulatory Guide 1.109, Revision 1. The values have been multiplied by 1.0E6 to convert from picocuries to microcuries. The following relationship should hold for HBR to show compliance with HBR's ODCM Specification 3.4.1.

For the calendar quarter:

$$D_{\gamma} \leq 5 \text{ mrad} \quad (3.5-3)$$

$$D_{\beta} \leq 10 \text{ mrad} \quad (3.5-4)$$

For the calendar year:

$$D_{\gamma} \leq 10 \text{ mrad} \quad (3.5-5)$$

$$D_{\beta} \leq 20 \text{ mrad} \quad (3.5-6)$$

The quarterly limits given above represent one-half of the annual design objectives of Section II.B.1 of Appendix I of 10 CFR 50. If any of the limits of Equations 3.5-3 through 3.5-6 are exceeded, a special report pursuant to ODCM Specification 9.3 must be filed with the NRC. This report complies with Section IV.A of Appendix I of 10 CFR 50.

3.5.1.2 Projection of Doses

Doses resulting from the release of gaseous effluents will be projected once per 31 days. These projections will include a safety margin based upon expected operational conditions which will take into consideration both planned and unplanned releases. Projected dose will be calculated as follows:

$$PD = \frac{92 * (DA + DB)}{TE} + M \quad (3.5-7)$$

where:

- PD = projected doses (mrad). |
- 92 = time in quarter (days). |
- DA = dose accumulated during current quarter (mrad). |
- DB = projected dose from this release (mrad). |
- TE = time elapsed in quarter (days). |
- M = safety margin (mrad). |

If the projected doses exceed 0.6 mrad for gamma radiation or 1.3 mrad for beta radiation when averaged over a calendar quarter, the ventilation exhaust treatment system will be operated to reduce releases of radioactive materials.

3.5.2 Compliance with 10 CFR Part 50 - Radioiodines, Radioactive Materials in Particulate Form, and Radionuclides other than Radionoble Gases

Applicability

Applies to radioiodines, radioactive materials in particulate form, and radionuclides other than radionoble gases released from the site to unrestricted areas.

Objective

To define the dose limits of 10 CFR 50 for radioiodines, radioactive materials in particulate form, and radionuclides other than radionoble gases released from the site to unrestricted areas.

Specification

CONTROLS

3.5.2.1 The dose to a member of the public from I-131, I-133, tritium and radioactive materials in particulate form, with half-lives greater than 8 days in gaseous effluents released to unrestricted areas (See Figure 7-1), shall be limited, at all times, to the following:

- a. During any calendar quarter, ≤ 7.5 mrem to an organ

AND

- b. During any calendar year, ≤ 15 mrem to any organ.

ACTIONS

3.5.2.2 With the calculated dose commitment from the release of I-131, I-133, tritium and radioactive materials in particulate form, with half-lives greater than 8 days, in gaseous effluents exceeding any of the limits prescribed by ODCM Specification 3.5.2.1 above, prepare and submit a report to the Commission in accordance with ODCM Specification 9.3.

BASES

Compliance With 10 CFR Part 50 - Radioiodines, Radioactive Materials in Particulate Form, and Radionuclides Other Than Radionoble Gases

This specification is provided to implement the requirements of Section II.C, III.A, and IV.A of Appendix I, 10 CFR Part 50. The Control implements the guides set forth in Section II.C of Appendix I. The action statement provides the required operating flexibility and at the same time implements the guides set forth in Section IV.A of Appendix I to assure that the releases of radioactive materials as gaseous effluents will be kept "as low as reasonably achievable." The surveillance requirements implement the requirements in Section III.A of Appendix I that conformance with the guides of Appendix I be shown by calculative procedures based on models and data, such that the actual exposure of an individual through appropriate pathways is unlikely to be substantially underestimated. The methods established in the ODCM for calculating the doses due to the actual release rates of the subject materials are consistent with the methodology provided in Regulatory Guide 1.109, "Calculation of Annual Doses to Man from Routine Releases of Reactor Effluents for the Purpose of Evaluating Compliance with 10 CFR Part 50, Appendix I", Revision 1, October 1977 and Regulatory Guide 1.111, "Methods for Estimating Atmospheric Transport and Dispersion of Gaseous Effluents in Routine Releases from Light-Water-Cooled Reactors", Revision 1, July 1977. The ODCM equations provided for determining the commitment are based upon historical average atmospheric conditions.

3.5.3 Radioiodine, Particulates, and Tritium

3.5.3.1 Cumulation of Doses

Section II.C of Appendix I of 10 CFR 50 limits the release of radioiodines and radioactive material in particulate form from each reactor such that estimated annual dose or dose commitment to an individual in an unrestricted area from all pathways of exposure is not in excess of 15 mrem to any organ. Based upon NUREG 0133, the dose to an organ of an individual from radioiodines, tritium, and particulates with half-lives ≥ 8 days in gaseous effluents released to unrestricted areas can be determined by the following equation:

$$\begin{aligned}
 D_{\tau} = & 3.17 \times 10^{-8} * \sum_i R_{iI} * \left[\left(\overline{(\chi/Q)}_v * \bar{Q}_{iv} \right) + \left(\overline{(\chi/q)}_v * \bar{q}_{iv} \right) + \left(\overline{(\chi/Q)}_e * \bar{Q}_{ie} \right) \right] \\
 & + (R_{iB} + R_{iM} + R_{iV} + R_{iG}) * \left[\left(\overline{(D/Q)}_v * \bar{Q}_{iv} \right) + \left(\overline{(D/q)}_v * \bar{q}_{iv} \right) + \left(\overline{(D/Q)}_e * \bar{Q}_{ie} \right) \right] \\
 & + (R_{TM} + R_{TB} + R_{TI} + R_{TV}) * \left[\left(\overline{(\chi/Q)}_v * \bar{Q}_{Tv} \right) + \left(\overline{(\chi/q)}_v * \bar{q}_{Tv} \right) + \left(\overline{(\chi/Q)}_e * \bar{Q}_{TE} \right) \right]
 \end{aligned}
 \tag{3.5-8}$$

where:

- D_{τ} = Dose to any organ τ from I-131, I-133, particulates with ≥ 8 day half-lives, and Tritium (mrem).
- 3.17×10^{-8} = The inverse of the number of seconds in a year (sec/year)⁻¹.
- $\overline{(\chi/Q)}_v$ = Annual average relative concentration for plant vent releases, > 500 hrs/yr (sec/m³).
 = From Table A-1 for ground level releases for conservatism.
 = From Table A-10 for mixed mode releases.
- $\overline{(\chi/q)}_v$ = Annual average relative concentration for plant vent releases, ≤ 500 hrs/yr (sec/m³).
 = From Table A-7 for ground release.
 = From Table A-16 for mixed mode releases.
- $\overline{(\chi/Q)}_e$ = Annual average dilution for radwaste building vent, fuel handling basement exhaust, and the environmental and radiation control building hood exhaust releases, > 500 hrs/yr (sec/m³).
 = From Table A-1 for ground level releases.
- $\overline{(D/Q)}_v$ = Annual average deposition factor for plant vent releases, > 500 hrs/yr (m⁻²).
 = From Table A-3 for ground level releases for conservatism.
 = From Table A-12 for mixed mode releases.

- $(\overline{D/q})_v$ = Relative deposition factor for short-term plant vent releases, < 500 hrs/yr (m^{-2}).
 = From Table A-3 for ground level continuous releases for conservatism.
 = From Table A-9 for ground level releases.
 = From Table A-18 for mixed mode releases.
- $(\overline{D/Q})_e$ = Annual average relative deposition factor for radwaste building vent, fuel handling basement exhaust, and the environmental and radiation control building hood exhaust releases, > 500 hrs/yr (m^{-2}).
 = From Table A-3 for ground level releases.
- \overline{Q}_{iv} = Release of radionuclide 'i' in gaseous effluents for long-term plant vent releases > 500 hrs/yr (μCi).
- \overline{q}_{iv} = Release of radionuclide 'i' in gaseous effluents for short-term plant vent releases < 500 hrs/yr (μCi).
- \overline{Q}_{ie} = Release of radionuclide 'i' in gaseous effluents for long-term radwaste building vent, fuel handling basement exhaust, and the environmental and radiation control building hood exhaust releases, > 500 hrs/yr (μCi).
- \overline{Q}_{Tv} = Release of tritium in gaseous effluents for long-term plant vent releases > 500 hrs/yr (μCi).
- \overline{q}_{Tv} = Release of tritium in gaseous effluents for short-term plant vent releases < 500 hrs/yr (μCi).
- \overline{Q}_{TE} = Release of tritium in gaseous effluents for long-term radwaste building vent, fuel handling basement exhaust, and the environmental and radiation control building hood exhaust > 500 hrs/yr (μCi).
- R_{iI} = Dose factor for an organ for radionuclide 'i' for the inhalation pathway ($mrem/yr$ per $\mu Ci/m^3$).
- R_{iB} = Dose factor for an organ for radionuclide 'i' for the meat exposure pathway (m^2 - $mrem/yr$ per $\mu Ci/sec$).
- R_{iM} = Dose factor for an organ for radionuclide 'i' for the milk exposure pathway (m^2 - $mrem/yr$ per $\mu Ci/sec$).
- R_{iV} = Dose factor for an organ for radionuclide 'i' for the vegetable pathway (m^2 - $mrem/yr$ per $\mu Ci/sec$).
- R_{iG} = Dose factor for an organ for radionuclide 'i' for the ground plane exposure pathway (m^2 - $mrem/yr$ per $\mu Ci/sec$).

R_{TM}	=	Dose factor for an organ for tritium for the milk pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).
R_{TB}	=	Dose factor for an organ for tritium for the meat pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).
R_{TI}	=	Dose factor for an organ for tritium for the inhalation pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).
R_{TV}	=	Dose factor for an organ for tritium for the vegetable pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

To show compliance with 10 CFR 50, Equation 3.5-8 is evaluated at the limiting pathway location. At HBR this location is the vegetable garden 0.3 miles in the SSE sector. The critical receptor is a child. Substitution of the appropriate χ/Q and D/Q values from tables in Appendix A into Equation 3.5-8 would yield an equation with the short-term χ/Q and D/Q values being less than the long-term values. Therefore, for this document, only long-term annual χ/Q and D/Q values (i.e., more conservative values) are used.

The determination of a limiting location for implementation of 10 CFR 50 for radioiodines and particulates is a function of:

1. Radionuclide mix and isotopic release
2. Meteorology
3. Exposure pathway
4. Receptor's age

In the determination of the limiting location, the radionuclide mix of radioiodines and particulates was based upon the source terms calculated using the GALE Code. This mix is presented in Table 3.3-1 as a function of release point. The only source of short-term releases from the plant vent is containment purges. In the determination of the limiting location, all of the exposure pathways, as presented in Table 3.3-2, were evaluated. These include cow milk, goat milk, beef and vegetable ingestion, and inhalation and ground plane exposure.

An infant was assumed to be present at all milk pathway locations. A child was assumed to be present at all vegetable garden and beef animal locations. The ground plane exposure pathway was not considered a viable pathway for an infant. Naturally, the inhalation pathway was present everywhere an individual was present. HBR ODCM Specification 4.4.1 requires that a land-use census survey be conducted on an annual basis. The age groupings at the various receptor locations are also determined during this survey; a new limiting location and receptor age group can result.

For the determination of the limiting location, the highest D/Q values for the vegetable garden, cow milk, and goat milk pathways were selected. The thyroid dose was calculated at each of these locations using the radionuclide mix and releases of Table 3.3-1. Based upon these calculations, it was determined that the limiting receptor pathway is the vegetable/child pathway.

In the determination of the limiting location, annual average γ/Q and D/Q values are used. A description of the derivation of the various γ/Q and D/Q values is presented in Appendix A. Short-term and long-term γ/Q and D/Q values for ground level releases and for long-term mixed mode releases are provided in tables in Appendix A. They may be utilized if an additional special location arises different from those presented in the special locations of Table 3.3-2.

Tables 3.5-1 through 3.5-19 present R_i values for the total body, GI-tract, bone, liver, kidney, thyroid, skin, and lung organs for the ground plane, inhalation, cow milk, goat milk, vegetable, and meat ingestion pathways for the infant, child, teen, and adult age groups as appropriate to the pathways. These values were calculated using the methodology described in NUREG 0133 using a grazing period of eight months. A description of the methodology is presented in Appendix B.

The following relationship should hold for HBR to show compliance with HBR ODCM Specification 3.5.2.1.

For the calendar quarter:

$$D_{\tau} \leq 7.5 \text{ mrem} \quad (3.5-9)$$

For the calendar year:

$$D_{\tau} \leq 15 \text{ mrem} \quad (3.5-10)$$

The quarterly limit given above represent one-half the annual design objectives of Section II.C of Appendix I of 10 CFR 50. If any of the limits of Equations 3.5-9 or 3.5-10 are exceeded, a special report pursuant ODCM Specification 9.3 must be filed with the NRC. This report complies with Section IV.A of Appendix I of 10 CFR 50.

3.5.3.2 Projection of Doses

Doses resulting from release of radioiodines and particulate effluents will be projected once per 31 days. These projections will include a safety margin based upon expected operational conditions which will take into consideration both planned and unplanned releases. Projected dose will be calculated as follows:

$$PD = \frac{92 * (DA + DB)}{TE} + M \quad (3.5-11)$$

where:

- PD = Projected doses (mrem).
- 92 = time in quarter (days).
- DA = Dose accumulated during current quarter (mrem).
- DB = Projected dose from this release (mrem).
- TE = Time elapsed in quarter (days).
- M = Safety margin (mrem).

If the projected doses exceed 1.0 mrem to any organ when averaged over a calendar quarter, the ventilation exhaust treatment system will be operated to reduce releases of radioactive materials.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-1
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹
(Reference Regulatory Guide 1.109)

PATHWAY = Ground

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
F-18	3.96E+05	3.96E+05	3.96E+05	3.96E+05	3.96E+05	3.96E+05	3.96E+05	4.66E+05
NA-24	1.19E+07	1.19E+07	1.19E+07	1.19E+07	1.19E+07	1.19E+07	1.19E+07	1.39E+07
CR-51	4.66E+06	4.66E+06	4.66E+06	4.66E+06	4.66E+06	4.66E+06	4.66E+06	5.51E+06
MN-54	1.39E+09	1.39E+09	1.39E+09	1.39E+09	1.39E+09	1.39E+09	1.39E+09	1.62E+09
MN-56	9.03E+05	9.03E+05	9.03E+05	9.03E+05	9.03E+05	9.03E+05	9.03E+05	1.07E+06
FE-59	2.73E+08	2.73E+08	2.73E+08	2.73E+08	2.73E+08	2.73E+08	2.73E+08	3.21E+08
CO-57	1.88E+08	1.88E+08	1.88E+08	1.88E+08	1.88E+08	1.88E+08	1.88E+08	2.07E+08
CO-58	3.79E+08	3.79E+08	3.79E+08	3.79E+08	3.79E+08	3.79E+08	3.79E+08	4.44E+08
CO-60	2.15E+10	2.15E+10	2.15E+10	2.15E+10	2.15E+10	2.15E+10	2.15E+10	2.53E+10
NI-65	2.97E+05	2.97E+05	2.97E+05	2.97E+05	2.97E+05	2.97E+05	2.97E+05	3.45E+05
CU-64	6.07E+05	6.07E+05	6.07E+05	6.07E+05	6.07E+05	6.07E+05	6.07E+05	6.88E+05
ZN-65	7.47E+08	7.47E+08	7.47E+08	7.47E+08	7.47E+08	7.47E+08	7.47E+08	8.59E+08
BR-82	2.14E+07	2.14E+07	2.14E+07	2.14E+07	2.14E+07	2.14E+07	2.14E+07	2.47E+07
BR-83	4.87E+03	4.87E+03	4.87E+03	4.87E+03	4.87E+03	4.87E+03	4.87E+03	7.08E+03
BR-84	2.03E+05	2.03E+05	2.03E+05	2.03E+05	2.03E+05	2.03E+05	2.03E+05	2.36E+05
RB-86	8.99E+06	8.99E+06	8.99E+06	8.99E+06	8.99E+06	8.99E+06	8.99E+06	1.03E+07
RB-88	3.31E+04	3.31E+04	3.31E+04	3.31E+04	3.31E+04	3.31E+04	3.31E+04	3.78E+04
RB-89	1.23E+05	1.23E+05	1.23E+05	1.23E+05	1.23E+05	1.23E+05	1.23E+05	1.48E+05
SR-89	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.16E+04	2.51E+04
SR-91	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.15E+06	2.51E+06
SR-92	7.77E+05	7.77E+05	7.77E+05	7.77E+05	7.77E+05	7.77E+05	7.77E+05	8.63E+05
Y-91M	1.00E+05	1.00E+05	1.00E+05	1.00E+05	1.00E+05	1.00E+05	1.00E+05	1.16E+05
Y-91	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.21E+06
Y-92	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05	1.80E+05	2.14E+05
Y-93	1.83E+05	1.83E+05	1.83E+05	1.83E+05	1.83E+05	1.83E+05	1.83E+05	2.51E+05
ZR-95	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.45E+08	2.84E+08
ZR-97	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	2.96E+06	3.44E+06
NB-95	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.37E+08	1.61E+08
NB-97	1.76E+05	1.76E+05	1.76E+05	1.76E+05	1.76E+05	1.76E+05	1.76E+05	2.07E+05
MO-99	3.99E+06	3.99E+06	3.99E+06	3.99E+06	3.99E+06	3.99E+06	3.99E+06	4.63E+06
TC-99M	1.84E+05	1.84E+05	1.84E+05	1.84E+05	1.84E+05	1.84E+05	1.84E+05	2.11E+05
TC-101	2.04E+04	2.04E+04	2.04E+04	2.04E+04	2.04E+04	2.04E+04	2.04E+04	2.26E+04
RU-103	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.08E+08	1.26E+08
RU-105	6.36E+05	6.36E+05	6.36E+05	6.36E+05	6.36E+05	6.36E+05	6.36E+05	7.21E+05
RU-106	4.22E+08	4.22E+08	4.22E+08	4.22E+08	4.22E+08	4.22E+08	4.22E+08	5.07E+08
AG-110M	3.44E+09	3.44E+09	3.44E+09	3.44E+09	3.44E+09	3.44E+09	3.44E+09	4.01E+09
SN-113	1.42E+07	1.42E+07	1.42E+07	1.42E+07	1.42E+07	1.42E+07	1.42E+07	4.08E+07
SB-124	5.98E+08	5.98E+08	5.98E+08	5.98E+08	5.98E+08	5.98E+08	5.98E+08	6.90E+08
SB-125	2.34E+09	2.34E+09	2.34E+09	2.34E+09	2.34E+09	2.34E+09	2.34E+09	2.64E+09
TE-129M	1.98E+07	1.98E+07	1.98E+07	1.98E+07	1.98E+07	1.98E+07	1.98E+07	2.31E+07
TE-129	2.62E+04	2.62E+04	2.62E+04	2.62E+04	2.62E+04	2.62E+04	2.62E+04	3.10E+04
TE-131M	8.03E+06	8.03E+06	8.03E+06	8.03E+06	8.03E+06	8.03E+06	8.03E+06	9.46E+06
TE-132	4.23E+06	4.23E+06	4.23E+06	4.23E+06	4.23E+06	4.23E+06	4.23E+06	4.98E+06
I-131	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	1.72E+07	2.09E+07
I-132	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.25E+06	1.46E+06
I-133	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.98E+06
I-134	4.47E+05	4.47E+05	4.47E+05	4.47E+05	4.47E+05	4.47E+05	4.47E+05	5.30E+05
I-135	2.53E+06	2.53E+06	2.53E+06	2.53E+06	2.53E+06	2.53E+06	2.53E+06	2.95E+06
CS-134	6.86E+09	6.86E+09	6.86E+09	6.86E+09	6.86E+09	6.86E+09	6.86E+09	8.00E+09
CS-136	1.51E+08	1.51E+08	1.51E+08	1.51E+08	1.51E+08	1.51E+08	1.51E+08	1.71E+08
CS-137	1.03E+10	1.03E+10	1.03E+10	1.03E+10	1.03E+10	1.03E+10	1.03E+10	1.20E+10
CS-138	3.59E+05	3.59E+05	3.59E+05	3.59E+05	3.59E+05	3.59E+05	3.59E+05	4.10E+05
BA-139	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.06E+05	1.19E+05
BA-140	2.05E+07	2.05E+07	2.05E+07	2.05E+07	2.05E+07	2.05E+07	2.05E+07	2.35E+07
BA-142	4.49E+04	4.49E+04	4.49E+04	4.49E+04	4.49E+04	4.49E+04	4.49E+04	5.11E+04

¹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-1 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹

PATHWAY = Ground

<u>Nuclide</u>	<u>Bone</u>	<u>Liver</u>	<u>T.Body</u>	<u>Thyroid</u>	<u>Kidney</u>	<u>Lung</u>	<u>GI-Tract</u>	<u>Skin</u>
LA-140	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	1.92E+07	2.18E+07
LA-142	7.60E+05	7.60E+05	7.60E+05	7.60E+05	7.60E+05	7.60E+05	7.60E+05	9.11E+05
CE-141	1.37E+07	1.37E+07	1.37E+07	1.37E+07	1.37E+07	1.37E+07	1.37E+07	1.54E+07
CE-143	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.31E+06	2.63E+06
CE-144	6.95E+07	6.95E+07	6.95E+07	6.95E+07	6.95E+07	6.95E+07	6.95E+07	8.04E+07
PR-144	1.83E+03	1.83E+03	1.83E+03	1.83E+03	1.83E+03	1.83E+03	1.83E+03	2.11E+03
HF-181	1.96E+08	1.96E+08	1.96E+08	1.96E+08	1.96E+08	1.96E+08	1.96E+08	2.80E+08
W-187	2.35E+06	2.35E+06	2.35E+06	2.35E+06	2.35E+06	2.35E+06	2.35E+06	2.73E+06
NP-239	1.71E+06	1.71E+06	1.71E+06	1.71E+06	1.71E+06	1.71E+06	1.71E+06	1.98E+06

¹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem/yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-2
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT²
(Reference Regulatory Guide 1.109)

PATHWAY = Vegetation
AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	2.26E+03	2.26E+03	2.26E+03	2.26E+03	2.26E+03	2.26E+03	2.26E+03
F-18	4.22E+00	0.00E+00	4.68E-01	0.00E+00	0.00E+00	0.00E+00	1.25E-01	0.00E+00
NA-24	2.68E+05	2.68E+05	2.68E+05	2.68E+05	2.68E+05	2.68E+05	2.68E+05	0.00E+00
CR-51	0.00E+00	0.00E+00	4.59E+04	2.74E+04	1.01E+04	6.09E+04	1.15E+07	0.00E+00
MN-54	0.00E+00	3.08E+08	5.87E+07	0.00E+00	9.15E+07	0.00E+00	9.42E+08	0.00E+00
MN-56	0.00E+00	1.54E+01	2.74E+00	0.00E+00	1.96E+01	0.00E+00	4.93E+02	0.00E+00
FE-55	2.00E+08	1.38E+08	3.22E+07	0.00E+00	0.00E+00	7.70E+07	7.91E+07	0.00E+00
FE-59	1.24E+08	2.90E+08	1.11E+08	0.00E+00	0.00E+00	8.11E+07	9.68E+08	0.00E+00
CO-57	0.00E+00	1.01E+07	1.88E+07	0.00E+00	0.00E+00	0.00E+00	2.86E+08	0.00E+00
CO-58	0.00E+00	2.99E+07	6.70E+07	0.00E+00	0.00E+00	0.00E+00	6.06E+08	0.00E+00
CO-60	0.00E+00	1.67E+08	3.67E+08	0.00E+00	0.00E+00	0.00E+00	3.13E+09	0.00E+00
NI-65	5.97E+01	7.75E+00	3.54E+00	0.00E+00	0.00E+00	0.00E+00	1.97E+02	0.00E+00
CU-64	0.00E+00	9.19E+03	4.31E+03	0.00E+00	2.32E+04	0.00E+00	7.83E+05	0.00E+00
ZN-65	4.01E+08	1.28E+09	5.77E+08	0.00E+00	8.54E+08	0.00E+00	8.04E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	1.55E+06	0.00E+00	0.00E+00	0.00E+00	1.78E+06	0.00E+00
BR-83	0.00E+00	0.00E+00	3.10E+00	0.00E+00	0.00E+00	0.00E+00	4.47E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	2.21E-11	0.00E+00	0.00E+00	0.00E+00	1.73E-16	0.00E+00
RB-86	0.00E+00	2.21E+08	1.03E+08	0.00E+00	0.00E+00	0.00E+00	4.35E+07	0.00E+00
RB-88	0.00E+00	2.66E-22	1.41E-22	0.00E+00	0.00E+00	0.00E+00	3.67E-33	0.00E+00
RB-89	0.00E+00	2.90E-26	2.04E-26	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SR-89	9.77E+09	0.00E+00	2.80E+08	0.00E+00	0.00E+00	0.00E+00	1.57E+09	0.00E+00
SR-90	6.71E+11	0.00E+00	1.65E+11	0.00E+00	0.00E+00	0.00E+00	1.94E+10	0.00E+00
SR-91	3.02E+05	0.00E+00	1.22E+04	0.00E+00	0.00E+00	0.00E+00	1.44E+06	0.00E+00
SR-92	4.15E+02	0.00E+00	1.79E+01	0.00E+00	0.00E+00	0.00E+00	8.22E+03	0.00E+00
Y-91M	4.76E-09	0.00E+00	1.84E-10	0.00E+00	0.00E+00	0.00E+00	1.40E-08	0.00E+00
Y-91	4.98E+06	0.00E+00	1.33E+05	0.00E+00	0.00E+00	0.00E+00	2.74E+09	0.00E+00
Y-92	8.96E-01	0.00E+00	2.62E-02	0.00E+00	0.00E+00	0.00E+00	1.57E+04	0.00E+00
Y-93	1.68E+02	0.00E+00	4.65E+00	0.00E+00	0.00E+00	0.00E+00	5.34E+06	0.00E+00
ZR-95	1.14E+06	3.66E+05	2.48E+05	0.00E+00	5.75E+05	0.00E+00	1.16E+09	0.00E+00
ZR-97	3.36E+02	6.78E+01	3.10E+01	0.00E+00	1.02E+02	0.00E+00	2.10E+07	0.00E+00
NB-95	1.40E+05	7.80E+04	4.19E+04	0.00E+00	7.71E+04	0.00E+00	4.73E+08	0.00E+00
NB-97	2.02E-06	5.11E-07	1.87E-07	0.00E+00	5.96E-07	0.00E+00	1.89E-03	0.00E+00
MO-99	0.00E+00	6.18E+06	1.18E+06	0.00E+00	1.40E+07	0.00E+00	1.43E+07	0.00E+00
TC-99M	3.10E+00	8.75E+00	1.11E+02	0.00E+00	1.33E+02	4.29E+00	5.18E+03	0.00E+00
TC-101	6.00E-31	8.64E-31	8.47E-30	0.00E+00	1.56E-29	4.41E-31	0.00E+00	0.00E+00
RU-103	4.72E+06	0.00E+00	2.03E+06	0.00E+00	1.80E+07	0.00E+00	5.51E+08	0.00E+00
RU-105	5.30E+01	0.00E+00	2.09E+01	0.00E+00	6.85E+02	0.00E+00	3.24E+04	0.00E+00
RU-106	1.95E+08	0.00E+00	2.47E+07	0.00E+00	3.76E+08	0.00E+00	1.26E+10	0.00E+00
AG-110M	1.13E+07	1.05E+07	6.22E+06	0.00E+00	2.06E+07	0.00E+00	4.27E+09	0.00E+00
SN-113	1.43E+07	5.50E+05	1.35E+07	1.94E+05	4.04E+05	0.00E+00	2.49E+08	0.00E+00
SB-124	1.01E+08	1.91E+06	4.01E+07	2.45E+05	0.00E+00	7.88E+07	2.87E+09	0.00E+00
SB-125	1.34E+08	1.50E+06	3.20E+07	1.37E+05	0.00E+00	1.04E+08	1.48E+09	0.00E+00
TE-129M	2.94E+08	1.10E+08	4.65E+07	1.01E+08	1.23E+09	0.00E+00	1.48E+09	0.00E+00
TE-129	7.52E-04	2.83E-04	1.83E-04	5.77E-04	3.16E-03	0.00E+00	5.68E-04	0.00E+00
TE-131M	9.63E+05	4.71E+05	3.93E+05	7.46E+05	4.77E+06	0.00E+00	4.68E+07	0.00E+00
TE-132	4.58E+06	2.96E+06	2.78E+06	3.27E+06	2.85E+07	0.00E+00	1.40E+08	0.00E+00
I-131	8.07E+07	1.15E+08	6.61E+07	3.78E+10	1.98E+08	0.00E+00	3.04E+07	0.00E+00
I-132	5.57E+01	1.49E+02	5.21E+01	5.21E+03	2.37E+02	0.00E+00	2.80E+01	0.00E+00
I-133	2.08E+06	3.61E+06	1.10E+06	5.31E+08	6.31E+06	0.00E+00	3.25E+06	0.00E+00
I-134	8.84E-05	2.40E-04	8.59E-05	4.16E-03	3.82E-04	0.00E+00	2.09E-07	0.00E+00
I-135	3.85E+04	1.01E+05	3.72E+04	6.65E+06	1.62E+05	0.00E+00	1.14E+05	0.00E+00

² R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-2 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT²

PATHWAY = Vegetation
 AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	4.55E+09	1.08E+10	8.84E+09	0.00E+00	3.50E+09	1.16E+09	1.89E+08	0.00E+00
CS-136	4.26E+07	1.68E+08	1.21E+08	0.00E+00	9.36E+07	1.28E+07	1.91E+07	0.00E+00
CS-137	6.64E+09	9.08E+09	5.95E+09	0.00E+00	3.08E+09	1.03E+09	1.76E+08	0.00E+00
CS-138	3.39E-11	6.70E-11	3.32E-11	0.00E+00	4.92E-11	4.86E-12	2.86E-16	0.00E+00
BA-139	2.70E-02	1.93E-05	7.91E-04	0.00E+00	1.80E-05	1.09E-05	4.79E-02	0.00E+00
BA-140	1.28E+08	1.61E+05	8.40E+06	0.00E+00	5.47E+04	9.22E+04	2.64E+08	0.00E+00
LA-140	1.97E+03	9.95E+02	2.63E+02	0.00E+00	0.00E+00	0.00E+00	7.30E+07	0.00E+00
LA-142	1.92E-04	8.75E-05	2.18E-05	0.00E+00	0.00E+00	0.00E+00	6.39E-01	0.00E+00
CE-141	1.94E+05	1.31E+05	1.49E+04	0.00E+00	6.10E+04	0.00E+00	5.02E+08	0.00E+00
CE-143	9.96E+02	7.36E+05	8.15E+01	0.00E+00	3.24E+02	0.00E+00	2.75E+07	0.00E+00
CE-144	3.15E+07	1.32E+07	1.69E+06	0.00E+00	7.81E+06	0.00E+00	1.07E+10	0.00E+00
PR-144	2.36E-26	9.81E-27	1.20E-27	0.00E+00	5.53E-27	0.00E+00	3.40E-33	0.00E+00
HF-181	9.50E+06	5.36E+04	1.08E+06	3.40E+04	4.47E+04	0.00E+00	7.05E+08	0.00E+00
W-187	3.79E+04	3.17E+04	1.11E+04	0.00E+00	0.00E+00	0.00E+00	1.04E+07	0.00E+00
NP-239	1.43E+03	1.40E+02	7.73E+01	0.00E+00	4.37E+02	0.00E+00	2.88E+07	0.00E+00

² R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-3
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT³
 (Reference Regulatory Guide 1.109)

PATHWAY = Vegetation
 AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	2.59E+03	2.59E+03	2.59E+03	2.59E+03	2.59E+03	2.59E+03	2.59E+03
F-18	3.83E+00	0.00E+00	4.20E-01	0.00E+00	0.00E+00	0.00E+00	3.45E-01	0.00E+00
NA-24	2.38E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05	2.38E+05	0.00E+00
CR-51	0.00E+00	0.00E+00	6.09E+04	3.38E+04	1.34E+04	8.70E+04	1.02E+07	0.00E+00
MN-54	0.00E+00	4.47E+08	8.86E+07	0.00E+00	1.33E+08	0.00E+00	9.16E+08	0.00E+00
MN-56	0.00E+00	1.39E+01	2.48E+00	0.00E+00	1.76E+01	0.00E+00	9.17E+02	0.00E+00
FE-55	3.10E+08	2.20E+08	5.13E+07	0.00E+00	0.00E+00	1.40E+08	9.53E+07	0.00E+00
FE-59	1.76E+08	4.10E+08	1.58E+08	0.00E+00	0.00E+00	1.29E+08	9.70E+08	0.00E+00
CO-57	0.00E+00	1.72E+07	2.89E+07	0.00E+00	0.00E+00	0.00E+00	3.21E+08	0.00E+00
CO-58	0.00E+00	4.24E+07	9.78E+07	0.00E+00	0.00E+00	0.00E+00	5.85E+08	0.00E+00
CO-60	0.00E+00	2.48E+08	5.58E+08	0.00E+00	0.00E+00	0.00E+00	3.23E+09	0.00E+00
NI-65	5.56E+01	7.10E+00	3.23E+00	0.00E+00	0.00E+00	0.00E+00	3.85E+02	0.00E+00
CU-64	0.00E+00	8.33E+03	3.92E+03	0.00E+00	2.11E+04	0.00E+00	6.46E+05	0.00E+00
ZN-65	5.36E+08	1.86E+09	8.68E+08	0.00E+00	1.19E+09	0.00E+00	7.88E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	1.37E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	2.91E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	2.01E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	2.75E+08	1.29E+08	0.00E+00	0.00E+00	0.00E+00	4.07E+07	0.00E+00
RB-88	0.00E+00	2.46E-22	1.31E-22	0.00E+00	0.00E+00	0.00E+00	2.11E-29	0.00E+00
RB-89	0.00E+00	2.61E-26	1.84E-26	0.00E+00	0.00E+00	0.00E+00	4.00E-35	0.00E+00
SR-89	1.48E+10	0.00E+00	4.25E+08	0.00E+00	0.00E+00	0.00E+00	1.77E+09	0.00E+00
SR-90	8.33E+11	0.00E+00	2.06E+11	0.00E+00	0.00E+00	0.00E+00	2.34E+10	0.00E+00
SR-91	2.83E+05	0.00E+00	1.12E+04	0.00E+00	0.00E+00	0.00E+00	1.28E+06	0.00E+00
SR-92	3.86E+02	0.00E+00	1.65E+01	0.00E+00	0.00E+00	0.00E+00	9.84E+03	0.00E+00
Y-91M	4.43E-09	0.00E+00	1.69E-10	0.00E+00	0.00E+00	0.00E+00	2.09E-07	0.00E+00
Y-91	7.64E+06	0.00E+00	2.05E+05	0.00E+00	0.00E+00	0.00E+00	3.13E+09	0.00E+00
Y-92	8.42E-01	0.00E+00	2.43E-02	0.00E+00	0.00E+00	0.00E+00	2.31E+04	0.00E+00
Y-93	1.58E+02	0.00E+00	4.33E+00	0.00E+00	0.00E+00	0.00E+00	4.82E+06	0.00E+00
ZR-95	1.67E+06	5.28E+05	3.63E+05	0.00E+00	7.76E+05	0.00E+00	1.22E+09	0.00E+00
ZR-97	3.11E+02	6.15E+01	2.83E+01	0.00E+00	9.33E+01	0.00E+00	1.67E+07	0.00E+00
NB-95	1.89E+05	1.05E+05	5.78E+04	0.00E+00	1.02E+05	0.00E+00	4.49E+08	0.00E+00
NB-97	1.87E-06	4.65E-07	1.70E-07	0.00E+00	5.44E-07	0.00E+00	1.11E-02	0.00E+00
MO-99	0.00E+00	5.67E+06	1.08E+06	0.00E+00	1.30E+07	0.00E+00	1.02E+07	0.00E+00
TC-99M	2.73E+00	7.62E+00	9.87E+01	0.00E+00	1.13E+02	4.23E+00	5.00E+03	0.00E+00
TC-101	5.58E-31	7.93E-31	7.79E-30	0.00E+00	1.43E-29	4.83E-31	1.36E-37	0.00E+00
RU-103	6.75E+06	0.00E+00	2.88E+06	0.00E+00	2.38E+07	0.00E+00	5.64E+08	0.00E+00
RU-105	4.93E+01	0.00E+00	1.91E+01	0.00E+00	6.22E+02	0.00E+00	3.98E+04	0.00E+00
RU-106	3.13E+08	0.00E+00	3.94E+07	0.00E+00	6.03E+08	0.00E+00	1.50E+10	0.00E+00
AG-110M	1.63E+07	1.54E+07	9.37E+06	0.00E+00	2.94E+07	0.00E+00	4.33E+09	0.00E+00
SN-113	1.88E+07	7.89E+05	2.00E+07	2.60E+05	5.58E+05	0.00E+00	2.26E+08	0.00E+00
SB-124	1.51E+08	2.78E+06	5.88E+07	3.42E+05	0.00E+00	1.32E+08	3.04E+09	0.00E+00
SB-125	2.11E+08	2.30E+06	4.92E+07	2.01E+05	0.00E+00	1.85E+08	1.64E+09	0.00E+00
TE-129M	4.23E+08	1.57E+08	6.69E+07	1.36E+08	1.77E+09	0.00E+00	1.59E+09	0.00E+00
TE-129	7.04E-04	2.63E-04	1.71E-04	5.03E-04	2.96E-03	0.00E+00	3.85E-03	0.00E+00
TE-131M	8.92E+05	4.28E+05	3.57E+05	6.43E+05	4.46E+06	0.00E+00	3.43E+07	0.00E+00
TE-132	4.16E+06	2.64E+06	2.48E+06	2.78E+06	2.53E+07	0.00E+00	8.35E+07	0.00E+00
I-131	7.67E+07	1.07E+08	5.77E+07	3.14E+10	1.85E+08	0.00E+00	2.13E+07	0.00E+00
I-132	5.02E+01	1.31E+02	4.72E+01	4.43E+03	2.07E+02	0.00E+00	5.73E+01	0.00E+00
I-133	1.93E+06	3.27E+06	9.99E+05	4.57E+08	5.74E+06	0.00E+00	2.48E+06	0.00E+00
I-134	7.99E-05	2.12E-04	7.61E-05	3.53E-03	3.34E-04	0.00E+00	2.79E-06	0.00E+00
I-135	3.48E+04	8.96E+04	3.32E+04	5.77E+06	1.42E+05	0.00E+00	9.93E+04	0.00E+00

³ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-3 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT³

PATHWAY = Vegetation
 AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	6.92E+09	1.63E+10	7.55E+09	0.00E+00	5.17E+09	1.97E+09	2.02E+08	0.00E+00
CS-136	4.36E+07	1.72E+08	1.15E+08	0.00E+00	9.35E+07	1.47E+07	1.38E+07	0.00E+00
CS-137	1.06E+10	1.41E+10	4.90E+09	0.00E+00	4.79E+09	1.86E+09	2.00E+08	0.00E+00
CS-138	3.13E-11	6.01E-11	3.01E-11	0.00E+00	4.44E-11	5.16E-12	2.73E-14	0.00E+00
BA-139	2.54E-02	1.79E-05	7.41E-04	0.00E+00	1.69E-05	1.23E-05	2.27E-01	0.00E+00
BA-140	1.38E+08	1.69E+05	8.87E+06	0.00E+00	5.72E+04	1.13E+05	2.12E+08	0.00E+00
LA-140	1.80E+03	8.86E+02	2.36E+02	0.00E+00	0.00E+00	0.00E+00	5.09E+07	0.00E+00
LA-142	1.77E-04	7.85E-05	1.95E-05	0.00E+00	0.00E+00	0.00E+00	2.39E+00	0.00E+00
CE-141	2.79E+05	1.86E+05	2.14E+04	0.00E+00	8.76E+04	0.00E+00	5.32E+08	0.00E+00
CE-143	9.31E+02	6.77E+05	7.56E+01	0.00E+00	3.04E+02	0.00E+00	2.04E+07	0.00E+00
CE-144	5.05E+07	2.09E+07	2.71E+06	0.00E+00	1.25E+07	0.00E+00	1.27E+10	0.00E+00
PR-144	2.22E-26	9.07E-27	1.12E-27	0.00E+00	5.20E-27	0.00E+00	2.44E-29	0.00E+00
HF-181	1.38E+07	7.58E+04	1.54E+06	4.62E+04	6.30E+04	0.00E+00	6.89E+08	0.00E+00
W-187	3.53E+04	2.87E+04	1.01E+04	0.00E+00	0.00E+00	0.00E+00	7.78E+06	0.00E+00
NP-239	1.38E+03	1.31E+02	7.25E+01	0.00E+00	4.10E+02	0.00E+00	2.10E+07	0.00E+00

³ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-4
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁴
(Reference Regulatory Guide 1.109)

PATHWAY = Vegetation
AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	4.01E+03	4.01E+03	4.01E+03	4.01E+03	4.01E+03	4.01E+03	4.01E+03
F-18	6.84E+00	0.00E+00	6.78E-01	0.00E+00	0.00E+00	0.00E+00	1.85E+00	0.00E+00
NA-24	3.72E+05	3.72E+05	3.72E+05	3.72E+05	3.72E+05	3.72E+05	3.72E+05	0.00E+00
CR-51	0.00E+00	0.00E+00	1.16E+05	6.42E+04	1.75E+04	1.17E+05	6.14E+06	0.00E+00
MN-54	0.00E+00	6.54E+08	1.74E+08	0.00E+00	1.83E+08	0.00E+00	5.49E+08	0.00E+00
MN-56	0.00E+00	1.82E+01	4.11E+00	0.00E+00	2.20E+01	0.00E+00	2.64E+03	0.00E+00
FE-55	7.63E+08	4.05E+08	1.25E+08	0.00E+00	0.00E+00	2.29E+08	7.50E+07	0.00E+00
FE-59	3.89E+08	6.30E+08	3.14E+08	0.00E+00	0.00E+00	1.83E+08	6.56E+08	0.00E+00
CO-57	0.00E+00	2.88E+07	5.83E+07	0.00E+00	0.00E+00	0.00E+00	2.36E+08	0.00E+00
CO-58	0.00E+00	6.27E+07	1.92E+08	0.00E+00	0.00E+00	0.00E+00	3.65E+08	0.00E+00
CO-60	0.00E+00	3.77E+08	1.11E+09	0.00E+00	0.00E+00	0.00E+00	2.09E+09	0.00E+00
NI-65	1.02E+02	9.60E+00	5.60E+00	0.00E+00	0.00E+00	0.00E+00	1.18E+03	0.00E+00
CU-64	0.00E+00	1.10E+04	6.63E+03	0.00E+00	2.65E+04	0.00E+00	5.15E+05	0.00E+00
ZN-65	1.03E+09	2.74E+09	1.70E+09	0.00E+00	1.72E+09	0.00E+00	4.81E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	2.10E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	5.36E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	3.41E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	4.55E+08	2.80E+08	0.00E+00	0.00E+00	0.00E+00	2.93E+07	0.00E+00
RB-88	0.00E+00	3.39E-22	2.36E-22	0.00E+00	0.00E+00	0.00E+00	1.66E-23	0.00E+00
RB-89	0.00E+00	3.43E-26	3.05E-26	0.00E+00	0.00E+00	0.00E+00	2.99E-28	0.00E+00
SR-89	3.52E+10	0.00E+00	1.01E+09	0.00E+00	0.00E+00	0.00E+00	1.36E+09	0.00E+00
SR-90	1.38E+12	0.00E+00	3.50E+11	0.00E+00	0.00E+00	0.00E+00	1.86E+10	0.00E+00
SR-91	5.20E+05	0.00E+00	1.96E+04	0.00E+00	0.00E+00	0.00E+00	1.15E+06	0.00E+00
SR-92	7.08E+02	0.00E+00	2.84E+01	0.00E+00	0.00E+00	0.00E+00	1.34E+04	0.00E+00
Y-91M	8.12E-09	0.00E+00	2.95E-10	0.00E+00	0.00E+00	0.00E+00	1.59E-05	0.00E+00
Y-91	1.82E+07	0.00E+00	4.86E+05	0.00E+00	0.00E+00	0.00E+00	2.42E+09	0.00E+00
Y-92	1.55E+00	0.00E+00	4.44E-02	0.00E+00	0.00E+00	0.00E+00	4.48E+04	0.00E+00
Y-93	2.91E+02	0.00E+00	7.98E+00	0.00E+00	0.00E+00	0.00E+00	4.34E+06	0.00E+00
ZR-95	3.75E+06	8.25E+05	7.34E+05	0.00E+00	1.18E+06	0.00E+00	8.60E+08	0.00E+00
ZR-97	5.68E+02	8.20E+01	4.84E+01	0.00E+00	1.18E+02	0.00E+00	1.24E+07	0.00E+00
NB-95	4.04E+05	1.57E+05	1.12E+05	0.00E+00	1.48E+05	0.00E+00	2.91E+08	0.00E+00
NB-97	3.41E-06	6.16E-07	2.88E-07	0.00E+00	6.84E-07	0.00E+00	1.90E-01	0.00E+00
SR-91	5.20E+05	0.00E+00	1.96E+04	0.00E+00	0.00E+00	0.00E+00	1.15E+06	0.00E+00
SR-92	7.08E+02	0.00E+00	2.84E+01	0.00E+00	0.00E+00	0.00E+00	1.34E+04	0.00E+00
Y-91M	8.12E-09	0.00E+00	2.95E-10	0.00E+00	0.00E+00	0.00E+00	1.59E-05	0.00E+00
Y-91	1.82E+07	0.00E+00	4.86E+05	0.00E+00	0.00E+00	0.00E+00	2.42E+09	0.00E+00
Y-92	1.55E+00	0.00E+00	4.44E-02	0.00E+00	0.00E+00	0.00E+00	4.48E+04	0.00E+00
Y-93	2.91E+02	0.00E+00	7.98E+00	0.00E+00	0.00E+00	0.00E+00	4.34E+06	0.00E+00
ZR-95	3.75E+06	8.25E+05	7.34E+05	0.00E+00	1.18E+06	0.00E+00	8.60E+08	0.00E+00
ZR-97	5.68E+02	8.20E+01	4.84E+01	0.00E+00	1.18E+02	0.00E+00	1.24E+07	0.00E+00
NB-95	4.04E+05	1.57E+05	1.12E+05	0.00E+00	1.48E+05	0.00E+00	2.91E+08	0.00E+00
NB-97	3.41E-06	6.16E-07	2.88E-07	0.00E+00	6.84E-07	0.00E+00	1.90E-01	0.00E+00
MO-99	0.00E+00	7.75E+06	1.92E+06	0.00E+00	1.65E+07	0.00E+00	6.41E+06	0.00E+00
TC-99M	4.70E+00	9.21E+00	1.53E+02	0.00E+00	1.34E+02	4.68E+00	5.24E+03	0.00E+00
TC-101	1.03E-30	1.07E-30	1.36E-29	0.00E+00	1.83E-29	5.68E-31	3.41E-30	0.00E+00
RU-103	1.52E+07	0.00E+00	5.83E+06	0.00E+00	3.82E+07	0.00E+00	3.92E+08	0.00E+00
RU-105	9.02E+01	0.00E+00	3.27E+01	0.00E+00	7.93E+02	0.00E+00	5.89E+04	0.00E+00
RU-106	7.54E+08	0.00E+00	9.40E+07	0.00E+00	1.02E+09	0.00E+00	1.17E+10	0.00E+00
AG-110M	3.45E+07	2.33E+07	1.86E+07	0.00E+00	4.34E+07	0.00E+00	2.77E+09	0.00E+00
SN-113	3.60E+07	1.16E+06	3.93E+07	4.75E+05	7.96E+05	0.00E+00	1.44E+08	0.00E+00
SB-124	3.43E+08	4.46E+06	1.20E+08	7.58E+05	0.00E+00	1.91E+08	2.15E+09	0.00E+00
SB-125	4.91E+08	3.79E+06	1.03E+08	4.55E+05	0.00E+00	2.74E+08	1.17E+09	0.00E+00

⁴ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-4 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁴

PATHWAY = Vegetation
AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
TE-129M	9.83E+08	2.74E+08	1.53E+08	3.17E+08	2.89E+09	0.00E+00	1.20E+09	0.00E+00
TE-129	1.30E-03	3.64E-04	3.09E-04	9.30E-04	3.81E-03	0.00E+00	8.12E-02	0.00E+00
TE-131M	1.63E+06	5.63E+05	5.99E+05	1.16E+06	5.45E+06	0.00E+00	2.28E+07	0.00E+00
TE-132	7.46E+06	3.30E+06	3.99E+06	4.81E+06	3.07E+07	0.00E+00	3.32E+07	0.00E+00
I-131	1.43E+08	1.44E+08	8.16E+07	4.75E+10	2.36E+08	0.00E+00	1.28E+07	0.00E+00
I-132	8.92E+01	1.64E+02	7.53E+01	7.60E+03	2.51E+02	0.00E+00	1.93E+02	0.00E+00
I-133	3.52E+06	4.35E+06	1.65E+06	8.08E+08	7.25E+06	0.00E+00	1.75E+06	0.00E+00
I-134	1.42E-04	2.64E-04	1.21E-04	6.07E-03	4.03E-04	0.00E+00	1.75E-04	0.00E+00
I-135	6.18E+04	1.11E+05	5.27E+04	9.86E+06	1.71E+05	0.00E+00	8.48E+04	0.00E+00
CS-134	1.56E+10	2.56E+10	5.41E+09	0.00E+00	7.94E+09	2.85E+09	1.38E+08	0.00E+00
CS-136	8.22E+07	2.26E+08	1.46E+08	0.00E+00	1.20E+08	1.79E+07	7.94E+06	0.00E+00
CS-137	2.50E+10	2.39E+10	3.53E+09	0.00E+00	7.79E+09	2.80E+09	1.50E+08	0.00E+00
CS-138	5.69E-11	7.92E-11	5.02E-11	0.00E+00	5.57E-11	5.99E-12	3.65E-11	0.00E+00
BA-139	4.69E-02	2.50E-05	1.36E-03	0.00E+00	2.18E-05	1.47E-05	2.71E+00	0.00E+00
BA-140	2.76E+08	2.42E+05	1.61E+07	0.00E+00	7.87E+04	1.44E+05	1.40E+08	0.00E+00
LA-140	3.24E+03	1.13E+03	3.82E+02	0.00E+00	0.00E+00	0.00E+00	3.16E+07	0.00E+00
LA-142	3.20E-04	1.02E-04	3.20E-05	0.00E+00	0.00E+00	0.00E+00	2.02E+01	0.00E+00
CE-141	6.46E+05	3.22E+05	4.79E+04	0.00E+00	1.41E+05	0.00E+00	4.02E+08	0.00E+00
CE-143	1.71E+03	9.29E+05	1.35E+02	0.00E+00	3.90E+02	0.00E+00	1.36E+07	0.00E+00
CE-144	1.22E+08	3.82E+07	6.50E+06	0.00E+00	2.11E+07	0.00E+00	9.95E+09	0.00E+00
PR-144	4.11E-26	1.27E-26	2.07E-27	0.00E+00	6.73E-27	0.00E+00	2.74E-23	0.00E+00
HF-181	3.12E+07	1.22E+05	3.14E+06	1.03E+05	9.80E+04	0.00E+00	5.18E+08	0.00E+00
W-187	6.41E+04	3.80E+04	1.70E+04	0.00E+00	0.00E+00	0.00E+00	5.34E+06	0.00E+00
NP-239	2.56E+03	1.84E+02	1.29E+02	0.00E+00	5.31E+02	0.00E+00	1.36E+07	0.00E+00

⁴ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-5
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁵
 (Reference Regulatory Guide 1.109)

PATHWAY = Meat
 AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	3.24E+02	3.24E+02	3.24E+02	3.24E+02	3.24E+02	3.24E+02	3.24E+02
NA-24	1.39E-03	1.39E-03	1.39E-03	1.39E-03	1.39E-03	1.39E-03	1.39E-03	0.00E+00
CR-51	0.00E+00	0.00E+00	6.30E+03	3.76E+03	1.39E+03	8.36E+03	1.58E+06	0.00E+00
MN-54	0.00E+00	7.33E+06	1.40E+06	0.00E+00	2.18E+06	0.00E+00	2.24E+07	0.00E+00
FE-55	2.28E+08	1.58E+08	3.68E+07	0.00E+00	0.00E+00	8.81E+07	9.06E+07	0.00E+00
FE-59	2.28E+08	5.36E+08	2.05E+08	0.00E+00	0.00E+00	1.50E+08	1.79E+09	0.00E+00
CO-57	0.00E+00	4.01E+06	7.43E+06	0.00E+00	0.00E+00	0.00E+00	1.13E+08	0.00E+00
CO-58	0.00E+00	1.52E+07	3.40E+07	0.00E+00	0.00E+00	0.00E+00	3.07E+08	0.00E+00
CO-60	0.00E+00	5.96E+07	1.31E+08	0.00E+00	0.00E+00	0.00E+00	1.12E+09	0.00E+00
CU-64	0.00E+00	2.80E-07	1.31E-07	0.00E+00	7.05E-07	0.00E+00	2.38E-05	0.00E+00
ZN-65	3.20E+08	1.02E+09	4.60E+08	0.00E+00	6.81E+08	0.00E+00	6.42E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	1.25E+03	0.00E+00	0.00E+00	0.00E+00	1.43E+03	0.00E+00
RB-86	0.00E+00	4.53E+08	2.11E+08	0.00E+00	0.00E+00	0.00E+00	8.94E+07	0.00E+00
SR-89	2.57E+08	0.00E+00	7.37E+06	0.00E+00	0.00E+00	0.00E+00	4.12E+07	0.00E+00
SR-90	1.03E+10	0.00E+00	2.53E+09	0.00E+00	0.00E+00	0.00E+00	2.98E+08	0.00E+00
SR-91	1.58E-10	0.00E+00	6.39E-12	0.00E+00	0.00E+00	0.00E+00	7.53E-10	0.00E+00
Y-91	9.53E+05	0.00E+00	2.55E+04	0.00E+00	0.00E+00	0.00E+00	5.24E+08	0.00E+00
Y-93	4.87E-12	0.00E+00	1.35E-13	0.00E+00	0.00E+00	0.00E+00	1.55E-07	0.00E+00
ZR-95	1.57E+06	5.02E+05	3.40E+05	0.00E+00	7.88E+05	0.00E+00	1.59E+09	0.00E+00
ZR-97	2.11E-05	4.27E-06	1.95E-06	0.00E+00	6.44E-06	0.00E+00	1.32E+00	0.00E+00
NB-95	2.01E+06	1.12E+06	6.02E+05	0.00E+00	1.11E+06	0.00E+00	6.79E+09	0.00E+00
MO-99	0.00E+00	1.01E+05	1.92E+04	0.00E+00	2.28E+05	0.00E+00	2.33E+05	0.00E+00
TC-99M	4.76E-21	1.35E-20	1.71E-19	0.00E+00	2.04E-19	7.96E-21	7.96E-18	0.00E+00
RU-103	9.15E+07	0.00E+00	3.94E+07	0.00E+00	3.49E+08	0.00E+00	1.07E+10	0.00E+00
RU-105	6.30E-28	0.00E+00	2.49E-28	0.00E+00	8.15E-27	0.00E+00	3.86E-25	0.00E+00
RU-106	2.26E+09	0.00E+00	2.85E+08	0.00E+00	4.36E+09	0.00E+00	1.46E+11	0.00E+00
AG-110M	5.57E+06	5.15E+06	3.06E+06	0.00E+00	1.01E+07	0.00E+00	2.10E+09	0.00E+00
SN-113	3.94E+07	1.52E+06	3.73E+07	5.36E+05	1.12E+06	0.00E+00	6.89E+08	0.00E+00
SB-124	1.66E+07	3.14E+05	6.60E+06	4.03E+04	0.00E+00	1.30E+07	4.72E+08	0.00E+00
SB-125	1.51E+07	1.69E+05	3.59E+06	1.53E+04	0.00E+00	1.16E+07	1.66E+08	0.00E+00
TE-129M	1.07E+09	3.99E+08	1.69E+08	3.67E+08	4.46E+09	0.00E+00	5.38E+09	0.00E+00
TE-131M	4.66E+02	2.28E+02	1.90E+02	3.61E+02	2.31E+03	0.00E+00	2.26E+04	0.00E+00
TE-132	1.46E+06	9.44E+05	8.86E+05	1.04E+06	9.09E+06	0.00E+00	4.46E+07	0.00E+00
I-131	1.06E+07	1.51E+07	8.66E+06	4.95E+09	2.59E+07	0.00E+00	3.99E+06	0.00E+00
I-133	3.72E-01	6.47E-01	1.97E-01	9.51E+01	1.13E+00	0.00E+00	5.82E-01	0.00E+00
I-135	4.69E-17	1.23E-16	4.53E-17	8.10E-15	1.97E-16	0.00E+00	1.39E-16	0.00E+00
CS-134	5.18E+08	1.23E+09	1.01E+09	0.00E+00	3.99E+08	1.32E+08	2.16E+07	0.00E+00
CS-136	1.15E+07	4.54E+07	3.27E+07	0.00E+00	2.53E+07	3.46E+06	5.16E+06	0.00E+00
CS-137	7.04E+08	9.63E+08	6.31E+08	0.00E+00	3.27E+08	1.09E+08	1.86E+07	0.00E+00
BA-140	2.75E+07	3.45E+04	1.80E+06	0.00E+00	1.17E+04	1.98E+04	5.66E+07	0.00E+00
LA-140	3.74E-02	1.89E-02	4.99E-03	0.00E+00	0.00E+00	0.00E+00	1.38E+03	0.00E+00
CE-141	1.24E+04	8.37E+03	9.49E+02	0.00E+00	3.89E+03	0.00E+00	3.20E+07	0.00E+00
CE-143	2.03E-02	1.50E+01	1.66E-03	0.00E+00	6.61E-03	0.00E+00	5.61E+02	0.00E+00
CE-144	1.15E+06	4.82E+05	6.19E+04	0.00E+00	2.86E+05	0.00E+00	3.90E+08	0.00E+00
HF-181	1.79E+08	1.01E+06	2.03E+07	6.41E+05	8.41E+05	0.00E+00	1.33E+10	0.00E+00
W-187	2.08E-02	1.74E-02	6.09E-03	0.00E+00	0.00E+00	0.00E+00	5.71E+00	0.00E+00
NP-239	2.61E-01	2.56E-02	1.41E-02	0.00E+00	8.00E-02	0.00E+00	5.26E+03	0.00E+00

⁵ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

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TABLE 3.5-6
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁶
(Reference Regulatory Guide 1.109)

PATHWAY = Meat
AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02	1.93E+02
NA-24	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	1.11E-03	0.00E+00
CR-51	0.00E+00	0.00E+00	5.04E+03	2.80E+03	1.10E+03	7.19E+03	8.46E+05	0.00E+00
MN-54	0.00E+00	5.59E+06	1.11E+06	0.00E+00	1.67E+06	0.00E+00	1.15E+07	0.00E+00
FE-55	1.86E+08	1.32E+08	3.07E+07	0.00E+00	0.00E+00	8.35E+07	5.69E+07	0.00E+00
FE-59	1.82E+08	4.25E+08	1.64E+08	0.00E+00	0.00E+00	1.34E+08	1.01E+09	0.00E+00
CO-57	0.00E+00	3.59E+06	6.02E+06	0.00E+00	0.00E+00	0.00E+00	6.70E+07	0.00E+00
CO-58	0.00E+00	1.17E+07	2.69E+07	0.00E+00	0.00E+00	0.00E+00	1.61E+08	0.00E+00
CO-60	0.00E+00	4.62E+07	1.04E+08	0.00E+00	0.00E+00	0.00E+00	6.02E+08	0.00E+00
CU-64	0.00E+00	2.28E-07	1.07E-07	0.00E+00	5.77E-07	0.00E+00	1.77E-05	0.00E+00
ZN-65	2.25E+08	7.82E+08	3.65E+08	0.00E+00	5.00E+08	0.00E+00	3.31E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	9.94E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	3.78E+08	1.78E+08	0.00E+00	0.00E+00	0.00E+00	5.60E+07	0.00E+00
SR-89	2.17E+08	0.00E+00	6.21E+06	0.00E+00	0.00E+00	0.00E+00	2.58E+07	0.00E+00
SR-90	6.68E+09	0.00E+00	1.65E+09	0.00E+00	0.00E+00	0.00E+00	1.88E+08	0.00E+00
SR-91	1.33E-10	0.00E+00	5.29E-12	0.00E+00	0.00E+00	0.00E+00	6.04E-10	0.00E+00
Y-91	8.03E+05	0.00E+00	2.15E+04	0.00E+00	0.00E+00	0.00E+00	3.29E+08	0.00E+00
Y-93	4.11E-12	0.00E+00	1.13E-13	0.00E+00	0.00E+00	0.00E+00	1.26E-07	0.00E+00
ZR-95	1.25E+06	3.96E+05	2.72E+05	0.00E+00	5.82E+05	0.00E+00	9.13E+08	0.00E+00
ZR-97	1.76E-05	3.49E-06	1.61E-06	0.00E+00	5.29E-06	0.00E+00	9.44E-01	0.00E+00
NB-95	1.57E+06	8.72E+05	4.80E+05	0.00E+00	8.45E+05	0.00E+00	3.73E+09	0.00E+00
MO-99	0.00E+00	8.33E+04	1.59E+04	0.00E+00	1.91E+05	0.00E+00	1.49E+05	0.00E+00
TC-99M	3.78E-21	1.05E-20	1.37E-19	0.00E+00	1.57E-19	5.85E-21	6.92E-18	0.00E+00
RU-103	7.45E+07	0.00E+00	3.18E+07	0.00E+00	2.63E+08	0.00E+00	6.22E+09	0.00E+00
RU-105	5.27E-28	0.00E+00	2.05E-28	0.00E+00	6.65E-27	0.00E+00	4.26E-25	0.00E+00
RU-106	1.90E+09	0.00E+00	2.39E+08	0.00E+00	3.66E+09	0.00E+00	9.11E+10	0.00E+00
AG-110M	4.21E+06	3.99E+06	2.43E+06	0.00E+00	7.60E+06	0.00E+00	1.12E+09	0.00E+00
SN-113	2.78E+07	1.16E+06	2.95E+07	3.84E+05	8.23E+05	0.00E+00	3.33E+08	0.00E+00
SB-124	1.36E+07	2.50E+05	5.30E+06	3.08E+04	0.00E+00	1.19E+07	2.74E+08	0.00E+00
SB-125	1.24E+07	1.35E+05	2.89E+06	1.18E+04	0.00E+00	1.09E+07	9.61E+07	0.00E+00
TE-129M	8.96E+08	3.32E+08	1.42E+08	2.89E+08	3.75E+09	0.00E+00	3.36E+09	0.00E+00
TE-131M	3.89E+02	1.86E+02	1.55E+02	2.80E+02	1.94E+03	0.00E+00	1.50E+04	0.00E+00
TE-132	1.19E+06	7.56E+05	7.12E+05	7.97E+05	7.25E+06	0.00E+00	2.40E+07	0.00E+00
I-131	8.78E+06	1.23E+07	6.60E+06	3.59E+09	2.12E+07	0.00E+00	2.43E+06	0.00E+00
I-133	3.11E-01	5.28E-01	1.61E-01	7.37E+01	9.26E-01	0.00E+00	3.99E-01	0.00E+00
I-135	3.82E-17	9.83E-17	3.64E-17	6.32E-15	1.55E-16	0.00E+00	1.09E-16	0.00E+00
CS-134	4.12E+08	9.69E+08	4.50E+08	0.00E+00	3.08E+08	1.18E+08	1.21E+07	0.00E+00
CS-136	8.97E+06	3.53E+07	2.37E+07	0.00E+00	1.92E+07	3.03E+06	2.84E+06	0.00E+00
CS-137	5.85E+08	7.78E+08	2.71E+08	0.00E+00	2.65E+08	1.03E+08	1.11E+07	0.00E+00
BA-140	2.27E+07	2.78E+04	1.46E+06	0.00E+00	9.44E+03	1.87E+04	3.50E+07	0.00E+00
LA-140	3.08E-02	1.51E-02	4.02E-03	0.00E+00	0.00E+00	0.00E+00	8.69E+02	0.00E+00
CE-141	1.04E+04	6.94E+03	7.97E+02	0.00E+00	3.27E+03	0.00E+00	1.98E+07	0.00E+00
CE-143	1.71E-02	1.24E+01	1.39E-03	0.00E+00	5.58E-03	0.00E+00	3.74E+02	0.00E+00
CE-144	9.71E+05	4.02E+05	5.22E+04	0.00E+00	2.40E+05	0.00E+00	2.44E+08	0.00E+00
HF-181	1.47E+08	8.06E+05	1.64E+07	4.91E+05	6.70E+05	0.00E+00	7.33E+09	0.00E+00
W-187	1.75E-02	1.42E-02	4.99E-03	0.00E+00	0.00E+00	0.00E+00	3.85E+00	0.00E+00
NP-239	2.28E-01	2.15E-02	1.19E-02	0.00E+00	6.75E-02	0.00E+00	3.46E+03	0.00E+00

⁶ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

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TABLE 3.5-7
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁷
(Reference Regulatory Guide 1.109)

PATHWAY = Meat
AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	2.33E+02	2.33E+02	2.33E+02	2.33E+02	2.33E+02	2.33E+02	2.33E+02
NA-24	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	1.77E-03	0.00E+00
CR-51	0.00E+00	0.00E+00	7.85E+03	4.36E+03	1.19E+03	7.96E+03	4.16E+05	0.00E+00
MN-54	0.00E+00	6.39E+06	1.70E+06	0.00E+00	1.79E+06	0.00E+00	5.37E+06	0.00E+00
FE-55	3.56E+08	1.89E+08	5.85E+07	0.00E+00	0.00E+00	1.07E+08	3.50E+07	0.00E+00
FE-59	3.23E+08	5.23E+08	2.60E+08	0.00E+00	0.00E+00	1.51E+08	5.44E+08	0.00E+00
CO-57	0.00E+00	4.69E+06	9.50E+06	0.00E+00	0.00E+00	0.00E+00	3.85E+07	0.00E+00
CO-58	0.00E+00	1.37E+07	4.18E+07	0.00E+00	0.00E+00	0.00E+00	7.97E+07	0.00E+00
CO-60	0.00E+00	5.49E+07	1.62E+08	0.00E+00	0.00E+00	0.00E+00	3.04E+08	0.00E+00
CU-64	0.00E+00	3.06E-07	1.85E-07	0.00E+00	7.41E-07	0.00E+00	1.44E-05	0.00E+00
ZN-65	3.38E+08	9.00E+08	5.60E+08	0.00E+00	5.67E+08	0.00E+00	1.58E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	1.56E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	5.37E+08	3.30E+08	0.00E+00	0.00E+00	0.00E+00	3.45E+07	0.00E+00
SR-89	4.10E+08	0.00E+00	1.17E+07	0.00E+00	0.00E+00	0.00E+00	1.59E+07	0.00E+00
SR-90	8.64E+09	0.00E+00	2.19E+09	0.00E+00	0.00E+00	0.00E+00	1.16E+08	0.00E+00
SR-91	2.50E-10	0.00E+00	9.42E-12	0.00E+00	0.00E+00	0.00E+00	5.51E-10	0.00E+00
Y-91	1.52E+06	0.00E+00	4.06E+04	0.00E+00	0.00E+00	0.00E+00	2.02E+08	0.00E+00
Y-93	7.73E-12	0.00E+00	2.12E-13	0.00E+00	0.00E+00	0.00E+00	1.15E-07	0.00E+00
ZR-95	2.23E+06	4.90E+05	4.36E+05	0.00E+00	7.01E+05	0.00E+00	5.11E+08	0.00E+00
ZR-97	3.28E-05	4.74E-06	2.80E-06	0.00E+00	6.80E-06	0.00E+00	7.18E-01	0.00E+00
NB-95	2.71E+06	1.06E+06	7.55E+05	0.00E+00	9.92E+05	0.00E+00	1.95E+09	0.00E+00
MO-99	0.00E+00	1.16E+05	2.87E+04	0.00E+00	2.47E+05	0.00E+00	9.58E+04	0.00E+00
TC-99M	6.63E-21	1.30E-20	2.15E-19	0.00E+00	1.89E-19	6.60E-21	7.40E-18	0.00E+00
RU-103	1.35E+08	0.00E+00	5.18E+07	0.00E+00	3.39E+08	0.00E+00	3.48E+09	0.00E+00
RU-105	9.84E-28	0.00E+00	3.57E-28	0.00E+00	8.65E-27	0.00E+00	6.42E-25	0.00E+00
RU-106	3.58E+09	0.00E+00	4.46E+08	0.00E+00	4.83E+09	0.00E+00	5.56E+10	0.00E+00
AG-110M	6.99E+06	4.72E+06	3.77E+06	0.00E+00	8.79E+06	0.00E+00	5.61E+08	0.00E+00
SN-113	4.17E+07	1.34E+06	4.56E+07	5.51E+05	9.23E+05	0.00E+00	1.67E+08	0.00E+00
SB-124	2.46E+07	3.19E+05	8.62E+06	5.43E+04	0.00E+00	1.36E+07	1.54E+08	0.00E+00
SB-125	2.25E+07	1.73E+05	4.71E+06	2.08E+04	0.00E+00	1.25E+07	5.37E+07	0.00E+00
TE-129M	1.69E+09	4.71E+08	2.62E+08	5.44E+08	4.96E+09	0.00E+00	2.06E+09	0.00E+00
TE-131M	7.23E+02	2.50E+02	2.66E+02	5.14E+02	2.42E+03	0.00E+00	1.01E+04	0.00E+00
TE-132	2.18E+06	9.65E+05	1.17E+06	1.41E+06	8.96E+06	0.00E+00	9.71E+06	0.00E+00
I-131	1.63E+07	1.64E+07	9.30E+06	5.41E+09	2.69E+07	0.00E+00	1.46E+06	0.00E+00
I-133	5.78E-01	7.15E-01	2.71E-01	1.33E+02	1.19E+00	0.00E+00	2.88E-01	0.00E+00
I-135	6.91E-17	1.24E-16	5.88E-17	1.10E-14	1.91E-16	0.00E+00	9.47E-17	0.00E+00
CS-134	7.26E+08	1.19E+09	2.51E+08	0.00E+00	3.69E+08	1.33E+08	6.43E+06	0.00E+00
CS-136	1.55E+07	4.26E+07	2.75E+07	0.00E+00	2.27E+07	3.38E+06	1.50E+06	0.00E+00
CS-137	1.08E+09	1.03E+09	1.52E+08	0.00E+00	3.36E+08	1.21E+08	6.45E+06	0.00E+00
BA-140	4.19E+07	3.67E+04	2.45E+06	0.00E+00	1.20E+04	2.19E+04	2.12E+07	0.00E+00
LA-140	5.64E-02	1.97E-02	6.64E-03	0.00E+00	0.00E+00	0.00E+00	5.49E+02	0.00E+00
CE-141	1.96E+04	9.76E+03	1.45E+03	0.00E+00	4.28E+03	0.00E+00	1.22E+07	0.00E+00
CE-143	3.21E-02	1.74E+01	2.52E-03	0.00E+00	7.29E-03	0.00E+00	2.55E+02	0.00E+00
CE-144	1.83E+06	5.74E+05	9.77E+04	0.00E+00	3.18E+05	0.00E+00	1.50E+08	0.00E+00
HF-181	2.66E+08	1.04E+06	2.68E+07	8.75E+05	8.35E+05	0.00E+00	4.42E+09	0.00E+00
W-187	3.24E-02	1.92E-02	8.60E-03	0.00E+00	0.00E+00	0.00E+00	2.69E+00	0.00E+00
NP-239	4.29E-01	3.08E-02	2.16E-02	0.00E+00	8.90E-02	0.00E+00	2.28E+03	0.00E+00

⁷ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-8
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁸
 (Reference Regulatory Guide 1.109)

PATHWAY = Cow Milk
 AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	7.63E+02	7.63E+02	7.63E+02	7.63E+02	7.63E+02	7.63E+02	7.63E+02
F-18	4.57E-03	0.00E+00	5.07E-04	0.00E+00	0.00E+00	0.00E+00	1.35E-04	0.00E+00
NA-24	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	2.45E+06	0.00E+00
CR-51	0.00E+00	0.00E+00	2.55E+04	1.53E+04	5.62E+03	3.39E+04	6.42E+06	0.00E+00
MN-54	0.00E+00	6.71E+06	1.28E+06	0.00E+00	2.00E+06	0.00E+00	2.06E+07	0.00E+00
MN-56	0.00E+00	4.21E-03	7.47E-04	0.00E+00	5.35E-03	0.00E+00	1.34E-01	0.00E+00
FE-55	1.96E+07	1.35E+07	3.15E+06	0.00E+00	0.00E+00	7.54E+06	7.75E+06	0.00E+00
FE-59	2.55E+07	5.99E+07	2.30E+07	0.00E+00	0.00E+00	1.67E+07	2.00E+08	0.00E+00
CO-57	0.00E+00	9.10E+05	1.69E+06	0.00E+00	0.00E+00	0.00E+00	2.57E+07	0.00E+00
CO-58	0.00E+00	3.92E+06	8.79E+06	0.00E+00	0.00E+00	0.00E+00	7.95E+07	0.00E+00
CO-60	0.00E+00	1.30E+07	2.87E+07	0.00E+00	0.00E+00	0.00E+00	2.44E+08	0.00E+00
NI-65	3.76E-01	4.88E-02	2.23E-02	0.00E+00	0.00E+00	0.00E+00	1.24E+00	0.00E+00
CU-64	0.00E+00	2.39E+04	1.12E+04	0.00E+00	6.04E+04	0.00E+00	2.04E+06	0.00E+00
ZN-65	1.23E+09	3.93E+09	1.78E+09	0.00E+00	2.63E+09	0.00E+00	2.47E+09	0.00E+00
BR-82	0.00E+00	0.00E+00	3.27E+07	0.00E+00	0.00E+00	0.00E+00	3.75E+07	0.00E+00
BR-83	0.00E+00	0.00E+00	9.98E-02	0.00E+00	0.00E+00	0.00E+00	1.44E-01	0.00E+00
BR-84	0.00E+00	0.00E+00	1.75E-23	0.00E+00	0.00E+00	0.00E+00	1.37E-28	0.00E+00
RB-86	0.00E+00	2.41E+09	1.12E+09	0.00E+00	0.00E+00	0.00E+00	4.76E+08	0.00E+00
SR-89	1.23E+09	0.00E+00	3.54E+07	0.00E+00	0.00E+00	0.00E+00	1.98E+08	0.00E+00
SR-90	3.89E+10	0.00E+00	9.54E+09	0.00E+00	0.00E+00	0.00E+00	1.12E+09	0.00E+00
SR-91	2.91E+04	0.00E+00	1.17E+03	0.00E+00	0.00E+00	0.00E+00	1.38E+05	0.00E+00
SR-92	4.95E-01	0.00E+00	2.14E-02	0.00E+00	0.00E+00	0.00E+00	9.82E+00	0.00E+00
Y-91M	6.27E-20	0.00E+00	2.43E-21	0.00E+00	0.00E+00	0.00E+00	1.84E-19	0.00E+00
Y-91	7.23E+03	0.00E+00	1.93E+02	0.00E+00	0.00E+00	0.00E+00	3.98E+06	0.00E+00
Y-92	5.64E-05	0.00E+00	1.65E-06	0.00E+00	0.00E+00	0.00E+00	9.88E-01	0.00E+00
Y-93	2.24E-01	0.00E+00	6.19E-03	0.00E+00	0.00E+00	0.00E+00	7.11E+03	0.00E+00
ZR-95	7.89E+02	2.53E+02	1.71E+02	0.00E+00	3.97E+02	0.00E+00	8.02E+05	0.00E+00
ZR-97	4.34E-01	8.76E-02	4.01E-02	0.00E+00	1.32E-01	0.00E+00	2.71E+04	0.00E+00
NB-95	7.23E+04	4.02E+04	2.16E+04	0.00E+00	3.97E+04	0.00E+00	2.44E+08	0.00E+00
NB-97	3.40E-12	8.59E-13	3.14E-13	0.00E+00	1.00E-12	0.00E+00	3.17E-09	0.00E+00
MO-99	0.00E+00	2.48E+07	4.72E+06	0.00E+00	5.62E+07	0.00E+00	5.76E+07	0.00E+00
TC-99M	3.35E+00	9.48E+00	1.21E+02	0.00E+00	1.44E+02	4.64E+00	5.61E+03	0.00E+00
RU-103	8.85E+02	0.00E+00	3.81E+02	0.00E+00	3.38E+03	0.00E+00	1.03E+05	0.00E+00
RU-105	8.65E-04	0.00E+00	3.41E-04	0.00E+00	1.12E-02	0.00E+00	5.29E-01	0.00E+00
RU-106	1.64E+04	0.00E+00	2.08E+03	0.00E+00	3.17E+04	0.00E+00	1.06E+06	0.00E+00
AG-110M	4.85E+07	4.49E+07	2.66E+07	0.00E+00	8.82E+07	0.00E+00	1.83E+10	0.00E+00
SN-113	3.87E+06	1.49E+05	3.66E+06	5.26E+04	1.10E+05	0.00E+00	6.77E+07	0.00E+00
SB-124	2.16E+07	4.09E+05	8.58E+06	5.25E+04	0.00E+00	1.68E+07	6.14E+08	0.00E+00
SB-125	1.61E+07	1.80E+05	3.84E+06	1.64E+04	0.00E+00	1.24E+07	1.78E+08	0.00E+00
TE-129M	5.67E+07	2.12E+07	8.98E+06	1.95E+07	2.37E+08	0.00E+00	2.86E+08	0.00E+00
TE-129	2.97E-10	1.12E-10	7.25E-11	2.28E-10	1.25E-09	0.00E+00	2.25E-10	0.00E+00
TE-131M	3.69E+05	1.80E+05	1.50E+05	2.86E+05	1.83E+06	0.00E+00	1.79E+07	0.00E+00
TE-132	2.46E+06	1.59E+06	1.49E+06	1.76E+06	1.53E+07	0.00E+00	7.52E+07	0.00E+00
I-131	2.91E+08	4.16E+08	2.38E+08	1.36E+11	7.13E+08	0.00E+00	1.10E+08	0.00E+00
I-132	1.67E-01	4.47E-01	1.56E-01	1.56E+01	7.12E-01	0.00E+00	8.39E-02	0.00E+00
I-133	3.88E+06	6.74E+06	2.06E+06	9.91E+08	1.18E+07	0.00E+00	6.06E+06	0.00E+00
I-134	2.11E-12	5.72E-12	2.05E-12	9.92E-11	9.10E-12	0.00E+00	4.99E-15	0.00E+00
I-135	1.29E+04	3.38E+04	1.25E+04	2.23E+06	5.42E+04	0.00E+00	3.82E+04	0.00E+00

⁸ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-8 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁸

PATHWAY = Cow Milk
 AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	4.45E+09	1.06E+10	8.66E+09	0.00E+00	3.43E+09	1.14E+09	1.85E+08	0.00E+00
CS-136	2.51E+08	9.91E+08	7.14E+08	0.00E+00	5.52E+08	7.56E+07	1.13E+08	0.00E+00
CS-137	5.96E+09	8.15E+09	5.34E+09	0.00E+00	2.77E+09	9.20E+08	1.58E+08	0.00E+00
CS-138	9.72E-24	1.92E-23	9.51E-24	0.00E+00	1.41E-23	1.39E-24	8.19E-29	0.00E+00
BA-139	4.54E-08	3.24E-11	1.33E-09	0.00E+00	3.03E-11	1.84E-11	8.06E-08	0.00E+00
BA-140	2.57E+07	3.23E+04	1.68E+06	0.00E+00	1.10E+04	1.85E+04	5.29E+07	0.00E+00
LA-140	4.52E+00	2.28E+00	6.01E-01	0.00E+00	0.00E+00	0.00E+00	1.67E+05	0.00E+00
LA-142	1.90E-11	8.66E-12	2.16E-12	0.00E+00	0.00E+00	0.00E+00	6.32E-08	0.00E+00
CE-141	4.27E+03	2.89E+03	3.27E+02	0.00E+00	1.34E+03	0.00E+00	1.10E+07	0.00E+00
CE-143	4.16E+01	3.08E+04	3.40E+00	0.00E+00	1.35E+01	0.00E+00	1.15E+06	0.00E+00
CE-144	2.83E+05	1.18E+05	1.52E+04	0.00E+00	7.01E+04	0.00E+00	9.56E+07	0.00E+00
HF-181	8.46E+03	4.77E+01	9.57E+02	3.03E+01	3.97E+01	0.00E+00	6.28E+05	0.00E+00
W-187	6.52E+03	5.45E+03	1.90E+03	0.00E+00	0.00E+00	0.00E+00	1.78E+06	0.00E+00
NP-239	3.67E+00	3.61E-01	1.99E-01	0.00E+00	1.13E+00	0.00E+00	7.41E+04	0.00E+00

⁸ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-9
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁹
(Reference Regulatory Guide 1.109)

PATHWAY = Cow Milk
AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	9.93E+02	9.93E+02	9.93E+02	9.93E+02	9.93E+02	9.93E+02	9.93E+02
F-18	8.16E-03	0.00E+00	8.94E-04	0.00E+00	0.00E+00	0.00E+00	7.35E-04	0.00E+00
A-24	4.27E+06	4.27E+06	4.27E+06	4.27E+06	4.27E+06	4.27E+06	4.27E+06	0.00E+00
CR-51	0.00E+00	0.00E+00	4.46E+04	2.48E+04	9.77E+03	6.36E+04	7.49E+06	0.00E+00
MN-54	0.00E+00	1.12E+07	2.22E+06	0.00E+00	3.34E+06	0.00E+00	2.29E+07	0.00E+00
MN-56	0.00E+00	7.47E-03	1.33E-03	0.00E+00	9.45E-03	0.00E+00	4.91E-01	0.00E+00
FE-55	3.47E+07	2.46E+07	5.74E+06	0.00E+00	0.00E+00	1.56E+07	1.06E+07	0.00E+00
FE-59	4.45E+07	1.04E+08	4.01E+07	0.00E+00	0.00E+00	3.27E+07	2.45E+08	0.00E+00
CO-57	0.00E+00	1.78E+06	2.99E+06	0.00E+00	0.00E+00	0.00E+00	3.32E+07	0.00E+00
CO-58	0.00E+00	6.60E+06	1.52E+07	0.00E+00	0.00E+00	0.00E+00	9.10E+07	0.00E+00
CO-60	0.00E+00	2.20E+07	4.96E+07	0.00E+00	0.00E+00	0.00E+00	2.87E+08	0.00E+00
NI-65	6.88E-01	8.79E-02	4.00E-02	0.00E+00	0.00E+00	0.00E+00	4.76E+00	0.00E+00
CU-64	0.00E+00	4.27E+04	2.01E+04	0.00E+00	1.08E+05	0.00E+00	3.31E+06	0.00E+00
ZN-65	1.90E+09	6.58E+09	3.07E+09	0.00E+00	4.21E+09	0.00E+00	2.79E+09	0.00E+00
BR-82	0.00E+00	0.00E+00	5.68E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	1.84E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	3.13E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	4.40E+09	2.07E+09	0.00E+00	0.00E+00	0.00E+00	6.51E+08	0.00E+00
SR-89	2.28E+09	0.00E+00	6.52E+07	0.00E+00	0.00E+00	0.00E+00	2.71E+08	0.00E+00
SR-90	5.49E+10	0.00E+00	1.36E+10	0.00E+00	0.00E+00	0.00E+00	1.54E+09	0.00E+00
SR-91	5.34E+04	0.00E+00	2.12E+03	0.00E+00	0.00E+00	0.00E+00	2.42E+05	0.00E+00
SR-92	9.07E-01	0.00E+00	3.87E-02	0.00E+00	0.00E+00	0.00E+00	2.31E+01	0.00E+00
Y-91M	1.15E-19	0.00E+00	4.39E-21	0.00E+00	0.00E+00	0.00E+00	5.42E-18	0.00E+00
Y-91	1.33E+04	0.00E+00	3.56E+02	0.00E+00	0.00E+00	0.00E+00	5.45E+06	0.00E+00
Y-92	1.04E-04	0.00E+00	3.01E-06	0.00E+00	0.00E+00	0.00E+00	2.86E+00	0.00E+00
Y-93	4.14E-01	0.00E+00	1.13E-02	0.00E+00	0.00E+00	0.00E+00	1.26E+04	0.00E+00
ZR-95	1.38E+03	4.35E+02	2.99E+02	0.00E+00	6.40E+02	0.00E+00	1.00E+06	0.00E+00
ZR-97	7.90E-01	1.56E-01	7.20E-02	0.00E+00	2.37E-01	0.00E+00	4.23E+04	0.00E+00
NB-95	1.23E+05	6.84E+04	3.76E+04	0.00E+00	6.63E+04	0.00E+00	2.92E+08	0.00E+00
NB-97	6.19E-12	1.54E-12	5.61E-13	0.00E+00	1.80E-12	0.00E+00	3.67E-08	0.00E+00
MO-99	0.00E+00	4.48E+07	8.55E+06	0.00E+00	1.03E+08	0.00E+00	8.03E+07	0.00E+00
TC-99M	5.82E+00	1.62E+01	2.10E+02	0.00E+00	2.42E+02	9.01E+00	1.07E+04	0.00E+00
RU-103	1.57E+03	0.00E+00	6.73E+02	0.00E+00	5.55E+03	0.00E+00	1.31E+05	0.00E+00
RU-105	1.58E-03	0.00E+00	6.13E-04	0.00E+00	1.99E-02	0.00E+00	1.28E+00	0.00E+00
RU-106	3.02E+04	0.00E+00	3.81E+03	0.00E+00	5.83E+04	0.00E+00	1.45E+06	0.00E+00
AG-110M	8.02E+07	7.59E+07	4.61E+07	0.00E+00	1.45E+08	0.00E+00	2.13E+10	0.00E+00
SN-113	5.95E+06	2.49E+05	6.33E+06	8.23E+04	1.76E+05	0.00E+00	7.14E+07	0.00E+00
SB-124	3.86E+07	7.11E+05	1.51E+07	8.75E+04	0.00E+00	3.37E+07	7.78E+08	0.00E+00
SB-125	2.89E+07	3.15E+05	6.75E+06	2.76E+04	0.00E+00	2.54E+07	2.25E+08	0.00E+00
TE-129M	1.04E+08	3.85E+07	1.64E+07	3.35E+07	4.34E+08	0.00E+00	3.90E+08	0.00E+00
TE-129	5.48E-10	2.04E-10	1.33E-10	3.91E-10	2.30E-09	0.00E+00	2.99E-09	0.00E+00
TE-131M	6.71E+05	3.22E+05	2.69E+05	4.84E+05	3.36E+06	0.00E+00	2.58E+07	0.00E+00
TE-132	4.39E+06	2.78E+06	2.62E+06	2.93E+06	2.67E+07	0.00E+00	8.81E+07	0.00E+00
I-131	5.28E+08	7.39E+08	3.97E+08	2.16E+11	1.27E+09	0.00E+00	1.46E+08	0.00E+00
I-132	2.96E-01	7.75E-01	2.78E-01	2.61E+01	1.22E+00	0.00E+00	3.38E-01	0.00E+00
I-133	7.08E+06	1.20E+07	3.66E+06	1.68E+09	2.11E+07	0.00E+00	9.09E+06	0.00E+00
I-134	3.74E-12	9.93E-12	3.56E-12	1.65E-10	1.56E-11	0.00E+00	1.31E-13	0.00E+00
I-135	2.29E+04	5.91E+04	2.19E+04	3.80E+06	9.33E+04	0.00E+00	6.54E+04	0.00E+00

⁹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-9 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT⁹

PATHWAY = Cow Milk
 AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	7.73E+09	1.82E+10	8.44E+09	0.00E+00	5.78E+09	2.21E+09	2.26E+08	0.00E+00
CS-136	4.27E+08	1.68E+09	1.13E+09	0.00E+00	9.16E+08	1.44E+08	1.35E+08	0.00E+00
CS-137	1.08E+10	1.44E+10	5.01E+09	0.00E+00	4.89E+09	1.90E+09	2.05E+08	0.00E+00
CS-138	1.76E-23	3.38E-23	1.69E-23	0.00E+00	2.50E-23	2.91E-24	1.54E-26	0.00E+00
BA-139	8.40E-08	5.91E-11	2.45E-09	0.00E+00	5.57E-11	4.07E-11	7.50E-07	0.00E+00
BA-140	4.64E+07	5.68E+04	2.99E+06	0.00E+00	1.93E+04	3.82E+04	7.15E+07	0.00E+00
LA-140	8.11E+00	3.99E+00	1.06E+00	0.00E+00	0.00E+00	0.00E+00	2.29E+05	0.00E+00
LA-142	3.44E-11	1.53E-11	3.80E-12	0.00E+00	0.00E+00	0.00E+00	4.64E-07	0.00E+00
CE-141	7.82E+03	5.22E+03	6.00E+02	0.00E+00	2.46E+03	0.00E+00	1.49E+07	0.00E+00
CE-143	7.65E+01	5.56E+04	6.22E+00	0.00E+00	2.50E+01	0.00E+00	1.67E+06	0.00E+00
CE-144	5.20E+05	2.15E+05	2.80E+04	0.00E+00	1.29E+05	0.00E+00	1.31E+08	0.00E+00
HF-181	1.51E+04	8.32E+01	1.69E+03	5.06E+01	6.91E+01	0.00E+00	7.57E+05	0.00E+00
W-187	1.19E+04	9.72E+03	3.40E+03	0.00E+00	0.00E+00	0.00E+00	2.63E+06	0.00E+00
NP-239	7.01E+00	6.61E-01	3.67E-01	0.00E+00	2.08E+00	0.00E+00	1.06E+05	0.00E+00

⁹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-10
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁰
(Reference Regulatory Guide 1.109)

PATHWAY = Cow Milk
AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	1.57E+03	1.57E+03	1.57E+03	1.57E+03	1.57E+03	1.57E+03	1.57E+03
F-18	1.94E-02	0.00E+00	1.92E-03	0.00E+00	0.00E+00	0.00E+00	5.25E-03	0.00E+00
NA-24	8.88E+06	8.88E+06	8.88E+06	8.88E+06	8.88E+06	8.88E+06	8.88E+06	0.00E+00
CR-51	0.00E+00	0.00E+00	9.09E+04	5.05E+04	1.38E+04	9.21E+04	4.82E+06	0.00E+00
MN-54	0.00E+00	1.67E+07	4.46E+06	0.00E+00	4.69E+06	0.00E+00	1.40E+07	0.00E+00
MN-56	0.00E+00	1.30E-02	2.94E-03	0.00E+00	1.57E-02	0.00E+00	1.89E+00	0.00E+00
FE-55	8.71E+07	4.62E+07	1.43E+07	0.00E+00	0.00E+00	2.61E+07	8.56E+06	0.00E+00
FE-59	1.03E+08	1.67E+08	8.31E+07	0.00E+00	0.00E+00	4.84E+07	1.74E+08	0.00E+00
CO-57	0.00E+00	3.04E+06	6.16E+06	0.00E+00	0.00E+00	0.00E+00	2.49E+07	0.00E+00
CO-58	0.00E+00	1.01E+07	3.09E+07	0.00E+00	0.00E+00	0.00E+00	5.88E+07	0.00E+00
CO-60	0.00E+00	3.42E+07	1.01E+08	0.00E+00	0.00E+00	0.00E+00	1.89E+08	0.00E+00
NI-65	1.68E+00	1.58E-01	9.24E-02	0.00E+00	0.00E+00	0.00E+00	1.94E+01	0.00E+00
CU-64	0.00E+00	7.50E+04	4.53E+04	0.00E+00	1.81E+05	0.00E+00	3.52E+06	0.00E+00
ZN-65	3.72E+09	9.91E+09	6.16E+09	0.00E+00	6.24E+09	0.00E+00	1.74E+09	0.00E+00
BR-82	0.00E+00	0.00E+00	1.16E+08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	4.52E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	7.08E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	8.16E+09	5.02E+09	0.00E+00	0.00E+00	0.00E+00	5.25E+08	0.00E+00
SR-89	5.63E+09	0.00E+00	1.61E+08	0.00E+00	0.00E+00	0.00E+00	2.18E+08	0.00E+00
SR-90	9.28E+10	0.00E+00	2.35E+10	0.00E+00	0.00E+00	0.00E+00	1.25E+09	0.00E+00
SR-91	1.31E+05	0.00E+00	4.94E+03	0.00E+00	0.00E+00	0.00E+00	2.89E+05	0.00E+00
SR-92	2.21E+00	0.00E+00	8.88E-02	0.00E+00	0.00E+00	0.00E+00	4.19E+01	0.00E+00
Y-91M	2.80E-19	0.00E+00	1.02E-20	0.00E+00	0.00E+00	0.00E+00	5.49E-16	0.00E+00
Y-91	3.28E+04	0.00E+00	8.78E+02	0.00E+00	0.00E+00	0.00E+00	4.38E+06	0.00E+00
Y-92	2.56E-04	0.00E+00	7.32E-06	0.00E+00	0.00E+00	0.00E+00	7.39E+00	0.00E+00
Y-93	1.02E+00	0.00E+00	2.79E-02	0.00E+00	0.00E+00	0.00E+00	1.51E+04	0.00E+00
ZR-95	3.20E+03	7.04E+02	6.27E+02	0.00E+00	1.01E+03	0.00E+00	7.35E+05	0.00E+00
ZR-97	1.92E+00	2.78E-01	1.64E-01	0.00E+00	3.99E-01	0.00E+00	4.21E+04	0.00E+00
NB-95	2.78E+05	1.08E+05	7.74E+04	0.00E+00	1.02E+05	0.00E+00	2.00E+08	0.00E+00
NB-97	1.50E-11	2.72E-12	1.27E-12	0.00E+00	3.01E-12	0.00E+00	8.38E-07	0.00E+00
MO-99	0.00E+00	8.16E+07	2.02E+07	0.00E+00	1.74E+08	0.00E+00	6.75E+07	0.00E+00
TC-99M	1.33E+01	2.62E+01	4.34E+02	0.00E+00	3.80E+02	1.33E+01	1.49E+04	0.00E+00
RU-103	3.72E+03	0.00E+00	1.43E+03	0.00E+00	9.37E+03	0.00E+00	9.62E+04	0.00E+00
RU-105	3.86E-03	0.00E+00	1.40E-03	0.00E+00	3.39E-02	0.00E+00	2.52E+00	0.00E+00
RU-106	7.45E+04	0.00E+00	9.29E+03	0.00E+00	1.01E+05	0.00E+00	1.16E+06	0.00E+00
AG-110M	1.74E+08	1.17E+08	9.39E+07	0.00E+00	2.19E+08	0.00E+00	1.40E+10	0.00E+00
SN-113	1.17E+07	3.76E+05	1.28E+07	1.54E+05	2.59E+05	0.00E+00	4.67E+07	0.00E+00
SB-124	9.13E+07	1.18E+06	3.20E+07	2.01E+05	0.00E+00	5.07E+07	5.71E+08	0.00E+00
SB-125	6.87E+07	5.30E+05	1.44E+07	6.36E+04	0.00E+00	3.83E+07	1.64E+08	0.00E+00
TE-129M	2.56E+08	7.14E+07	3.97E+07	8.25E+07	7.51E+08	0.00E+00	3.12E+08	0.00E+00
TE-129	1.35E-09	3.77E-10	3.21E-10	9.64E-10	3.95E-09	0.00E+00	8.41E-08	0.00E+00
TE-131M	1.63E+06	5.65E+05	6.02E+05	1.16E+06	5.47E+06	0.00E+00	2.29E+07	0.00E+00
TE-132	1.05E+07	4.64E+06	5.61E+06	6.76E+06	4.31E+07	0.00E+00	4.67E+07	0.00E+00
I-131	1.28E+09	1.29E+09	7.32E+08	4.26E+11	2.11E+09	0.00E+00	1.15E+08	0.00E+00
I-132	7.01E-01	1.29E+00	5.92E-01	5.97E+01	1.97E+00	0.00E+00	1.52E+00	0.00E+00
I-133	1.72E+07	2.13E+07	8.05E+06	3.95E+09	3.55E+07	0.00E+00	8.57E+06	0.00E+00
I-134	8.87E-12	1.65E-11	7.57E-12	3.79E-10	2.52E-11	0.00E+00	1.09E-11	0.00E+00
I-135	5.43E+04	9.77E+04	4.62E+04	8.66E+06	1.50E+05	0.00E+00	7.45E+04	0.00E+00

¹⁰ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
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TABLE 3.5-10 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁰

PATHWAY = Cow Milk
 AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	1.78E+10	2.93E+10	6.17E+09	0.00E+00	9.07E+09	3.25E+09	1.58E+08	0.00E+00
CS-136	9.65E+08	2.65E+09	1.72E+09	0.00E+00	1.41E+09	2.11E+08	9.32E+07	0.00E+00
CS-137	2.60E+10	2.49E+10	3.68E+09	0.00E+00	8.12E+09	2.92E+09	1.56E+08	0.00E+00
CS-138	4.27E-23	5.94E-23	3.77E-23	0.00E+00	4.18E-23	4.50E-24	2.74E-23	0.00E+00
BA-139	2.06E-07	1.10E-10	5.98E-09	0.00E+00	9.62E-11	6.48E-11	1.19E-05	0.00E+00
BA-140	1.12E+08	9.80E+04	6.53E+06	0.00E+00	3.19E+04	5.85E+04	5.67E+07	0.00E+00
LA-140	1.94E+01	6.79E+00	2.29E+00	0.00E+00	0.00E+00	0.00E+00	1.89E+05	0.00E+00
LA-142	8.30E-11	2.64E-11	8.28E-12	0.00E+00	0.00E+00	0.00E+00	5.24E-06	0.00E+00
CE-141	1.93E+04	9.61E+03	1.43E+03	0.00E+00	4.21E+03	0.00E+00	1.20E+07	0.00E+00
CE-143	1.88E+02	1.02E+05	1.47E+01	0.00E+00	4.27E+01	0.00E+00	1.49E+06	0.00E+00
CE-144	1.28E+06	4.02E+05	6.85E+04	0.00E+00	2.23E+05	0.00E+00	1.05E+08	0.00E+00
HF-181	3.59E+04	1.40E+02	3.61E+03	1.18E+02	1.13E+02	0.00E+00	5.96E+05	0.00E+00
W-187	2.89E+04	1.71E+04	7.68E+03	0.00E+00	0.00E+00	0.00E+00	2.40E+06	0.00E+00
NP-239	1.73E+01	1.24E+00	8.71E-01	0.00E+00	3.58E+00	0.00E+00	9.17E+04	0.00E+00

¹⁰ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem/yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
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TABLE 3.5-11
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹¹
(Reference Regulatory Guide 1.109)

PATHWAY = Cow Milk
AGE GROUP = Infant

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	2.38E+03	2.38E+03	2.38E+03	2.38E+03	2.38E+03	2.38E+03	2.38E+03
F-18	4.04E-02	0.00E+00	3.45E-03	0.00E+00	0.00E+00	0.00E+00	9.51E-03	0.00E+00
NA-24	1.55E+07	1.55E+07	1.55E+07	1.55E+07	1.55E+07	1.55E+07	1.55E+07	0.00E+00
CR-51	0.00E+00	0.00E+00	1.44E+05	9.40E+04	2.05E+04	1.83E+05	4.20E+06	0.00E+00
MN-54	0.00E+00	3.11E+07	7.05E+06	0.00E+00	6.90E+06	0.00E+00	1.14E+07	0.00E+00
MN-56	0.00E+00	3.19E-02	5.50E-03	0.00E+00	2.74E-02	0.00E+00	2.90E+00	0.00E+00
FE-55	1.05E+08	6.80E+07	1.82E+07	0.00E+00	0.00E+00	3.32E+07	8.63E+06	0.00E+00
FE-59	1.93E+08	3.36E+08	1.33E+08	0.00E+00	0.00E+00	9.94E+07	1.61E+08	0.00E+00
CO-57	0.00E+00	7.10E+06	1.15E+07	0.00E+00	0.00E+00	0.00E+00	2.42E+07	0.00E+00
CO-58	0.00E+00	2.02E+07	5.03E+07	0.00E+00	0.00E+00	0.00E+00	5.03E+07	0.00E+00
CO-60	0.00E+00	6.98E+07	1.65E+08	0.00E+00	0.00E+00	0.00E+00	1.66E+08	0.00E+00
NI-65	3.56E+00	4.03E-01	1.83E-01	0.00E+00	0.00E+00	0.00E+00	3.07E+01	0.00E+00
CU-64	0.00E+00	1.86E+05	8.63E+04	0.00E+00	3.15E+05	0.00E+00	3.83E+06	0.00E+00
ZN-65	5.00E+09	1.71E+10	7.90E+09	0.00E+00	8.31E+09	0.00E+00	1.45E+10	0.00E+00
BR-82	0.00E+00	0.00E+00	1.96E+08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	9.60E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	1.37E-22	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	2.07E+10	1.02E+10	0.00E+00	0.00E+00	0.00E+00	5.30E+08	0.00E+00
SR-89	1.07E+10	0.00E+00	3.07E+08	0.00E+00	0.00E+00	0.00E+00	2.20E+08	0.00E+00
SR-90	1.01E+11	0.00E+00	2.57E+10	0.00E+00	0.00E+00	0.00E+00	1.26E+09	0.00E+00
SR-91	2.73E+05	0.00E+00	9.87E+03	0.00E+00	0.00E+00	0.00E+00	3.23E+05	0.00E+00
SR-92	4.71E+00	0.00E+00	1.75E-01	0.00E+00	0.00E+00	0.00E+00	5.08E+01	0.00E+00
Y-91M	5.94E-19	0.00E+00	2.03E-20	0.00E+00	0.00E+00	0.00E+00	1.98E-15	0.00E+00
Y-91	6.16E+04	0.00E+00	1.64E+03	0.00E+00	0.00E+00	0.00E+00	4.42E+06	0.00E+00
Y-92	5.44E-04	0.00E+00	1.53E-05	0.00E+00	0.00E+00	0.00E+00	1.04E+01	0.00E+00
Y-93	2.16E+00	0.00E+00	5.90E-02	0.00E+00	0.00E+00	0.00E+00	1.71E+04	0.00E+00
ZR-95	5.69E+03	1.39E+03	9.83E+02	0.00E+00	1.49E+03	0.00E+00	6.91E+05	0.00E+00
ZR-97	4.07E+00	6.99E-01	3.19E-01	0.00E+00	7.04E-01	0.00E+00	4.46E+04	0.00E+00
NB-95	5.19E+05	2.14E+05	1.24E+05	0.00E+00	1.53E+05	0.00E+00	1.81E+08	0.00E+00
NB-97	3.18E-11	6.78E-12	2.45E-12	0.00E+00	5.30E-12	0.00E+00	2.14E-06	0.00E+00
MO-99	0.00E+00	2.09E+08	4.07E+07	0.00E+00	3.12E+08	0.00E+00	6.87E+07	0.00E+00
TC-99M	2.78E+01	5.73E+01	7.37E+02	0.00E+00	6.16E+02	2.99E+01	1.66E+04	0.00E+00
RU-103	7.54E+03	0.00E+00	2.52E+03	0.00E+00	1.57E+04	0.00E+00	9.17E+04	0.00E+00
RU-105	8.13E-03	0.00E+00	2.74E-03	0.00E+00	5.98E-02	0.00E+00	3.23E+00	0.00E+00
RU-106	1.53E+05	0.00E+00	1.92E+04	0.00E+00	1.81E+05	0.00E+00	1.16E+06	0.00E+00
AG-110M	3.21E+08	2.35E+08	1.55E+08	0.00E+00	3.36E+08	0.00E+00	1.22E+10	0.00E+00
SN-113	1.78E+07	6.79E+05	1.84E+07	2.59E+05	3.65E+05	0.00E+00	3.79E+07	0.00E+00
SB-124	1.76E+08	2.59E+06	5.45E+07	4.67E+05	0.00E+00	1.10E+08	5.43E+08	0.00E+00
SB-125	1.18E+08	1.14E+06	2.43E+07	1.48E+05	0.00E+00	6.83E+07	1.57E+08	0.00E+00
TE-129M	5.25E+08	1.80E+08	8.09E+07	2.02E+08	1.31E+09	0.00E+00	3.14E+08	0.00E+00
TE-129	2.86E-09	9.87E-10	6.69E-10	2.40E-09	7.13E-09	0.00E+00	2.29E-07	0.00E+00
TE-131M	3.45E+06	1.39E+06	1.15E+06	2.82E+06	9.56E+06	0.00E+00	2.34E+07	0.00E+00
TE-132	2.16E+07	1.07E+07	9.98E+06	1.58E+07	6.69E+07	0.00E+00	3.96E+07	0.00E+00
I-131	2.67E+09	3.15E+09	1.38E+09	1.03E+12	3.68E+09	0.00E+00	1.12E+08	0.00E+00
I-132	1.45E+00	2.95E+00	1.05E+00	1.38E+02	3.29E+00	0.00E+00	2.39E+00	0.00E+00
I-133	3.63E+07	5.29E+07	1.55E+07	9.62E+09	6.22E+07	0.00E+00	8.95E+06	0.00E+00
I-134	1.84E-11	3.77E-11	1.34E-11	8.78E-10	4.21E-11	0.00E+00	3.89E-11	0.00E+00
I-135	1.13E+05	2.25E+05	8.19E+04	2.01E+07	2.50E+05	0.00E+00	8.13E+04	0.00E+00

¹¹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-11 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹¹

PATHWAY = Cow Milk
 AGE GROUP = Infant

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	2.87E+10	5.36E+10	5.41E+09	0.00E+00	1.38E+10	5.65E+09	1.46E+08	0.00E+00
CS-136	1.88E+09	5.54E+09	2.07E+09	0.00E+00	2.21E+09	4.52E+08	8.42E+07	0.00E+00
CS-137	4.16E+10	4.86E+10	3.45E+09	0.00E+00	1.31E+10	5.29E+09	1.52E+08	0.00E+00
CS-138	9.01E-23	1.47E-22	7.10E-23	0.00E+00	7.31E-23	1.14E-23	2.34E-22	0.00E+00
BA-139	4.39E-07	2.91E-10	1.27E-08	0.00E+00	1.75E-10	1.77E-10	2.78E-05	0.00E+00
BA-140	2.30E+08	2.30E+05	1.19E+07	0.00E+00	5.47E+04	1.41E+05	5.66E+07	0.00E+00
LA-140	4.06E+01	1.60E+01	4.11E+00	0.00E+00	0.00E+00	0.00E+00	1.88E+05	0.00E+00
LA-142	1.74E-10	6.40E-11	1.53E-11	0.00E+00	0.00E+00	0.00E+00	1.09E-05	0.00E+00
CE-141	3.82E+04	2.33E+04	2.74E+03	0.00E+00	7.18E+03	0.00E+00	1.20E+07	0.00E+00
CE-143	3.97E+02	2.64E+05	3.01E+01	0.00E+00	7.68E+01	0.00E+00	1.54E+06	0.00E+00
CE-144	1.84E+06	7.52E+05	1.03E+05	0.00E+00	3.04E+05	0.00E+00	1.05E+08	0.00E+00
HF-181	6.86E+04	3.22E+02	6.06E+03	2.73E+02	1.89E+02	0.00E+00	5.62E+05	0.00E+00
W-187	6.08E+04	4.23E+04	1.46E+04	0.00E+00	0.00E+00	0.00E+00	2.49E+06	0.00E+00
NP-239	3.65E+01	3.26E+00	1.84E+00	0.00E+00	6.51E+00	0.00E+00	9.44E+04	0.00E+00

¹¹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-12
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹²
(Reference Regulatory Guide 1.109)

PATHWAY = Goat Milk
AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	1.56E+03	1.56E+03	1.56E+03	1.56E+03	1.56E+03	1.56E+03	1.56E+03
F-18	5.48E-04	0.00E+00	6.08E-05	0.00E+00	0.00E+00	0.00E+00	1.63E-05	0.00E+00
NA-24	2.93E+05	2.93E+05	2.93E+05	2.93E+05	2.93E+05	2.93E+05	2.93E+05	0.00E+00
CR-51	0.00E+00	0.00E+00	3.06E+03	1.83E+03	6.75E+02	4.06E+03	7.70E+05	0.00E+00
MN-54	0.00E+00	8.06E+05	1.54E+05	0.00E+00	2.40E+05	0.00E+00	2.47E+06	0.00E+00
MN-56	0.00E+00	5.05E-04	8.96E-05	0.00E+00	6.42E-04	0.00E+00	1.61E-02	0.00E+00
FE-55	2.54E+05	1.76E+05	4.10E+04	0.00E+00	0.00E+00	9.80E+04	1.01E+05	0.00E+00
FE-59	3.31E+05	7.79E+05	2.98E+05	0.00E+00	0.00E+00	2.18E+05	2.60E+06	0.00E+00
CO-57	0.00E+00	1.09E+05	2.02E+05	0.00E+00	0.00E+00	0.00E+00	3.09E+06	0.00E+00
CO-58	0.00E+00	4.71E+05	1.05E+06	0.00E+00	0.00E+00	0.00E+00	9.54E+06	0.00E+00
CO-60	0.00E+00	1.56E+06	3.44E+06	0.00E+00	0.00E+00	0.00E+00	2.93E+07	0.00E+00
NI-65	4.51E-02	5.86E-03	2.67E-03	0.00E+00	0.00E+00	0.00E+00	1.49E-01	0.00E+00
CU-64	0.00E+00	2.67E+03	1.25E+03	0.00E+00	6.73E+03	0.00E+00	2.27E+05	0.00E+00
ZN-65	1.48E+08	4.71E+08	2.13E+08	0.00E+00	3.15E+08	0.00E+00	2.97E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	3.93E+06	0.00E+00	0.00E+00	0.00E+00	4.50E+06	0.00E+00
BR-83	0.00E+00	0.00E+00	1.20E-02	0.00E+00	0.00E+00	0.00E+00	1.73E-02	0.00E+00
BR-84	0.00E+00	0.00E+00	2.10E-24	0.00E+00	0.00E+00	0.00E+00	1.65E-29	0.00E+00
RB-86	0.00E+00	2.90E+08	1.35E+08	0.00E+00	0.00E+00	0.00E+00	5.71E+07	0.00E+00
SR-89	2.59E+09	0.00E+00	7.44E+07	0.00E+00	0.00E+00	0.00E+00	4.16E+08	0.00E+00
SR-90	8.16E+10	0.00E+00	2.00E+10	0.00E+00	0.00E+00	0.00E+00	2.36E+09	0.00E+00
SR-91	6.10E+04	0.00E+00	2.46E+03	0.00E+00	0.00E+00	0.00E+00	2.91E+05	0.00E+00
SR-92	1.04E+00	0.00E+00	4.50E-02	0.00E+00	0.00E+00	0.00E+00	2.06E+01	0.00E+00
Y-91M	7.52E-21	0.00E+00	2.91E-22	0.00E+00	0.00E+00	0.00E+00	2.21E-20	0.00E+00
Y-91	8.67E+02	0.00E+00	2.32E+01	0.00E+00	0.00E+00	0.00E+00	4.77E+05	0.00E+00
Y-92	6.77E-06	0.00E+00	1.98E-07	0.00E+00	0.00E+00	0.00E+00	1.19E-01	0.00E+00
Y-93	2.69E-02	0.00E+00	7.43E-04	0.00E+00	0.00E+00	0.00E+00	8.53E+02	0.00E+00
ZR-95	9.47E+01	3.04E+01	2.06E+01	0.00E+00	4.76E+01	0.00E+00	9.62E+04	0.00E+00
ZR-97	5.21E-02	1.05E-02	4.81E-03	0.00E+00	1.59E-02	0.00E+00	3.26E+03	0.00E+00
NB-95	8.67E+03	4.82E+03	2.59E+03	0.00E+00	4.77E+03	0.00E+00	2.93E+07	0.00E+00
NB-97	4.08E-13	1.03E-13	3.76E-14	0.00E+00	1.20E-13	0.00E+00	3.80E-10	0.00E+00
MO-99	0.00E+00	2.98E+06	5.67E+05	0.00E+00	6.75E+06	0.00E+00	6.91E+06	0.00E+00
TC-99M	4.03E-01	1.14E+00	1.45E+01	0.00E+00	1.73E+01	5.57E-01	6.73E+02	0.00E+00
RU-103	1.06E+02	0.00E+00	4.58E+01	0.00E+00	4.05E+02	0.00E+00	1.24E+04	0.00E+00
RU-105	1.04E-04	0.00E+00	4.10E-05	0.00E+00	1.34E-03	0.00E+00	6.35E-02	0.00E+00
RU-106	1.97E+03	0.00E+00	2.50E+02	0.00E+00	3.81E+03	0.00E+00	1.28E+05	0.00E+00
AG-110M	5.82E+06	5.38E+06	3.20E+06	0.00E+00	1.06E+07	0.00E+00	2.20E+09	0.00E+00
SN-113	4.64E+05	1.79E+04	4.39E+05	6.31E+03	1.32E+04	0.00E+00	8.12E+06	0.00E+00
SB-124	2.60E+06	4.90E+04	1.03E+06	6.29E+03	0.00E+00	2.02E+06	7.37E+07	0.00E+00
SB-125	1.94E+06	2.16E+04	4.61E+05	1.97E+03	0.00E+00	1.49E+06	2.13E+07	0.00E+00
TE-129M	6.81E+06	2.54E+06	1.08E+06	2.34E+06	2.84E+07	0.00E+00	3.43E+07	0.00E+00
TE-129	3.57E-11	1.34E-11	8.70E-12	2.74E-11	1.50E-10	0.00E+00	2.69E-11	0.00E+00
TE-131M	4.43E+04	2.17E+04	1.80E+04	3.43E+04	2.19E+05	0.00E+00	2.15E+06	0.00E+00
TE-132	2.95E+05	1.91E+05	1.79E+05	2.11E+05	1.84E+06	0.00E+00	9.02E+06	0.00E+00
I-131	3.49E+08	4.99E+08	2.86E+08	1.64E+11	8.56E+08	0.00E+00	1.32E+08	0.00E+00
I-132	2.00E-01	5.36E-01	1.88E-01	1.88E+01	8.54E-01	0.00E+00	1.01E-01	0.00E+00
I-133	4.65E+06	8.09E+06	2.47E+06	1.19E+09	1.41E+07	0.00E+00	7.27E+06	0.00E+00
I-134	2.53E-12	6.87E-12	2.46E-12	1.19E-10	1.09E-11	0.00E+00	5.99E-15	0.00E+00
I-135	1.55E+04	4.06E+04	1.50E+04	2.68E+06	6.51E+04	0.00E+00	4.58E+04	0.00E+00

¹² R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

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TABLE 3.5-12 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹²

PATHWAY = Goat Milk
 AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	1.34E+10	3.18E+10	2.60E+10	0.00E+00	1.03E+10	3.41E+09	5.56E+08	0.00E+00
CS-136	7.53E+08	2.97E+09	2.14E+09	0.00E+00	1.65E+09	2.27E+08	3.38E+08	0.00E+00
CS-137	1.79E+10	2.45E+10	1.60E+10	0.00E+00	8.30E+09	2.76E+09	4.73E+08	0.00E+00
CS-138	2.91E-23	5.76E-23	2.85E-23	0.00E+00	4.23E-23	4.18E-24	2.46E-28	0.00E+00
BA-139	5.45E-09	3.88E-12	1.60E-10	0.00E+00	3.63E-12	2.20E-12	9.67E-09	0.00E+00
BA-140	3.08E+06	3.87E+03	2.02E+05	0.00E+00	1.32E+03	2.22E+03	6.35E+06	0.00E+00
LA-140	5.42E-01	2.73E-01	7.22E-02	0.00E+00	0.00E+00	0.00E+00	2.00E+04	0.00E+00
LA-142	2.28E-12	1.04E-12	2.59E-13	0.00E+00	0.00E+00	0.00E+00	7.58E-09	0.00E+00
CE-141	5.12E+02	3.46E+02	3.93E+01	0.00E+00	1.61E+02	0.00E+00	1.32E+06	0.00E+00
CE-143	4.99E+00	3.69E+03	4.09E-01	0.00E+00	1.63E+00	0.00E+00	1.38E+05	0.00E+00
CE-144	3.39E+04	1.42E+04	1.82E+03	0.00E+00	8.41E+03	0.00E+00	1.15E+07	0.00E+00
HF-181	1.01E+03	5.73E+00	1.15E+02	3.63E+00	4.77E+00	0.00E+00	7.53E+04	0.00E+00
W-187	7.82E+02	6.54E+02	2.29E+02	0.00E+00	0.00E+00	0.00E+00	2.14E+05	0.00E+00
NP-239	4.41E-01	4.34E-02	2.39E-02	0.00E+00	1.35E-01	0.00E+00	8.89E+03	0.00E+00

¹² R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

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Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-13
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹³
(Reference Regulatory Guide 1.109)

PATHWAY = Goat Milk
AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	2.03E+03	2.03E+03	2.03E+03	2.03E+03	2.03E+03	2.03E+03	2.03E+03
F-18	9.79E-04	0.00E+00	1.07E-04	0.00E+00	0.00E+00	0.00E+00	8.82E-05	0.00E+00
NA-24	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	5.12E+05	0.00E+00
CR-51	0.00E+00	0.00E+00	5.35E+03	2.97E+03	1.17E+03	7.64E+03	8.99E+05	0.00E+00
MN-54	0.00E+00	1.34E+06	2.66E+05	0.00E+00	4.00E+05	0.00E+00	2.75E+06	0.00E+00
MN-56	0.00E+00	8.96E-04	1.59E-04	0.00E+00	1.13E-03	0.00E+00	5.90E-02	0.00E+00
FE-55	4.51E+05	3.20E+05	7.46E+04	0.00E+00	0.00E+00	2.03E+05	1.38E+05	0.00E+00
FE-59	5.78E+05	1.35E+06	5.21E+05	0.00E+00	0.00E+00	4.25E+05	3.19E+06	0.00E+00
CO-57	0.00E+00	2.14E+05	3.58E+05	0.00E+00	0.00E+00	0.00E+00	3.99E+06	0.00E+00
CO-58	0.00E+00	7.92E+05	1.83E+06	0.00E+00	0.00E+00	0.00E+00	1.09E+07	0.00E+00
CO-60	0.00E+00	2.64E+06	5.95E+06	0.00E+00	0.00E+00	0.00E+00	3.44E+07	0.00E+00
NI-65	8.25E-02	1.05E-02	4.80E-03	0.00E+00	0.00E+00	0.00E+00	5.72E-01	0.00E+00
CU-64	0.00E+00	4.75E+03	2.24E+03	0.00E+00	1.20E+04	0.00E+00	3.69E+05	0.00E+00
ZN-65	2.27E+08	7.90E+08	3.68E+08	0.00E+00	5.05E+08	0.00E+00	3.34E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	6.82E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	2.21E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	3.75E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	5.28E+08	2.48E+08	0.00E+00	0.00E+00	0.00E+00	7.81E+07	0.00E+00
SR-89	4.78E+09	0.00E+00	1.37E+08	0.00E+00	0.00E+00	0.00E+00	5.69E+08	0.00E+00
SR-90	1.15E+11	0.00E+00	2.85E+10	0.00E+00	0.00E+00	0.00E+00	3.24E+09	0.00E+00
SR-91	1.12E+05	0.00E+00	4.46E+03	0.00E+00	0.00E+00	0.00E+00	5.08E+05	0.00E+00
SR-92	1.90E+00	0.00E+00	8.12E-02	0.00E+00	0.00E+00	0.00E+00	4.85E+01	0.00E+00
Y-91M	1.38E-20	0.00E+00	5.26E-22	0.00E+00	0.00E+00	0.00E+00	6.50E-19	0.00E+00
Y-91	1.59E+03	0.00E+00	4.28E+01	0.00E+00	0.00E+00	0.00E+00	6.54E+05	0.00E+00
Y-92	1.25E-05	0.00E+00	3.62E-07	0.00E+00	0.00E+00	0.00E+00	3.43E-01	0.00E+00
Y-93	4.96E-02	0.00E+00	1.36E-03	0.00E+00	0.00E+00	0.00E+00	1.52E+03	0.00E+00
ZR-95	1.66E+02	5.22E+01	3.59E+01	0.00E+00	7.68E+01	0.00E+00	1.21E+05	0.00E+00
ZR-97	9.48E-02	1.88E-02	8.64E-03	0.00E+00	2.84E-02	0.00E+00	5.08E+03	0.00E+00
NB-95	1.48E+04	8.20E+03	4.52E+03	0.00E+00	7.95E+03	0.00E+00	3.51E+07	0.00E+00
NB-97	7.43E-13	1.84E-13	6.73E-14	0.00E+00	2.16E-13	0.00E+00	4.40E-09	0.00E+00
MO-99	0.00E+00	5.38E+06	1.03E+06	0.00E+00	1.23E+07	0.00E+00	9.63E+06	0.00E+00
TC-99M	6.98E-01	1.95E+00	2.52E+01	0.00E+00	2.90E+01	1.08E+00	1.28E+03	0.00E+00
RU-103	1.89E+02	0.00E+00	8.07E+01	0.00E+00	6.66E+02	0.00E+00	1.58E+04	0.00E+00
RU-105	1.90E-04	0.00E+00	7.36E-05	0.00E+00	2.39E-03	0.00E+00	1.53E-01	0.00E+00
RU-106	3.63E+03	0.00E+00	4.57E+02	0.00E+00	7.00E+03	0.00E+00	1.74E+05	0.00E+00
AG-110M	9.62E+06	9.10E+06	5.54E+06	0.00E+00	1.74E+07	0.00E+00	2.56E+09	0.00E+00
SN-113	7.14E+05	2.99E+04	7.59E+05	9.88E+03	2.12E+04	0.00E+00	8.57E+06	0.00E+00
SB-124	4.63E+06	8.53E+04	1.81E+06	1.05E+04	0.00E+00	4.04E+06	9.33E+07	0.00E+00
SB-125	3.46E+06	3.78E+04	8.10E+05	3.31E+03	0.00E+00	3.04E+06	2.69E+07	0.00E+00
TE-129M	1.25E+07	4.62E+06	1.97E+06	4.02E+06	5.21E+07	0.00E+00	4.68E+07	0.00E+00
TE-129	6.57E-11	2.45E-11	1.60E-11	4.69E-11	2.76E-10	0.00E+00	3.59E-10	0.00E+00
TE-131M	8.06E+04	3.86E+04	3.22E+04	5.81E+04	4.03E+05	0.00E+00	3.10E+06	0.00E+00
TE-132	5.27E+05	3.34E+05	3.14E+05	3.52E+05	3.20E+06	0.00E+00	1.06E+07	0.00E+00
I-131	6.34E+08	8.87E+08	4.76E+08	2.59E+11	1.53E+09	0.00E+00	1.75E+08	0.00E+00
I-132	3.55E-01	9.30E-01	3.34E-01	3.13E+01	1.47E+00	0.00E+00	4.05E-01	0.00E+00
I-133	8.50E+06	1.44E+07	4.40E+06	2.01E+09	2.53E+07	0.00E+00	1.09E+07	0.00E+00
I-134	4.49E-12	1.19E-11	4.28E-12	1.99E-10	1.88E-11	0.00E+00	1.57E-13	0.00E+00
I-135	2.75E+04	7.09E+04	2.63E+04	4.56E+06	1.12E+05	0.00E+00	7.85E+04	0.00E+00

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R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-13 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹³

PATHWAY = Goat Milk
 AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	2.32E+10	5.46E+10	2.53E+10	0.00E+00	1.73E+10	6.62E+09	6.79E+08	0.00E+00
CS-136	1.28E+09	5.05E+09	3.39E+09	0.00E+00	2.75E+09	4.33E+08	4.06E+08	0.00E+00
CS-137	3.24E+10	4.31E+10	1.50E+10	0.00E+00	1.47E+10	5.70E+09	6.14E+08	0.00E+00
CS-138	5.29E-23	1.02E-22	5.08E-23	0.00E+00	7.50E-23	8.72E-24	4.61E-26	0.00E+00
BA-139	1.01E-08	7.09E-12	2.94E-10	0.00E+00	6.69E-12	4.89E-12	8.99E-08	0.00E+00
BA-140	5.56E+06	6.82E+03	3.58E+05	0.00E+00	2.31E+03	4.58E+03	8.58E+06	0.00E+00
LA-140	9.73E-01	4.78E-01	1.27E-01	0.00E+00	0.00E+00	0.00E+00	2.75E+04	0.00E+00
LA-142	4.12E-12	1.83E-12	4.56E-13	0.00E+00	0.00E+00	0.00E+00	5.57E-08	0.00E+00
CE-141	9.39E+02	6.27E+02	7.20E+01	0.00E+00	2.95E+02	0.00E+00	1.79E+06	0.00E+00
CE-143	9.18E+00	6.68E+03	7.46E-01	0.00E+00	3.00E+00	0.00E+00	2.01E+05	0.00E+00
CE-144	6.24E+04	2.58E+04	3.35E+03	0.00E+00	1.54E+04	0.00E+00	1.57E+07	0.00E+00
HF-181	1.82E+03	9.98E+00	2.03E+02	6.08E+00	8.29E+00	0.00E+00	9.08E+04	0.00E+00
W-187	1.43E+03	1.17E+03	4.09E+02	0.00E+00	0.00E+00	0.00E+00	3.16E+05	0.00E+00
NP-239	8.42E-01	7.94E-02	4.41E-02	0.00E+00	2.49E-01	0.00E+00	1.28E+04	0.00E+00

¹³ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem/yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-14
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁴
(Reference Regulatory Guide 1.109)

PATHWAY = Goat Milk
AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	3.20E+03	3.20E+03	3.20E+03	3.20E+03	3.20E+03	3.20E+03	3.20E+03
F-18	2.33E-03	0.00E+00	2.31E-04	0.00E+00	0.00E+00	0.00E+00	6.30E-04	0.00E+00
NA-24	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	1.07E+06	0.00E+00
CR-51	0.00E+00	0.00E+00	1.09E+04	6.05E+03	1.65E+03	1.11E+04	5.79E+05	0.00E+00
MN-54	0.00E+00	2.01E+06	5.35E+05	0.00E+00	5.63E+05	0.00E+00	1.69E+06	0.00E+00
MN-56	0.00E+00	1.56E-03	3.53E-04	0.00E+00	1.89E-03	0.00E+00	2.26E-01	0.00E+00
FE-55	1.13E+06	6.00E+05	1.86E+05	0.00E+00	0.00E+00	3.40E+05	1.11E+05	0.00E+00
FE-59	1.34E+06	2.17E+06	1.08E+06	0.00E+00	0.00E+00	6.29E+05	2.26E+06	0.00E+00
CO-57	0.00E+00	3.65E+05	7.39E+05	0.00E+00	0.00E+00	0.00E+00	2.99E+06	0.00E+00
CO-58	0.00E+00	1.21E+06	3.71E+06	0.00E+00	0.00E+00	0.00E+00	7.06E+06	0.00E+00
CO-60	0.00E+00	4.11E+06	1.21E+07	0.00E+00	0.00E+00	0.00E+00	2.27E+07	0.00E+00
NI-65	2.02E-01	1.90E-02	1.11E-02	0.00E+00	0.00E+00	0.00E+00	2.33E+00	0.00E+00
CU-64	0.00E+00	8.35E+03	5.05E+03	0.00E+00	2.02E+04	0.00E+00	3.92E+05	0.00E+00
ZN-65	4.46E+08	1.19E+09	7.40E+08	0.00E+00	7.49E+08	0.00E+00	2.09E+08	0.00E+00
BR-82	0.00E+00	0.00E+00	1.40E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	5.42E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	8.49E-24	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	9.79E+08	6.02E+08	0.00E+00	0.00E+00	0.00E+00	6.30E+07	0.00E+00
SR-89	1.18E+10	0.00E+00	3.38E+08	0.00E+00	0.00E+00	0.00E+00	4.58E+08	0.00E+00
SR-90	1.95E+11	0.00E+00	4.94E+10	0.00E+00	0.00E+00	0.00E+00	2.62E+09	0.00E+00
SR-91	2.75E+05	0.00E+00	1.04E+04	0.00E+00	0.00E+00	0.00E+00	6.07E+05	0.00E+00
SR-92	4.65E+00	0.00E+00	1.86E-01	0.00E+00	0.00E+00	0.00E+00	8.81E+01	0.00E+00
Y-91M	3.36E-20	0.00E+00	1.22E-21	0.00E+00	0.00E+00	0.00E+00	6.59E-17	0.00E+00
Y-91	3.94E+03	0.00E+00	1.05E+02	0.00E+00	0.00E+00	0.00E+00	5.25E+05	0.00E+00
Y-92	3.07E-05	0.00E+00	8.78E-07	0.00E+00	0.00E+00	0.00E+00	8.87E-01	0.00E+00
Y-93	1.22E-01	0.00E+00	3.35E-03	0.00E+00	0.00E+00	0.00E+00	1.82E+03	0.00E+00
ZR-95	3.85E+02	8.45E+01	7.53E+01	0.00E+00	1.21E+02	0.00E+00	8.82E+04	0.00E+00
ZR-97	2.31E-01	3.33E-02	1.97E-02	0.00E+00	4.79E-02	0.00E+00	5.05E+03	0.00E+00
NB-95	3.34E+04	1.30E+04	9.29E+03	0.00E+00	1.22E+04	0.00E+00	2.40E+07	0.00E+00
NB-97	1.80E-12	3.26E-13	1.52E-13	0.00E+00	3.62E-13	0.00E+00	1.01E-07	0.00E+00
MO-99	0.00E+00	9.79E+06	2.42E+06	0.00E+00	2.09E+07	0.00E+00	8.10E+06	0.00E+00
TC-99M	1.60E+00	3.14E+00	5.20E+01	0.00E+00	4.56E+01	1.59E+00	1.79E+03	0.00E+00
RU-103	4.47E+02	0.00E+00	1.72E+02	0.00E+00	1.12E+03	0.00E+00	1.15E+04	0.00E+00
RU-105	4.63E-04	0.00E+00	1.68E-04	0.00E+00	4.07E-03	0.00E+00	3.02E-01	0.00E+00
RU-106	8.93E+03	0.00E+00	1.11E+03	0.00E+00	1.21E+04	0.00E+00	1.39E+05	0.00E+00
AG-110M	2.09E+07	1.41E+07	1.13E+07	0.00E+00	2.62E+07	0.00E+00	1.68E+09	0.00E+00
SN-113	1.40E+06	4.52E+04	1.53E+06	1.85E+04	3.10E+04	0.00E+00	5.61E+06	0.00E+00
SB-124	1.10E+07	1.42E+05	3.84E+06	2.42E+04	0.00E+00	6.08E+06	6.85E+07	0.00E+00
SB-125	8.25E+06	6.36E+04	1.73E+06	7.64E+03	0.00E+00	4.60E+06	1.97E+07	0.00E+00
TE-129M	3.07E+07	8.57E+06	4.76E+06	9.90E+06	9.01E+07	0.00E+00	3.74E+07	0.00E+00
TE-129	1.62E-10	4.53E-11	3.85E-11	1.16E-10	4.74E-10	0.00E+00	1.01E-08	0.00E+00
TE-131M	1.96E+05	6.78E+04	7.22E+04	1.39E+05	6.57E+05	0.00E+00	2.75E+06	0.00E+00
TE-132	1.26E+06	5.57E+05	6.73E+05	8.11E+05	5.17E+06	0.00E+00	5.61E+06	0.00E+00
I-131	1.54E+09	1.55E+09	8.78E+08	5.11E+11	2.54E+09	0.00E+00	1.38E+08	0.00E+00
I-132	8.41E-01	1.55E+00	7.11E-01	7.17E+01	2.36E+00	0.00E+00	1.82E+00	0.00E+00
I-133	2.06E+07	2.55E+07	9.66E+06	4.74E+09	4.25E+07	0.00E+00	1.03E+07	0.00E+00
I-134	1.06E-11	1.98E-11	9.09E-12	4.54E-10	3.02E-11	0.00E+00	1.31E-11	0.00E+00
I-135	6.52E+04	1.17E+05	5.55E+04	1.04E+07	1.80E+05	0.00E+00	8.94E+04	0.00E+00

¹⁴ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
 Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-14 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁴

PATHWAY = Goat Milk
 AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	5.35E+10	8.78E+10	1.85E+10	0.00E+00	2.72E+10	9.76E+09	4.73E+08	0.00E+00
CS-136	2.89E+09	7.96E+09	5.15E+09	0.00E+00	4.24E+09	6.32E+08	2.80E+08	0.00E+00
CS-137	7.81E+10	7.48E+10	1.10E+10	0.00E+00	2.44E+10	8.77E+09	4.68E+08	0.00E+00
CS-138	1.28E-22	1.78E-22	1.13E-22	0.00E+00	1.25E-22	1.35E-23	8.21E-23	0.00E+00
BA-139	2.48E-08	1.32E-11	7.18E-10	0.00E+00	1.15E-11	7.78E-12	1.43E-06	0.00E+00
BA-140	1.34E+07	1.18E+04	7.84E+05	0.00E+00	3.83E+03	7.01E+03	6.80E+06	0.00E+00
LA-140	2.33E+00	8.14E-01	2.75E-01	0.00E+00	0.00E+00	0.00E+00	2.27E+04	0.00E+00
LA-142	9.95E-12	3.17E-12	9.94E-13	0.00E+00	0.00E+00	0.00E+00	6.29E-07	0.00E+00
CE-141	2.31E+03	1.15E+03	1.71E+02	0.00E+00	5.05E+02	0.00E+00	1.44E+06	0.00E+00
CE-143	2.25E+01	1.22E+04	1.77E+00	0.00E+00	5.12E+00	0.00E+00	1.79E+05	0.00E+00
CE-144	1.54E+05	4.82E+04	8.21E+03	0.00E+00	2.67E+04	0.00E+00	1.26E+07	0.00E+00
HF-181	4.30E+03	1.68E+01	4.33E+02	1.42E+01	1.35E+01	0.00E+00	7.15E+04	0.00E+00
W-187	3.47E+03	2.05E+03	9.22E+02	0.00E+00	0.00E+00	0.00E+00	2.89E+05	0.00E+00
NP-239	2.07E+00	1.49E-01	1.05E-01	0.00E+00	4.30E-01	0.00E+00	1.10E+04	0.00E+00

¹⁴ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-15
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁵
(Reference Regulatory Guide 1.109)

PATHWAY = Goat Milk
AGE GROUP = Infant

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	4.86E+03	4.86E+03	4.86E+03	4.86E+03	4.86E+03	4.86E+03	4.86E+03
F-18	4.85E-03	0.00E+00	4.14E-04	0.00E+00	0.00E+00	0.00E+00	1.14E-03	0.00E+00
NA-24	1.86E+06	1.86E+06	1.86E+06	1.86E+06	1.86E+06	1.86E+06	1.86E+06	0.00E+00
CR-51	0.00E+00	0.00E+00	1.73E+04	1.13E+04	2.46E+03	2.19E+04	5.04E+05	0.00E+00
MN-54	0.00E+00	3.73E+06	8.46E+05	0.00E+00	8.28E+05	0.00E+00	1.37E+06	0.00E+00
MN-56	0.00E+00	3.83E-03	6.60E-04	0.00E+00	3.29E-03	0.00E+00	3.48E-01	0.00E+00
FE-55	1.37E+06	8.84E+05	2.36E+05	0.00E+00	0.00E+00	4.32E+05	1.12E+05	0.00E+00
FE-59	2.50E+06	4.37E+06	1.72E+06	0.00E+00	0.00E+00	1.29E+06	2.09E+06	0.00E+00
CO-57	0.00E+00	8.52E+05	1.39E+06	0.00E+00	0.00E+00	0.00E+00	2.90E+06	0.00E+00
CO-58	0.00E+00	2.42E+06	6.04E+06	0.00E+00	0.00E+00	0.00E+00	6.03E+06	0.00E+00
CO-60	0.00E+00	8.38E+06	1.98E+07	0.00E+00	0.00E+00	0.00E+00	1.99E+07	0.00E+00
NI-65	4.27E-01	4.84E-02	2.20E-02	0.00E+00	0.00E+00	0.00E+00	3.68E+00	0.00E+00
CU-64	0.00E+00	2.08E+04	9.62E+03	0.00E+00	3.51E+04	0.00E+00	4.26E+05	0.00E+00
ZN-65	5.99E+08	2.06E+09	9.48E+08	0.00E+00	9.97E+08	0.00E+00	1.74E+09	0.00E+00
BR-82	0.00E+00	0.00E+00	2.35E+07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	1.15E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	1.64E-23	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	2.48E+09	1.23E+09	0.00E+00	0.00E+00	0.00E+00	6.36E+07	0.00E+00
SR-89	2.25E+10	0.00E+00	6.45E+08	0.00E+00	0.00E+00	0.00E+00	4.62E+08	0.00E+00
SR-90	2.12E+11	0.00E+00	5.40E+10	0.00E+00	0.00E+00	0.00E+00	2.65E+09	0.00E+00
SR-91	5.73E+05	0.00E+00	2.07E+04	0.00E+00	0.00E+00	0.00E+00	6.78E+05	0.00E+00
SR-92	9.89E+00	0.00E+00	3.67E-01	0.00E+00	0.00E+00	0.00E+00	1.07E+02	0.00E+00
Y-91M	7.13E-20	0.00E+00	2.43E-21	0.00E+00	0.00E+00	0.00E+00	2.38E-16	0.00E+00
Y-91	7.40E+03	0.00E+00	1.97E+02	0.00E+00	0.00E+00	0.00E+00	5.30E+05	0.00E+00
Y-92	6.52E-05	0.00E+00	1.83E-06	0.00E+00	0.00E+00	0.00E+00	1.24E+00	0.00E+00
Y-93	2.60E-01	0.00E+00	7.08E-03	0.00E+00	0.00E+00	0.00E+00	2.05E+03	0.00E+00
ZR-95	6.83E+02	1.66E+02	1.18E+02	0.00E+00	1.79E+02	0.00E+00	8.29E+04	0.00E+00
ZR-97	4.89E-01	8.38E-02	3.83E-02	0.00E+00	8.45E-02	0.00E+00	5.35E+03	0.00E+00
NB-95	6.23E+04	2.57E+04	1.48E+04	0.00E+00	1.84E+04	0.00E+00	2.17E+07	0.00E+00
NB-97	3.82E-12	8.14E-13	2.93E-13	0.00E+00	6.36E-13	0.00E+00	2.57E-07	0.00E+00
MO-99	0.00E+00	2.50E+07	4.88E+06	0.00E+00	3.74E+07	0.00E+00	8.24E+06	0.00E+00
TC-99M	3.33E+00	6.87E+00	8.85E+01	0.00E+00	7.39E+01	3.59E+00	2.00E+03	0.00E+00
RU-103	9.04E+02	0.00E+00	3.02E+02	0.00E+00	1.88E+03	0.00E+00	1.10E+04	0.00E+00
RU-105	9.76E-04	0.00E+00	3.29E-04	0.00E+00	7.17E-03	0.00E+00	3.88E-01	0.00E+00
RU-106	1.84E+04	0.00E+00	2.30E+03	0.00E+00	2.18E+04	0.00E+00	1.40E+05	0.00E+00
AG-110M	3.86E+07	2.81E+07	1.86E+07	0.00E+00	4.03E+07	0.00E+00	1.46E+09	0.00E+00
SN-113	2.13E+06	8.15E+04	2.20E+06	3.10E+04	4.37E+04	0.00E+00	4.55E+06	0.00E+00
SB-124	2.11E+07	3.11E+05	6.54E+06	5.61E+04	0.00E+00	1.32E+07	6.52E+07	0.00E+00
SB-125	1.42E+07	1.37E+05	2.91E+06	1.77E+04	0.00E+00	8.20E+06	1.89E+07	0.00E+00
TE-129M	6.30E+07	2.16E+07	9.71E+06	2.42E+07	1.58E+08	0.00E+00	3.76E+07	0.00E+00
TE-129	3.44E-10	1.18E-10	8.02E-11	2.88E-10	8.56E-10	0.00E+00	2.75E-08	0.00E+00
TE-131M	4.14E+05	1.67E+05	1.38E+05	3.38E+05	1.15E+06	0.00E+00	2.81E+06	0.00E+00
TE-132	2.59E+06	1.28E+06	1.20E+06	1.89E+06	8.02E+06	0.00E+00	4.75E+06	0.00E+00
I-131	3.21E+09	3.78E+09	1.66E+09	1.24E+12	4.41E+09	0.00E+00	1.35E+08	0.00E+00
I-132	1.74E+00	3.54E+00	1.26E+00	1.66E+02	3.95E+00	0.00E+00	2.87E+00	0.00E+00
I-133	4.36E+07	6.35E+07	1.86E+07	1.15E+10	7.46E+07	0.00E+00	1.07E+07	0.00E+00
I-134	2.21E-11	4.52E-11	1.61E-11	1.05E-09	5.05E-11	0.00E+00	4.67E-11	0.00E+00
I-135	1.36E+05	2.70E+05	9.83E+04	2.42E+07	3.00E+05	0.00E+00	9.76E+04	0.00E+00

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R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem/yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-15 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁵

PATHWAY = Goat Milk
 AGE GROUP = Infant

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
CS-134	8.62E+10	1.61E+11	1.62E+10	0.00E+00	4.14E+10	1.70E+10	4.37E+08	0.00E+00
CS-136	5.65E+09	1.66E+10	6.21E+09	0.00E+00	6.63E+09	1.35E+09	2.52E+08	0.00E+00
CS-137	1.25E+11	1.46E+11	1.03E+10	0.00E+00	3.92E+10	1.59E+10	4.56E+08	0.00E+00
CS-138	2.70E-22	4.40E-22	2.13E-22	0.00E+00	2.19E-22	3.42E-23	7.03E-22	0.00E+00
BA-139	5.27E-08	3.49E-11	1.53E-09	0.00E+00	2.10E-11	2.12E-11	3.34E-06	0.00E+00
BA-140	2.76E+07	2.76E+04	1.42E+06	0.00E+00	6.56E+03	1.70E+04	6.79E+06	0.00E+00
LA-140	4.87E+00	1.92E+00	4.94E-01	0.00E+00	0.00E+00	0.00E+00	2.25E+04	0.00E+00
LA-142	2.09E-11	7.68E-12	1.84E-12	0.00E+00	0.00E+00	0.00E+00	1.30E-06	0.00E+00
CE-141	4.58E+03	2.80E+03	3.29E+02	0.00E+00	8.62E+02	0.00E+00	1.44E+06	0.00E+00
CE-143	4.77E+01	3.16E+04	3.61E+00	0.00E+00	9.21E+00	0.00E+00	1.85E+05	0.00E+00
CE-144	2.21E+05	9.03E+04	1.24E+04	0.00E+00	3.65E+04	0.00E+00	1.27E+07	0.00E+00
HF-181	8.23E+03	3.87E+01	7.27E+02	3.28E+01	2.27E+01	0.00E+00	6.75E+04	0.00E+00
W-187	7.30E+03	5.08E+03	1.75E+03	0.00E+00	0.00E+00	0.00E+00	2.98E+05	0.00E+00
NP-239	4.38E+00	3.92E-01	2.21E-01	0.00E+00	7.81E-01	0.00E+00	1.13E+04	0.00E+00

¹⁵ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem/yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-16
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁶
(Reference Regulatory Guide 1.109)

PATHWAY = Inhalation
AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	1.26E+03	1.26E+03	1.26E+03	1.26E+03	1.26E+03	1.26E+03	1.26E+03
F-18	4.99E+03	0.00E+00	5.54E+02	0.00E+00	0.00E+00	0.00E+00	1.48E+02	0.00E+00
NA-24	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	1.02E+04	0.00E+00
CR-51	0.00E+00	0.00E+00	1.00E+02	5.95E+01	2.28E+01	1.44E+04	3.32E+03	0.00E+00
MN-54	0.00E+00	3.96E+04	6.30E+03	0.00E+00	9.84E+03	1.40E+06	7.74E+04	0.00E+00
MN-56	0.00E+00	1.24E+00	1.83E-01	0.00E+00	1.30E+00	9.44E+03	2.02E+04	0.00E+00
FE-55	2.46E+04	1.70E+04	3.94E+03	0.00E+00	0.00E+00	7.21E+04	6.03E+03	0.00E+00
FE-59	1.18E+04	2.78E+04	1.06E+04	0.00E+00	0.00E+00	1.02E+06	1.88E+05	0.00E+00
CO-57	0.00E+00	6.92E+02	6.71E+02	0.00E+00	0.00E+00	3.70E+05	3.14E+04	0.00E+00
CO-58	0.00E+00	1.58E+03	2.07E+03	0.00E+00	0.00E+00	9.28E+05	1.06E+05	0.00E+00
CO-60	0.00E+00	1.15E+04	1.48E+04	0.00E+00	0.00E+00	5.97E+06	2.85E+05	0.00E+00
NI-65	1.54E+00	2.10E-01	9.12E-02	0.00E+00	0.00E+00	5.60E+03	1.23E+04	0.00E+00
CU-64	0.00E+00	1.46E+00	6.15E-01	0.00E+00	4.62E+00	6.78E+03	4.90E+04	0.00E+00
ZN-65	3.24E+04	1.03E+05	4.66E+04	0.00E+00	6.90E+04	8.64E+05	5.34E+04	0.00E+00
BR-82	0.00E+00	0.00E+00	1.35E+04	0.00E+00	0.00E+00	0.00E+00	1.04E+04	0.00E+00
BR-83	0.00E+00	0.00E+00	2.41E+02	0.00E+00	0.00E+00	0.00E+00	2.32E+02	0.00E+00
BR-84	0.00E+00	0.00E+00	3.13E+02	0.00E+00	0.00E+00	0.00E+00	1.64E-03	0.00E+00
RB-86	0.00E+00	1.35E+05	5.90E+04	0.00E+00	0.00E+00	0.00E+00	1.66E+04	0.00E+00
RB-88	0.00E+00	3.87E+02	1.93E+02	0.00E+00	0.00E+00	0.00E+00	3.34E-09	0.00E+00
RB-89	0.00E+00	2.56E+02	1.70E+02	0.00E+00	0.00E+00	0.00E+00	9.28E-12	0.00E+00
SR-89	3.04E+05	0.00E+00	8.72E+03	0.00E+00	0.00E+00	1.40E+06	3.50E+05	0.00E+00
SR-90	9.92E+07	0.00E+00	6.10E+06	0.00E+00	0.00E+00	9.60E+06	7.22E+05	0.00E+00
SR-91	6.19E+01	0.00E+00	2.50E+00	0.00E+00	0.00E+00	3.65E+04	1.91E+05	0.00E+00
SR-92	6.74E+00	0.00E+00	2.91E-01	0.00E+00	0.00E+00	1.65E+04	4.30E+04	0.00E+00
Y-91M	2.61E-01	0.00E+00	1.02E-02	0.00E+00	0.00E+00	1.92E+03	1.33E+00	0.00E+00
Y-91	4.62E+05	0.00E+00	1.24E+04	0.00E+00	0.00E+00	1.70E+06	3.85E+05	0.00E+00
Y-92	1.03E+01	0.00E+00	3.02E-01	0.00E+00	0.00E+00	1.57E+04	7.35E+04	0.00E+00
Y-93	9.44E+01	0.00E+00	2.61E+00	0.00E+00	0.00E+00	4.85E+04	4.22E+05	0.00E+00
ZR-95	1.07E+05	3.44E+04	2.33E+04	0.00E+00	5.42E+04	1.77E+06	1.50E+05	0.00E+00
ZR-97	9.68E+01	1.96E+01	9.04E+00	0.00E+00	2.97E+01	7.87E+04	5.23E+05	0.00E+00
NB-95	1.41E+04	7.82E+03	4.21E+03	0.00E+00	7.74E+03	5.05E+05	1.04E+05	0.00E+00
NB-97	2.22E-01	5.62E-02	2.05E-02	0.00E+00	6.54E-02	2.40E+03	2.42E+02	0.00E+00
MO-99	0.00E+00	1.21E+02	2.30E+01	0.00E+00	2.91E+02	9.12E+04	2.48E+05	0.00E+00
TC-99M	1.03E-03	2.91E-03	3.70E-02	0.00E+00	4.42E-02	7.64E+02	4.16E+03	0.00E+00
TC-101	4.18E-05	6.02E-05	5.90E-04	0.00E+00	1.08E-03	3.99E+02	1.09E-11	0.00E+00
RU-103	1.53E+03	0.00E+00	6.58E+02	0.00E+00	5.83E+03	5.05E+05	1.10E+05	0.00E+00
RU-105	7.90E-01	0.00E+00	3.11E-01	0.00E+00	1.02E+00	1.10E+04	4.82E+04	0.00E+00
RU-106	6.91E+04	0.00E+00	8.72E+03	0.00E+00	1.34E+05	9.36E+06	9.12E+05	0.00E+00
AG-110M	1.08E+04	1.00E+04	5.94E+03	0.00E+00	1.97E+04	4.63E+06	3.02E+05	0.00E+00
SN-113	6.86E+03	2.66E+02	6.48E+03	9.28E+01	1.97E+02	2.99E+05	2.48E+04	0.00E+00
SB-124	3.12E+04	5.89E+02	1.24E+04	7.55E+01	0.00E+00	2.48E+06	4.06E+05	0.00E+00
SB-125	5.34E+04	5.95E+02	1.26E+04	5.40E+01	0.00E+00	1.74E+06	1.01E+05	0.00E+00
TE-129M	9.76E+03	4.67E+03	1.58E+03	3.44E+03	3.66E+04	1.16E+06	3.83E+05	0.00E+00
TE-129	4.98E-02	2.39E-02	1.24E-02	3.90E-02	1.87E-01	1.94E+03	1.57E+02	0.00E+00
TE-131M	6.99E+01	4.36E+01	2.90E+01	5.50E+01	3.09E+02	1.46E+05	5.56E+05	0.00E+00
TE-132	2.60E+02	2.15E+02	1.62E+02	1.90E+02	1.46E+03	2.88E+05	5.10E+05	0.00E+00

¹⁶ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
 Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-16 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁶

PATHWAY = Inhalation
 AGE GROUP = Adult

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
I-131	2.52E+04	3.58E+04	2.05E+04	1.19E+07	6.13E+04	0.00E+00	6.28E+03	0.00E+00
I-132	1.16E+03	3.26E+03	1.16E+03	1.14E+05	5.18E+03	0.00E+00	4.06E+02	0.00E+00
I-133	8.64E+03	1.48E+04	4.52E+03	2.15E+06	2.58E+04	0.00E+00	8.88E+03	0.00E+00
I-134	6.44E+02	1.73E+03	6.15E+02	2.98E+04	2.75E+03	0.00E+00	1.01E+00	0.00E+00
I-135	2.68E+03	6.98E+03	2.57E+03	4.48E+05	1.11E+04	0.00E+00	5.25E+03	0.00E+00
CS-134	3.73E+05	8.48E+05	7.28E+05	0.00E+00	2.87E+05	9.76E+04	1.04E+04	0.00E+00
CS-136	3.90E+04	1.46E+05	1.10E+05	0.00E+00	8.56E+04	1.20E+04	1.17E+04	0.00E+00
CS-137	4.78E+05	6.21E+05	4.28E+05	0.00E+00	2.22E+05	7.52E+04	8.40E+03	0.00E+00
CS-138	3.31E+02	6.21E+02	3.24E+02	0.00E+00	4.80E+02	4.86E+01	1.86E-03	0.00E+00
BA-139	9.36E-01	6.66E-04	2.74E-02	0.00E+00	6.22E-04	3.76E+03	8.96E+02	0.00E+00
BA-140	3.90E+04	4.90E+01	2.57E+03	0.00E+00	1.67E+01	1.27E+06	2.18E+05	0.00E+00
BA-142	2.63E-02	2.70E-05	1.66E-03	0.00E+00	2.29E-05	1.19E+03	1.57E-16	0.00E+00
LA-140	3.44E+02	1.74E+02	4.58E+01	0.00E+00	0.00E+00	1.36E+05	4.58E+05	0.00E+00
LA-142	6.83E-01	3.10E-01	7.72E-02	0.00E+00	0.00E+00	6.33E+03	2.11E+03	0.00E+00
CE-141	1.99E+04	1.35E+04	1.53E+03	0.00E+00	6.26E+03	3.62E+05	1.20E+05	0.00E+00
CE-143	1.86E+02	1.38E+02	1.53E+01	0.00E+00	6.08E+01	7.98E+04	2.26E+05	0.00E+00
CE-144	3.43E+06	1.43E+06	1.84E+05	0.00E+00	8.48E+05	7.78E+06	8.16E+05	0.00E+00
PR-144	3.01E-02	1.25E-02	1.53E-03	0.00E+00	7.05E-03	1.02E+03	2.15E-08	0.00E+00
HF-181	4.56E+04	2.57E+02	5.15E+03	1.63E+03	2.14E+02	5.98E+05	1.29E+05	0.00E+00
W-187	8.48E+00	7.08E+00	2.48E+00	0.00E+00	0.00E+00	2.90E+04	1.55E+05	0.00E+00
NP-239	2.30E+02	2.26E+01	1.24E+01	0.00E+00	7.00E+01	3.76E+04	1.19E+05	0.00E+00

¹⁶ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-17
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁷
 (Reference Regulatory Guide 1.109)

PATHWAY = Inhalation
 AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.27E+03	1.27E+03
F-18	5.22E+03	0.00E+00	5.68E+02	0.00E+00	0.00E+00	0.00E+00	3.11E+02	0.00E+00
NA-24	1.38E+04	1.38E+04	1.38E+04	1.38E+04	1.38E+04	1.38E+04	1.38E+04	0.00E+00
CR-51	0.00E+00	0.00E+00	1.35E+02	7.50E+01	3.07E+01	2.10E+04	3.00E+03	0.00E+00
MN-54	0.00E+00	5.11E+04	8.40E+03	0.00E+00	1.27E+04	1.98E+06	6.68E+04	0.00E+00
MN-56	0.00E+00	1.70E+00	2.52E-01	0.00E+00	1.79E+00	1.52E+04	5.74E+04	0.00E+00
FE-55	3.34E+04	2.38E+04	5.54E+03	0.00E+00	0.00E+00	1.24E+05	6.39E+03	0.00E+00
FE-59	1.59E+04	3.70E+04	1.43E+04	0.00E+00	0.00E+00	1.53E+06	1.78E+05	0.00E+00
CO-57	0.00E+00	9.44E+02	9.20E+02	0.00E+00	0.00E+00	5.86E+05	3.14E+04	0.00E+00
CO-58	0.00E+00	2.07E+03	2.78E+03	0.00E+00	0.00E+00	1.34E+06	9.52E+04	0.00E+00
CO-60	0.00E+00	1.51E+04	1.98E+04	0.00E+00	0.00E+00	8.72E+06	2.59E+05	0.00E+00
NI-65	2.18E+00	2.93E-01	1.27E-01	0.00E+00	0.00E+00	9.36E+03	3.67E+04	0.00E+00
CU-64	0.00E+00	2.03E+00	8.48E-01	0.00E+00	6.41E+00	1.11E+04	6.14E+04	0.00E+00
ZN-65	3.86E+04	1.34E+05	6.24E+04	0.00E+00	8.64E+04	1.24E+06	4.66E+04	0.00E+00
BR-82	0.00E+00	0.00E+00	1.82E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	3.44E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	4.33E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	1.90E+05	8.40E+04	0.00E+00	0.00E+00	0.00E+00	1.77E+04	0.00E+00
RB-88	0.00E+00	5.46E+02	2.72E+02	0.00E+00	0.00E+00	0.00E+00	2.92E-05	0.00E+00
RB-89	0.00E+00	3.52E+02	2.33E+02	0.00E+00	0.00E+00	0.00E+00	3.38E-07	0.00E+00
SR-89	4.34E+05	0.00E+00	1.25E+04	0.00E+00	0.00E+00	2.42E+06	3.71E+05	0.00E+00
SR-90	1.08E+08	0.00E+00	6.68E+06	0.00E+00	0.00E+00	1.65E+07	7.65E+05	0.00E+00
SR-91	8.80E+01	0.00E+00	3.51E+00	0.00E+00	0.00E+00	6.07E+04	2.59E+05	0.00E+00
SR-92	9.52E+00	0.00E+00	4.06E-01	0.00E+00	0.00E+00	2.74E+04	1.19E+05	0.00E+00
Y-91M	3.70E-01	0.00E+00	1.42E-02	0.00E+00	0.00E+00	3.20E+03	3.02E+01	0.00E+00
Y-91	6.61E+05	0.00E+00	1.77E+04	0.00E+00	0.00E+00	2.94E+06	4.09E+05	0.00E+00
Y-92	1.47E+01	0.00E+00	4.29E-01	0.00E+00	0.00E+00	2.68E+04	1.65E+05	0.00E+00
Y-93	1.35E+02	0.00E+00	3.72E+00	0.00E+00	0.00E+00	8.32E+04	5.79E+05	0.00E+00
ZR-95	1.46E+05	4.58E+04	3.15E+04	0.00E+00	6.74E+04	2.69E+06	1.49E+05	0.00E+00
ZR-97	1.38E+02	2.72E+01	1.26E+01	0.00E+00	4.12E+01	1.30E+05	6.30E+05	0.00E+00
NB-95	1.86E+04	1.03E+04	5.66E+03	0.00E+00	1.00E+04	7.51E+05	9.68E+04	0.00E+00
NB-97	3.14E-01	7.78E-02	2.84E-02	0.00E+00	9.12E-02	3.93E+03	2.17E+03	0.00E+00
MO-99	0.00E+00	1.69E+02	3.22E+01	0.00E+00	4.11E+02	1.54E+05	2.69E+05	0.00E+00
TC-99M	1.38E-03	3.86E-03	4.99E-02	0.00E+00	5.76E-02	1.15E+03	6.13E+03	0.00E+00
TC-101	5.92E-05	8.40E-05	8.24E-04	0.00E+00	1.52E-03	6.67E+02	8.72E-07	0.00E+00
RU-103	2.10E+03	0.00E+00	8.96E+02	0.00E+00	7.43E+03	7.83E+05	1.09E+05	0.00E+00
RU-105	1.12E+00	0.00E+00	4.34E-01	0.00E+00	1.41E+00	1.82E+04	9.04E+04	0.00E+00
RU-106	9.84E+04	0.00E+00	1.24E+04	0.00E+00	1.90E+05	1.61E+07	9.60E+05	0.00E+00
AG-110M	1.38E+04	1.31E+04	7.99E+03	0.00E+00	2.50E+04	6.75E+06	2.73E+05	0.00E+00
SN-113	8.16E+03	3.44E+02	8.64E+03	1.13E+02	2.46E+02	4.26E+05	2.03E+04	0.00E+00
SB-124	4.30E+04	7.94E+02	1.68E+04	9.76E+01	0.00E+00	3.85E+06	3.98E+05	0.00E+00
SB-125	7.38E+04	8.08E+02	1.72E+04	7.04E+01	0.00E+00	2.74E+06	9.92E+04	0.00E+00
TE-129M	1.39E+04	6.58E+03	2.25E+03	4.58E+03	5.19E+04	1.98E+06	4.05E+05	0.00E+00
TE-129	7.10E-02	3.38E-02	1.76E-02	5.18E-02	2.66E-01	3.30E+03	1.62E+03	0.00E+00
TE-131M	9.84E+01	6.01E+01	4.02E+01	7.25E+01	4.39E+02	2.38E+05	6.21E+05	0.00E+00
TE-132	3.60E+02	2.90E+02	2.19E+02	2.46E+02	1.95E+03	4.49E+05	4.63E+05	0.00E+00

¹⁷ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-17 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁷

PATHWAY = Inhalation
AGE GROUP = Teen

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
I-131	3.54E+04	4.91E+04	2.64E+04	1.46E+07	8.40E+04	0.00E+00	6.49E+03	0.00E+00
I-132	1.59E+03	4.38E+03	1.58E+03	1.51E+05	6.92E+03	0.00E+00	1.27E+03	0.00E+00
I-133	1.22E+04	2.05E+04	6.22E+03	2.92E+06	3.59E+04	0.00E+00	1.03E+04	0.00E+00
I-134	8.88E+02	2.32E+03	8.40E+02	3.95E+04	3.66E+03	0.00E+00	2.04E+01	0.00E+00
I-135	3.70E+03	9.44E+03	3.49E+03	6.21E+05	1.49E+04	0.00E+00	6.95E+03	0.00E+00
CS-134	5.02E+05	1.13E+06	5.49E+05	0.00E+00	3.75E+05	1.46E+05	9.76E+03	0.00E+00
CS-136	5.15E+04	1.94E+05	1.37E+05	0.00E+00	1.10E+05	1.78E+04	1.09E+04	0.00E+00
CS-137	6.70E+05	8.48E+05	3.11E+05	0.00E+00	3.04E+05	1.21E+05	8.48E+03	0.00E+00
CS-138	4.66E+02	8.56E+02	4.46E+02	0.00E+00	6.62E+02	7.87E+01	2.70E-01	0.00E+00
BA-139	1.34E+00	9.44E-04	3.90E-02	0.00E+00	8.88E-04	6.46E+03	6.45E+03	0.00E+00
BA-140	5.47E+04	6.70E+01	3.52E+03	0.00E+00	2.28E+01	2.03E+06	2.29E+05	0.00E+00
BA-142	3.70E-02	3.70E-05	2.27E-03	0.00E+00	3.14E-05	1.91E+03	4.79E-10	0.00E+00
LA-140	4.79E+02	2.36E+02	6.26E+01	0.00E+00	0.00E+00	2.14E+05	4.87E+05	0.00E+00
LA-142	9.60E-01	4.25E-01	1.06E-01	0.00E+00	0.00E+00	1.02E+04	1.20E+04	0.00E+00
CE-141	2.84E+04	1.90E+04	2.17E+03	0.00E+00	8.88E+03	6.14E+05	1.26E+05	0.00E+00
CE-143	2.66E+02	1.94E+02	2.16E+01	0.00E+00	8.64E+01	1.30E+05	2.55E+05	0.00E+00
CE-144	4.89E+06	2.02E+06	2.62E+05	0.00E+00	1.21E+06	1.34E+07	8.64E+05	0.00E+00
PR-144	4.30E-02	1.76E-02	2.18E-03	0.00E+00	1.01E-02	1.75E+03	2.35E-04	0.00E+00
HF-181	6.31E+04	3.47E+02	7.04E+03	2.12E+02	2.90E+02	9.36E+05	1.20E+05	0.00E+00
W-187	1.20E+01	9.76E+00	3.43E+00	0.00E+00	0.00E+00	4.74E+04	1.77E+05	0.00E+00
NP-239	3.38E+02	3.19E+01	1.77E+01	0.00E+00	1.00E+02	6.49E+04	1.32E+05	0.00E+00

¹⁷ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-18
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁸
 (Reference Regulatory Guide 1.109)

PATHWAY = Inhalation
 AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03	1.12E+03
F-18	6.96E+03	0.00E+00	6.85E+02	0.00E+00	0.00E+00	0.00E+00	1.25E+03	0.00E+00
NA-24	1.61E+04	1.61E+04	1.61E+04	1.61E+04	1.61E+04	1.61E+04	1.61E+04	0.00E+00
CR-51	0.00E+00	0.00E+00	1.54E+02	8.55E+01	2.43E+01	1.70E+04	1.08E+03	0.00E+00
MN-54	0.00E+00	4.29E+04	9.51E+03	0.00E+00	1.00E+04	1.58E+06	2.29E+04	0.00E+00
MN-56	0.00E+00	1.66E+00	3.12E-01	0.00E+00	1.67E+00	1.31E+04	1.23E+05	0.00E+00
FE-55	4.74E+04	2.52E+04	7.77E+03	0.00E+00	0.00E+00	1.11E+05	2.87E+03	0.00E+00
FE-59	2.07E+04	3.34E+04	1.67E+04	0.00E+00	0.00E+00	1.27E+06	7.07E+04	0.00E+00
CO-57	0.00E+00	9.03E+02	1.07E+03	0.00E+00	0.00E+00	5.07E+05	1.32E+04	0.00E+00
CO-58	0.00E+00	1.77E+03	3.16E+03	0.00E+00	0.00E+00	1.11E+06	3.44E+04	0.00E+00
CO-60	0.00E+00	1.31E+04	2.26E+04	0.00E+00	0.00E+00	7.07E+06	9.62E+04	0.00E+00
NI-65	2.99E+00	2.96E-01	1.64E-01	0.00E+00	0.00E+00	8.18E+03	8.40E+04	0.00E+00
CU-64	0.00E+00	1.99E+00	1.07E+00	0.00E+00	6.03E+00	9.58E+03	3.67E+04	0.00E+00
ZN-65	4.26E+04	1.13E+05	7.03E+04	0.00E+00	7.14E+04	9.95E+05	1.63E+04	0.00E+00
BR-82	0.00E+00	0.00E+00	2.09E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	4.74E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	5.48E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	1.98E+05	1.14E+05	0.00E+00	0.00E+00	0.00E+00	7.99E+03	0.00E+00
RB-88	0.00E+00	5.62E+02	3.66E+02	0.00E+00	0.00E+00	0.00E+00	1.72E+01	0.00E+00
RB-89	0.00E+00	3.45E+02	2.90E+02	0.00E+00	0.00E+00	0.00E+00	1.89E+00	0.00E+00
SR-89	5.99E+05	0.00E+00	1.72E+04	0.00E+00	0.00E+00	2.16E+06	1.67E+05	0.00E+00
SR-90	1.01E+08	0.00E+00	6.44E+06	0.00E+00	0.00E+00	1.48E+07	3.43E+05	0.00E+00
SR-91	1.21E+02	0.00E+00	4.59E+00	0.00E+00	0.00E+00	5.33E+04	1.74E+05	0.00E+00
SR-92	1.31E+01	0.00E+00	5.25E-01	0.00E+00	0.00E+00	2.40E+04	2.42E+05	0.00E+00
Y-91M	5.07E-01	0.00E+00	1.84E-02	0.00E+00	0.00E+00	2.81E+03	1.72E+03	0.00E+00
Y-91	9.14E+05	0.00E+00	2.44E+04	0.00E+00	0.00E+00	2.63E+06	1.84E+05	0.00E+00
Y-92	2.04E+01	0.00E+00	5.81E-01	0.00E+00	0.00E+00	2.39E+04	2.39E+05	0.00E+00
Y-93	1.86E+02	0.00E+00	5.11E+00	0.00E+00	0.00E+00	7.44E+04	3.89E+05	0.00E+00
ZR-95	1.90E+05	4.18E+04	3.70E+04	0.00E+00	5.96E+04	2.23E+06	6.11E+04	0.00E+00
ZR-97	1.88E+02	2.72E+01	1.60E+01	0.00E+00	3.88E+01	1.13E+05	3.51E+05	0.00E+00
NB-95	2.35E+04	9.18E+03	6.55E+03	0.00E+00	8.62E+03	6.14E+05	3.70E+04	0.00E+00
NB-97	4.29E-01	7.70E-02	3.50E-02	0.00E+00	8.55E-02	3.42E+03	2.78E+16	0.00E+00
MO-99	0.00E+00	1.72E+02	4.25E+01	0.00E+00	3.92E+02	1.35E+05	1.27E+05	0.00E+00
TC-99M	1.78E-03	3.48E-03	5.77E-02	0.00E+00	5.07E-02	9.51E+02	4.81E+03	0.00E+00
TC-101	8.10E-05	8.51E-05	1.08E-03	0.00E+00	1.45E-03	5.85E+02	1.63E+01	0.00E+00
RU-103	2.79E+03	0.00E+00	1.07E+03	0.00E+00	7.03E+03	6.62E+05	4.48E+04	0.00E+00
RU-105	1.53E+00	0.00E+00	5.55E-01	0.00E+00	1.34E+00	1.59E+04	9.95E+04	0.00E+00
RU-106	1.36E+05	0.00E+00	1.69E+04	0.00E+00	1.84E+05	1.43E+07	4.29E+05	0.00E+00
AG-110M	1.69E+04	1.14E+04	9.14E+03	0.00E+00	2.12E+04	5.48E+06	1.00E+05	0.00E+00
SN-113	8.99E+03	2.90E+02	9.81E+03	1.19E+02	2.03E+02	3.40E+05	7.44E+03	0.00E+00
SB-124	5.74E+04	7.40E+02	2.00E+04	1.26E+02	0.00E+00	3.24E+06	1.64E+05	0.00E+00
SB-125	9.84E+04	7.59E+02	2.07E+04	9.10E+01	0.00E+00	2.32E+06	4.03E+04	0.00E+00
TE-129M	1.92E+04	6.85E+03	3.04E+03	6.33E+03	5.03E+04	1.76E+06	1.82E+05	0.00E+00
TE-129	9.77E-02	3.50E-02	2.38E-02	7.14E-02	2.57E-01	2.93E+03	2.55E+04	0.00E+00
TE-131M	1.34E+02	5.92E+01	5.07E+01	9.77E+01	4.00E+02	2.06E+05	3.08E+05	0.00E+00
TE-132	4.81E+02	2.72E+02	2.63E+02	3.17E+02	1.77E+03	3.77E+05	1.38E+05	0.00E+00

¹⁸ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-18 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁸

PATHWAY = Inhalation
AGE GROUP = Child

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
I-131	4.81E+04	4.81E+04	2.73E+04	1.62E+07	7.88E+04	0.00E+00	2.84E+03	0.00E+00
I-132	2.12E+03	4.07E+03	1.88E+03	1.94E+05	6.25E+03	0.00E+00	3.20E+03	0.00E+00
I-133	1.66E+04	2.03E+04	7.70E+03	3.85E+06	3.38E+04	0.00E+00	5.48E+03	0.00E+00
I-134	1.17E+03	2.16E+03	9.95E+02	5.07E+04	3.30E+03	0.00E+00	9.55E+02	0.00E+00
I-135	4.92E+03	8.73E+03	4.14E+03	7.92E+05	1.34E+04	0.00E+00	4.44E+03	0.00E+00
CS-134	6.51E+05	1.01E+06	2.25E+05	0.00E+00	3.30E+05	1.21E+05	3.85E+03	0.00E+00
CS-136	6.51E+04	1.71E+05	1.16E+05	0.00E+00	9.55E+04	1.45E+04	4.18E+03	0.00E+00
CS-137	9.07E+05	8.25E+05	1.28E+05	0.00E+00	2.82E+05	1.04E+05	3.62E+03	0.00E+00
CS-138	6.33E+02	8.40E+02	5.55E+02	0.00E+00	6.22E+02	6.81E+01	2.70E+02	0.00E+00
BA-139	1.84E+00	9.84E-04	5.36E-02	0.00E+00	8.62E-04	5.77E+03	5.77E+04	0.00E+00
BA-140	7.40E+04	6.48E+01	4.33E+03	0.00E+00	2.11E+01	1.74E+06	1.02E+05	0.00E+00
BA-142	4.99E-02	3.60E-05	2.79E-03	0.00E+00	2.91E-05	1.64E+03	2.74E+00	0.00E+00
LA-140	6.44E+02	2.25E+02	7.55E+01	0.00E+00	0.00E+00	1.83E+05	2.26E+05	0.00E+00
LA-142	1.29E+00	4.11E-01	1.29E-01	0.00E+00	0.00E+00	8.70E+03	7.59E+04	0.00E+00
CE-141	3.92E+04	1.95E+04	2.90E+03	0.00E+00	8.55E+03	5.44E+05	5.66E+04	0.00E+00
CE-143	3.66E+02	1.99E+02	2.87E+01	0.00E+00	8.36E+01	1.15E+05	1.27E+05	0.00E+00
CE-144	6.77E+06	2.12E+06	3.61E+05	0.00E+00	1.17E+06	1.20E+07	3.89E+05	0.00E+00
PR-144	5.96E-02	1.85E-02	3.00E-03	0.00E+00	9.77E-03	1.57E+03	1.97E+02	0.00E+00
HF-181	8.33E+04	3.28E+02	8.47E+03	2.76E+02	2.63E+02	7.96E+05	5.29E+04	0.00E+00
W-187	1.63E+01	9.66E+00	4.33E+00	0.00E+00	0.00E+00	4.11E+04	9.10E+04	0.00E+00
NP-239	4.66E+02	3.34E+01	2.35E+01	0.00E+00	9.73E+01	5.81E+04	6.40E+04	0.00E+00

¹⁸ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

TABLE 3.5-19
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁹
 (Reference Regulatory Guide 1.109)

PATHWAY = Inhalation
 AGE GROUP = Infant

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
H-3	0.00E+00	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02	6.47E+02
F-18	5.49E+03	0.00E+00	4.66E+02	0.00E+00	0.00E+00	0.00E+00	8.54E+02	0.00E+00
NA-24	1.06E+04	1.06E+04	1.06E+04	1.06E+04	1.06E+04	1.06E+04	1.06E+04	0.00E+00
CR-51	0.00E+00	0.00E+00	8.95E+01	5.75E+01	1.32E+01	1.28E+04	3.57E+02	0.00E+00
MN-54	0.00E+00	2.53E+04	4.98E+03	0.00E+00	4.98E+03	1.00E+06	7.06E+03	0.00E+00
MN-56	0.00E+00	1.54E+00	2.21E-01	0.00E+00	1.10E+00	1.25E+04	7.17E+04	0.00E+00
FE-55	1.97E+04	1.17E+04	3.33E+03	0.00E+00	0.00E+00	8.69E+04	1.09E+03	0.00E+00
FE-59	1.36E+04	2.35E+04	9.48E+03	0.00E+00	0.00E+00	1.02E+06	2.48E+04	0.00E+00
CO-57	0.00E+00	6.51E+02	6.41E+02	0.00E+00	0.00E+00	3.79E+05	4.86E+03	0.00E+00
CO-58	0.00E+00	1.22E+03	1.82E+03	0.00E+00	0.00E+00	7.77E+05	1.11E+04	0.00E+00
CO-60	0.00E+00	8.02E+03	1.18E+04	0.00E+00	0.00E+00	4.51E+06	3.19E+04	0.00E+00
NI-65	2.39E+00	2.84E-01	1.23E-01	0.00E+00	0.00E+00	8.12E+03	5.01E+04	0.00E+00
CU-64	0.00E+00	1.88E+00	7.74E-01	0.00E+00	3.98E+00	9.30E+03	1.50E+04	0.00E+00
ZN-65	1.93E+04	6.26E+04	3.11E+04	0.00E+00	3.25E+04	6.47E+05	5.14E+04	0.00E+00
BR-82	0.00E+00	0.00E+00	1.33E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-83	0.00E+00	0.00E+00	3.81E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BR-84	0.00E+00	0.00E+00	4.00E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RB-86	0.00E+00	1.90E+05	8.82E+04	0.00E+00	0.00E+00	0.00E+00	3.04E+03	0.00E+00
RB-88	0.00E+00	5.57E+02	2.87E+02	0.00E+00	0.00E+00	0.00E+00	3.39E+02	0.00E+00
RB-89	0.00E+00	3.21E+02	2.06E+02	0.00E+00	0.00E+00	0.00E+00	6.82E+01	0.00E+00
SR-89	3.98E+05	0.00E+00	1.14E+04	0.00E+00	0.00E+00	2.03E+06	6.40E+04	0.00E+00
SR-90	4.09E+07	0.00E+00	2.59E+06	0.00E+00	0.00E+00	1.12E+07	1.31E+05	0.00E+00
SR-91	9.56E+01	0.00E+00	3.46E+00	0.00E+00	0.00E+00	5.26E+04	7.34E+04	0.00E+00
SR-92	1.05E+01	0.00E+00	3.91E-01	0.00E+00	0.00E+00	2.38E+04	1.40E+05	0.00E+00
Y-91M	4.07E-01	0.00E+00	1.39E-02	0.00E+00	0.00E+00	2.79E+03	2.35E+03	0.00E+00
Y-91	5.88E+05	0.00E+00	1.57E+04	0.00E+00	0.00E+00	2.45E+06	7.03E+04	0.00E+00
Y-92	1.64E+01	0.00E+00	4.61E-01	0.00E+00	0.00E+00	2.45E+04	1.27E+05	0.00E+00
Y-93	1.50E+02	0.00E+00	4.07E+00	0.00E+00	0.00E+00	7.64E+04	1.67E+05	0.00E+00
ZR-95	1.15E+05	2.79E+04	2.03E+04	0.00E+00	3.11E+04	1.75E+06	2.17E+04	0.00E+00
ZR-97	1.50E+02	2.56E+01	1.17E+01	0.00E+00	2.59E+01	1.10E+05	1.40E+05	0.00E+00
NB-95	1.57E+04	6.43E+03	3.78E+03	0.00E+00	4.72E+03	4.79E+05	1.27E+04	0.00E+00
NB-97	3.42E-01	7.29E-02	2.63E-02	0.00E+00	5.70E-02	3.32E+03	2.69E+04	0.00E+00
MO-99	0.00E+00	1.65E+02	3.23E+01	0.00E+00	2.65E+02	1.35E+05	4.87E+04	0.00E+00
TC-99M	1.40E-03	2.88E-03	3.72E-02	0.00E+00	3.11E-02	8.11E+02	2.03E+03	0.00E+00
TC-101	6.51E-05	8.23E-05	8.12E-04	0.00E+00	9.79E-04	5.84E+02	8.44E+02	0.00E+00
RU-103	2.02E+03	0.00E+00	6.79E+02	0.00E+00	4.24E+03	5.52E+05	1.61E+04	0.00E+00
RU-105	1.22E+00	0.00E+00	4.10E-01	0.00E+00	8.99E-01	1.57E+04	4.84E+04	0.00E+00
RU-106	8.68E+04	0.00E+00	1.09E+04	0.00E+00	1.07E+05	1.16E+07	1.64E+05	0.00E+00
AG-110M	9.98E+03	7.22E+03	5.00E+03	0.00E+00	1.09E+04	3.67E+06	3.30E+04	0.00E+00
SN-113	4.68E+03	1.74E+02	4.89E+03	6.72E+01	9.94E+01	2.30E+05	2.28E+03	0.00E+00
SB-124	3.04E+04	5.56E+02	1.20E+04	1.01E+02	0.00E+00	2.65E+06	3.42E+04	0.00E+00
SB-125	5.17E+04	4.77E+02	1.09E+04	6.23E+00	5.70E-02	3.32E+03	2.69E+04	0.00E+00
TE-129M	1.41E+04	6.09E+03	2.23E+03	5.47E+03	3.18E+04	1.68E+06	6.90E+04	0.00E+00
TE-129	7.88E-02	3.47E-02	1.88E-02	6.75E-02	1.75E-01	3.00E+03	2.63E+04	0.00E+00
TE-131M	1.07E+02	5.50E+01	3.63E+01	8.93E+01	2.65E+02	1.99E+05	1.19E+05	0.00E+00
TE-132	3.72E+02	2.37E+02	1.76E+02	2.79E+02	1.03E+03	3.40E+05	4.41E+04	0.00E+00

¹⁹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

H.B. Robinson Steam Electric Plant Unit 2
Offsite Dose Calculation Manual (ODCM)

TABLE 3.5-19 (continued)
R VALUES for the H.B. ROBINSON STEAM ELECTRIC PLANT¹⁹

PATHWAY = Inhalation
AGE GROUP = Infant

Nuclide	Bone	Liver	T.Body	Thyroid	Kidney	Lung	GI-Tract	Skin
I-131	3.79E+04	4.44E+04	1.96E+04	1.48E+07	5.18E+04	0.00E+00	1.06E+03	0.00E+00
I-132	1.69E+03	3.54E+03	1.26E+03	1.69E+05	3.95E+03	0.00E+00	1.90E+03	0.00E+00
I-133	1.32E+04	1.92E+04	5.60E+03	3.56E+06	2.24E+04	0.00E+00	2.16E+03	0.00E+00
I-134	9.21E+02	1.88E+03	6.65E+02	4.45E+04	2.09E+03	0.00E+00	1.29E+03	0.00E+00
I-135	3.86E+03	7.60E+03	2.77E+03	6.96E+05	8.47E+03	0.00E+00	1.83E+03	0.00E+00
CS-134	3.96E+05	7.03E+05	7.45E+04	0.00E+00	1.90E+05	7.97E+04	1.33E+03	0.00E+00
CS-136	4.83E+04	1.35E+05	5.29E+04	0.00E+00	5.64E+04	1.18E+04	1.43E+03	0.00E+00
CS-137	5.49E+05	6.12E+05	4.55E+04	0.00E+00	1.72E+05	7.13E+04	1.33E+03	0.00E+00
CS-138	5.05E+02	7.81E+02	3.98E+02	0.00E+00	4.10E+02	6.54E+01	8.76E+02	0.00E+00
BA-139	1.48E+00	9.84E-04	4.30E-02	0.00E+00	5.92E-04	5.95E+03	5.10E+04	0.00E+00
BA-140	5.60E+04	5.60E+01	2.90E+03	0.00E+00	1.34E+01	1.60E+06	3.84E+04	0.00E+00
BA-142	3.98E-02	3.30E-05	1.96E-03	0.00E+00	1.90E-05	1.55E+03	6.93E+02	0.00E+00
LA-140	5.05E+02	2.00E+02	5.15E+01	0.00E+00	0.00E+00	1.68E+05	8.48E+04	0.00E+00
LA-142	1.03E+00	3.77E-01	9.04E-02	0.00E+00	0.00E+00	8.22E+03	5.95E+04	0.00E+00
CE-141	2.77E+04	1.67E+04	1.99E+03	0.00E+00	5.25E+03	5.17E+05	2.16E+04	0.00E+00
CE-143	2.93E+02	1.93E+02	2.21E+01	0.00E+00	5.64E+01	1.16E+05	4.97E+04	0.00E+00
CE-144	3.19E+06	1.21E+06	1.76E+05	0.00E+00	5.38E+05	9.84E+06	1.48E+05	0.00E+00
PR-144	4.79E-02	1.85E-02	2.41E-03	0.00E+00	6.72E-03	1.61E+03	4.28E+03	0.00E+00
HF-181	5.64E+04	2.66E+02	5.05E+03	2.25E+02	1.58E+02	6.72E+05	1.90E+04	0.00E+00
W-187	1.30E+01	9.02E+00	3.12E+00	0.00E+00	0.00E+00	3.96E+04	3.56E+04	0.00E+00
NP-239	3.71E+02	3.32E+01	1.88E+01	0.00E+00	6.62E+01	5.95E+04	2.49E+04	0.00E+00

¹⁹ R Values in units of mrem/yr per $\mu\text{Ci}/\text{m}^3$ for inhalation and tritium, and units of $\text{m}^2\text{-mrem}/\text{yr}$ per $\mu\text{Ci}/\text{sec}$ for all others.

3.6 Methodology for R-11 Setpoint (Air Particulate)

Determine the Monitor Alarm Setpoint based on the inhalation pathway to the child. The most restrictive organ 'j' will be determined from the following methodology.

3.6.1 Determine dose rate for organ 'j' (mrem/yr).

$$DR_j = (\overline{\chi/Q}) \sum_i (R_{ij} * Q_i) \tag{3.6-1}$$

where:

$(\overline{\chi/Q})$ = the highest calculated annual average relative dispersion factor for any area at or beyond the unrestricted area boundary for all sectors from Appendix A (sec/m^3).
 = $8.1\text{E-}05 \text{ sec/m}^3$ (continuous ground release) from Table A-1, Appendix A.

R_{ij} = the organ 'j' dose factor due to gamma emissions from particulates greater than or equal to 8 day half-life, I-133, I-131, and H-3.

Q_i = the particulate release rate for radionuclide 'i' ($\mu\text{Ci/sec}$).

$$Q_i = 472 * C_i * F$$

where:

472 = A conversion factor to convert cfm to cm^3/sec .

When R-11 is sampling the Plant Vent for C.V. Purges:

C_i = $(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Containment Vessel} * 0.366 * \text{DF}) + (\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Plant Vent} * 0.634)$

0.366 = Dilution correction factor for C.V. Purge.
 = $\frac{35,000 \text{ cfm}}{(60,600+35,000) \text{ cfm}}$

0.634 = Dilution correction factor for Plant Vent during C.V. Purge.
 = $\frac{60,600 \text{ cfm}}{(60,600+35,000) \text{ cfm}}$

When R-11 is sampling the Plant Vent for C.V. Pressure Relief:

$$C_i = \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Containment Vent} * 0.040 * DF \right) + \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Plant Vent} * 0.960 \right)$$

$$0.040 = \text{Dilution correction factor for C.V. Pressure Relief.}$$

$$= \frac{2,500^\dagger \text{ cfm}}{(60,600 + 2,500^\dagger) \text{ cfm}}$$

$$0.960 = \text{Dilution correction factor for Plant Vent during C.V. Pressure Relief.}$$

$$= \frac{60,600 \text{ cfm}}{(60,600 + 2,500^\dagger) \text{ cfm}}$$

When R-11 is sampling C.V. :

$$C_i = \left(\frac{\mu\text{Ci}}{\text{cm}^3} \text{ from analysis of Containment Vent} * DF \right)$$

$$DF = \text{Filter removal factor (dimensionless).}$$

$$= 1.0 \text{ for Tritium.}$$

$$= 10 \text{ for Iodines when using charcoal filters.}$$

$$= 100 \text{ for Particulates } \geq 8 \text{ day half-lives when using HEPA Filters.}$$

$$F = \text{The maximum acceptable effluent flow rate at the point of release (cfm).}$$

$$= 95,600 \text{ cfm for CV purge when R-11 is sampling from Plant Vent.}$$

$$= 35,000 \text{ cfm for CV purge when R-11 is sampling from CV.}$$

$$= 2,500 \text{ cfm for CV pressure relief when R-11 is sampling from CV.}$$

$$= 63,100 \text{ cfm for CV pressure relief when R-11 is sampling Plant Vent.}$$

[†] 2,500 CFM - Refer to Appendix B.3 for additional information

3.6.2 Determine the particulate emission Projected Dose Rate Ratio (PDRR) for the most critical organ 'j'.

$$PDRR_j = \frac{DR_j}{1500} \tag{3.6-2}$$

where:

$$1500 = \text{the allowable organ dose rate due to particulates with } \geq 8 \text{ day half-life, I-131, I-133, H-3 (mrem/year).}$$

3.6.3 Determine the maximum monitor setpoint concentration ($\mu\text{Ci}/\text{cm}^3$) for the most critical organ 'j'.

$$\text{Maximum Monitor Setpoint for Organ 'j'} = \frac{\sum_i C_i}{PDRR_j} * S * T_m * TL \quad (3.6-3)$$

where:

- S = 0.5, an engineering factor used to provide a margin of safety for cumulative measurement uncertainties.
- T_m = fraction of the radioactivity from the site that may be released via the monitored pathway to ensure that the site boundary limit is not exceeded due to simultaneous releases from several pathways.
= 0.81 for R-11 particulate monitor.
- T_L = total activity divided by $\sum_i C_i$, where the total activity is the sum of all detectable particulates from analysis of particulate filter divided by the detectable particulates of ≥ 8 day half-lives. If this ratio is not known use 1.0.
= 1.0 when R-11 sampling from Plant Vent.

3.6.4 Determine the maximum monitor setpoint (cpm) for the most critical organ 'j'.

$$\text{Setpoint} = \left(\text{Maximum Monitor Setpoint for Organ 'j' in } \frac{\mu\text{Ci}}{\text{cm}^3} \right) * (\text{Monitor Eff}) + \text{Bkg} \quad (3.6-4)$$

where:

- Monitor Eff = monitor efficiency obtained from the applicable effluent monitor curve efficiency located in the Station Curve Book. Use the radioactivity concentration ($\mu\text{Ci}/\text{cc}$) to find cpm.
- Bkg = the monitor background (cpm).

3.7 Deleted

3.8 Deleted

3.9 Methodology for R-22 Setpoint Determination for the Iodine and Particulate Monitors

This section describes the methodology in determining high alarm setpoint for the particulate and iodine channels for the Environmental and Radiation Control Building (R-22) based on the inhalation pathway to the most restrictive organ and age group (child).

3.9.1

The dose rate in an unrestricted area resulting from the release of radioiodines, tritium, and particulates with half-lives ≥ 8 days is limited to 1500 mrem/yr to any organ via inhalation (10 CFR 20). The iodine and particulate monitor setpoints for R-22 are limited to 1.0% of 10 CFR 20 over one hour period. Therefore, the iodine and particulate channels high alarms shall be set to 1.0% of 10 CFR 20 for any given hour.

3.9.2 Determine Q_i , the maximum release rate ($\mu\text{Ci}/\text{sec}$) for Iodine-131 and Cobalt-60 (the most restrictive particulate ≥ 8 day half-life) based on the most restrictive organ 'j' via inhalation to a child.

$$Q_i = \frac{15}{R_i * (\overline{\chi/Q})} \quad (3.9-1)$$

where:

15 = 1.0% of the maximum allowable dose rate in an unrestricted area in gaseous effluents due to radioparticulates with half-lives greater than or equal to 8 days, radioiodine, and tritium via the inhalation pathway to the child (mrem/yr).

R_i = The dose factor based on the most restrictive age group (child) and the most restrictive organ (thyroid) for Iodine-131 ($1.62\text{E}+07$ mrem/yr per $\mu\text{Ci}/\text{m}^3$) and lung for Co-60 ($7.06\text{E}+06$ mrem/yr per $\mu\text{Ci}/\text{m}^3$) at the most restrictive location (SITE BOUNDARY).

$(\overline{\chi/Q})$ = Annual average relative dilution for continuous ground level releases for the most restrictive section at the SITE BOUNDARY ($8.08\text{E}-05$ sec/ m^3 for the SSE sector from Table A-1).

Therefore:

$$Q_{i,\text{Iodine-131}} = 1.15\text{E}-02 \mu\text{Ci}/\text{sec}$$

$$Q_{i,\text{Cobalt-60}} = 2.63\text{E}-22 \mu\text{Ci}/\text{sec}$$

3.9.3 Determine $S_{C,i}$, the air particulate filter and charcoal cartridge sample collection rate ($\mu\text{Ci}/\text{sec}$) by:

$$S_{C,i} = Q_i * \frac{f}{F} \tag{3.9-2}$$

where:

f = typical value is 2.5 cfm for R-22, sampler flow rate (cfm).

F = typical value is 11,500 cfm, Environmental and Radiation Control Building exhaust vent flow rate (cfm).

Therefore:

The typical Co-60 sample collection rate is 5.72E-06 $\mu\text{Ci}/\text{sec}$ for R-22.

The typical I-131 sample collection rate is 2.5E-06 $\mu\text{Ci}/\text{sec}$ for R-22.

3.9.4 Determine $Q_{m,i}$, the setpoint activity (μCi) accumulated on the air particulate filter and charcoal filter for any given hour by:

$$Q_{m,i} = S_{C,i} * T \tag{3.9-3}$$

where:

T = 3600 (sec/hr).

Therefore:

The typical setpoint activity for the air particulate filter and the charcoal cartridge is:

<u>Monitor</u>	<u>Particulate</u>	<u>Iodine</u>
R-22	2.06E-02	9.00E-03

3.9.5 Determine HSP, the High Alarm Setpoint including background (cpm) by:

$$HSP = (Q_{m,i} * E_m) + Bkg \quad (3.9-4)$$

where:

E_m = efficiency of the detector (cpm/ μ Ci).

Bkg = the background of the detector (cpm).

The above methodology shall be used for the iodine cartridge and air particulate filter setpoint determinations for the Environmental and Radiation Control Building. The sampling and building vent flow rates used in the above equations are subject to change and shall be controlled by plant procedures. If or when this occurs, the recalculations of setpoints shall be performed by approved procedures using the above methodology.

3.10 Radioactive Gaseous Effluent Monitoring Instrumentation

Applicability

Applies to the radioactive gaseous effluent instrumentation system.

Objective

To define the operating requirements for the radioactive gaseous effluent instrumentation system.

Specification

CONTROLS

3.10.1 The radioactive gaseous effluent monitoring instrumentation channels shown in Table 3.10-1 shall be operable with their alarm/trip setpoints set to ensure that the limits of ODCM Specification 3.2.1 are not exceeded. The alarm/trip setpoints of these channels shall be determined in accordance with the ODCM.

ACTIONS

3.10.2 With a radioactive effluent monitoring instrumentation channel alarm/trip setpoint less conservative than required by the above specification, without delay suspend the release of radioactive gaseous effluents, change the setpoint so it is acceptably conservative, or declare the channel not operable.

3.10.3 With less than the minimum number of radioactive gaseous effluent monitoring instrumentation channels operable take the action shown in Table 3.10-1.

3.10.4 The provisions of ODCM Specification 8.1 are not applicable.

BASES

Radioactive Gaseous Effluent Instrumentation

The radioactive gaseous effluent monitoring instrumentation is provided to monitor and control, as applicable, the releases of radioactive materials in gaseous effluents during actual or potential releases of gaseous effluents. The alarm/trip setpoints for these instruments shall be calculated in accordance with the procedures in the ODCM to ensure that the alarm/trip will occur prior to exceeding the limits of 10 CFR Part 20, Appendix B, Table 2, Column 1. The operability and use of this instrumentation are consistent with the requirements of General Design Criteria 60, 63, and 64 of Appendix A to 10 CFR Part 50.

TABLE 3.10-1
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
1. Plant Vent (R-14) a. Radionoble gas monitor (R14C) provides automatic termination of Waste Gas Decay Tank releases upon exceeding alarm/trip setpoint. b. Radionoble gas monitor (R14C) monitors all effluents from Auxiliary Building Ventilation System without providing automatic termination of release upon exceeding their respective alarm setpoints.	1 1	With the number of channels operable less than the MCO requirements: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that prior to initiating a waste gas decay tank release: 1. Two independent samples are analyzed in accordance with the Surveillance Requirements of ODCM Specification 3.2.1 and; 2. Two members of the facility staff independently verify the release rate calculations and the discharge line valving. With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that grab samples are collected once per 12 hours and are analyzed for radionoble gases within 24 hours.

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
1. Plant Vent (Continued) c. Radioiodine Sampler d. Particulate Sampler e. Sampler flow rate monitor	1 1 1	<p>With the number of channels operable less than the MCO requirements:</p> <ol style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1) <p>With the number of channels operable less than the MCO requirement:</p> <ol style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may be continued, provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1) <p>With the number of channels operable less than the MCO requirement:</p> <ol style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided the flow rate is estimated once per 4 hours.

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
1. Plant Vent (Continued) f. Plant Vent flow rate	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that flow rate is estimated once per 4 hours.
2. Containment Vessel via Plant Vent a. Radionoble gas monitor (R-12) provides automatic termination of Containment Vessel releases upon exceeding alarm/trip Setpoint. b. Radioparticulate Monitor (R-11) provides automatic termination of containment vessel releases exceeding alarm/trip setpoints.	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that the Plant Vent Radionoble Gas Monitor (R14C) is operable; otherwise, suspend all releases via this pathway. (note 2)

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
2. Containment Vessel via Plant Vent (Continued) c. Sampler flow rate monitor (R-11)	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that either the Plant Vent Radionoble Gas Monitor (R-14C) is operable or the flow rate is estimated once per 4 hours. (note 2)
3. Fuel Handling Building Lower Level Exhaust Vent a. Radionoble gas monitor (R-20) b. Sampler flow rate monitor (R-20)	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that grab samples are taken once per 12 hours and analyzed for radionoble gases within 24 hours. With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided the flow rate is estimated once per 4 hours.

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
3. Fuel Handling Building Lower Level Exhaust Vent (continued) c. Radioiodine sampler d. Particulate sampler	1 1	With the number of channels operable less than the MCO requirements: <ul style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1) With the number of channels operable less than the MCO requirement: <ul style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may be continued, provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1)

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
<p>4. Fuel Handling Building Upper Level Exhaust Vent</p> <p>a. Radionoble gas monitor (R-21) trips the exhaust and supply fans for the upper level of the Fuel Handling Building upon exceeding alarm/trip setpoint.</p> <p>b. Sampler flow rate monitor (R-21)</p>	<p>1</p> <p>1</p>	<p>With the number of channels operable less than the MCO requirement:</p> <p>a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and,</p> <p>b. Effluent releases via this pathway may continue provided that:</p> <ol style="list-style-type: none"> 1. The Plant Vent Radionoble Gas Monitor (R14C) is operable, or; 2. Grab samples are collected once per 12 hours and are analyzed within 24 hours for radionoble gases. <p>With the number of channels operable less than the MCO requirement:</p> <p>a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and,</p> <p>b. Effluent releases via this pathway may continue provided the flow rate is estimated once per 4 hours.</p>

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
5. E&RC Building Exhaust (R-22) <ul style="list-style-type: none"> a. Radionoble gas monitor (R-22C) monitors all effluents from E&RC Laboratory Building Ventilation System without providing automatic termination of release upon exceeding their respective alarm setpoints. b. Radioiodine Sampler c. Particulate Sampler 	<ul style="list-style-type: none"> 1 1 1 	<ul style="list-style-type: none"> With the number of channels operable less than the MCO requirement: <ul style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that grab samples are collected once per 12 hours and are analyzed for radionoble gases within 24 hours. With the number of channels operable less than the MCO requirements: <ul style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1) With the number of channels operable less than the MCO requirements: <ul style="list-style-type: none"> a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1)

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
5. E&RC Building Exhaust (Continued) d. Sampler flow rate gauge	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided the flow rate is estimated once per 4 hours.
6. Radwaste Building Exhaust a. Radioiodine Sampler	1	With the number of channels operable less than the MCO requirements: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1)
b. Particulate Sampler	1	With the number of channels operable less than the MCO requirements: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided that a continuous sample is collected utilizing auxiliary sampling equipment as required by Table 3.12-1. (note 1)

* MCO - Minimum Channels Operable

TABLE 3.10-1 (continued)
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION

Release Pathway/Instrumentation	MCO*	Compensatory Measures
6. Radwaste Building Exhaust (Continued) c. Sampler flow rate gauge	1	With the number of channels operable less than the MCO requirement: a. Exert best efforts to return the instruments to operable status within 30 days and, if unsuccessful, explain in the next Annual Radioactive Effluent Release Report why the inoperability was not corrected in a timely manner in accordance with Technical Specification 5.6.3 and, b. Effluent releases via this pathway may continue provided the flow rate is estimated once per 4 hours.
7. Deleted.	NA	NA

* MCO - Minimum Channels Operable

NOTES TO TABLE 3.10-1

- Note 1 - No auxiliary sampling is required for periods when normal sampling is off \leq 45 minutes.
- Note 2 - This MCO is required during Modes 1, 2, 3, 4, and during the movement of recently irradiated fuel assemblies within the containment.

3.11 Radioactive Gaseous Effluent Monitoring Instrumentation Surveillance Requirements

Applicability

Applies to the radioactive gaseous effluent instrumentation system.

Objective

To ascertain that the radioactive gaseous effluent instrumentation system is functioning properly in order to accurately monitor radioactive gaseous effluent releases.

Specification

SURVEILLANCE REQUIREMENTS

3.11.1 Each radioactive gaseous effluent monitoring instrumentation channel shall be demonstrated operable by performance of the channel check, source check, channel calibration, and Channel Operational Test operations at the frequencies shown in Table 3.11-1.

TABLE 3.11-1
RADIOACTIVE GASEOUS EFFLUENT MONITORING INSTRUMENTATION SURVEILLANCE REQUIREMENTS

Pathway / Instruments	Channel Check	Source Check	Channel Calibration	Channel Operational Test
1. Plant Vent (R-14)				
a. (Deleted)	(Deleted)	(Deleted)	(Deleted)	(Deleted)
b. (Deleted)	(Deleted)	(Deleted)	(Deleted)	(Deleted)
c. Radionoble gas (R14C)	P (Note 4)/D	P (Note 4)/M	R (Note 2)	Q (Note 5)
d. Sampler flow rate	D (Note 1)	N.A.	R	Q
e. Plant Vent flow rate monitor (F14)	D (Note 1)	N.A.	R	Q
2. Containment Vessel via Plant Vent				
a. Radioparticulate Monitor (R-11)	D	D	R (Note 2)	Q
b. Radionoble gas monitor (R-12)	D	P (Note 3)	R (Note 2)	Q
c. Sampler flow rate monitor (R-12)	D	N.A.	R	Q
3. Fuel Handling Building Lower Level Exhaust Vent				
a. Radionoble gas monitor (R-20)	D	M	R (Note 2)	Q
b. Sampler flow rate monitor (R-20)	D (Note 1)	N.A.	N.A.	N.A.
4. Fuel Handling Building Upper Level Exhaust Vent				
a. Radionoble gas monitor (R-21)	D	M	R (Note 2)	Q
b. Sampler flow rate monitor (R-21)	D (Note 1)	N.A.	N.A.	N.A.
5. Environmental and Radiation Control Laboratory Exhaust				
a. Radionoble gas monitor (R-22C)	D	M	R (Note 2)	Q
b. Sampler flow rate monitor (R-22)	D (Note 1)	N.A.	N.A.	N.A.
6. Radwaste Building Exhaust				
a. Sampler flow rate monitor	D (Note 1)	N.A.	N.A.	N.A.
7. Deleted.	N.A.	N.A.	N.A.	N.A.

NOTES TO TABLE 3.11-1

- Note 1 The channel check shall consist of verifying indication of flow whenever plant conditions dictate that flow is supposed to be present.
- Note 2 The channel calibration shall be performed using one or more of the reference standards certified by the National Institute of Standards and Technology (NIST) or using standards that have been obtained from suppliers that participate in measurement assurance activities or otherwise NIST traceable.
- Note 3 Prior to each containment release.
- Note 4 Prior to each Waste Gas Decay Tank release.
- Note 5 The Channel Operational Test shall also demonstrate that automatic isolation of this pathway and control room alarm annunciation occur if any of the following conditions exists:
1. Instrument indicates measured levels above the alarm/trip setpoint.
 2. Power failure.
 3. Channel Fail Alarm.
- Note 6 The Channel Operational Test shall also demonstrate that Control Room alarm annunciation occurs if any of the following conditions exists:
1. Instrument indicates measured levels above the alarm setpoint.
 2. Power failure.
 3. Instrument indicates a downscale failure.
 4. Instrument controls not set in operate mode.

NOTATION

- P Completed prior to making a radioactive materials release
D At least once per 24 hours
W At least once per 7 days
N.A. Not applicable
M At least once per 31 days
R At least once per 18 months
Q At least once per 92 days

3.12 Radioactive Gaseous Effluents Sampling and Analysis Requirements

Applicability

Applies to the monitoring of radioactive gaseous effluents.

Objective

To ascertain that radioactive gaseous effluent releases are being maintained as low as reasonably achievable and within allowable limits.

Specification

SURVEILLANCE REQUIREMENTS

3.12.1 The dose rate due to radioactive materials in gaseous effluents shall be determined to be within the limits of ODCM Specification 3.2.1 in accordance with the methods and procedures of the ODCM by obtaining representative samples and performing analyses in accordance with the sampling and analysis program specified in Table 3.12-1.

TABLE 3.12-1
RADIOACTIVE GASEOUS WASTE SAMPLING ANALYSIS PROGRAM

Type of Release	Sampling Frequency	Minimum Analysis Frequency	Required Activity Analysis	Required LLD ^a $\mu\text{Ci/ml}$
Waste Gas Decay Tanks	P	P	Principal Gamma Emitters ^c	1E-04
			Tritium	1E-06
Containment Pressure Reliefs and Containment Purges	P, M ^e Grab Sample	P, M ^e on Grab Sample	Principal Gamma Emitters ^c	1E-04
			Tritium	1E-06
<u>Continuous Releases</u>				
1. Plant Vent	M ^{e, g, h} Grab Sample for Radionoble Gases and Tritium	M ^e on Grab Sample	Principal Gamma Emitters ^c	1E-04
			Tritium	1E-06
2. E&RC Building				
3. Lower Fuel Handling Building	Continuous ^{d, j} Radioiodine Sample	W ^f	I-131 I-133 on Sample	1E-12 1E-10
			Continuous ^{d, j} Particulate Sample	W ^f on Sample
4. Radwaste Building ^k	Continuous ^d Particulate Samples to be Composited	Q On Composite	Sr-89, Sr-90	1E-11
		M On Composite	Alpha	1E-11
	Continuous	Noble Gas Monitor	Noble Gases Gross Beta and Gamma	2E-5 $\mu\text{Ci/cm}^3$

TABLE 3.12-1 NOTATION

- a. Lower Limit of Detection (LLD) is an "a priori" limit representing the capability of a measurement system. LLD is calculated in accordance with methodology established in ODCM Table 2.8-1, Note a.
- b. (deleted)
- c. The principal gamma emitters for which the LLD specification applies exclusively are the following radionuclides: Kr-87, Kr-88, Xe-133, Xe-133m, Xe-135, and Xe-138 for gaseous emissions, I-131 for halogen emissions, and Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144 for particulate emissions. This list does not mean that only these nuclides are to be detected and reported. Other peaks which are measurable and identifiable, together with the above nuclides, shall also be identified and reported.
- d. The ratio of the sample flow rate to the sampled stream flow rate shall be known for the time period covered by each dose or dose rate calculation.
- e. Sampling and analysis shall also be performed following shutdown, startup, or a power change exceeding 15 percent of rated power within one hour unless (1) analysis shows that the dose equivalent I-131 concentration in the primary coolant has not increased more than a factor of 3; (2) the noble gas activity monitor shows that effluent activity has not increased by more than a factor of 3.
- f. Samples shall be changed once per 7 days and analyses shall be completed within 48 hours after changing (or after removal from sampler). Sampling and analyses shall also be performed once per 24 hours for 7 days following shutdown, start-up or thermal power level change exceeding 15% of rated thermal power in one hour and if I-131 Dose Equivalent in the RCS is greater than $0.1 \mu\text{Ci}/\text{cm}^3$. When samples collected for 24 hours are analyzed, the corresponding LLD's may be increased by a factor of 10. The analyses shall be performed within 48 hours.
- g. Tritium grab samples shall be taken at least once per 24 hours when the refueling canal is flooded.
- h. Tritium grab samples shall be taken at least once per 7 days from the ventilation exhaust from the spent fuel pool area, whenever spent fuel is in the spent fuel pool.
- i. (deleted)
- j. No auxiliary sampling is required for periods when normal sampling is off ≤ 45 minutes.

TABLE 3.12-1 NOTATION (continued)

- k. Monthly grab samples to be analyzed for principle gamma emitters and tritium are not applicable for the Radwaste Building release point. Additionally, the Radwaste Building release point does not have a noble gas monitor and, therefore, the noble gas monitor requirements do not apply.

NOTATION

- P Completed prior to making a radioactive materials release
W At least once per 7 days
M At least once per 31 days
Q At least once per 92 days

3.13 Radionoble Gases - Cumulative Doses

Applicability

Applies to the determination of cumulative doses from radionoble gases.

Objective

To ascertain that cumulative doses from radionoble gases are being maintained as low as reasonably achievable and within allowable limits.

Specification

SURVEILLANCE REQUIREMENTS

- 3.13.1 Cumulative dose commitments for the current calendar quarter and current calendar year shall be determined in accordance with the ODCM once per 31 days.

3.14 Radioiodines, Radioactive Materials in Particulate Form, and Radionuclides Other Than Radionoble Gases - Cumulative Doses

Applicability

Applies to the determination of cumulative doses from radioiodines, radioactive materials in particulate form, and radionuclides other than radionoble gases.

Objective

To ascertain that cumulative doses from radioiodines, radioactive materials in particulate form, and radionuclides other than radionoble gases are maintained as low as reasonably achievable and within allowable limits.

Specification

SURVEILLANCE REQUIREMENTS

- 3.14.1 Cumulative dose contributions for the current calendar quarter and current calendar year for I-131, I-133, tritium, and radionuclides in particulate form with half-lives greater than 8 days shall be determined in accordance with the methodology and parameters in the ODCM at least once per 31 days.

3.15 Gaseous Radwaste and Ventilation Exhaust Treatment Systems

Applicability

Applies to the gaseous radwaste and ventilation exhaust treatment systems.

Objective

To define the operating requirements for the gaseous radwaste and ventilation exhaust treatment systems and to ascertain that the concentration of radioactive materials in the gaseous radwaste and ventilation exhaust treatment systems is maintained as low as reasonably achievable and within allowable limits.

Specification

CONTROLS

3.15.1 The appropriate portions of the Gaseous Radwaste Treatment System and the Ventilation Exhaust Treatment System shall be maintained and used to reduce the concentrations of radioactive materials in gaseous wastes prior to their discharge when the projected dose commitments due to the release of gaseous effluents to unrestricted areas (See Figure 7-1) when averaged over a calendar quarter would exceed:

- a. 0.6 mrem for gamma radiation and 1.3 mrem for beta radiation due to radionoble gases

OR

- b. 1.0 mrem to any organ due to radioiodines, radioactive materials in particulate form, and radionuclides other than radionoble gases.

ACTIONS

3.15.2 With the Gaseous Radwaste Treatment System and/or the Ventilation Exhaust Treatment System not operable and with radioactive gaseous wastes being discharged without treatment while in excess of the limits of ODCM Specification 3.15.1 above, prepare and submit a report to the Commission in accordance with ODCM Specification 9.3.b.

SURVEILLANCE REQUIREMENTS

3.15.3 Dose commitments due to gaseous releases shall be projected at least once per 31 days, in accordance with the ODCM to ensure the provisions of ODCM Specification 3.15.1 are satisfied.

BASES

Gaseous Radwaste and Ventilation Exhaust Treatment Systems

The requirements that the appropriate portions of these systems be maintained and used when specified provides reasonable assurance that the releases of radioactive materials in gaseous effluents will be kept "as low as reasonably achievable". This specification implements the requirements of 10 CFR Part 50.36a, General Design Criterion 60 of Appendix A to 10 CFR Part 50, and the design objectives given in Section II.D of Appendix I to 10 CFR Part 50. The specified limits governing the use of appropriate portions of the systems were specified as the dose design objectives set forth in Section II.B and II.C of Appendix I, 10 CFR Part 50, for gaseous effluents.

3.16 Methodology for Carbon-14 Dose

Applicability

Applies to the determination of cumulative doses from the releases of C-14 from gaseous effluent releases.

Objective

To define the methodology to be used for the determination of the cumulative doses from C-14 from release of gaseous effluents.

Specification

SURVEILLANCE REQUIREMENTS

3.16.1 Cumulative dose commitments from the release of C-14 in gaseous effluents shall be determined once per year in accordance with the ODCM.

CONTROLS

3.16.2 Annual Dose from Inhalation of Carbon-14 Releases in Air.

3.16.2.1 Airborne Concentration for Short Term Mixed Mode Release at Receptor.

Determine the annual average airborne concentration pCi/m³ for C-14 at the location with respect to the release point for short term mixed mode releases from WGDT and Containment releases.

$$X_S = 3.17 \times 10^4 * Q_{SY} * (\overline{\chi/q})_v \quad (3.16-1)$$

where:

X_S = The annual average ground-level concentration of C-14 in air from short term mixed mode WGDT and Containment Building releases (pCi/m³).

$(\overline{\chi/q})_v$ = Annual average relative concentration for the short term mixed mode plant vent releases, < 500 hrs/yr, from Table A-16, (2.90E-06 sec/m³).

3.17×10^4 = The number of pCi/Ci divided by the number of sec/yr.

$$Q_{SY} = \text{Estimated pro-rated release rate of C-14 for short term mixed mode releases based on actual EFPD for the year.}$$

$$= Q_S * \frac{\text{EFPD}}{292}$$

where:

$$Q_S = 2.8 \text{ Ci/yr for short term mixed mode releases, Table 3.16-3.}$$

$$\text{EFPD} = \text{Effective full power days for the year.}$$

$$292 = \text{Effective full power days per year which NUREG-0017 release rates are based on.}$$

3.16.2.2 Airborne Concentration for Long Term Mixed Mode Release at Receptor.

Determine the annual average airborne concentration pCi/m³ for C-14 at the location with respect to the release point for long term mixed mode releases from the Auxiliary Building and Upper Fuel Handling Building.

$$X_L = 3.17 \times 10^4 * Q_{LY} * (\overline{\chi/Q})_v \tag{3.16-2}$$

where:

$$X_L = \text{The annual average ground-level concentration of C-14 in air from mixed mode long term releases from Auxiliary Building and Upper Fuel Handling Building Releases (pCi/m}^3\text{).}$$

$$(\overline{\chi/Q})_v = \text{Annual average relative concentration for the long term plant vent mixed mode releases, } > 500 \text{ hrs/yr, from Table A-10, (9.94E-07 sec/m}^3\text{)}$$

$$3.17 \times 10^4 = \text{The number of pCi/Ci divided by the number of sec/yr.}$$

$$Q_{LY} = \text{Estimated pro-rated release rate of C-14 for long term mixed mode releases based on actual EFPD for the year.}$$

$$= Q_L * \frac{\text{EFPD}}{292}$$

where:

$$Q_L = 4.5 \text{ Ci/yr for short term mixed mode releases, Table 3.16-4.}$$

$$\text{EFPD} = \text{Effective full power days for the year.}$$

$$292 = \text{Effective full power days per year which NUREG-0017 release rates are based on.}$$

3.16.2.3 Inhalation Dose.

Determine the annual inhalation dose from C-14, to organ (j) to an age group (a) for both the short term and long term releases using the following equation:

$$D_{ja,Inhal} = U_{ga} * DFA_{ja} * (X_S + X_L) \tag{3.16-3}$$

where:

$$D_{ja,Inhal} = \text{Annual dose from inhalation to an organ (j) of an age group (a) from C-14 (mrem/yr).}$$

$$U_{ga} = \text{Inhalation rate for age group (a), Section B.2.1 (m}^3\text{/yr).}$$

$$DFA_{ja} = \text{Dose factor for an organ (j) from C-14 for the inhalation pathway to an age group (a), Table 3.16-1 (mrem/pCi).}$$

$$X_S = \text{Annual average ground-level concentration of C-14 in air from WGDT and Containment Building short term mixed mode releases (pCi/m}^3\text{).}$$

$$X_L = \text{Annual average ground-level concentration of C-14 in air from Aux. Building, Upper Fuel Handling Building long term mixed mode releases (pCi/m}^3\text{).}$$

3.16.3 Annual Dose from Ingestion of Carbon-14 Released in Air.

3.16.3.1 Concentration of Airborne Carbon-14 in vegetation.

Determine the concentration of Carbon-14 in vegetation at location with respect to the release point for both the short term and long term releases using the following equation:

$$C_V = 3.17 \times 10^7 * p * \frac{0.11}{0.16} * \left[\left(Q_{SY} * 0.30 * (\overline{\chi/q})_v \right) + \left(Q_{LY} * 0.30 * (\overline{\chi/Q})_v \right) \right] \quad (3.16-4)$$

where:

- C_V = The concentration of C-14 in vegetation (pCi/kg)
- 3.17×10^7 = $(10^{12} \text{ pCi/Ci}) * (10^3 \text{ g/kg}) / (3.15 \times 10^7 \text{ sec/yr})$
- p = 1.0, the fractional equilibrium ratio fraction (dimensionless).
- 0.11 = Fraction of total plant mass that is natural carbon (dimensionless).
- 0.16 = Concentration of natural carbon in the atmosphere (g/m^3).
- 0.30 = Fractional estimate of C-14 as CO_2 , EPRI Technical Report 1021106, 2010, page 4-28 (dimensionless).
- $(\overline{\chi/q})_v$ = Annual average relative concentration for the short term plant vent mixed mode releases, < 500 hrs/yr, from Table A-16 ($2.90 \times 10^{-6} \text{ sec/m}^3$).
- $(\overline{\chi/Q})_v$ = Annual average relative concentration for the long term plant vent mixed mode releases, >500 hrs/yr, from Table A-10 ($9.94 \times 10^{-7} \text{ sec/m}^3$).

3.16.3.2 Concentration of Airborne Carbon-14 in Milk.

Determine the concentration of Carbon-14 in milk at location with respect to the release point for both the short and long term releases.

$$C_M = F_M * C_V * Q_f \quad (3.16-5)$$

where:

C_M = The concentration of C-14 in milk (pCi/L).

F_M = 0.012 days/liter, average fraction of the animal's daily intake of C-14 that appears in each liter of milk.

C_V = The concentration of C-14 in vegetation (pCi/kg).

Q_f = Amount of feed consumed by the animal per day, Table B-1 (kg/day).

3.16.3.3 Concentration of Airborne Carbon-14 in Meat.

Determine the concentration of Carbon-14 in meat at location with respect to the release point for both the short term and long term releases.

$$C_{Meat} = F_f * C_V * Q_f \quad (3.16-6)$$

where:

C_{Meat} = The concentration of C-14 in meat (pCi/kg).

F_f = 0.031 days/kg, average fraction of the animal's daily intake of C-14 that appears in each kilogram of flesh.

C_V = The concentration of C-14 in vegetation (pCi/kg).

Q_f = Amount of feed consumed by the animal per day, Table B-1 (kg/day).

3.16.3.4 Annual Dose from Ingestion (Produce, Milk, Meat & Leafy Vegetation).

Determine the annual dose from atmospherically released Carbon-14 from foods for both short term and long term releases.

$$D_{ja,Ingest} = DFI_{ja} * [(U_a^S * f_g * C_V) + (U_{ap,Milk} * C_{Milk}) + (U_{ap,Meat} * C_{Meat}) + (U_a^L * f_L * C_V)] \quad (3.16-7)$$

where:

$D_{ja,Ingest}$ group (a) and	=	The annual dose to organ (j) of an individual in age resulting from ingestion of C-14 in produce, milk, meat, leafy vegetables for both the short term and long term releases (mrem/yr).
DFI_{ja}	=	The dose conversion factor for the ingestion of Carbon-14, organ (j), and age group (a), Table 3.16-2 (mrem/pCi).
U_a^S	=	Ingestion rate of produce (non-leafy vegetables, fruit, grains), Table B-3 (kg/yr).
f_g	=	0.76, fraction of produce ingested grown in garden of interest (dimensionless).
C_V	=	The concentration of C-14 in vegetation (pCi/kg).
$U_{ap,Milk}$	=	Ingestion rate of milk, Table B-1 (L/yr).
C_{Milk}	=	The concentration of C-14 in milk (pCi/L).
$U_{ap,Meat}$	=	Ingestion rate of meat and poultry, Table B-1 (kg/yr).
C_{Meat}	=	The concentration of C-14 in meat (pCi/kg).
U_a^L	=	Ingestion rate of leafy vegetables, Table B-3 (kg/yr).
f_L	=	1.0, fraction of leafy vegetables grown in garden of interest (dimensionless).

3.16.4 Total Annual Dose from Inhalation and Food Consumption for Carbon-14 Releases.

Determine the total annual C-14 dose to organ (j) in an age group (a) for inhalation and ingestion for both the short term and long term releases using the following equation:

$$D_{ja,Tot} = D_{ja,Inhal} + D_{ja,Ingest} \quad (3.16-8)$$

where:

$D_{ja,Tot}$ = The total annual C-14 dose to an organ (j) of an individual in age group (a) resulting from the inhalation and ingestion of C-14 from short term and long term mixed mode releases (mrem/yr).

$D_{ja,Inhal}$ = The annual inhalation dose from C-14, to organ (j) in an age group (a) (mrem/yr).

$D_{ja,Ingest}$ = The annual ingestion dose from C-14, to organ (j) in an age group (a) (mrem/yr).

TABLE 3.16-1
INHALATION DOSE FACTORS FROM CARBON-14

<u>Age Group</u>	<u>Bone</u>	<u>Liver</u>	<u>T.Body</u>	<u>Thyroid</u>	<u>Kidney</u>	<u>Lung</u>	<u>GI-LLI</u>
Infant	1.89E-05	3.79E-06	3.79E-06	3.79E-06	3.79E-06	3.79E-06	3.79E-06
Child	9.70E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06	1.82E-06
Teen	3.25E-06	6.09E-07	6.09E-07	6.09E-07	6.09E-07	6.09E-07	6.09E-07
Adult	2.27E-06	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07	4.26E-07

NRC regulatory Guide 1.109, Rev. 1, Tables E-7 to E-10

TABLE 3.16-2
INGESTION DOSE FACTORS FROM CARBON-14

<u>Individual</u>	<u>Bone</u>	<u>Liver</u>	<u>T.Body</u>	<u>Thyroid</u>	<u>Kidney</u>	<u>Lung</u>	<u>GI-LLI</u>
Infant	2.37E-05	5.06E-06	5.06E-06	5.06E-06	5.06E-06	5.06E-06	5.06E-06
Child	1.21E-05	2.42E-06	2.42E-06	2.42E-06	2.42E-06	2.42E-06	2.42E-06
Teen	4.06E-06	8.12E-07	8.12E-07	8.12E-07	8.12E-07	8.12E-07	8.12E-07
Adult	2.84E-06	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07	5.68E-07

NRC regulatory Guide 1.109, Rev. 1, Tables E-11 to E-14

TABLE 3.16-3
CARBON-14 SOURCE TERMS

<u>Release Points</u>	<u>Ci/yr Released</u>
Containment Building	1.6
Aux. Bldg. & Fuel Handling	4.5
Waste Decay Tanks	1.2
<hr/>	<hr/>
Total	7.3

NUREG-0017, REV 1 (GALE CODE) SECTION 2.2.25.2, PAGE 2-90, TABLES 2-38 & 2-39,
SECTION 1.5.1.1 CAPACITY FACTOR = 80% (292 EFFECTIVE FULL POWER DAYS/YR)

BASES

Carbon-14 is produced by several nuclear reactions. In a nuclear reactor the most dominate mechanism is the reaction of O-17 in the fuel or water with a neutron to produce C-14 and an alpha particle. C-14 releases in PWRs occur primarily as a mix of organic carbon and carbon dioxide released from the waste gas system. Because the dose contribution of C-14 from liquid radioactive waste is much less than that contributed by gaseous radioactive waste, evaluation of C-14 in liquid waste is not required. The dose rate and subsequent dose to an individual from C-14 intake depends upon the specific activity of the food from each source and the amount of the ingested C-14 which is retained over the period under consideration.

The quantity of C-14 discharged can be estimated by sample measurements or by use of a normalized C-14 source term and scaling factors based upon power generation. NUREG-0017 Rev 1 "Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from Pressurized Reactors" gives a C-14 source term based on measurements at 10 operating power plants. The C-14 source term according to NUREG-0017 is 7.3 curies/year for an 80% capacity factory or 292 Effective Full Power Days. It is not necessary to calculate uncertainties for C-14 or to include C-14 uncertainty in any calculation of overall uncertainty.

In the determination of the limiting sector, all age groups and all of the exposure pathways based on land-use census are evaluated using the highest mixed mode χ/Q value in Appendix A for short and long term releases. These could include milk, meat and vegetable ingestion, and inhalation pathways. Atmosphere Carbon Dioxide (CO₂) is incorporated in cellular material by the photosynthetic actions of green plants. Plants and grasses, from which most foodstuff are derived, equilibrate with the C-14 CO₂ of the air. Due to the Primary Water System reducing environment, only 30% of the C-14 is released in the organic form.

To show compliance with 10 CFR 50, equation 3.16-8 is evaluated at the limiting pathway location. At HBR this location is the vegetable garden 0.3 miles in the SSE sector. The critical receptor is a child.

RNP ODCM Radiological Environmental Monitoring Program 4.2.1 requires that a land-use census survey be conducted on an annual basis. The age groupings at the various receptor locations are also determined during this survey. Thus, depending on the results of the survey, a new limiting location and receptor age group could result.

Regulatory Guide 1.109 provides the detailed implementation guidance to show compliance with Appendix I of 10 CFR 50 limits.

4.0 RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

4.1 Monitoring Program - Implementation

Applicability

Applies to the radiological environmental monitoring program.

Objective

To define the requirements for implementation of the radiological environmental monitoring program.

Specification

CONTROLS

4.1.1 The Radiological Environmental Monitoring Program shall be conducted as specified in Table 4.1-1.

ACTIONS

- 4.1.2 With the Radiological Environmental Monitoring Program not being conducted as specified in Table 4.1-1, prepare and submit to the Commission, in the Annual Radiological Environmental Operating Report required by Technical Specification 5.6.2, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence.
- 4.1.3 With the level of radioactivity as the result of plant effluents in an environmental sampling medium at a specified location exceeding the reporting levels of Table 4.1-2 when averaged over any calendar quarter, prepare and submit to the Commission within 30 days, pursuant to ODCM Specification 9.5, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions to be taken to reduce radioactive effluents so that the potential annual dose* to a member of the public is less than the calendar year limits of ODCM Specifications 2.4.1, 3.4.1, and 3.5.2.1. When more than one of the radionuclides in Table 4.1-2 are detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{concentration (1)}}{\text{reporting level (1)}} + \frac{\text{concentration (2)}}{\text{reporting level (2)}} + \dots \geq 1.0$$

When radionuclides other than those in Table 4.1-2 are detected and are the result of plant effluents, this report shall be submitted if the potential annual dose* to a member of the public is equal to or greater than the calendar year limits of ODCM Specifications 2.4.1, 3.4.1, and 3.5.2.1. This report is not required if the measured level of radioactivity was not the result of plant effluents; however, in such an event, the condition shall be reported and described in the Annual Radiological Environmental Operating Report.

* the methodology and parameters used to estimate the potential annual dose to a member of the public shall be indicated in this report.

- 4.1.4 With milk or fresh leafy vegetable samples unavailable from one or more of the sample locations required by Table 4.1-1, identify locations for obtaining replacement samples and add them to the radiological environmental monitoring program within 30 days. The specific locations from which samples were unavailable may then be deleted from the monitoring program. Pursuant to Technical Specification 5.6.2, identify the cause of the unavailability of samples and identify the new location(s) for obtaining replacement samples in the next Annual Radioactive Effluent Release Report and also include in the report a revised figure(s) and table for the ODCM reflecting the new location(s).
- 4.1.5 The provisions of ODCM Specification 8.1 are not applicable.
- 4.1.6 Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, or to malfunction of automatic sampling equipment. If the latter, every effort shall be made to complete corrective action prior to the end of the next sampling period.

BASES

Monitoring Program

The radiological environmental monitoring program required by this specification provides representative measurements of radiation and of radioactive materials in those exposure pathways and for those radionuclides that lead to the highest potential radiation exposures of members of the public resulting from the station operation. This monitoring program implements Section IV.B.2 of Appendix I to 10 CFR Part 50 and thereby supplements the radiological effluent monitoring program by verifying that the measurable concentrations of radioactive materials and levels of radiation are not higher than expected on the basis of the effluent measurements and the modeling of the environmental exposure pathways. Guidance for this monitoring program is provided by the Radiological Assessment Branch Technical Position on Environmental Monitoring. The initially specified monitoring program will be effective for at least the first three years of commercial operation. Following this period, program changes may be initiated based on operational experience.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLD). The LLDs required by Table 4.1-3 are considered optimum for routine environmental measurements in industrial laboratories. It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as a posteriori (after the fact) limit for a particular measurement.

Detailed discussion of the LLD, and other detection limits, can be found in HASL Procedures Manual, HASL-300 (revised annually), Currie, L. A., "Limits for Qualitative Detection and Quantitative Determination - Application to Radiochemistry," Anal. Chem. 40, 586-93 (1968), and Hartwell, J. K., "Detection Limits for Radioanalytical Counting Techniques," Atlantic Richfield Hanford Company Report ARH-SA-215 (June 1975).

TABLE 4.1-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations	Sampling and Collection Frequency	Type and Frequency of Analysis
1. DIRECT RADIATION ^a	33 routine monitoring stations with two or more dosimeters or with one instrument for measuring and recording dose rate continuously, placed as follows:	Quarterly	Gamma dose quarterly.
	an inner ring of stations, one in each of the 16 meteorological sectors in the general area of the site boundary;		
	an outer ring of stations, one in each of the 16 meteorological sectors in the 6- to 8-km range from site;		
	area to serve as a control ^b station.		
2. AIRBORNE Radioiodine and Particulates	Samples from 5 locations 3 samples from close to the 3 site boundary locations, in different sectors, of the highest calculated annual average ground level D/Q.	Continuous sampler operation with sample collection weekly, or more frequently if required by dust loading.	<u>Radioiodine Canister:</u> I-131 analysis weekly. <u>Particulate Sampler:</u> Gross beta radioactivity analysis following filter change; Gamma isotopic analysis ^d of composite (by location) quarterly.
	1 sample from the vicinity of a community having the highest calculated annual average ground level D/Q.		
	1 sample from a control ^b location, as for example 15-30 km distant and in the least prevalent wind direction.		

TABLE 4.1-1 (continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Number of Representative Samples and Sample Locations	Sampling and Collection	Type and Frequency of Analysis
3. WATERBORNE a. Surface ^e	1 sample upstream control location ^b 1 sample downstream	Composite sample over 1-month period ^f	Gamma isotopic analysis ^d monthly. Composite for tritium analysis quarterly.
	b. Ground ^g	Quarterly	Gamma isotopic ^d and tritium analysis quarterly.
	c. Sediment from shoreline	1 sample from downstream area with existing or potential recreational valve	Semiannually
4. INGESTION a. Milk ^j	1 sample from milking animals within 5 km distance having the highest dose potential. If there are none, then, 1 sample from milking animals between 5 to 8 km distant where doses are calculated to be greater than 1 mrem per year ^h .	Semimonthly when animals are on pasture, monthly at other times	Gamma isotopic ^d and I-131 analysis semimonthly when animals are on pasture; monthly at other times.
	1 sample from milking animals at a control location. ^b 15-30 km distant and in the least prevalent wind direction.		
b. Fish	1 sample of recreationally important species in vicinity of plant discharge area including at least one free swimmer and one bottom feeder.	Semiannually	Gamma isotopic analysis ^d on edible portions semiannually.
	1 sample of comparable species in areas not influenced by plant discharge to serve as control location. ^b		
c. Food Products	1 sample of each principal class of food products from any area that is irrigated by water in which liquid plant wastes have been discharged.	At time of harvest ⁱ	Gamma isotopic analyses ^d on edible portion
	Samples of 3 different kinds of broad leaf vegetation grown nearest each of two different locations at or near the site boundary of highest predicted annual average ground level D/Q if milk sampling is not performed.	Monthly when available	Gamma isotopic ^d and I-131 analysis.
	1 sample of each of the similar broad leaf vegetation grown 15-30 km distant in the least prevalent wind direction if milk sampling is not performed.	Monthly when available	Gamma isotopic ^d and I-131 analysis.

TABLE 4.1-1 NOTATION

- a. One or more instruments, such as a pressurized ion chamber, for measuring and recording dose rate continuously may be used in place of, or in addition to, integrating dosimeters. For the purposes of this table, a thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters. Film badges shall not be used as dosimeters for measuring direct radiation.
- b. The purpose of this sample is to obtain background information.
- c. Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate samples is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.
- d. Gamma isotopic analysis means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
- e. The "upstream sample" shall be taken at a distance beyond significant influence of the discharge. The "downstream" sample shall be taken in an area beyond but near the mixing zone.
- f. A composite sample is one which the quantity (aliquot) 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. In this program composite sample aliquots shall be collected at time intervals that are very short (e.g., hourly) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.
- g. Ground water samples shall be taken when this source is tapped for drinking or irrigation purposes in areas where the hydraulic gradient or recharge properties are suitable for contamination.
- h. The dose shall be calculated for the maximum organ and age group, using the methodology and parameters in the ODCM.
- i. If harvest occurs more than once a year, sampling shall be performed during each discrete harvest. If harvest occurs continuously, sampling shall be monthly. Attention shall be paid to including samples of tuberous and root food products.
- j. There are currently no identified milk producing animals. Doses to a MEMBER OF THE PUBLIC due to a milk pathway will be evaluated annually, but not included in the annual report. Doses via this pathway will be estimated as ≤ 1 mrem/yr, unless it can be shown to exist.

TABLE 4.1-2
REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

Radionuclide	Water (pCi/l)	Airborne (pCi/m ³)	Fish (pCi/Kg, wet)	Milk (pCi/l)	Food Products (pCi/Kg, wet)
H-3	2E+04 ^a				
Mn-54	1E+03		3E+04		
Fe-59	4E+02		1E+04		
Co-58	1E+03		3E+04		
Co-60	3E+02		1E+04		
Zn-65	3E+02		2E+04		
Zr-Nb-95	4E+02				
I-131	2E+00 ^b	9E-01		3E+00	1E+02
Cs-134	3E+01	1E+01	1E+03	6E+01	1E+03
Cs-137	5E+01	2E+01	2E+03	7E+01	2E+03
Ba-La-140	2E+02			3E+02	

^a For drinking water samples. This is a 40 CFR Part 141 value. If no drinking water pathway exists, a value of 30,000 pCi/l may be used.

^b If no drinking water pathway exists, a value of 20 pCi/l may be used.

TABLE 4.1-3
LOWER LIMITS OF DETECTION (LLD)^a

Analysis	Water (pCi/l)	Airborne (pCi/m ³)	Fish (pCi/Kg,wet)	Milk (pCi/l)	Food Products (pCi/Kg,wet)	Sediment (pCi/Kg,dry)
gross beta		1E-02				
H-3	2E+03 ^c					
Mn-54	1.5E+01		1.3E+02			
Fe-59	3E+01		2.6E+02			
Co-58,60	1.5E+01		1.3E+02			
Zn-65	3E+01		2.6E+02			
Zr-Nb-95 ^b	1.5E+01					
I-131	1.0E+00 ^d	7E-02		1E+00	6E+01	
Cs-134	1.5E+01	5E-02	1.3E+02	1.5E+01	6E+01	1.5E+02
Cs-137	1.8E+01	6E-02	1.5E+02	1.8E+01	8E+01	1.8E+02
Ba-La-140 ^b	1.5E+01			1.5E+01		

TABLE 4.1-3 NOTATION

- a. The LLD is defined, for purposes of these specifications, 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% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 * S_b}{E * V * 2.22 * Y * e^{(-\lambda * \Delta t)}}$$

where:

LLD is the "a priori" lower limit of detection as defined above, as picocuries 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, and

Δt for environmental samples is the elapsed time between sample collection, or end of the sample collection period, and time of counting

Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay correction time (Δt) are to be used in the calculation.

It should be recognized that the LLD is defined as a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analysis shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2.

TABLE 4.1-3 NOTATION (continued)

- b. The specified LLD applies to the daughter nuclide of an equilibrium mixture of the parent and daughter nuclides.
- c. If no drinking water pathway exists, a value of 3,000 pCi/l may be used.
- d. If no drinking water pathway exists, a value of 15 pCi/l may be used.

4.2 Land Use Census - Implementation

Applicability

Applies to the land use census.

Objective

To define the requirements for the conduct of the land use census.

Specification

CONTROLS

- 4.2.1 A land use census shall be conducted and shall identify the location of the nearest milk animal, the nearest residence and the nearest garden of greater than 500 square feet producing fresh leafy vegetables in each of the 16 meteorological sectors within a distance of five miles.

ACTIONS

- 4.2.2 With a land use census identifying a location(s) that yields a calculated dose or dose commitment greater than the values currently being calculated in ODCM Specification 3.14.1, identify the new location(s) in the next Annual Radioactive Effluent Release report, pursuant to Technical Specification 5.6.3.
- 4.2.3 With the land use census identifying a location which yields an annual calculated dose or dose commitment of a specific pathway which is 20% greater than that at a current sampling location:
- a. Add the new location(s) to the radiological environmental monitoring program within 30 days.

AND

- b. If desired, delete the sampling location having the lowest calculated dose or dose commitments via the same exposure pathway, excluding the control station location, from the monitoring program after October 31 of the year in which the land use census was conducted.

AND

- c. Identify the new location(s) in the next Annual Radioactive Effluent Release Report, Technical Specification 5.6.3, including a revised figure(s) and table for the ODCM reflecting the new location(s).

BASES

Land Use Census

This specification is provided to ensure that changes in the use of areas at and beyond the Site Boundary are identified and that modifications to the monitoring program are made if required by the results of the census. This census satisfies the requirements of Section IV.B.3 of Appendix I to 10 CFR Part 50. Restricting the census to gardens of greater than 500 square feet provides assurance that significant exposure pathways via leafy vegetables will be identified and monitored since a garden of this size is the minimum required to produce the quantity (26 kg/year) of leafy vegetables assumed in Regulatory Guide 1.109, Revision 1 for consumption by a child. To determine this minimum garden size, the following assumptions were used: 1) that 20% of the garden was used for growing broad leaf vegetation (i.e., similar to lettuce and cabbage), and 2) a vegetation yield of 2 kg/square meter.

4.3 Monitoring Program - Sampling Requirements

Applicability

Applies to the radiological environmental monitoring program.

Objective

To ascertain that radiological environmental monitoring samples are collected and analyzed in accordance with the radiological environmental monitoring program.

Specification

SURVEILLANCE REQUIREMENTS

- 4.3.1 The radiological environmental monitoring samples shall be collected pursuant to Table 4.1-1 from the locations defined in the ODCM and shall be analyzed pursuant to the requirements of Tables 4.1-2 and 4.1-3.

4.4 Land Use Census - Surveillance Requirements

Applicability

Applies to the land use census.

Objective

To ascertain that the land use census is conducted in accordance with the radiological environmental monitoring program.

Specification

SURVEILLANCE REQUIREMENTS

4.4.1 The land use census shall be conducted once per 12 months during the growing season by any one of the following methods: door-to-door survey, aerial survey, and by consulting local agriculture authorities. This sampling may be performed at the site boundary in each of two different direction sectors with the highest predicted D/Qs in lieu of the garden census. Specifications for broad leaf vegetation sampling in Table 4.1-1, Item 4.C shall be followed, including analysis of control samples.

4.5 Analysis and Sample Point Description

Table 4.5-1 contains the sample point description, sampling and collection frequency analysis, and analysis frequency for various exposure pathways in the vicinity of HBR for the Radiological Monitoring Program. Figures 4-1 and 4-2 show the location of the various sampling points.

At the time of initial preparation of this manual, the limiting cow milk location was 1.3 miles in the NE sector. As of the time of submittal of this manual, there is no longer a cow present at this location. The radiological environmental monitoring program has been altered to reflect this change. However, the χ/Q , and D/Q values associated with this location have been retained for future reference.

H.B. Robinson Steam Electric Plant Unit 2
 Offsite Dose Calculation Manual (ODCM)

TABLE 4.5-1
H. B. ROBINSON RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Analysis ¹ Frequency	Analysis ¹
1. Airborne Particulates and Radioiodines	1.	Florence, S. C. (Control Station) ² 24.4 miles ESE	Continuous operating sampler with sample collection at least weekly	Weekly	I-131 for Air Cartridges
	2.	Information Center 0.2 miles S		Weekly	Gross Beta ³
	3.	Microwave tower 0.5 miles N		Quarterly	Gamma Scan ⁴ of composite (by location)
	4.	Spillway 0.4 miles ESE			
	5.	East Shore of lake near Johnson's Landing 0.9 miles ENE			
	6.	Information Center 0.2 miles SSW			
	7.	CP&L facility on Railroad Ave., Hartsville 6.4 miles ESE			
	55.	South of the West Settling Pond 0.2 miles SSE			
	60.	Robinson Picnic Area 0.2 miles SE			
	61.	West parking lot near RR tracks 0.3 miles WSW			

TABLE 4.5-1 (continued)
H. B. ROBINSON RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Analysis ¹ Frequency	Analysis ¹
2. Direct Radiation	1.	Florence, S. C. (Control Station) ² 24.4 miles ESE	Continuous measurement with readout at least once per quarter (TLDs)	Quarterly	Gamma Dose ⁵
	2.	Information Center ^{10,11} 0.2 mile S			
	3.	Microwave tower 0.5 mile N			
	4.	Spillway 0.4 mile ESE			
	5.	East shore of lake near Johnson's landing 0.9 mile ENE			
	6.	Information Center ^{10,11} 0.2 mile SSW			
	7.	CP&L facility on Railroad Ave., Hartsville 6.4 miles ESE			
	8.	Transmission right-of-way 0.8 mile SSE			
	9.	Transmission right-of-way 1.0 mile S			

TABLE 4.5-1 (continued)
H. B. ROBINSON RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Analysis ¹ Frequency	Analysis ¹
2. Direct Radiation (continued)	10.	Clyde Church of God 1.0 mile WSW	Continuous measurement with readout at least once per quarter (TLDs)	Quarterly	Gamma Dose ⁵
	11.	Old Camden Road 1.0 mile SW			
	12.	Off of Old Camden Road 1.2 miles SSW			
	13.	Corner of Saluda and Sandpit Roads 0.7 miles W			
	14.	First Baptist Church of Pine Ridge 0.8 mile WNW			
	15.	Transmission right-of-way 0.7 miles NW			
	16.	South side of Darlington County I.C. Turbine Plant 1.0 mile NNW			
	17.	Darlington County Plant emergency fire pump 1.2 miles N			

TABLE 4.5-1 (continued)
H. B. ROBINSON RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Analysis ¹ Frequency	Analysis ¹
2. Direct Radiation (continued)	18.	Old Black Creek RR trestle 0.7 mile SE	Continuous measurement with readout at least once per quarter (TLDS)	Quarterly	Gamma Dose ⁵
	19.	Old Camden Road (#S-16-23) 1.0 mile E			
	20.	New Market Road (#S-16-39) 1.0 miles ENE			
	21.	New Market Road (#S-16-39) 1.4 miles NE			
	22.	Shady Rest entrance off of Cloverdale Drive 1.7 miles NNE			
	23.	New Market Road (#S-16-39) 1.0 miles ESE			
	24.	Sowell Road (#S-13-711) 4.6 miles NW			
	25.	Lake Robinson Road (#S-13-346) 4.0 miles NNW			
	26.	Lake Robinson Road (#S-13-346) 5.0 miles N			

TABLE 4.5-1 (continued)
H. B. ROBINSON RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Analysis ¹ Frequency	Analysis ¹
2. Direct Radiation (continued)	27.	Prospect Church Road (#S-13-763) 5.4 miles NNE	Continuous measurement with readout at least once per quarter (TLDs)	Quarterly	Gamma Dose ⁵
	28.	New Market Road (#S-13-39) 4.3 miles NE			
	29.	Ruby Road (#S-16-20) 4.0 mile ENE			
	30.	Ruby Road (#S-16-20) 4.4 miles E			
	31.	Lakeshore Drive 4.6 miles ESE			
	32.	Transmission right-of-way 4.0 miles SE			
	33.	Bay Road (#S-16-493) 4.5 miles SSE			
	34.	Kellybell Road (#S-16-772) 4.7 miles S			

TABLE 4.5-1 (continued)
H. B. ROBINSON RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Analysis ¹ Frequency	Analysis ¹
2. Direct Radiation (continued)	35.	Kelly Bridge Road (#S-31-51) 4.5 miles SSW	Continuous measurement with readout at least once per quarter (TLDs)	Quarterly	Gamma Dose ⁵
	36.	Kingston Drive 5.0 miles SW			
	37.	Pine Cone Road 5.0 miles WSW			
	38.	Union Church Road 4.9 miles W			
	39.	King's Pond Road 5.1 miles WNW			
	55.	South of the West Settling Pond 0.2 miles SSE			
	56.	North of the center of the 7P-ISFSI ^{10,11} 0.4 miles NNW			
	61.	West parking lot near RR tracks ¹¹ 0.3 miles WSW			
	65.	Northwest of the 24P-ISFSI ¹¹ 0.3 miles WNW			

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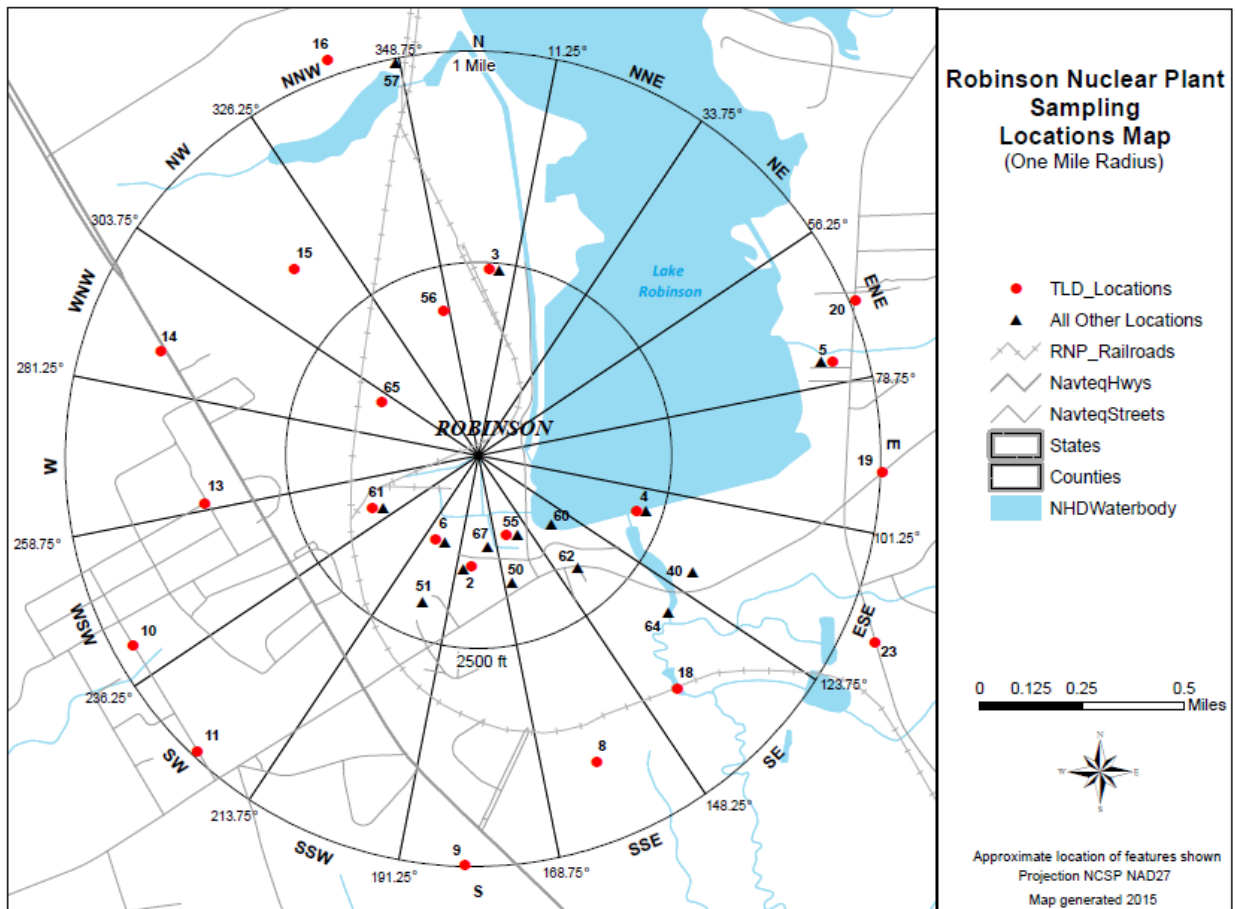
TABLE 4.5-1 (continued)
H. B. ROBINSON RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway and/or Sample	Sample Point	Sample Point Description, Distance, and Direction	Sampling and Collection Frequency	Analysis ¹ Frequency	Analysis ¹	
3. Waterborne a. Surface Water	40.	Black Creek at Old Camden Road (S-16-23) 0.6 mile ESE	Composite sample ⁶ over one-month period	Monthly	Gamma Scan ⁴ H-3	
	41.	Black Creek at US Highway 1 (Control Station) ² 8.0 miles N				
	b. Groundwater	64.	Artesian Well (0.6 miles SE)	Quarterly Grab	Quarterly	Gamma Scan ⁴ H-3
	c. Drinking water	NA	Not required ⁷			
d. Shoreline Sediment	44.	East Shore of Lake, Shady Rest Club 1.6 miles NNE	Semi-annually	Semi-annually	Gamma Scan ⁴	
4. Ingestion a. Milk	NA	(There are no milk samples available within 8 Km of Plant. Broad-leaf vegetation are to be sampled and analyzed in lieu of milk samples.)	NA	NA	NA	
b. Broadleaf	50.	SSE Close to Site Boundary ⁹	Monthly when available (3 different kinds of broad-leaf vegetation)	Each sample	Gamma Scan ⁴ I-131	
	51.	SSW Close to Site Boundary.				
	52.	10 miles W, near Bethune (Control Station for Broad-leaf Vegetation).				
	62.	SE Close to Site Boundary.				
	67.	S Close to Site Boundary ⁹				
c. Fish	45.	Site varies within lake Robinson	Semiannually (collect comparable species at all three locations)	Each sample	Gamma Scan ⁴ Edible portion	
	46.	Site varies within Prestwood Lake				
	47.	Control station ² , Any lake not influenced by plant discharge.				
d. Food Products leafy vegetables	54.	Auburndale Plantation ⁸ 10.1 miles E (One sample of each principal class of irrigated food products).	Annual at harvest	Each sample	Gamma Scan ⁴	

TABLE 4.5-1 NOTATION

1. The LLD for each analysis is specified in Table 4.1-3 of the HBR ODCM.
2. Control stations are locations outside the influence of plant effluents.
3. Airborne particulate sample filter shall be analyzed for gross beta radioactivity 24 hours or more after sampling to allow for radon and thoron daughter decay. If gross beta activity in air particulate is greater than ten times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.
4. Gamma scan means the identification and quantification of gamma-emitting radionuclides that may be attributable to the effluents from the facility.
5. Thermoluminescent dosimeter (TLD) is considered to be one phosphor; two or more phosphors in a packet are considered as two or more dosimeters.
6. Composite sample aliquots shall be collected at time interval that are short (5 or 6 times daily) relative to the compositing period (monthly in order to assure obtaining a representative sample).
7. Collection of drinking water samples is not required since there are no known reservoirs on Black Creek used for drinking purposes.
8. Water from Black Creek is sometimes used to irrigate food crops at Auburndale Plantation which is located 11 miles east @ 90° from the plant.
9. Sample Points 50 and 67 are the highest and the second highest D/Q values, respectively.
10. These samples are required for monitoring of the 7P-ISFSI.
11. These samples are required for monitoring of the 24P-ISFSI.

FIGURE 4-1
RADIOLOGICAL SAMPLE LOCATIONS NEAR SITE



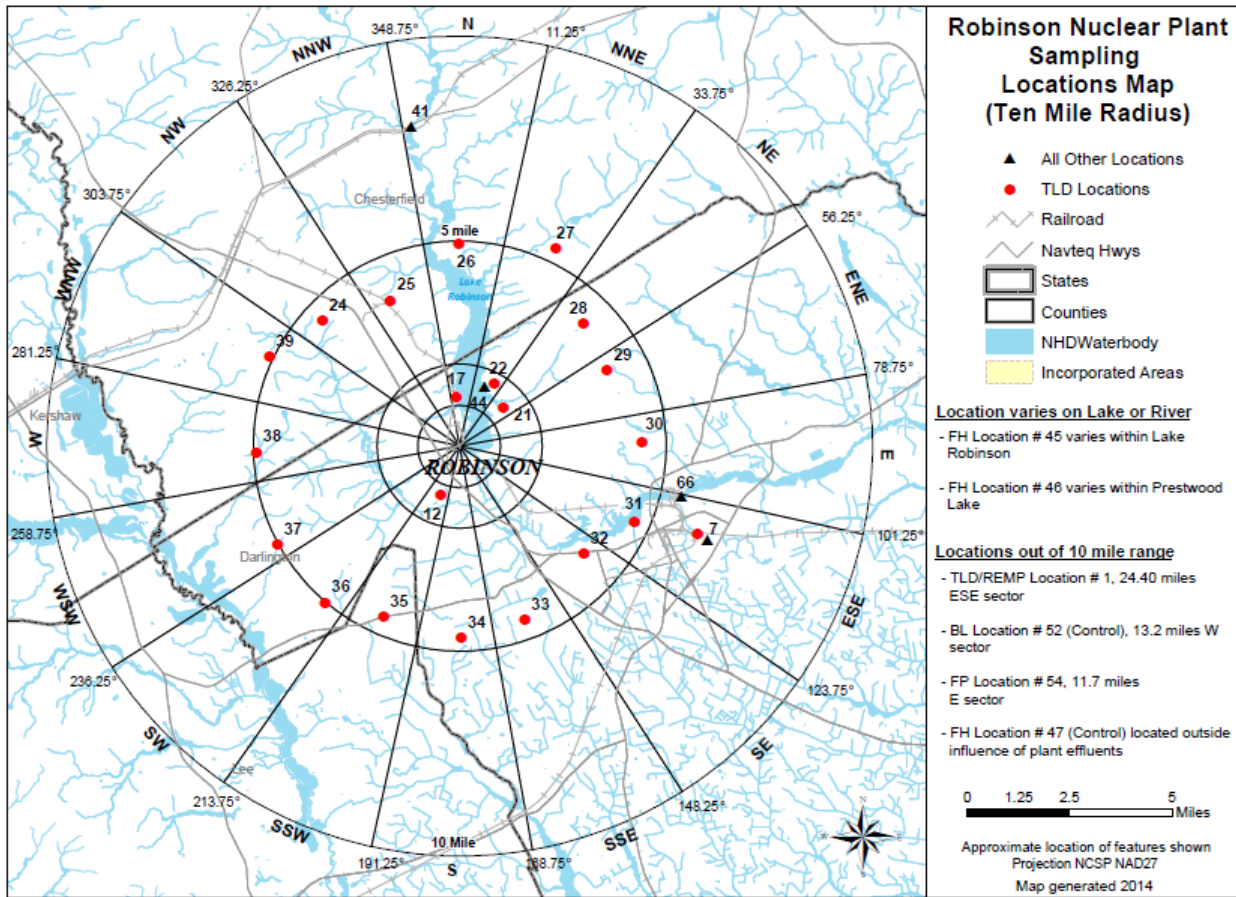
Sample Types

Air Cartridge & Particulate
 Shoreline Sediment
 Ground Water
 Broadleaf Vegetation
 Surface Water
 Thermoluminescent Dosimeter
 Fish
 Food Products

Sample Locations

1 – 7, 55, 60, 61
 44
 64
 50, 51, 52, 62, 67
 40, 41
 1 – 39, 55, 56, 61, 65
 45 – 47
 54

FIGURE 4-2
RADIOLOGICAL SAMPLE LOCATIONS DISTANT LOCATIONS



Sample Types

Air Cartridge & Particulate
 Shoreline Sediment
 Ground Water
 Broadleaf Vegetation
 Surface Water
 Thermoluminescent Dosimeter
 Fish
 Food Products

Sample Locations

1 – 7, 55, 60, 61
 44
 64
 50, 51, 52, 62, 67
 40, 41
 1 – 39, 55, 56, 61, 65
 45 – 47
 54

5.0 INTERLABORATORY COMPARISON PROGRAM

Applicability

Applies to the interlaboratory comparison program of like media.

Objective

To ensure precision and accuracy of laboratory analyses.

Specification

CONTROLS

- 5.1 Analyses shall be performed on radioactive materials supplied as a part of an Interlaboratory Comparison Program of like media within the environmental program as per Table 4.1-1 and pursuant to ODCM Specification 5.2, 5.3, and 5.4.

ACTIONS

- 5.2 With analyses not being performed as required above, report the corrective action taken to prevent a recurrence to the Commission in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2.
- 5.3 The provisions of ODCM Specification 8.1 are not applicable.

SURVEILLANCE REQUIREMENTS

- 5.4 The Interlaboratory Comparison Program shall be described in the ODCM. A summary of the results obtained as part of the above required Interlaboratory Comparison Program shall be included in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2.

BASES

Interlaboratory Comparison Program

The requirement for participation in an approved Interlaboratory Comparison Program is provided to ensure that independent checks on the precision and accuracy of the measurements of radioactive material in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring in order to demonstrate that the results are valid for the purposes of Section IV.B.2 of Appendix I to 10 CFR Part 50.

5.5 Interlaboratory Comparison Studies - Program Requirements

5.5.1 Objective

The objective of this program is to evaluate the total laboratory analysis process by comparing results with results obtained by a separate laboratory or laboratories for an equivalent sample.

5.6 Program

5.6.1 Environmental Sample Analyses Comparison Program

Environmental samples from the HBR environs are to be analyzed by the Harris Energy & Environmental Center or by a qualified contracting laboratory. These laboratories will participate at least annually in a nationally recognized interlaboratory comparison study. The results of the laboratories' performances in the study will be provided to HBR E&RC and will be included in the Annual Radiological Environmental Operating Report.

5.6.2 Effluent Release Analyses Program

HBR E&RC will perform sample analyses for gamma-emitting radionuclides in effluent releases. The E&RC radiochemistry laboratory will participate annually in a corporate interlaboratory comparison study or an equivalent study. The results of these studies will be provided to the NRC upon request.

5.6.3 Abnormal Results

Company Internal laboratory or vendor laboratory results shall be compared to the criteria established in the USNRC Inspection Manual (Procedure 84750) for Radioactive Waste Treatment, Effluent, and Environmental monitoring. The referenced criteria is as follows:

- a. Divide each standard result by its associated uncertainty to obtain resolution (the uncertainty is defined as the relative standard deviation, one sigma, of the standard result as calculated from counting statistics).
- b. Divide each laboratory result by the corresponding standard result to obtain the ratio (laboratory result/standard).
- c. The laboratory measurement is in agreement if the value of the ratio falls within the limits shown below for the corresponding resolution:

<u>Resolution</u>	<u>Ratio</u>
< 4	0.40 - 2.50
4 - 7	0.50 - 2.00
8 - 15	0.60 - 1.66
16 - 50	0.75 - 1.33
51 - 200	0.80 - 1.25
> 200	0.85 - 1.18

If the Company Internal laboratory or vendor laboratory results lie outside the ratio criteria, an evaluation will be performed to identify any recommended actions to reduce anomalous errors. Complete documentation of the evaluation will be available to HBR and will be provided to the USNRC upon request.

6.0 COMPLIANCE WITH 40 CFR PART 190

6.1 Requirements For Compliance With 40 CFR Part 190 - Radioactive Effluents From Uranium Fuel Cycle Sources

Applicability

Applies to radioactive effluents from uranium fuel cycle sources.

Objective

To define the dose limits of 40 CFR 190 for radioactive effluents from uranium fuel cycle sources.

Specification

CONTROLS

- 6.1.1 The dose commitment to any member of the public, due to releases of licensed materials and radiation, from uranium fuel cycle sources shall be limited to ≤ 25 mrem to the total body or any organ except the thyroid, which shall be limited to ≤ 75 mrem over 12 consecutive months. This specification is applicable to Robinson Unit 2 only for the area within a five mile radius around the Robinson Plant.

ACTIONS

- 6.1.2 With the calculated doses from the release of the radioactive materials in liquid or gaseous effluents exceeding twice the limits of ODCM Specification 2.4.1.a, 2.4.1.b, 3.4.1.a, 3.4.1.b, 3.5.2.1.a, or 3.5.2.1.b, calculations should be made including direct radiation contributions from the reactor unit and from outside storage tanks to determine whether the above limits of ODCM Specification 6.1.1 have been exceeded. If such is the case, prepare and submit to the Commission within 30 days, pursuant to ODCM Specification 9.3.d, a Special Report that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits.

This Special Report, as defined in 10 CFR Part 20.2203(a)(4), shall include an analysis that estimates the radiation exposure (dose) to a member of the public from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190. Submittal of the report is considered a timely request, and a variance is granted until staff action on the same request is complete.

- 6.1.3 The provisions of ODCM Specification 8.1 are not applicable.

BASES

Compliance with 40 CFR Part 190 - Radioactive Effluents From Uranium Fuel Cycle Sources

This specification is provided to meet the dose limitations of 40 CFR Part 190 that have been incorporated into 10 CFR Part 20 by 46 FR 18525. The specification requires the preparation and submittal of a Special Report whenever the calculated doses from plant generated radioactive effluents and direct radiation exceed 25 mrem to the total body or any organ, except the thyroid, which shall be limited to less than or equal to 75 mrem. It is highly unlikely that the resultant dose to a member of the public will exceed dose limits of 40 CFR Part 190 if the reactor remains within twice the dose design objectives of Appendix I, and if direct radiation doses from the reactor unit and outside storage tanks are kept small. The Special Report will describe a course of action that should result in the limitation of the annual dose to a member of the public to within the 40 CFR part 190 limits. For the purposes of the Special Report, it may be assumed that the dose commitment to the member of the public from other uranium fuel cycle sources is negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 8 km must be considered. If the dose to any member of the public is estimated to exceed the requirements of 40 CFR Part 190, the Special Report with a request for a variance (provided the release conditions resulting in violation of 40 CFR Part 190 have not already been corrected), in accordance with the provisions of 40 CFR Part 190.11 and 10 CFR Part 20.2203(a)(4), is considered to be a timely request and fulfills the requirements of 40 CFR Part 190 until NRC staff action is completed. The variance only relates to the limits of 40 CFR Part 190, and does not apply in any way to the other requirements for dose limitation of 10 CFR Part 20, as addressed in ODCM Specifications 2.2.1 and 3.2.1. An individual is not considered a member of the public during any period in which he/she is engaged in carrying out any operation that is part of the nuclear fuel cycle.

6.2 Total Dose (40 CFR 190 Conformance)

6.2.1 Compliance with 40 CFR 190

Compliance with 40 CFR 190 as prescribed by ODCM Specification 6.1 is to be demonstrated only when one or more of ODCM Specifications 2.4.1.a, 2.4.1.b, 3.4.1.a, 3.4.1.b, 3.5.2.1.a, and 3.5.2.1.b is exceeded by a factor of 2. Once this occurs the Company has 30 days to submit this report in accordance with ODCM Specification 9.3.

6.2.1 Calculations Evaluating Conformance with 40 CFR 190

To perform the calculations to evaluate conformance with 40 CFR 190, an effort is made to develop doses that are realistic by removing assumptions that lead to overestimates of dose to a MEMBER OF THE PUBLIC (i.e., calculations for compliance with 10 CFR 50, App.I). To accomplish this the following calculational rules are used:

1. Doses to a MEMBER OF THE PUBLIC via the liquid release pathway will be calculated.
2. Doses to a MEMBER OF THE PUBLIC due to a milk pathway will be evaluated only as can be shown to exist. Otherwise, doses via this pathway will be estimated as ≤ 1 mrem / yr.
3. Environmental sampling data which demonstrate that no pathway exists may be used to delete a pathway to man from a calculation.
4. To sum numbers represented as "less than" (<), use the value of the largest number in the group.

$$(i.e. <5 + <1 + <1 + <3 = 5)$$

5. When doses via direct radiation are added to doses via inhalation pathway, they will be calculated for the same distance in the same sector.
6. The calculational locations for a MEMBER OF THE PUBLIC will only be at residences or places of employment.

NOTE: Additional assumptions may be used to provide situation-specific parameters, provided they are documented along with their concomitant bases.

6.3 Calculations of Total Body Dose

Estimates will be made for each of the following exposure pathways to the same location by age class. Only those age classes known to exist at a location are considered.

6.3.1 Direct Radiation

The component of dose to a MEMBER OF THE PUBLIC due to direct radiation will be determined by:

1. Determine the direct radiation dose at the plant boundary in each sector, $D_{B,\theta}$.
2. Extrapolate that dose to the calculational location as follows:

$$D_{L,\theta} = \frac{D_{B,\theta} * 1.49E+06}{(X_{L,\theta})^2}$$

where:

$D_{L,\theta}$ = Dose at calculational location in sector θ (mrem).

1.49E+06 = Square of mean distance to the site boundary (1220^2 m²).

$X_{L,\theta}$ = Distance to calculational locations in sector θ (m).

6.3.2 Inhalation Dose

The inhalation dose will be determined at the calculational locations for each age class at risk according to the methods outlined in Section 3.5 of this manual.

6.3.3 Ingestion Pathway

The dose via the ingestion pathway will be calculated at the consumer locations for the consumers at risk. If no milk pathway exists in a sector, the dose via this pathway will be treated as < 1 mrem/yr.

6.3.4 Other Uranium Fuel Cycle Sources

The dose from other fuel cycle sources will be treated as < 1 mrem/yr.

6.4 Thyroid Dose

The dose of the thyroid will be calculated for each sector as the sum of inhalation dose and milk ingestion dose (if existing). The calculational methods will be those identified in Section 3.5 of this manual.

6.5 Dose Projections

Dose projections are to incorporate planned plant operations such as power reduction or outages for the projected period.

6.6 Radioactive Effluents from Uranium Fuel Cycle Sources - Cumulative Doses

Applicability

Applies to the determination of cumulative doses from radioactive effluents from uranium fuel cycle sources.

Objective

To ascertain that cumulative doses from radioactive effluents from uranium fuel cycle sources are maintained as low as reasonably achievable and within allowable limits.

Specification

SURVEILLANCE REQUIREMENTS

- 6.6.1 Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with ODCM Specifications 2.4.1, 3.4.1, and 3.5.2.1 in accordance with the methodology and parameters in the ODCM. For the purposes of this Surveillance Requirement, it may be assumed that fuel cycle sources are negligible, with the exception that dose contributions from other nuclear fuel cycle facilities at the same site or within a radius of 5 miles must be considered. In addition, an individual is not considered a member of the public during any period in which he/she is engaged in carrying out any operation which is part of the nuclear fuel cycle.
- 6.6.2 Cumulative dose contributions from direct radiation from the reactor units and from radwaste storage tanks shall be determined in accordance with the methodology and parameters in the ODCM. This requirement is applicable only under conditions set forth in ODCM Specification 6.1.2.

7.0 DEFINITIONS

The following frequently used terms are defined for the uniform interpretation of the specifications.

7.1 Rated Thermal Power

RTP shall be a total reactor core heat transfer (RTP) rate to the reactor coolant of 2339 MWt.

7.2 Mode

A mode shall be as required by Technical Specifications.

7.3 Operable - Operability

A system, subsystem, train, component, or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified safety function(s) and when all necessary attendant instrumentation, controls, normal or emergency electrical power, cooling and seal water, lubrication, and other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its specified safety function(s) are also capable of performing their related support function(s).

7.4 Instrumentation Surveillance

7.4.1 Action

Action shall be that part of a specification which prescribes remedial measures required under designated conditions.

7.4.2 Channel Calibration

A CHANNEL CALIBRATION shall be the adjustment, as necessary, of the channel so that it responds within the required range and accuracy to known input. The CHANNEL CALIBRATION shall encompass the entire channel, including the required sensor, alarm, interlock, display, and trip functions.

7.4.3 Channel Check

A CHANNEL CHECK shall be the qualitative assessment, by observation, of channel behavior during operation. This determination shall include, where possible, comparison of the channel indication and status to other indications or status derived from independent instrument channels measuring the same parameter.

7.4.4 Channel Operational Test (COT)

A COT shall be the injection of a simulated or actual signal into the channel as close to the sensor as practicable to verify the OPERABILITY of required alarm, interlock, display, and trip functions. The COT shall include adjustments, as necessary, of the required alarm, interlock, and trip setpoints so that the setpoints are within the required range and accuracy.

7.4.5 Source Check

A source check shall be the qualitative assessment of channel response when the channel sensor is exposed to a radioactive source.

7.5 Gaseous Radwaste Treatment System

The Gaseous Radwaste Treatment System is the system designed and installed to reduce radioactive gaseous effluents by collecting primary coolant system off-gases from the primary system and providing for delay or holdup for the purpose of reducing the total radioactivity prior to release to the environment.

7.6 Ventilation Exhaust Treatment System

The Ventilation Exhaust Treatment System is the system designed and installed to reduce gaseous radioiodine or radioactive material in particulate form in effluents by passing ventilation or vent exhaust gases through charcoal absorbers and/or HEPA filters prior to their release to the environment. Engineered Safety Feature (ESF) atmospheric cleanup systems are not considered to be Ventilation Exhaust Treatment System components.

7.7 Offsite Dose Calculation Manual

- a. The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the radiological environmental monitoring program; and
- b. The ODCM shall also contain the radioactive effluent controls and radiological environmental monitoring activities, and descriptions of the information that should be included in the Annual Radiological Environmental Operating, and Radioactive Effluent Release Reports required by Specification 5.6.2 and Specification 5.6.3.
- c. Licensee initiated changes to the ODCM:
 1. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:
 - (a) sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s),

AND
 - (b) a determination that the change(s) maintain the levels of radioactive effluent control required by 10 CFR 20.1302, 40 CFR 190, 10 CFR 50.36a, and 10 CFR 50, Appendix I, and do not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations;
 2. Shall become effective after the approval of the Plant Manager;

AND
 3. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. "Each change shall be identified by markings in the margin of the affected pages. Each change, affected page number(s) and technical justification will be listed in Chapter 10, Licensee Initiated Changes. .

7.8 Dose Equivalent I-131

The Dose Equivalent I-131 shall be that concentration of I-131 (microcuries/gram) that alone would produce the same dose as the quantity and isotopic mixture of I-131, I-132, I-133, I-134, and I-135 actually present. The dose conversion factors used for this calculation shall be those listed under the "Effective" column of Table 2.1 of Federal Guidance Report 11.

7.9 Purge - Purging

Purge or purging is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is required to purify the confinement.

7.10 Venting

Venting is the controlled process of discharging air or gas from a confinement to maintain temperature, pressure, humidity, concentration or other operating condition, in such a manner that replacement air or gas is not provided or required during venting. Vent, used in system names, does not imply a venting process.

7.11 Site Boundary

The site boundary shall be that line beyond which the land is not owned, leased, or otherwise controlled by the licensee, as defined by Figure 7-1.

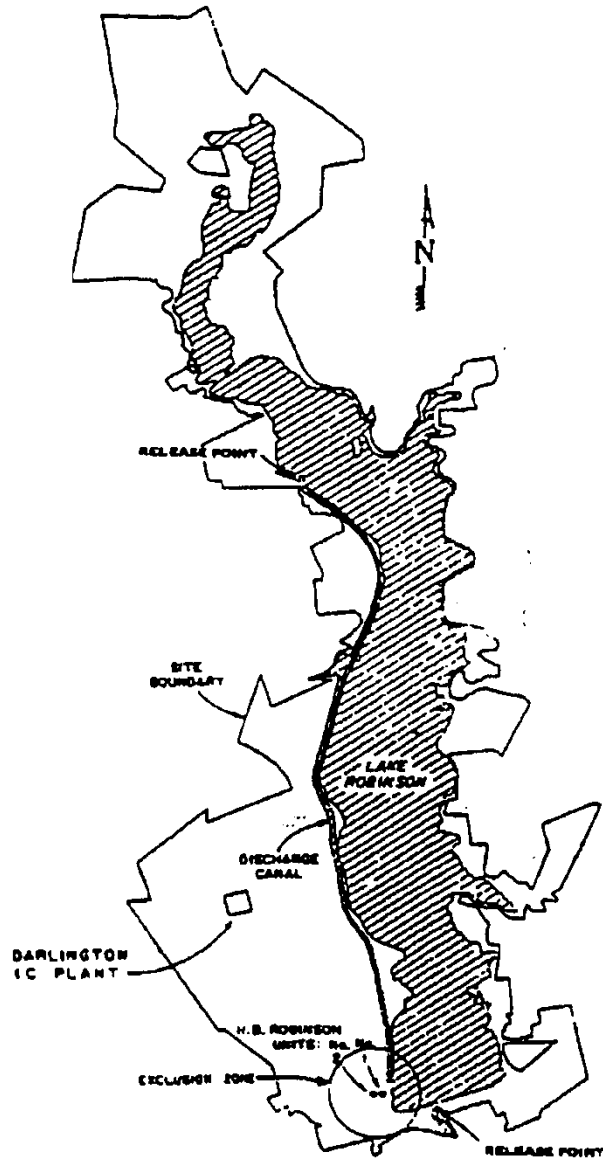
7.12 Member(s) of the Public

Member(s) of the public shall include all individuals who by virtue of their occupational status have no formal association with the plant. This category shall include non-employees of the licensee who are permitted to use portions of the site for recreational, occupational or other purposes not associated with plant function. This category shall not include non-employees such as vending machine servicemen, or postmen who, as part of their formal job function, occasionally enter an area that is controlled by the licensee for the purposes of protection of individuals from exposure to radiation and radioactive materials.

7.13 Unrestricted Area

Unrestricted area shall be any area at or beyond the Site Boundary to which access is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, or any area within the Site Boundary used for residential quarters or for industrial, commercial, institutional, and/or recreational purposes.

FIGURE 7-1
PLANT SITE BOUNDARY AND EXCLUSION ZONE



8.0 CONTROLS APPLICABILITY AND SURVEILLANCE/COMPENSATORY REQUIREMENTS

8.1 Controls Applicability

CONTROL 8.1.1 CONTROLS shall be met during the MODES or other specified conditions in the Applicability, except as provided in CONTROL 8.1.2.

CONTROL 8.1.2 Upon discovery of a failure to meet an CONTROL, the Required COMPENSATORY MEASURES of the associated Conditions shall be met, except as provided in CONTROL 8.1.5.

If the CONTROL is met or is no longer applicable prior to expiration of the specified Completion Time(s), completion of the Required Action(s) is not required unless otherwise stated.

CONTROL 8.1.3 When an CONTROL is not met and the associated COMPENSATORY MEASURES are not met, an associated ACTION is not provided, or if directed by the associated COMPENSATORY MEASURES, the unit shall be placed in a MODE or other specified condition in which the CONTROL is not applicable. Action shall be initiated within 1 hour to place the unit, as applicable, in:

- a. MODE 3 within 7 hours; and
- b. MODE 4 within 13 hours; and
- c. MODE 5 within 37 hours.

Exceptions to this Specification are stated in the individual Specifications.

Where corrective measures are completed that permit operation in accordance with the CONTROL or COMPENSATORY MEASURES, completion of the COMPENSATORY MEASURES required by CONTROL 8.1.3 is not required.

CONTROL 3.0.3 is only applicable in MODES 1, 2, 3, and 4

CONTROL 8.1.4 When a CONTROL is not met, entry into a MODE or other specified condition in the Applicability shall not be made except when the associated COMPENSATORY MEASURES to be entered permit continued operation in the MODE or other specified condition in the Applicability for an unlimited period of time.

This Specification shall not prevent changes in MODES or other specified conditions in the Applicability that are required to comply with COMPENSATORY MEASURES or that are part of a shutdown of the unit.

Exceptions to this Specification are stated in the individual Specifications. These exceptions allow entry into MODES or other specified conditions in the Applicability when the associated COMPENSATORY MEASURES to be entered allow unit operation in the MODE or other specified condition in the Applicability only for a limited period of time.

CONTROL 8.1.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4.

CONTROL 8.1.5 Equipment removed from service or declared inoperable to comply with COMPENSATORY MEASURES may be returned to service under administrative control solely to perform testing required to demonstrate its OPERABILITY or the OPERABILITY of other equipment. This is an exception to CONTROL 8.1.2 for the system returned to service under administrative control to perform the testing required to demonstrate OPERABILITY.

8.2 Surveillance Requirements

SR 8.2.1 SRs shall be met during the MODES or other specified conditions in the Applicability for individual CONTROLS, unless otherwise stated in the SR. Failure to meet a Surveillance, whether such failure is experienced during the performance of the Surveillance or between performances of the Surveillance, shall be failure to meet the CONTROL. Failure to perform a Surveillance within the specified Frequency shall be failure to meet the CONTROL except as provided in SR 8.2.3. Surveillances do not have to be performed on inoperable equipment or variables outside specified limits.

SR 8.2.2 The specified Frequency for each SR is met if the Surveillance is performed within 1.25 times the interval specified in the Frequency, as measured from the previous performance or as measured from the time a specified condition of the Frequency is met.

For Frequencies specified as "once," the above interval extension does not apply.

If a Completion Time requires periodic performance on a "once per...." basis, the above Frequency extension applies to each performance after the initial performance.

Exceptions to this Specification are stated in the individual Specifications.

SR 8.2.3 If it is discovered that a Surveillance was not performed within its specified Frequency, then compliance with the requirement to declare the CONTROL not met may be delayed, from the time of discovery, up to 24 hours or up to the limit of the specified Frequency, whichever is less. This delay period is permitted to allow performance of the Surveillance.

If the Surveillance is not performed within the delay period, the CONTROL must immediately be declared not met, and the applicable Condition(s) must be entered.

When the Surveillance is performed within the delay period and the Surveillance is not met, the CONTROL must immediately be declared not met, and the applicable Condition(s) must be entered.

SR 8.2.4 Entry into a MODE or other specified condition in the Applicability of an CONTROL shall not be made unless the CONTROL's Surveillances have been met within their specified Frequency. This provision shall not prevent entry into MODES or other specified conditions in the Applicability that are required to comply with COMPENSATORY MEASURES or that are part of a shutdown of the unit.

SR 8.2.4 is only applicable for entry into a MODE or other specified condition in the Applicability in MODES 1, 2, 3, and 4.

SR 8.2.5 Surveillance Requirements shall be applicable as follows in Table 8.2-1:

TABLE 8.2-1
SURVEILLANCE REQUIREMENTS

<u>Frequency</u>	<u>Time Interval</u>
P	Completed prior to making a radioactive materials release.
D	At least once per 24 hours.
W	At least once per 7 days.
M	At least once per 31 days.
Q	At least once per 92 days.
R	At least once per 18 months.
3/W	At least 3 times per week.

8.3 Compensatory Requirements

CR 8.3.1 CR 8.3.1 establishes the requirements for meeting the specified Frequency for any Required Compensatory Measure with a Completion Time that requires the periodic performance of the Required Compensatory Measure on a "once per..." interval.

CR 8.3.1 permits a 25% extension of the interval specified in the Frequency. This extension facilitates scheduling and considers plant operating conditions that may not be suitable for conducting the Test (e.g., transient conditions or other ongoing Test or maintenance activities).

The 25% extension does not significantly degrade the reliability that results from performing the action at its specified Frequency. This is based on the recognition that the most probable result of any particular Test being performed is the verification of conformance with the applicable requirements. The 25% extension also does not apply to the initial portion of a periodic Completion Time that requires performance on a "once per..." basis. The 25% extension applies to each performance after the initial performance. The initial performance of the Required Compensatory Measure is considered a single compensatory measure with a single Completion Time.

The provisions of CR 8.3.1 are not intended to be used repeatedly merely as an operational convenience to extend periodic Completion Time intervals beyond those specified.

Exceptions to this Specification are stated in the individual Specifications.

9.0 REPORTING REQUIREMENTS

9.1 Annual Radioactive Effluent Release Report

Routine radioactive effluent release reports covering the operation of the unit during the previous twelve months shall be submitted within twelve months of the previous report in accordance with Technical Specification 5.6.3. The report shall be submitted by May 1 of each year. Those portions of the report shall include:

9.1.1

A summary of the quantities of radioactive liquid and gaseous effluent and solid waste released from the unit as outlined in Regulatory Guide 1.21, "Measuring, Evaluating, and Reporting Radioactivity in Solid Wastes and Radioactive Materials in Liquid and Gaseous Effluents from Light Water Cooled Nuclear Power Plants" (Revision 1, June 1974), with data summarized on a quarterly basis following the format of Appendix B thereof.

9.1.2

The Radioactive Effluent Release Report shall include an annual summary of hourly meteorological data collected over the previous year. This annual summary may be either in the form of an hour-by-hour listing on magnetic tape of wind speed, wind direction, atmospheric stability, and precipitation (if measured), or in the form of joint frequency distributions of wind speed, wind direction, and atmospheric stability.* This same report shall include an assessment of the radiation doses due to the radioactive liquid and gaseous effluents released from the unit or station during the previous calendar year. For the assessment of radiation doses, approximate and conservative approximate methods are acceptable. The assessment of radiation doses shall be performed in accordance with the methodology and parameters in the Offsite Dose Calculation Manual (ODCM).

* In lieu of submission with the Radioactive Effluent Releases Report, the licensee has the option of retaining this summary of required meteorological data on site in a file that shall be provided to the NRC upon request.

9.1.3

The Radioactive Effluent Release Report shall also include an assessment of radiation doses to the likely most exposed member of the public from reactor releases and other nearby uranium fuel cycle sources, including doses from primary effluent pathways and direct radiation, for the previous calendar year to show conformance with 40 CFR Part 190, Environmental Radiation Protection Standards for Nuclear Power Operation.

9.1.4

The Radioactive Effluent Release Report shall include the following information for each class of solid waste (as defined by 10 CFR Part 61) shipped offsite during the report period:

- a. Waste volume.
- b. Total curie quantity (specify whether determined by measurement or estimate).
- c. Principal radionuclides (specify whether determined by measurement or estimate).
- d. Source of waste and processing employed (e.g., dewatered spent resin, compacted dry waste, evaporator bottoms).
- e. Deleted.
- f. Deleted.
- g. The number of shipments, the mode of transport, and the destination.

9.1.5

The Radioactive Effluent Release Report shall include a list and description of unplanned releases from the site to unrestricted areas of radioactive materials in gaseous and liquid effluents made during the reporting period.

9.1.6

The Radioactive Effluent Release Report shall include any changes made during the reporting period to the Process Control Program (PCP) and to the Offsite Dose Calculation Manual (ODCM), as well as a listing of new locations for dose calculations and/or environmental monitoring identified by the land use census pursuant to ODCM Specification 4.2.2.

9.1.7

Changes to the radioactive waste systems (liquid, gaseous, and solid) shall be reported to the Commission in the Annual Radioactive Effluent Release Report for the period in which the evaluation was reviewed by the Plant Nuclear Safety Committee (PNSC).^{*} The discussion of each change shall contain:

- a. A summary of the evaluation that led to the determination that the change could be made in accordance with 10 CFR Part 50.59.
- b. Sufficient detailed information to totally support the reason for the change without benefit of additional or supplemental information.
- c. A detailed description of the equipment, components and processes involved and the interfaces with other plant systems.
- d. An evaluation of the change, which shows the predicted releases of radioactive materials in liquid and gaseous effluents and/or quantity of solid waste that differ from those previously predicted in the license application and amendments thereto.
- e. An evaluation of the change, which shows the expected maximum exposures to an individual in the unrestricted area and to the general population that differ from those previously estimated in the license application and amendments thereto.
- f. A comparison of the predicted releases of radioactive materials, in liquid and gaseous effluents and in solid waste, to the actual releases for the period prior to when the changes are to be made.
- g. An estimate of the exposure to plant operating personnel as a result of the change.
- h. Documentation of the fact that the change was reviewed and found acceptable by the PNSC.

* The licensee may choose to submit the information called for in this Specification as part of the annual FSAR update

9.1.8

Changes to the radioactive waste systems (liquid, gaseous, and solid) shall become effective upon review and acceptance by the PNSC.

9.1.9

The Radioactive Effluent Release Report shall include results from any groundwater samples that are drawn IAW the REMP program during the reporting period that are not described in the ODCM.

9.1.10

Deleted.

9.1.11

The Radioactive Effluent Release Report shall include a summary of any on-site spills and leaks that occurred during the reporting period that are communicated IAW ODCM 9.4 Special Ground Water Protection Reports.

9.2 Annual Radiological Environmental Operating Report

Routine radiological environmental operating reports covering the operation of the unit during the previous calendar year shall be submitted prior to May 15 of each year in accordance with Technical Specification 5.6.2. With the radiological environmental monitoring program not being conducted as specified in Table 4.1-1, a description of the reasons for not conducting the program as required and the plans for preventing a recurrence shall be included.

The Annual Radiological Environmental Operating Reports shall include summaries, interpretations, and analysis of trends of the results of the radiological environmental surveillance activities for the report period, including a comparison with preoperational studies, operational controls (as appropriate), and previous environmental surveillance reports and an assessment of the observed impacts of the plant operations on the environment. The reports shall also include the results of land use censuses required by ODCM Specification 4.2.

The Annual Radiological Environmental Operating Reports shall include the results of analysis of all radiological environmental samples and of all environmental radiation measurements taken during the period pursuant to the locations specified in the Table and Figures in the ODCM, as well as summarized and tabulated results of these analyses and measurements in the format of the table in the Radiological Assessment Branch Technical Position, Revision 1, November 1979. In the event that some individual results are not available for inclusion with the report, the report shall be submitted noting and explaining the reasons for the missing results. The missing data shall be submitted as soon as possible in a supplementary report.

The reports shall also include the following: a summary description of the radiological environmental monitoring program; at least two legible maps* covering all sampling locations keyed to a table giving distances and directions from the centerline of the reactor, the results of licensee participation in the Interlaboratory Comparison Program, required by ODCM Specification 5.0; discussion of all deviations from the sampling schedule of Table 4.1-1; and discussion of all analyses in which the LLD required by Table 4.1-3 was not achievable.

* One map shall cover stations near the site boundary; a second shall be the more distant stations

9.3 Special Radiological Effluent Report

The Special radiological effluent reports discussed below shall be the subject of written reports to the NRC within 30 days of the occurrence of the event.

- a. Exceeding any of the limits prescribed by ODCM Specification 2.4.1, 3.4.1, and/or 3.5.2.1. This report shall include the following information:
 1. The cause for exceeding the limit(s).
 2. The corrective action(s) to be taken to reduce the releases of radioactive materials in the affected effluents (i.e., liquid, radionoble gas, and/or radioiodines, particulates) within the specification and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.
 3. If any of the limits of ODCM Specification 2.4.1 were exceeded, the report must include a statement that no drinking water source exists that could be affected or include the results of radiological impact on finished drinking water supplied with regard to the requirements of 40 CFR 141, Safe Drinking Water Act.
- b. Exceeding any of the limits prescribed by ODCM Specification 2.9.1, and/or 3.15.1. This report shall include the following information:
 1. Identification of equipment or subsystem that rendered the affected radwaste system not operable.
 2. The corrective action(s) taken to restore the affected radwaste treatment system to an operable status.
 3. A summary description of the action(s) taken to prevent a similar recurrence.
- c. Exceeding the reporting level for environmental sample media as specified in ODCM Specifications 4.1.3. This report shall include the following information:
 1. An evaluation of any environmental factor, release condition or other aspect which may have caused the reporting level to be exceeded.
 2. A description of action(s) taken or planned to reduce the levels of licensed materials in the affected environmental media to below reporting level.

- d. Exceeding the limits prescribed by ODCM Specification 6.1.1. This report shall be made in lieu of any other report and shall include the following:
 1. The corrective action(s) to be taken to reduce subsequent releases to prevent recurrence of exceeding the limits prescribed by ODCM Specification 6.1.1.
 2. An analysis which estimates the dose commitment to a member of the general public from uranium fuel cycle source including all effluent pathways and direct radiation for a 12 month period that includes releases covered by this report.
 3. If the release conditions resulting in violation of 40 CFR 190 have not already been corrected, include a request for a variance in accordance with the provisions of 40 CFR 190 and include the specified information of 40 CFR 190.11(b).

9.4 Special Groundwater Protection Reports

- a. Special Ground Water Protection Reports as listed below in 9.4.c, d, & e are not required for subsequent samples results that are from the same plume and have already been reported in accordance with this section.
- b. Notification time requirements for water samples that exceed the reporting criteria start following the notification of sample results from the applicable vendor or corporate laboratory to the RNP Environmental & Chemistry Section.
- c. If any sample result for onsite groundwater, that is or may be used as a source of drinking water, exceeds the reporting criteria of ODCM Table 4.1-2, then submit a special 30 day written report to the NRC. Additionally, a copy of this report shall be forwarded to designated state/local offices listed in ODCM 9.4.f.
- d. If any of the following samples exceed the reporting criteria of ODCM Table 4.1-2,
 1. Any offsite groundwater, or
 2. Any offsite surface water, or
 3. Any onsite groundwater monitoring well, or
 4. Any onsite surface water that is hydrologically connected to groundwaterthen make informal notification to the designated state/local offices listed in ODCM 9.4.f by the end of the next business day.
- e. If a liquid spill or leak from any of the following has the potential to enter groundwater,
 1. Spill or leak that exceeds or may have exceeded 100 gallons from a source containing licensed material, or
 2. Deleted
 3. Any spill or leak, regardless of volume or activity, deemed by the licensee to warrant voluntary communication,then make informal notification to the designated state/local offices listed in ODCM 9.4.f by the end of the next business day.

- f. Designated state/local offices for notification:
1. Office of the Darlington County Director of Emergency Management
 2. Office of the SC DHEC Director of Water Monitoring Assessment and Protection Division, Bureau of Water
 3. Office of the SC DHEC Director, Bureau of Radiological Health
 4. American Nuclear Insurers (ANI)

10.0 LICENSEE INITIATED CHANGES

All ODCM changes are reviewed by knowledgeable individual(s), the PSNC Chairman, and approved by the Plant Manager. Revision 34 changes do not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations.

ODCM Revision 34 - Implementation Date: refer to Cover Page

All Pages

Complete revision to ODCM to improve formatting, usability, and align with fleet standards. Previous revision's change bars and individual page number revisions were removed and will be discontinued to provide clarity and improve usability.

Some characters/symbols used in calculations converted to other undefined characters/symbols during upgrade to Microsoft Office 2010 for ODCM Revision 33. These were replaced with actual characters/symbols as appropriate. The changes were extensive and are not individually identified by change bars in Revision 34.

Units for defined variables/parameters used in calculations are all explicitly stated and shown in parentheses following variable/parameter definition. These changes were extensive and not individually identified by change bars in the ODCM.

Table of Contents - Page iii

Revised Section 8 title from "Controls and Surveillance/Compensatory Requirements" to "Controls Applicability and Surveillance/Compensatory Requirements" to reflect actual section title.

Revised Section 8.1 title from "Controls" to "Controls Applicability" to reflect actual section title.

Added explicit title for Appendix D as "Liquid and Gaseous Process Monitors and Radwaste Systems". ODCM had pages marked as "D" but no Appendix D. Appendix D added for consistency.

Added Appendix E, "Map of Lake Robinson". Improvement opportunity to show how Lake Robinson is partitioned into five sections with section areas.

List of Figures - Page vii

Added figure E-1 for map of Lake Robinson to align with new Appendix E.

Section 2.2 - Page 2-7

Revised section title from "Requirements for Compliance with 10 CFR Part 20 - Radioactive Materials in Liquid Effluents" to "Requirements for Compliance with 10 CFR Part 20 (Liquids)" to align with Table of Contents.

Section 2.3.2.1 - Page 2-10 to 2-11

Added values for D_{fr} to match pump flow rate values listed in Section 2.1. Revision made for clarity.

Revised statement in second to last paragraph from:

"Pump curves show that with three pumps operating, the circulating water flow is 400,000 gpm, with two pumps--250,000 gpm, and with one pump--160,000 gpm. Unit 1 of the H.B. Robinson Steam Electric Plant has two circulating water pumps. The circulating water flow is 50,000 gpm with one pump and 80,000 gpm with two pumps."

to:

"Pump curves show the circulating water flow is 400,000 gpm with three pumps operating, 250,000 gpm with two pumps operating, and 160,000 gpm with one pump operating. Unit 1 of the H.B. Robinson Steam Electric Plant has two circulating water pumps. The circulating water flow is 80,000 gpm with two pumps operating and 50,000 gpm with one pump operating."

Revision made for clarity.

Revised statement in last paragraph from:

"The maximum administrative release rate (R_b) is 160 gpm for each of the steam generators, 60 gpm from the monitor and waste condensate tanks, and 300 gpm for the Condensate Polisher Liquid Wastes, and 130 for each of the steam generators during drainage."

to:

"The maximum administrative release rate (R_b) is 160 gpm for each of the steam generators during blowdown, 60 gpm from the monitor and waste condensate tanks, and 300 gpm for the Condensate Polisher Liquid Wastes, and 130 gpm for each of the steam generators during drainage."

Revision made for clarity.

Section 2.3.2.2 - Page 2-12

Revised definition of V_{kd} from "Actual volume of dilution flow during release 'k' (gal)." to "Actual volume of dilution during release 'k' (gal)". Units of dilution are volume, not flow rate.

Section 2.4 - Page 2-14

Revised section title from "Requirements for Compliance with 10 CFR 50 - Radioactive Materials in Liquid Effluents" to "Requirements for Compliance with 10 CFR 50 (Liquids)" to align with Table of Contents.

Section 2.5.2 - Page 2-20

Added definition for "92" as "time in quarter (days)". Remove ambiguity by explicitly defining all variables used in calculations.

Section 2.5.3 - Page 2-21

Added paragraph:

" H. B. Robinson air dispersion and deposition factors are calculated annually from annual averaged air concentrations and deposition values obtained during routine releases. The methodology for calculating air dispersion and deposition factors are discussed in Appendix A. Five year climatology (2005 – 2009) data was used to generated air dispersion factors listed below. Annually, air dispersion factors are compared to the five year data for each of the Lake Sections. If a determination is made that the annual average air concentrations and deposition values change by greater than 20% compared to the five year annual averaged values, resulting in an underestimation of the dose to a member of the public, then the five year annual averaged values shall be updated to reflect the most appropriate meteorology conditions."

Statement aligns ODCM with RNP Technical Specification 5.5.1.A, discussing how Lake Robinson annual air dispersion and deposition factors are used and provides criteria for when to update meteorology information.

Revised definition of R_{TB} from "Dose factor for an organ for tritium for meat pathway, mrem/yr per $\mu\text{Ci}/\text{m}^3$ " to "Organ dose factor for tritium meat pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$)."

Revised definition of R_{TI} from "Dose factor for an organ for tritium for inhalation pathway, mrem/yr per $\mu\text{Ci}/\text{m}^3$ " to "Organ dose factor for tritium inhalation pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$)."

Revised definition of R_{TV} from "Dose factor for an organ for tritium for vegetation pathway, mrem/yr per $\mu\text{Ci}/\text{m}^3$ " to "Organ dose factor for tritium vegetation pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$)."

Revisions made for clarity.

Table 2.8-1 Notation - Page 2-37

Revised final statement from "Typical values of E, V, Y, and Δt should be used in the calculation." to " Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay corrections are to be used in the calculation."

Revision made for clarity.

Section 3.1.1.1 - Page 3-1

Moved paragraph describing definition for S_i to actual variable definition list under equation 3.1-1. Change made for clarity.

Section 3.1.1.3 - Page 3-2

Changed equation 3.1-3 variable " $1.1M_i$ " to " $1.11M_i$ " and reflected same change in variable definition. Change aligns ODCM with Regulatory Guide 1.109 Revision 1.

Section 3.1.1.4 - Page 3-2 to 3-3

Revised equation 3.1-4 variable "SF" to "S" and updated definition to reflect change. Change made for consistency with other uses of safety factor in equations throughout ODCM.

Section 3.1.2.1 - Page 3-4 to 3-5

Reformatted variable definitions from equation 3.1-7 for clarity and usability.

Section 3.1.2.2 (b) - Page 3-6

Changed equation 3.1-9 variable " $1.1M_i$ " to " $1.11M_i$ " and reflected same change in variable definition. Change aligns ODCM with NRC Regulatory Guide 1.109, Revision 1.

Section 3.1.2.2 (c) - Page 3-7

Revised equations 3.1-12 and 3.1-13 variable "SF" to "S" and updated definition to reflect change. Change made for consistency with other uses of safety factor in equations throughout ODCM.

Table 3.1-1 - Page 3-9

Changed "Gas Decay Tanks" to "Waste Gas Decay Tanks" for clarity.

Table 3.1-2 - Page 3-10

Changed "Total Skin Dose Factor" column variable " $1.1M_i$ " to " $1.11M_i$ ". Change aligns ODCM with Regulatory Guide 1.109 Revision 1.

Section 3.3.1 - Page 3-12 to 3-13

Added NRC Regulatory Guide 1.109, Revision 1, as reference in second paragraph describing equations 3.3-1 and 3.3-2.

Added variable S_F to equations 3.3-1 and 3.3-2 to align ODCM with NRC Regulatory Guide 1.109, Revision 1. Also added S_F variable definition as "1.0, shielding factor accounting for the dose reduction due to shielding provided by residential structures (dimensionless)".

Changed tissue to air absorption coefficient in equation 3.3-2 from "1.1" to "1.11" to align ODCM with NRC Regulatory Guide 1.109, Revision 1. Change also reflected in variable definition.

Revised variable definition "1.11" reference from "NUREG 0133, October 1978" to "NRC Regulatory Guide 1.109, Revision 1". Change aligns ODCM with NRC Regulatory Guide 1.109, Revision 1.

Revised final sentence from "...use in expressions 3.3-1 and 3.3-2." to "...use in equations 3.3-1 and 3.3-2." for clarity.

Section 3.3.2 - Page 3-14

Added section number 3.3.2 to "Radioiodines, Particulates, and Tritium". Section previously not designated by number. Change made for clarity.

Section 3.4 - Page 3-20

Changed Objective from:

"To define the air dose limits of 10 CFR 50 for radionoble gases released in gaseous effluents to unrestricted areas."

to:

"To define the air dose limits of 10 CFR 50 Appendix I for radionoble gases released in gaseous effluents to unrestricted areas."

Change made for clarity to specify limits contained within 10 CFR 50 Appendix I.

Section 3.5.1.2 - Page 3-24

Added definition for "92" as "time in quarter (days)". Remove ambiguity by explicitly defining all variables used in calculations.

Revised definitions of variables PD, DA, DB, and M from equation 3.5-7 to indicate units are mrad. Previous units indicated mrem. Section 3.5.1.2 involves projection of beta and gamma air doses, therefore units of mrad are more appropriate.

Section 3.5.3.1 - Page 3-28

Variable definitions previously listed two different definitions for Q_{TV} , one indicating long-term vent releases and the other short-term vent releases. Short-term vent release definition variable should be q_{TV} . Variable changed for accuracy and matching with equation 3.5-8.

Changed units for variables R_{iB} , R_{iM} , R_{iV} , and R_{iG} from "mrem/yr per $\mu\text{Ci}/\text{sec}/\text{m}^{-2}$ " to " m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ " for clarity.

Section 3.5.3.2 - Page 3-31

Added definition for "92" as "time in quarter (days)". Remove ambiguity by explicitly defining all variables used in calculations.

Section 3.6.1 - Page 3-67 to 3-68

Reformatted variable definitions from equation 3.6-1 for clarity and usability.

Added definition for variable DF as "Filter removal factor (dimensionless)." for clarity.

Added definition for variable F as " The maximum acceptable effluent flow rate at the point of release (cfm)." for clarity.

Add note "[†]2,500 CFM - Refer to Appendix B.3 for additional information" for clarity.

Section 3.6.3 - Page 3-69

Revised equation 3.6-3 variable "SF" to "S" and updated definition to reflect change. Change made for consistency with other uses of safety factor in equations throughout ODCM.

Section 3.9.3 - Page 3-71

Revised definition of variable f from "sampler flow rate (typically 2.5 CFM for R-22)" to "typical value is 2.5 cfm for R-22, sampler flow rate (cfm)." for clarity and consistency.

Revised definition of variable F from "Environmental and Radiation Control Building exhaust vent flow rate (11,500 typically)" to "typical value is 11,500 cfm, Environmental and Radiation Control Building exhaust vent flow rate (cfm)." for clarity and consistency.

Table 4.1-1 - Page 4-5

Revised '3. Waterborne', 'b. Ground' number of samples from "*15 samples*" to "*1 sample*".

Change made to support removal of all NEI 07-07 groundwater wells from ODCM. See additional justification below for revision to Table 4.5-1.

Table 4.1-1 - Page 4-6

Added note j:

"There are currently no identified milk producing animals. Doses to a MEMBER OF THE PUBLIC due to a milk pathway will be evaluated annually, but not included in the annual report. Doses via this pathway will be estimated as ≤ 1 mrem/yr, unless it can be shown to exist."

Table 4.1-3 - Page 4-9

Revised final statement from "Typical values of E, V, Y, and Δt should be used in the calculation." to " Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay corrections are to be used in the calculation."

Section 4.4.1 - Page 4-14

Revised Land Use Census Surveillance Requirement from:

"... any one of the following methods: door-to-door survey, aerial survey, by consulting local agriculture authorities, or by broad leaf vegetation sampling of at least three different kinds of vegetation. This sampling..."

to:

"any one of the following methods: door-to-door survey, aerial survey, and by consulting local agriculture authorities. This sampling..."

Change aligns ODCM with NUREG 1301 Land Use Census guidance verbatim.

Table 4.5-1 - Page 4-22

Revised table to remove all '3. Waterborne', 'b. Groundwater' sample points except Location 64, *Artesian Well (0.6 miles SE)*.

Change made to support removal of all NEI 07-07 groundwater wells from ODCM. NEI 07-07 groundwater wells should not be included in a description of REMP in the ODCM. Groundwater wells monitored as part of REMP are considered direct sources of potential drinking water to offsite members of the public. Wells sampled in accordance with NEI 07-07, Objective 1.3, Acceptance Criteria 'a', are "...within the boundary defined by the site license." and therefor cannot be considered an offsite source of drinking water at RNP. RNP does not currently have any offsite wells sampled in accordance with NEI 07-07. The NEI 07-07 sampling program is contained in RNP Chemistry procedure EMP-001, *Environmental Sampling Program*. This does not represent a reduction in the number of wells sampled, frequency of sampling, or quality of the NEI 07-07 program.

Revised Ingestion-Milk Sample Point Description, Distance, and Direction wording from:

"There are no milk samples available within 8 Km of Plant. The following broad-leaf vegetation are to be sampled and analyzed."

to:

"There are no milk samples available within 8 Km of Plant. Broad-leaf vegetation are to be sampled and analyzed in lieu of milk samples."

Change made for clarity.

Figure 4-1 - Page 4-24

Updated Figure 4-1 to reflect removal of Groundwater locations 42 and 68 - 82 from ODCM.

Deleted statement:

"Stations not shown include 1, 7 through 18, 20 through 39, 41, 45, 46, 47, 52, 54, 71, 76, and 79."

Change made to reflect updated Figure 4-1 and Figure 4.2 displaying locations within specified range.

Revised Sample Locations for 'Ground Water' Sample Type from:

"42, 64, 68 – 73, 75 – 79, 81 – 82"

to:

"64"

Change made to support removal of all NEI 07-07 groundwater wells from ODCM.

Figure 4-2 - Page 4-25

Deleted statement: " Stations not shown include 1, 2, 6, 7, 26, 41, 42, 47 (varies), 50, 51, 52, 54, 55, 56, 60, 61, 62, 65, 67, and 68 – 73, 75 – 79, 81 - 82."

Change made to reflect updated Figure 4-1 and Figure 4.2 displaying locations within specified range.

Revised Sample Locations for 'Ground Water' Sample Type from:

"42, 64, 68 –73, 75 – 79, 81 – 82"

to:

"64"

Change made to support removal of all NEI 07-07 groundwater wells from ODCM.

Section 5.6.3 - Page 5-3

Replaced references to "CP&L" with "Company Internal". Change made for clarity and flexibility.

Section 7.7.c.3 – Page 7-3

Revised the following editorial requirement from:

"Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented"

to:

"Each change shall be identified by markings in the margin of the affected pages. Each change, affected page number(s) and technical justification will be listed in Chapter 10, Licensee Initiated Changes.

Change made for clarity and ease of use.

Appendix A - Page A-2

Added statement "NRC's XOQDOQ program will be used to determine the annual averaged γ/Q and D/Q values for annual radiological effluent release reporting." to specify how γ/Q and D/Q are obtained.

Table A-1 to A-3, A-7 to A-12, A-16 to A-18

Revised statement "A milk goat is located here" to "A milk goat was located here". Milk goat is no longer present at location.

Appendix B - All

Appendix B revised in its entirety to show child age group is the limiting factor due to magnitude of breathing rate and pathways identified.

Appendix B - Section B.1 - Page B-1

Removed statement:

"...however, the youngest age group, the infant, will always receive the maximum dose under the exposure conditions for ODCM Specification 3.2.1.b. For the infant exposure, separate values of P_i may be calculated for the inhalation pathway which is combined with a W parameter based on (X/Q) and the food (milk) and ground pathway which is combined with a W parameter normally based on (D/Q) , except for tritium."

Statement implied from NUREG 0133. However, child age group receives maximum dose, not infant, due to higher breathing rate used in dose calculations.

Appendix B - Section B.1.1 - Page B-1 to B-2

Revised statement from:

"The evaluation of this pathway consists of estimating the maximum dose to the most critical organ received by an infant through inhalation by:"

to:

"The dose factor from inhalation pathway is calculated by:"

Change made for clarity and to remove reference to infant age group. Child age group is most limiting, not infant.

Revised definitions to variables BR and DFA_i from equation B.1-1 to specify child age group instead of infant. Child age group is most limiting, not infant.

Revised statement to change references to infant age group to child age group:

"The age group considered is the infant group. The infant's breathing rate is taken as 1400 m^3/yr from Table E-5 of Regulatory Guide 1.109, Revision 1. The inhalation dose factors for the infant, DFA_i , are presented in Table E-10 of Regulatory Guide 1.109 in units of $mrem/\rho Ci$. The total body is considered as an organ in the selection of DFA_i .

Appendix B - Section B.1.1 - Page B-1 to B-2

The incorporation of breathing rate of an infant and the unit conversion factor results in the following equation:"

to:

"The age group considered is the child group. The child's breathing rate is taken as 3700 m^3/yr from Table E-5 of Regulatory Guide 1.109, Revision 1. The inhalation dose factors for the child, DFA_i , are presented in Table E-10 of Regulatory Guide 1.109 in units of $mrem/\rho Ci$. The total body is considered as an organ in the selection of DFA_i .

The incorporation of breathing rate of an child and the unit conversion factor results in the following equation:"

Child age group is most limiting, not infant.

Appendix B - Section B.1.2 - Page B-2

Changed units for variable P_{iG} from "mrem/yr per $\mu\text{Ci}/\text{sec}/\text{m}^{-2}$ " to " m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ " for clarity.

Appendix B - Section B.1.3 - Page B-3

Changed units for variable P_{iM} from "mrem/yr per $\mu\text{Ci}/\text{sec}/\text{m}^{-2}$ " to " m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ " for clarity.

Revised definition to variables U_{ap} and t_f from equation B.1-5 to specify child age group instead of infant. Child age group is most limiting, not infant.

Appendix B - Section B.2 - Page B-5

Revised statement from:

" R_i values have been calculated for the adult, teen, child, and infant age groups for the ground plane, cow milk, goat milk, vegetable, and beef ingestion pathways."

to:

" R_i values have been calculated for the adult, teen, and child age groups for the inhalation, ground plane, cow milk, goat milk, vegetable, and beef ingestion pathways. R_i values have been calculated for the infant age group for the inhalation, ground plane, cow milk, and goat milk pathways."

Change made for clarity.

Appendix B - Section B.2.2 - Page B-6

Changed units for variable R_{iG} from "mrem/yr per $\mu\text{Ci}/\text{sec}/\text{m}^{-2}$ " to " m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ " for clarity.

Changed description of variable I_i to "1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Table 3.5-1 (dimensionless)." for clarity.

Change description of variable S_F to "0.7, the shielding factor suggested in Table E-15 of Regulatory Guide 1.109, Revision 1 (dimensionless)." for clarity.

Changed description of variable DFG_i to "The ground plane dose conversion factor for radionuclide 'i'. A tabulation of DFG_i values is presented in Table E-6 of Regulatory Guide 1.109, Revision 1 (mrem/hr per $\mu\text{Ci}/\text{m}^2$)." for clarity.

Appendix B - Section B.2.3 - Page B-7

Changed units for variable R_{iM} from "mrem/yr per $\mu\text{Ci}/\text{sec}/\text{m}^{-2}$ " to " m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ " for clarity.

Changed description of variable I_i to "1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Tables 3.5-8 through 3.5-15 (dimensionless)." for clarity.

Changed description of variable f_s from:

"Fraction of the cow feed that is pasture grass while the cow is on pasture."

to:

"Fraction of the cow or goat feed that is pasture grass while the animal is on pasture (dimensionless)."

Change made for clarity to include both cow and goat pathways.

Appendix B - Section B.2.3 - Page B-7

Changed description of variable r from:

"Fraction of deposited activity retained on cow's feed grass."

to:

"Fraction of deposited activity retained on cow's or goat's feed grass (dimensionless)."

Change made for clarity to include both cow and goat pathways.

Appendix B - Section B.2.3 - Page B-8

Changed description of variable H to "8, used in lieu of site-specific information, absolute humidity of the atmosphere (gm/m^3)." for clarity.

Appendix B - Section B.2.4 - Page B-9

Changed units for variable R_{iB} from "mrem/yr per $\mu\text{Ci}/\text{sec}/\text{m}^{-2}$ " to " m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ " for clarity.

Changed description of I_i to "1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Tables 3.5-8 through 3.5-15 (dimensionless)." for clarity.

Appendix B - Section B.2.5 - Page B-10 to B-11

Changed units for variable R_{iV} from "mrem/yr per $\mu\text{Ci}/\text{sec}/\text{m}^{-2}$ " to " m^2 -mrem/yr per $\mu\text{Ci}/\text{sec}$ " for clarity.

Changed description of I_i to "1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Tables 3.5-8 through 3.5-15 (dimensionless)." for clarity.

Changed description of variable f_L to "1.0, used in lieu of site-specific data, fraction of the annual intake of fresh leafy vegetation grown locally. Value of 1.0, obtained from Table E-15 of Regulatory Guide 1.109, Revision 1, was used in the calculations of R_{iV} (dimensionless)." for clarity.

Changed description of variable f_g to "0.76, used in lieu of site-specific data, fraction of annual intake of stored vegetation grown locally. Value of 0.76, obtained from Table E-15 of Regulatory Guide 1.109, Revision 1, was used in the calculations of R_{iV} (dimensionless)." for clarity.

Appendix C - Section C.1 - Page C-1

Revised statement from:

"Typical values of efficiency, volume/mass, chemical yield, and radionuclide decay corrections are to be used in the calculation."

to:

"Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay corrections are to be used in the calculation."

Change made for clarity.

Appendix C - Section C.2 - Page C-2

Revised statement from:

"Typical values of E, V, Y, and Δt should be used in the calculation."

to:

"Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay corrections are to be used in the calculation."

Change made for clarity.

Appendix D - Page D-1

Added Appendix D, titled as "Liquid and Gaseous Process Monitors and Radwaste Systems", for clarity.

Appendix E - Page E-1

Added Appendix E, titled as "Map of Lake Robinson", for clarity.

APPENDIX A: METEOROLOGICAL DISPERSION FACTOR COMPUTATIONS

Carolina Power & Light Company (CP&L) engaged the services of Dames & Moore to assess the transport and dispersion of the effluent in the atmosphere as outlined in Preparation of Radiological Effluent Technical Specifications for Nuclear Power Plants, NUREG 0133 (USNRC 1978). The methodology for this assessment was based on guidelines presented in Regulatory Guide (RG) 1.111, Revision 1 (USNRC 1977). The results of the assessment were to provide the relative deposition flux and relative concentrations (undepleted and depleted) based on numerical models acceptable for use in Appendix I evaluations.

Regulatory Guide 1.111 presented three acceptable diffusion models for use in estimating deposition flux and concentrations. These were (1) particle-in-cell model (a variable trajectory model based on the gradient-transport theory), (2) puff-advection model (a variable trajectory model based on the statistical approach to diffusion), and (3) the constant mean wind direction model referred to here as the straight-line trajectory Gaussian diffusion model (the most widely used model based on a statistical approach). It was resolved that for operational efficiency, the straight-line described in XOQDOQ Program for the Meteorological Evaluation of Routine Effluent Releases at Nuclear Power Stations (Draft), NUREG 0324 (USNRC September 1977) would be used for generating the required analyses of Appendix I. To provide a more realistic accounting of the variability of wind around the plant site, terrain/recirculation correction factors (TCF) were to be determined from a combined puff-advection/straight-line scheme for a one-year meteorological data base.

Dames & Moore was provided a one-year record of meteorological data from the on-site meteorological program at the H. B. Robinson Steam Electric Plant. These data consisted of all collected parameters at both the 11.03-meter and 62.39-meter tower levels for the year 1977. Dames & Moore computed dispersions and depositions using the model described in the reference. The following tables from the reference provide the basis for the meteorological dilution factor development of the technical specifications for Appendix I and were the source of the X/Q and D/Q values used to show compliance with 10 CFR 20 and 10 CFR 50 for noble gases and radioiodines and particulates.

Tables A-1 through A-6 Relative undepleted concentration, relative depleted concentration, and relative deposition flux estimates for ground level releases for both standard distances and special locations for long-term releases.

Tables A-7 through A-9 Relative undepleted concentration, relative depleted concentration, and relative deposition flux estimates for ground level releases for special locations for short-term releases.

The χ/Q and D/Q values which are used in Appendix B for showing compliance with 10 CFR 20 and 10 CFR 50 when the HBR Plant vent has been modified such that it qualifies as a mixed mode release were based upon the following tables:

Tables A-10 through A-15 Relative undepleted concentration, relative depleted concentration, and relative deposition flux estimates for elevated release for both standard distances and special locations for long-term releases.

Tables A-16 through A-18 Relative undepleted concentration, relative depleted concentration, and relative deposition flux estimates for mixed mode releases for special locations for short-term releases.

It should be noted that the short-term releases were based upon 100 hours per year of containment purges.

Future Operation Computations

NRC's XOQDOQ program will be used to determine the annual averaged χ/Q and D/Q values for annual radiological effluent release reporting.

In general, Dames & Moore concluded that the straight-line model is as reasonable a projection of concentrations as the puff-advection model. By inclusion of the terrain correction factors developed by a combination of the puff-advection/straight-line scheme with the results of the XOQDOQ Program, ready evaluation of on-site meteorological data may be made.

For routine meteorological dispersion evaluations, the "XOQDOQ" Program will be run with the appropriate physical plant data, appropriate meteorological information for the standard distances, and special locations of interest without a terrain/recirculation factor. The resulting computations will have applied the TCFs to produce a final atmospheric diffusion estimate for the site. The input to "XOQDOQ" for ground level releases at HBR are presented in Table A-19 and for mixed mode releases at HBR in Table A-20.

Reference

Chandler, Martin W. and George Hoopes, Revised Radiological Effluent Technical Specifications. Gaseous Effluent Dilution Factors, Prepared for Carolina Power & Light Company, Robinson Facility, Dames & Moore, January 18, 1979.

TABLE A-1
 χ/Q VALUES FOR LONG-TERM GROUND LEVEL RELEASES
AT SPECIAL LOCATIONS (sec/m³)^{*}

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Ground Level
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	6.67E-06	4.13E-06	0.00	6.26E-06	5.56E-06
NE	3.02E-06	2.56E-06	2.13E-06	2.44E-06	2.13E-06
ENE	4.41E-06	4.93E-07	0.00	4.18E-06	7.36E-07
E	6.39E-06	3.02E-07	1.44E-07	3.51E-06	3.68E-07
ESE	1.12E-05	1.18E-06	0.00	7.90E-06	7.90E-06
SE	3.28E-05	0.00	0.00	3.27E-05	3.27E-05
SSE	8.08E-05	0.00	0.00	6.01E-05	6.01E-05
S	3.29E-05	4.22E-07	0.00	2.78E-05	1.65E-05
SSW	2.10E-05	5.61E-07	0.00	2.04E-05	8.07E-06
SW	8.91E-06	2.61E-07	2.14E-07**	6.90E-06	5.38E-06
WSW	3.97E-06	1.16E-07	0.00	3.22E-06	1.83E-06
W	2.11E-06	3.89E-08	0.00	1.38E-06	1.38E-06
WNW	1.62E-06	5.32E-08	0.00	1.03E-06	6.06E-07
NW	7.93E-07	5.06E-07	0.00	7.39E-07	7.39E-07
NNW	1.31E-06	4.78E-07	0.00	4.42E-07	3.82E-07
N	1.45E-06	6.44E-07	0.00	6.67E-07	6.67E-07

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-2
DEPLETED γ/Q VALUES FOR LONG-TERM GROUND LEVEL RELEASES
AT SPECIAL LOCATIONS (sec/m³)*

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Ground Level
 Variable: Relative Depleted Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	5.84E-06	3.38E-06	0.00	5.25E-06	4.77E-06
NE	2.68E-06	2.21E-06	1.79E-06	2.09E-06	1.79E-06
ENE	3.95E-06	3.99E-07	0.00	3.72E-06	5.93E-07
E	5.79E-06	2.42E-07	1.08E-07	3.12E-06	2.86E-07
ESE	1.01E-05	9.72E-07	0.00	7.11E-06	7.11E-06
SE	3.08E-05	0.00	0.00	3.05E-05	3.05E-05
SSE	7.46E-05	0.00	0.00	5.61E-05	5.61E-05
S	3.11E-05	3.42E-07	0.00	2.61E-05	1.53E-05
SSW	1.91E-05	4.55E-07	0.00	1.96E-05	7.35E-06
SW	8.25E-06	2.14E-07	2.44E-07**	6.44E-06	4.88E-06
WSW	3.68E-06	8.92E-08	0.00	2.94E-06	1.68E-06
W	1.98E-06	2.96E-08	0.00	1.26E-06	1.26E-06
WNW	1.47E-06	4.07E-08	0.00	9.26E-07	5.42E-07
NW	6.71E-07	4.19E-07	0.00	6.31E-07	6.31E-07
NNW	1.09E-06	3.80E-07	0.00	3.48E-07	2.98E-07
N	1.24E-06	5.11E-07	0.00	5.24E-07	5.24E-07

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-3
D/Q VALUES FOR LONG-TERM GROUND LEVEL RELEASES
AT SPECIAL LOCATIONS (m⁻²)^{*}

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Ground Level
 Variable: Relative Deposition Rate (Meter ⁻²)
 Calculation Points: Special
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	9.80E-09	5.63E-09	0.00	9.09E-09	7.74E-09
NE	5.59E-09	4.65E-09	3.70E-09	4.42E-09	3.70E-09
ENE	8.06E-09	6.96E-10	0.00	7.59E-09	1.05E-09
E	1.24E-08	4.13E-10	1.80E-10	6.43E-09	5.11E-10
ESE	1.71E-08	1.46E-09	0.00	1.20E-08	1.20E-08
SE	4.23E-08	0.00	0.00	4.14E-08	4.14E-08
SSE	8.08E-08	0.00	0.00	6.21E-08	6.21E-08
S	4.39E-08	4.77E-10	0.00	3.82E-08	2.33E-08
SSW	5.92E-08	1.38E-09	0.00	6.12E-08	2.33E-08
SW	2.80E-08	6.49E-10	5.17E-10**	2.15E-08	1.65E-08
WSW	1.91E-08	4.37E-10	0.00	1.54E-08	8.84E-09
W	8.84E-09	1.09E-10	0.00	5.75E-09	5.75E-09
WNW	8.10E-09	1.88E-10	0.00	5.08E-09	2.97E-09
NW	2.44E-09	1.45E-09	0.00	2.16E-09	2.16E-09
NNW	2.44E-09	7.45E-10	0.00	6.83E-10	5.73E-10
N	1.76E-09	6.44E-10	0.00	6.67E-10	6.67E-10

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-4
 χ /Q VALUES FOR LONG-TERM GROUND LEVEL RELEASES
AT STANDARD DISTANCES (sec/m³)

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Ground Level
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Standard
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

BASE DISTANCE IN MILES/KILOMETERS

<u>Sector</u>	<u>Mi→</u>	<u>.25</u>	<u>.75</u>	<u>1.25</u>	<u>1.75</u>	<u>2.25</u>	<u>2.75</u>	<u>3.25</u>	<u>3.75</u>	<u>4.25</u>	<u>4.75</u>
	<u>Km→</u>	<u>.40</u>	<u>1.21</u>	<u>2.01</u>	<u>2.82</u>	<u>3.62</u>	<u>4.42</u>	<u>5.23</u>	<u>6.03</u>	<u>6.84</u>	<u>7.64</u>
NNE		8.8E-05	1.5E-05	6.4E-06	3.5E-06	2.3E-06	1.7E-06	1.1E-06	8.0E-07	5.5E-07	3.7E-07
NE		3.9E-05	4.6E-06	2.0E-06	1.1E-06	6.9E-07	4.6E-07	3.5E-07	2.8E-07	2.2E-07	1.7E-07
ENE		3.2E-05	5.2E-06	1.8E-06	9.7E-07	5.3E-07	3.8E-07	2.6E-07	2.1E-07	1.7E-07	1.5E-07
E		2.9E-05	4.5E-06	1.6E-06	8.3E-07	6.2E-07	3.3E-07	2.7E-07	1.9E-07	1.3E-07	9.5E-08
ESE		3.6E-05	5.4E-06	2.3E-06	1.3E-06	9.2E-07	6.2E-07	5.1E-07	3.6E-07	2.7E-07	1.9E-07
SE		4.0E-05	5.4E-06	2.6E-06	1.3E-06	8.5E-07	4.8E-07	3.6E-07	2.1E-07	1.9E-07	1.6E-07
SSE		8.2E-05	1.2E-05	5.0E-06	2.6E-06	1.5E-06	9.2E-07	6.5E-07	5.5E-07	4.5E-07	4.0E-07
S		3.6E-05	4.4E-06	1.7E-06	9.1E-07	4.2E-07	3.3E-07	2.6E-07	2.1E-07	1.7E-07	1.4E-07
SSW		2.5E-05	4.6E-06	1.9E-06	7.9E-07	4.5E-07	3.0E-07	2.1E-07	1.6E-07	1.2E-07	9.8E-08
SW		1.5E-05	2.2E-06	8.3E-07	3.7E-07	2.3E-07	1.6E-07	1.2E-07	8.8E-08	7.1E-08	5.9E-08
WSW		6.5E-06	1.0E-06	3.7E-07	2.0E-07	1.6E-07	1.0E-07	6.9E-08	5.8E-08	4.8E-08	3.7E-08
W		6.5E-06	8.3E-07	3.2E-07	1.7E-07	1.3E-07	8.8E-08	6.7E-08	4.3E-08	3.0E-08	2.4E-08
WNW		6.1E-06	7.8E-07	3.0E-07	1.8E-07	1.3E-07	9.6E-08	7.1E-08	5.4E-08	4.0E-08	3.0E-08
NW		1.1E-05	1.6E-06	7.4E-07	4.2E-07	2.4E-07	1.3E-07	8.0E-08	6.7E-08	5.3E-08	4.4E-08
NNW		2.0E-05	3.6E-06	1.9E-06	1.4E-06	9.4E-07	5.2E-07	2.7E-07	1.8E-07	1.2E-07	9.2E-08
N		5.2E-05	8.0E-06	3.3E-06	1.6E-06	1.0E-06	7.1E-07	4.9E-07	3.7E-07	2.9E-07	2.4E-07

Number of Valid Observations = 8703

Number of Invalid Observations = 57

Number of Calms Lower Level = 398

Number of Calms Upper Limit = 0

TABLE A-5
DEPLETED χ/Q VALUES FOR LONG-TERM GROUND LEVEL RELEASES
AT STANDARD DISTANCES (sec/m³)

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Ground Level
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Standard
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

BASE DISTANCE IN MILES/KILOMETERS

<u>Sector</u>	<u>Mi→</u>	<u>.25</u>	<u>.75</u>	<u>1.25</u>	<u>1.75</u>	<u>2.25</u>	<u>2.75</u>	<u>3.25</u>	<u>3.75</u>	<u>4.25</u>	<u>4.75</u>
	<u>Km→</u>	<u>.40</u>	<u>1.21</u>	<u>2.01</u>	<u>2.82</u>	<u>3.62</u>	<u>4.42</u>	<u>5.23</u>	<u>6.03</u>	<u>6.84</u>	<u>7.64</u>
NNE		8.3E-05	1.3E-05	5.4E-06	3.0E-06	2.0E-06	1.3E-07	8.3E-06	6.2E-07	4.1E-07	2.7E-07
NE		3.6E-05	4.1E-06	1.7E-06	9.2E-07	5.6E-07	3.6E-07	2.7E-07	2.1E-07	1.6E-07	1.3E-07
ENE		3.1E-05	4.6E-06	1.5E-06	8.3E-07	4.3E-07	3.0E-07	2.0E-07	1.6E-07	1.3E-07	1.1E-07
E		2.7E-05	4.1E-06	1.3E-06	6.9E-07	5.0E-07	2.7E-07	2.1E-07	1.4E-07	9.4E-08	7.2E-08
ESE		3.4E-05	4.9E-06	2.0E-06	1.1E-06	7.4E-07	5.0E-07	4.0E-07	2.9E-07	2.1E-07	1.5E-07
SE		3.8E-05	4.9E-06	2.2E-06	1.1E-06	7.0E-07	3.8E-07	2.8E-07	1.7E-07	1.4E-07	1.2E-07
SSE		7.8E-05	1.1E-05	4.4E-06	2.2E-06	1.3E-06	7.6E-07	5.1E-07	4.3E-07	3.3E-07	2.9E-07
S		3.5E-05	3.9E-06	1.4E-06	7.6E-07	3.5E-07	2.6E-07	2.0E-07	1.6E-07	1.3E-07	1.1E-07
SSW		2.3E-05	4.1E-06	1.6E-06	6.6E-07	3.7E-07	2.4E-07	1.7E-07	1.2E-07	8.9E-08	6.9E-08
SW		1.4E-05	1.9E-06	7.1E-07	3.1E-07	1.9E-07	1.2E-07	9.8E-08	6.7E-08	5.0E-08	4.3E-08
WSW		6.2E-06	9.2E-07	3.2E-07	1.7E-07	1.3E-07	8.0E-08	5.4E-08	4.4E-08	3.6E-08	2.7E-08
W		6.1E-06	7.5E-07	2.8E-07	1.4E-07	1.1E-07	6.8E-08	5.2E-08	3.3E-08	2.3E-08	1.8E-08
WNW		5.8E-06	7.0E-07	2.6E-07	1.5E-07	1.1E-07	7.6E-08	5.5E-08	4.2E-08	3.0E-08	2.2E-08
NW		1.1E-05	1.4E-06	6.4E-07	1.4E-07	2.0E-07	1.0E-07	6.1E-08	5.0E-08	4.0E-08	3.3E-08
NNW		1.9E-05	3.1E-06	1.6E-06	1.1E-06	7.6E-07	4.2E-07	2.0E-07	1.3E-07	8.8E-08	7.1E-08
N		4.9E-05	7.2E-06	2.8E-06	1.4E-06	8.1E-07	5.6E-07	3.8E-07	2.9E-07	2.2E-07	1.8E-07

Number of Valid Observations = 8703

Number of Invalid Observations = 57

Number of Calms Lower Level = 398

Number of Calms Upper Limit = 0

TABLE A-6
D/Q VALUES FOR LONG-TERM GROUND LEVEL RELEASES
AT STANDARD DISTANCES (m⁻²)

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Ground Level
 Variable: Relative Concentration (Meter⁻²)
 Calculation Points: Standard
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

BASE DISTANCE IN MILES/KILOMETERS

<u>Sector</u>	<u>Mi→</u>	<u>.25</u>	<u>.75</u>	<u>1.25</u>	<u>1.75</u>	<u>2.25</u>	<u>2.75</u>	<u>3.25</u>	<u>3.75</u>	<u>4.25</u>	<u>4.75</u>
	<u>Km→</u>	<u>.40</u>	<u>1.21</u>	<u>2.01</u>	<u>2.82</u>	<u>3.62</u>	<u>4.42</u>	<u>5.23</u>	<u>6.03</u>	<u>6.84</u>	<u>7.64</u>
NNE		1.3E-07	2.4E-08	9.3E-09	4.8E-09	3.0E-09	2.0E-09	1.2E-09	8.2E-10	5.4E-10	3.4E-10
NE		7.1E-08	8.9E-09	3.4E-09	1.8E-09	1.0E-09	6.5E-10	4.6E-10	3.4E-10	2.6E-10	2.0E-10
ENE		5.5E-08	9.6E-09	3.1E-09	1.5E-09	7.9E-10	5.1E-10	3.3E-10	2.6E-10	1.9E-10	1.6E-10
E		5.1E-08	8.7E-09	2.7E-09	1.4E-09	9.4E-10	4.7E-10	3.6E-10	2.4E-10	1.5E-10	1.1E-10
ESE		5.0E-08	8.2E-09	3.2E-09	1.6E-09	1.1E-09	6.9E-10	5.1E-10	3.6E-10	2.5E-10	1.8E-10
SE		4.8E-08	7.0E-09	3.1E-09	1.5E-09	8.6E-10	4.5E-10	3.1E-10	1.8E-10	1.5E-10	1.2E-10
SSE		8.2E-08	1.3E-08	5.2E-09	2.6E-09	1.4E-09	7.7E-10	4.9E-10	3.9E-10	3.0E-10	2.5E-10
S		4.8E-08	6.3E-09	2.2E-09	1.2E-09	4.8E-10	3.5E-10	2.6E-10	1.9E-10	1.6E-10	1.2E-10
SSW		7.2E-08	1.4E-08	5.1E-09	2.0E-09	1.1E-09	6.8E-10	4.5E-10	3.2E-10	2.3E-10	1.8E-10
SW		4.2E-08	6.5E-09	2.3E-09	1.0E-09	5.7E-10	3.7E-10	2.7E-10	1.8E-10	1.4E-10	1.1E-10
WSW		3.0E-08	4.9E-09	1.7E-09	8.5E-10	6.3E-10	3.8E-10	2.5E-10	1.9E-10	1.6E-10	1.2E-10
W		2.7E-08	3.4E-09	1.2E-09	6.1E-10	4.4E-10	2.7E-10	2.0E-10	1.3E-10	8.5E-11	6.7E-11
WNW		3.0E-08	3.9E-09	1.4E-09	7.4E-10	5.4E-10	3.7E-10	2.6E-10	2.0E-10	1.4E-10	1.0E-10
NW		3.4E-08	5.2E-09	2.2E-09	1.2E-09	6.3E-10	3.2E-10	1.8E-10	1.5E-10	1.1E-10	9.0E-11
NNW		4.1E-08	7.4E-09	3.6E-09	2.5E-09	1.6E-09	8.0E-10	3.9E-10	2.4E-10	1.5E-10	1.2E-10
N		6.7E-08	1.1E-08	4.1E-09	2.0E-09	1.1E-09	7.2E-10	4.7E-10	3.3E-10	2.5E-10	2.0E-10

Number of Valid Observations = 8703

Number of Invalid Observations = 57

Number of Calms Lower Level = 398

Number of Calms Upper Limit = 0

TABLE A-7
 γ/Q VALUES FOR SHORT-TERM GROUND LEVEL RELEASES
AT SPECIAL LOCATIONS (sec/m³)*

Carolina Power & Light Company - Robinson
 Release Type: Purge
 Release Mode: Ground Level
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Purge (ACNPURG2)
 Application of Terrain Correction Factors: No
 Number of Observations: 8703
 Purge Time: 100 Hours

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	7.20E-06	5.00E-06	0.00	6.80E-06	6.20E-06
NE	5.30E-06	4.60E-06	4.00E-06	4.40E-06	4.00E-06
ENE	6.90E-06	1.50E-06	0.00	6.70E-06	1.90E-06
E	1.00E-05	1.10E-06	6.40E-07	6.20E-06	1.20E-06
ESE	1.50E-05	2.60E-06	0.00	1.10E-05	1.10E-05
SE	3.40E-05	0.00	0.00	3.30E-05	3.30E-05
SSE	5.10E-05	0.00	0.00	4.10E-05	4.10E-05
S	3.00E-05	1.20E-06	0.00	2.60E-05	1.80E-05
SSW	2.10E-05	1.30E-06	0.00	2.00E-05	9.80E-06
SW	1.10E-05	7.80E-07	6.70E-07**	9.10E-06	7.20E-06
WSW	8.10E-06	5.50E-07	0.00	6.90E-06	4.20E-06
W	5.50E-06	3.00E-07	0.00	4.20E-06	4.20E-06
WNW	5.30E-06	3.90E-07	0.00	3.70E-06	2.50E-06
NW	2.30E-06	1.70E-06	0.00	2.20E-06	2.20E-06
NNW	2.40E-06	1.20E-06	0.00	1.20E-06	1.10E-06
N	2.70E-06	1.50E-06	0.00	1.50E-06	1.50E-06

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-8
DEPLETED γ/Q VALUES FOR SHORT-TERM GROUND LEVEL RELEASES
AT SPECIAL LOCATIONS (sec/m³)*

Carolina Power & Light Company - Robinson
 Release Type: Purge
 Release Mode: Ground Level
 Variable: Relative Depleted Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Purge (ACNPURG2)
 Application of Terrain Correction Factors: No
 Number of Observations: 8703
 Purge Time: 100 Hours

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	6.30E-06	4.09E-06	0.00	5.71E-06	5.31E-06
NE	4.71E-06	3.97E-06	3.37E-06	3.77E-06	3.37E-06
ENE	6.19E-06	1.21E-06	0.00	5.96E-06	1.53E-06
E	9.06E-06	8.80E-07	4.80E-07	5.51E-06	9.34E-07
ESE	1.36E-05	2.14E-06	0.00	9.90E-06	9.90E-06
SE	3.19E-05	0.00	0.00	3.08E-05	3.08E-05
SSE	4.71E-05	0.00	0.00	3.83E-05	3.83E-05
S	2.83E-05	9.74E-07	0.00	2.44E-05	1.67E-05
SSW	1.91E-05	1.05E-06	0.00	1.92E-05	8.93E-06
SW	1.02E-05	6.38E-07	7.64E-07**	8.49E-06	6.52E-06
WSW	7.50E-06	4.23E-07	0.00	6.30E-06	3.85E-06
W	5.16E-06	2.28E-07	0.00	3.85E-06	3.85E-06
WNW	4.82E-06	2.98E-07	0.00	3.33E-06	2.23E-06
NW	1.95E-06	1.41E-06	0.00	1.88E-06	1.88E-06
NNW	1.99E-06	9.53E-07	0.00	9.46E-07	8.59E-07
N	2.31E-06	1.19E-06	0.00	1.18E-06	1.18E-06

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-9
D/Q VALUES FOR SHORT-TERM GROUND LEVEL RELEASES
AT SPECIAL LOCATIONS (m⁻²)*

Carolina Power & Light Company - Robinson
 Release Type: Purge
 Release Mode: Ground Level
 Variable: Relative Deposition Rate (Meter⁻²)
 Calculation Points: Special
 Model: Purge (ACNPURG2)
 Application of Terrain Correction Factors: No
 Number of Observations: 8703
 Purge Time: 100 Hours

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	1.06E-08	6.80E-09	0.00	9.86E-09	8.62E-09
NE	9.80E-09	8.37E-09	6.96E-09	7.96E-09	6.96E-09
ENE	1.26E-08	2.12E-09	0.00	1.21E-08	2.72E-09
E	1.94E-08	1.51E-09	8.00E-10	1.13E-08	1.67E-09
ESE	2.29E-08	3.22E-09	0.00	1.68E-08	1.68E-08
SE	4.25E-08	0.00	0.00	4.19E-08	4.19E-08
SSE	5.10E-08	0.00	0.00	4.22E-08	4.22E-08
S	3.99E-08	1.36E-09	0.00	3.59E-08	2.54E-08
SSW	5.92E-08	3.18E-09	0.00	6.00E-08	2.83E-08
SW	3.46E-08	1.93E-09	1.61E-09**	2.83E-08	2.20E-08
WSW	3.90E-08	2.07E-09	0.00	3.30E-08	2.03E-08
W	2.30E-08	8.40E-10	0.00	1.75E-08	1.75E-08
WNW	2.65E-08	1.38E-09	0.00	1.82E-08	1.22E-08
NW	7.08E-09	4.86E-09	0.00	6.42E-09	6.42E-09
NNW	4.46E-09	1.87E-09	0.00	1.86E-09	1.65E-09
N	3.27E-09	1.50E-09	0.00	1.50E-09	1.50E-09

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-10
 χ/Q VALUES FOR LONG-TERM MIXED MODE RELEASES
AT SPECIAL LOCATIONS (sec/m³)*

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Mixed Mode
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

<u>Affected</u> <u>Sector</u>	<u>Site</u> <u>Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	3.33E-07	2.82E-07	0.00	3.23E-07	3.18E-07
NE	1.34E-07	1.40E-07	1.23E-07	1.39E-07	1.23E-07
ENE	2.74E-07	1.23E-07	0.00	2.79E-07	8.51E-08
E	2.40E-07	1.11E-07	5.39E-08	2.53E-07	1.33E-07
ESE	2.75E-07	1.25E-07	0.00	2.17E-07	2.17E-07
SE	5.13E-07	0.00	0.00	5.23E-07	5.23E-07
SSE	9.94E-07	0.00	0.00	7.61E-07	7.61E-07
S	4.57E-07	3.61E-08	0.00	4.00E-07	2.50E-07
SSW	5.54E-07	1.27E-07	0.00	5.71E-07	2.69E-07
SW	2.31E-07	5.38E-08	4.72E-08**	1.84E-07	1.51E-07
WSW	2.06E-07	4.64E-08	0.00	1.68E-07	1.02E-07
W	9.36E-08	1.87E-08	0.00	7.13E-08	7.13E-08
WNW	1.02E-07	4.28E-08	0.00	9.55E-08	9.80E-08
NW	1.52E-07	1.30E-07	0.00	1.54E-07	1.54E-07
NNW	1.71E-07	8.86E-08	0.00	8.30E-08	7.28E-08
N	9.32E-08	5.66E-08	0.00	5.80E-08	5.80E-08

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-11
DEPLETED γ/Q VALUES FOR LONG-TERM MIXED MODE RELEASES
AT SPECIAL LOCATIONS (sec/m³)*

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Mixed Mode
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	3.33E-07	2.82E-07	0.00	3.23E-07	2.98E-07
NE	1.23E-07	1.28E-07	1.23E-07	1.28E-07	1.23E-07
ENE	2.59E-07	1.23E-07	0.00	2.63E-07	8.12E-08
E	2.40E-07	1.11E-07	4.39E-08	2.53E-07	1.23E-07
ESE	2.54E-07	1.18E-07	0.00	1.96E-07	1.96E-07
SE	4.93E-07	0.00	0.00	5.02E-07	5.02E-07
SSE	9.32E-07	0.00	0.00	7.21E-07	7.21E-07
S	4.39E-07	3.42E-08	0.00	3.82E-07	2.33E-07
SSW	5.35E-07	1.27E-07	0.00	5.51E-07	2.51E-07
SW	2.31E-07	5.14E-08	5.31E-08**	1.84E-07	1.45E-07
WSW	2.06E-07	4.46E-08	0.00	1.68E-07	9.91E-08
W	9.10E-08	1.82E-08	0.00	6.90E-08	6.90E-08
WNW	9.88E-08	4.07E-08	0.00	9.26E-08	9.54E-08
NW	1.51E-07	1.27E-07	0.00	1.54E-07	1.54E-07
NNW	1.64E-07	8.44E-08	0.00	8.04E-08	6.92E-08
N	8.91E-08	5.42E-08	0.00	5.56E-08	5.56E-08

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-12
D/Q VALUES FOR LONG-TERM MIXED MODE RELEASES
AT SPECIAL LOCATIONS (m⁻²)^{*}

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Mixed Mode
 Variable: Relative Deposition Rate (Meter⁻²)
 Calculation Points: Special
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	2.29E-09	1.39E-09	0.00	2.22E-09	1.89E-09
NE	1.79E-09	1.51E-09	1.23E-09	1.39E-09	1.23E-09
ENE	3.19E-09	3.41E-10	0.00	3.10E-09	4.78E-10
E	4.99E-09	2.31E-10	1.15E-10	2.92E-09	2.76E-10
ESE	4.86E-09	5.90E-10	0.00	3.75E-09	3.75E-09
SE	6.98E-09	0.00	0.00	7.20E-09	7.20E-09
SSE	6.22E-09	0.00	0.00	5.21E-09	5.21E-09
S	7.31E-09	1.77E-10	0.00	6.60E-09	5.17E-09
SSW	1.01E-08	7.41E-10	0.00	1.06E-08	6.81E-09
SW	4.62E-09	3.32E-10	2.66E-10 ^{**}	4.14E-09	3.87E-09
WSW	4.85E-09	2.59E-10	0.00	4.34E-09	3.35E-09
W	2.64E-09	6.74E-11	0.00	1.95E-09	1.95E-09
WNW	2.59E-09	1.25E-10	0.00	1.94E-09	1.29E-09
NW	1.20E-09	7.66E-10	0.00	1.12E-09	1.12E-09
NNW	7.77E-10	2.53E-10	0.00	2.41E-10	2.03E-10
N	3.62E-10	1.41E-10	0.00	1.51E-10	1.51E-10

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-13
 χ /Q VALUES FOR LONG-TERM MIXED MODE RELEASES
AT STANDARD DISTANCES (sec/m³)

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Mixed Mode
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Standard
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

BASE DISTANCE IN MILES/KILOMETERS

<u>Sector</u>	<u>Mi</u> →	<u>.25</u>	<u>.75</u>	<u>1.25</u>	<u>1.75</u>	<u>2.25</u>	<u>2.75</u>	<u>3.25</u>	<u>3.75</u>	<u>4.25</u>	<u>4.75</u>
	<u>Km</u> →	<u>.40</u>	<u>1.21</u>	<u>2.01</u>	<u>2.82</u>	<u>3.62</u>	<u>4.42</u>	<u>5.23</u>	<u>6.03</u>	<u>6.84</u>	<u>7.64</u>
NNE		1.5E-06	3.9E-07	3.1E-07	2.7E-07	2.3E-07	2.0E-07	1.6E-07	1.4E-07	9.8E-08	6.5E-08
NE		1.0E-06	1.5E-07	1.1E-07	9.0E-08	6.7E-08	5.2E-08	7.8E-08	3.8E-08	5.4E-08	3.4E-08
ENE		8.6E-07	2.6E-07	1.9E-07	1.7E-07	1.2E-07	1.1E-07	7.4E-08	6.2E-08	4.8E-08	4.2E-08
E		7.2E-07	2.6E-07	2.2E-07	2.0E-07	2.1E-07	1.2E-07	9.4E-08	7.0E-08	4.7E-08	3.6E-08
ESE		7.8E-07	1.9E-07	1.7E-07	1.3E-07	1.0E-07	7.6E-08	6.6E-08	4.9E-08	3.8E-08	2.9E-08
SE		5.9E-07	1.0E-07	7.5E-08	5.1E-08	3.8E-08	2.4E-08	1.9E-08	1.2E-08	1.2E-08	1.1E-08
SSE		1.0E-06	1.8E-07	1.2E-07	8.0E-08	5.4E-08	3.6E-08	2.6E-08	2.3E-08	1.9E-08	1.8E-08
S		5.0E-07	9.4E-08	7.0E-08	5.9E-08	3.5E-08	3.2E-08	2.9E-08	2.5E-08	2.2E-08	1.9E-08
SSW		6.3E-07	2.7E-07	2.4E-07	1.5E-07	1.2E-07	8.4E-08	6.3E-08	4.7E-08	3.6E-08	3.1E-08
SW		3.5E-07	9.9E-08	8.8E-08	6.1E-08	4.6E-08	3.7E-08	3.2E-08	2.3E-08	2.0E-08	1.7E-08
WSW		3.0E-07	6.5E-08	6.2E-08	5.4E-08	5.4E-08	4.1E-08	3.0E-08	2.7E-08	2.4E-08	1.9E-08
W		2.4E-07	6.2E-08	6.0E-08	4.9E-08	4.9E-08	3.5E-08	3.0E-08	2.0E-08	1.5E-08	1.2E-08
WNW		2.8E-07	8.4E-08	8.6E-08	6.8E-08	6.3E-08	5.2E-08	4.2E-08	3.6E-08	3.6E-08	3.4E-08
NW		3.8E-07	1.2E-07	1.5E-07	1.2E-07	9.2E-08	6.5E-08	4.7E-08	4.1E-08	3.5E-08	2.9E-08
NNW		4.2E-07	1.8E-07	1.4E-07	1.6E-07	1.4E-07	9.2E-08	5.4E-08	3.7E-08	2.5E-08	2.1E-08
N		7.8E-07	1.7E-07	1.3E-07	9.3E-08	7.2E-08	5.9E-08	4.5E-08	3.8E-08	3.3E-08	2.9E-08

Number of Valid Observations = 8703

Number of Invalid Observations = 57

Number of Calms Lower Level = 60

Number of Calms Upper Limit = 5

TABLE A-14
DEPLETED χ/Q VALUES FOR LONG-TERM MIXED MODE RELEASES
AT STANDARD DISTANCES (sec/m³)

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Mixed Mode
 Variable: Relative Depleted Concentration (Sec./Cubic Meter)
 Calculation Points: Standard
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

BASE DISTANCE IN MILES/KILOMETERS

<u>Sector</u>	<u>Mi</u> →	<u>.25</u>	<u>.75</u>	<u>1.25</u>	<u>1.75</u>	<u>2.25</u>	<u>2.75</u>	<u>3.25</u>	<u>3.75</u>	<u>4.25</u>	<u>4.75</u>
	<u>Km</u> →	<u>.40</u>	<u>1.21</u>	<u>2.01</u>	<u>2.82</u>	<u>3.62</u>	<u>4.42</u>	<u>5.23</u>	<u>6.03</u>	<u>6.84</u>	<u>7.64</u>
NNE		1.5E-06	3.7E-07	3.1E-07	2.5E-07	2.2E-07	1.8E-07	1.5E-07	1.3E-07	8.9E-08	6.1E-08
NE		9.8E-07	1.4E-07	1.1E-07	8.5E-08	6.4E-08	4.9E-08	7.8E-08	3.6E-08	5.2E-08	3.1E-08
ENE		8.3E-07	2.5E-07	1.8E-07	1.6E-07	1.2E-07	1.0E-07	6.9E-08	5.7E-08	4.5E-08	4.0E-08
E		7.0E-07	2.4E-07	2.0E-07	1.9E-07	2.1E-07	1.1E-07	9.4E-08	6.6E-08	4.5E-08	3.4E-08
ESE		7.3E-07	1.8E-07	1.6E-07	1.2E-07	9.6E-08	7.2E-08	6.1E-08	4.6E-08	3.6E-08	2.7E-08
SE		5.7E-07	9.6E-08	6.9E-08	4.7E-08	3.6E-08	2.3E-08	1.8E-08	1.2E-08	1.0E-08	9.9E-09
SSE		9.6E-07	1.7E-07	1.1E-07	7.4E-08	4.9E-08	3.3E-08	2.4E-08	2.1E-08	1.7E-08	1.6E-08
S		4.8E-07	8.9E-08	6.7E-08	5.8E-08	3.8E-08	3.1E-08	2.7E-08	2.4E-08	2.1E-08	1.8E-08
SSW		6.1E-07	2.5E-07	2.4E-07	1.5E-07	1.1E-07	8.0E-08	6.0E-08	4.5E-08	3.4E-08	2.9E-08
SW		3.4E-07	9.5E-08	8.5E-08	5.8E-08	4.4E-08	3.6E-08	3.1E-08	2.2E-08	1.9E-08	1.6E-08
WSW		2.9E-07	6.3E-08	6.1E-08	5.2E-08	5.2E-08	4.0E-08	2.9E-08	2.6E-08	2.2E-08	1.8E-08
W		2.4E-07	6.0E-08	5.9E-08	4.8E-08	4.7E-08	3.4E-08	2.9E-08	1.9E-08	1.4E-08	1.2E-08
WNW		2.6E-07	8.3E-08	8.4E-08	6.6E-08	6.2E-08	5.0E-08	4.0E-08	3.4E-08	3.4E-08	3.2E-08
NW		3.8E-07	1.1E-07	1.5E-07	1.1E-07	9.0E-08	6.3E-08	4.5E-08	3.9E-08	3.0E-08	2.4E-08
NNW		4.1E-07	1.2E-07	1.4E-07	1.6E-07	1.4E-07	8.8E-08	5.2E-08	3.5E-08	2.4E-08	2.0E-08
N		7.5E-07	1.5E-07	1.2E-07	8.8E-08	6.9E-08	5.7E-08	4.3E-08	3.6E-08	3.1E-08	2.7E-08

Number of Valid Observations = 8703

Number of Invalid Observations = 57

Number of Calms Lower Level = 60

Number of Calms Upper Limit = 5

TABLE A-15
D/Q VALUES FOR LONG-TERM MIXED MODE RELEASES
AT STANDARD DISTANCES (m⁻²)

Carolina Power & Light Company - Robinson
 Release Type: Annual
 Release Mode: Mixed Mode
 Variable: Relative Deposition Rate (Meter-2)
 Calculation Points: Standard
 Model: Straight Line (ANNX0Q9)
 Application of Terrain Correction Factors: Yes
 Number of Observations: 8703

BASE DISTANCE IN MILES/KILOMETERS

<u>Sector</u>	<u>Mi→</u>	<u>.25</u>	<u>.75</u>	<u>1.25</u>	<u>1.75</u>	<u>2.25</u>	<u>2.75</u>	<u>3.25</u>	<u>3.75</u>	<u>4.25</u>	<u>4.75</u>
	<u>Km→</u>	<u>.40</u>	<u>1.21</u>	<u>2.01</u>	<u>2.82</u>	<u>3.62</u>	<u>4.42</u>	<u>5.23</u>	<u>6.03</u>	<u>6.84</u>	<u>7.64</u>
NNE		1.6E-08	5.0E-09	2.1E-09	1.2E-09	7.5E-10	5.2E-10	3.4E-10	2.7E-10	2.0E-10	1.4E-10
NE		1.1E-08	2.6E-09	1.2E-09	6.2E-10	3.5E-10	2.3E-10	1.8E-10	1.2E-10	1.2E-10	1.0E-10
ENE		1.1E-08	3.8E-09	1.4E-09	7.6E-10	3.7E-10	2.7E-10	1.8E-10	1.4E-10	1.2E-10	1.1E-10
E		1.1E-08	3.7E-09	1.4E-09	7.2E-10	5.0E-10	2.6E-10	2.1E-10	1.4E-10	1.0E-10	7.8E-11
ESE		8.6E-09	2.7E-09	1.2E-09	6.7E-10	4.3E-10	2.8E-10	2.1E-10	1.5E-10	1.0E-10	7.3E-11
SE		7.0E-09	1.9E-09	9.5E-10	4.7E-10	2.8E-10	1.5E-10	1.1E-10	5.9E-11	5.0E-11	4.2E-11
SSE		6.2E-09	1.8E-09	8.6E-10	4.6E-10	2.6E-10	1.5E-10	9.5E-11	7.7E-11	5.9E-11	5.0E-11
S		7.1E-09	1.8E-09	7.6E-10	4.2E-10	1.8E-10	1.3E-10	9.9E-11	7.3E-11	6.1E-11	4.8E-11
SSW		1.0E-08	5.0E-09	2.6E-09	1.1E-09	6.1E-10	3.9E-10	2.6E-10	1.8E-10	1.3E-10	1.0E-10
SW		5.0E-09	2.0E-09	9.8E-10	4.7E-10	2.9E-10	1.9E-10	1.5E-10	9.8E-11	7.6E-11	6.4E-11
WSW		4.9E-09	1.9E-09	8.4E-10	4.8E-10	3.7E-10	2.3E-10	1.5E-10	1.2E-10	1.0E-10	7.1E-11
W		4.0E-09	1.4E-09	6.3E-10	3.4E-10	2.6E-10	1.6E-10	1.3E-10	7.9E-11	5.4E-11	4.1E-11
WNW		4.6E-09	1.5E-09	7.1E-10	4.2E-10	3.2E-10	2.2E-10	1.6E-10	1.2E-10	9.9E-11	7.4E-11
NW		5.6E-09	2.2E-09	1.1E-09	6.4E-10	3.6E-10	1.9E-10	1.2E-10	1.0E-10	1.1E-10	9.6E-11
NNW		4.5E-09	1.9E-09	1.1E-09	8.1E-10	5.2E-10	2.7E-10	1.4E-10	8.8E-11	5.7E-11	4.5E-11
N		5.9E-09	1.8E-09	8.2E-10	4.0E-10	2.4E-10	1.6E-10	1.0E-10	7.4E-11	5.8E-11	4.7E-11

Number of Valid Observations = 8703

Number of Invalid Observations = 57

Number of Calms Lower Level = 60

Number of Calms Upper Limit = 5

TABLE A-16
 λ/Q VALUES FOR SHORT-TERM MIXED MODE RELEASES
AT SPECIAL LOCATIONS (sec/m³)^{*}

Carolina Power & Light Company - Robinson
 Release Type: Purge
 Release Mode: Mixed Mode
 Variable: Relative Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Purge (ACNPURG2)
 Application of Terrain Correction Factors: No
 Number of Observations: 8703
 Purge Time: 100 Hours

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	8.40E-07	7.00E-07	0.00	8.30E-07	7.90E-07
NE	5.40E-07	5.30E-07	4.70E-07	5.20E-07	4.70E-07
ENE	8.90E-07	4.20E-07	0.00	8.80E-07	3.10E-07
E	1.00E-06	4.00E-07	2.50E-07	9.20E-07	4.50E-07
ESE	1.24E-06	4.70E-07	0.00	1.00E-06	1.00E-06
SE	2.20E-06	0.00	0.00	2.10E-06	2.10E-06
SSE	2.90E-06	0.00	0.00	2.40E-06	2.40E-06
S	1.90E-06	2.00E-07	0.00	1.70E-06	1.20E-06
SSW	2.00E-06	4.00E-07	0.00	2.00E-06	1.10E-06
SW	1.10E-06	2.40E-07	2.10E-07**	9.50E-07	7.70E-07
WSW	1.20E-06	2.20E-07	0.00	9.90E-07	6.30E-07
W	7.40E-07	1.30E-07	0.00	5.90E-07	5.90E-07
WNW	7.90E-07	2.20E-07	0.00	6.80E-07	6.20E-07
NW	6.30E-07	5.10E-07	0.00	6.20E-07	6.20E-07
NNW	5.10E-07	3.20E-07	0.00	3.10E-07	2.90E-07
N	3.50E-07	2.30E-07	0.00	2.40E-07	2.40E-07

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-17
DEPLETED γ/Q VALUES FOR SHORT-TERM MIXED MODE RELEASES
AT SPECIAL LOCATIONS (sec/m³)*

Carolina Power & Light Company - Robinson
 Release Type: Purge
 Release Mode: Mixed Mode
 Variable: Relative Depleted Concentration (Sec./Cubic Meter)
 Calculation Points: Special
 Model: Purge (ACNPURG2)
 Application of Terrain Correction Factors: No
 Number of Observations: 8703
 Purge Time: 100 Hours

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	8.40E-07	7.00E-07	0.00	8.30E-07	7.41E-07
NE	4.95E-07	4.86E-07	4.70E-07	4.77E-07	4.70E-07
ENE	8.40E-07	4.20E-07	0.00	8.31E-07	2.96E-07
E	1.00E-06	4.00E-07	2.03E-07	9.20E-07	4.15E-07
ESE	1.11E-06	4.44E-07	0.00	9.00E-07	9.00E-07
SE	2.11E-06	0.00	0.00	2.01E-06	2.01E-06
SSE	2.72E-07	0.00	0.00	2.27E-06	2.27E-06
S	1.82E-06	1.90E-07	0.00	1.63E-06	1.12E-06
SSW	1.93E-06	4.00E-07	0.00	1.93E-06	1.03E-06
SW	1.10E-06	2.29E-07	2.35E-07**	9.50E-07	7.36E-07
WSW	1.20E-06	2.12E-07	0.00	9.90E-07	6.11E-07
W	7.19E-07	1.26E-07	0.00	5.71E-07	5.71E-07
WNW	7.65E-07	2.09E-07	0.00	6.59E-07	6.04E-07
NW	6.24E-07	4.99E-07	0.00	6.20E-07	6.20E-07
NNW	4.90E-07	3.05E-07	0.00	3.00E-07	2.76E-07
N	3.35E-07	2.20E-07	0.00	2.30E-07	2.30E-07

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-18
D/Q VALUES FOR SHORT-TERM MIXED MODE RELEASES
AT SPECIAL LOCATIONS (m⁻²)^{*}

Carolina Power & Light Company - Robinson
 Release Type: Purge
 Release Mode: Mixed Mode
 Variable: Relative Deposition Rate (Meter⁻²)
 Calculation Points: Special
 Model: Purge (ACNPURG2)
 Application of Terrain Correction Factors: No
 Number of Observations: 8703
 Purge Time: 100 Hours

<u>Affected Sector</u>	<u>Site Boundary</u>	<u>Meat</u>	<u>Dairy</u>	<u>Resident</u>	<u>Garden</u>
NNE	5.77E-09	3.45E-09	0.00	5.70E-09	4.68E-09
NE	7.18E-09	5.72E-09	4.70E-09	5.20E-09	4.70E-09
ENE	1.04E-08	1.16E-09	0.00	9.77E-09	1.74E-09
E	2.08E-08	8.36E-10	5.32E-10	1.06E-08	9.36E-10
ESE	2.12E-08	2.22E-09	0.00	1.73E-08	1.73E-08
SE	2.99E-08	0.00	0.00	2.88E-08	2.88E-08
SSE	1.81E-08	0.00	0.00	1.64E-08	1.64E-08
S	3.04E-08	9.84E-10	0.00	2.80E-08	2.48E-08
SSW	3.66E-08	2.33E-09	0.00	3.72E-08	2.78E-08
SW	2.20E-08	1.48E-09	1.18E-09**	2.14E-08	1.97E-08
WSW	2.83E-08	1.23E-09	0.00	2.55E-08	2.07E-08
W	2.09E-08	4.69E-10	0.00	1.62E-08	1.62E-08
WNW	2.01E-08	6.45E-10	0.00	1.38E-08	8.18E-09
NW	4.98E-09	3.00E-09	0.00	4.53E-09	4.53E-09
NNW	2.32E-09	9.15E-10	0.00	8.99E-10	8.09E-10
N	1.36E-09	5.75E-10	0.00	6.24E-10	6.24E-10

* Zeroes indicate that this point was not calculated

** A milk goat was located here

TABLE A-19
ROBINSON PLANT SITE INFORMATION TO BE USED FOR
GROUND LEVEL CALCULATIONS WITH NRC "XOQDOQ" PROGRAM

<u>CARD TYPE</u>	<u>COLUMNS</u>	<u>DESCRIPTION</u>	<u>VALUE TO BE USED IN</u> <u>XOQDOQ</u>
1	1 38 39 41 55 56 58	Print input data Calculate annual X/Qs for points of interest Calculate annual X/Q averages for site radial segments Print out set distance X/Qs and D/Qs Calculate annual D/Q averages for the set radial segments Allow depleted X/Qs (if Decays (1), (2), or (3) are negative) Calculate annual D/Qs for points of interest	1 1 1 1 1 1 1
2	1-80	Title card	N/A
3	1-5 6-10 11-15 16-20 21-25 26-30 31-35	Number of wind velocity categories Number of stability categories Number of distances within terrain data for each sector Total number of hours in joint wind frequency distribution Increment in % for which plotted results are to be printed Number of titles of receptor types Number or release exit locations	7 7 5 (1) 5 5 3
4	1-5 6-20	Height of the measured wind (meters) Half-life (days) used in the X/Q calculations	11 101.00 226 -8.00
5	N/A	N/A	---
6	1-80	Joint wind frequency distribution	(1)

TABLE A-19 (continued)
ROBINSON PLANT SITE INFORMATION TO BE USED FOR
GROUND LEVEL CALCULATIONS WITH NRC "XOQDOQ" PROGRAM

<u>CARD TYPE</u>	<u>COLUMNS</u>	<u>DESCRIPTION</u>	<u>VALUE TO BE USED IN</u> <u>XOQDOQ</u>
7	1-5 6-75	Wind velocity units correction Maximum wind speed in each wind class (m/sec)	200.00 0.75 3.50 7.50 12.50 18.50 25.00 26.00
8	1-80	Distance in meters at which terrain heights are given	(2)
9	1-80	Terrain heights (in meters, above plant grade) correspond to distance in Card Type 8	(2)
10	1-25	Number of receptor locations for a particular receptor type	Site boundary = 16 Dairy = 1 Meat = 14 Residence = 16 Garden = 16
11	1-16	Title of receptor type for receptor locations	Site Boundary Dairy Meat Residence Garden
12	1-80	Receptor direction and distance	(See Table 1)
13	1-80	Title for release point whose characteristics are described on Card Type 14	(1)

TABLE A-19 (continued)
ROBINSON PLANT SITE INFORMATION TO BE USED FOR
GROUND LEVEL CALCULATIONS WITH NRC "XOQDOQ" PROGRAM

<u>CARD TYPE</u>	<u>COLUMNS</u>	<u>DESCRIPTION</u>	<u>VALUE TO BE USED IN XOQDOQ</u>
14	1-5	Vent average velocity (m/sec)	20.1
	6-10	Vent inside diameter (m)	1.0
	11-15	Height of vent release point (m)	0.000
	16-20	Height of the vent's building (m)	59.0
	21-25	Minimum cross-sectional area for the vent's building (m ²)	1370.0
	26-30	Wind height used for vent elevated release	11.0
	31-35	Vent heat emission rate (cal/sec)	0.0
15	1	Identification for release point	A
	2-5	Intermittent releases	1
	6-10	Number of intermittent releases per year for this release point	100
	11-15	Average number of hours per intermittent release	1

- (1) Appropriate data to be supplied
- (2) Obtained from cross-sectional topographic maps

TABLE A-20
ROBINSON PLANT SITE INFORMATION TO BE USED FOR
MIXED MODE RELEASE CALCULATIONS WITH NRC "XOQDOQ" PROGRAM

<u>CARD TYPE</u>	<u>COLUMNS</u>	<u>DESCRIPTION</u>	<u>VALUE TO BE USED IN XOQDOQ</u>
1	1 38 39 41 55 56 58	Print input data Calculate annual X/Qs for points of interest Calculate annual X/Q averages for site radial segments Print out set distance X/Qs and D/Qs Calculate annual D/Q averages for the set radial segments Allow depleted X/Qs (if Decays (1), (2), or (3) are negative) Calculate annual D/Qs for points of interest	1 1 1 1 1 1 1
2	1-80	Title card	N/A
3	1-5 6-10 11-15 16-20 21-25 26-30 31-35	Number of wind velocity categories Number of stability categories Number of distances within terrain data for each sector Total number of hours in joint wind frequency distribution Increment in % for which plotted results are to be printed Number of titles of receptor types Number of release exit locations	7 7 5 (1) 5 5 3
4	1-5 6-20	Height of the measured wind (meters) Half-life (days) used in the X/Q calculations	11 101.00 226 -8.00
5	N/A	N/A	---
6	1-80	Joint wind frequency distribution	(1)

TABLE A-20 (continued)
ROBINSON PLANT SITE INFORMATION TO BE USED FOR
MIXED MODE RELEASE CALCULATIONS WITH NRC "XOQDOQ" PROGRAM

<u>CARD TYPE</u>	<u>COLUMNS</u>	<u>DESCRIPTION</u>	<u>VALUE TO BE USED IN</u> <u>XOQDOQ</u>
7	1-5 6-75	Wind velocity units correction Maximum wind speed in each wind class (m/sec)	200.00 0.75 3.50 7.50 12.50 18.50 25.00 26.00
8	1-80	Distance in meters at which terrain heights are given	(2)
9	1-80	Terrain heights (in meters, above plant grade) corresponding to distances in Card Type 8	(2)
10	1-25	Number of receptor locations for a particular receptor type	Site boundary = 16 Dairy = 1 Meat = 14 Residence = 16 Garden = 16
11	1-16	Title of receptor type for receptor locations	Site Boundary Dairy Meat Residence Garden
12	1-80	Receptor direction and distance	(See Table 1)
13	1-80	Title for release point whose characteristics are described on Card Type 14	(1)

TABLE A-20 (continued)
ROBINSON PLANT SITE INFORMATION TO BE USED FOR
MIXED MODE RELEASE CALCULATIONS WITH NRC "XOQDOQ" PROGRAM

<u>CARD TYPE</u>	<u>COLUMNS</u>	<u>DESCRIPTION</u>	<u>VALUE TO BE USED IN XOQDOQ</u>
14	1-5	Vent average velocity (m/sec)	20.1
	6-10	Vent inside diameter (m)	1.0
	11-15	Height of vent release point (m)	60.7
	16-20	Height of the vent's building (m)	59.0
	21-25	Minimum cross-sectional area for the vent's building (m ²)	1370.0
	26-30	Wind height used for vent elevated release	11.
	31-35	Vent heat emission rate (cal/sec)	0.
15	1	Identification for release point	A
	2-5	Intermittent releases	1
	6-10	Number of intermittent releases per year for this release point	100
	11-15	Average number of hours per intermittent release	1

- (1) Appropriate data to be supplied
- (2) Obtained from cross-sectional topographic maps

APPENDIX B:

DOSE PARAMETERS FOR RADIOIODINES, PARTICULATES, AND TRITIUM

This appendix contains the methodology which was used to calculate the dose parameters for radioiodines, particulates, and tritium to show compliance with 10 CFR 20 and Appendix I of 10 CFR 50 for gaseous effluents. These dose parameters, P_i and R_i , were calculated using the methodology outlined in NUREG 0133 along with Regulatory Guide 1.109, Revision 1. The following sections provide the specific methodology which was utilized in calculating the P_i and R_i values for the various exposure pathways.

B.1 Calculation of P_i

The dose parameter, P_i , contained in the radioiodine and particulates portion of Section 3.3 includes pathway transport parameters of the 'i' radionuclide, the receptor's usage of the pathway media, and the dosimetry of the exposure. Pathway usage rates and the internal dosimetry are functions of the receptor's age. The following sections provide in detail the methodology which was used in calculating the P_i values for inclusion into this ODCM.

B.1.1 Inhalation Pathway

The dose factor from inhalation pathway is calculated by:

$$P_{ii} = K' * BR * DFA_i \tag{B.1-1}$$

where:

P_{ii} = Dose parameter for radionuclide 'i' for the inhalation pathway (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

K' = 10^6 , a constant of unit conversion (pCi/ μCi).

BR = The breathing rate of the child age group (m^3/yr).

DFA_i = The organ inhalation dose factor for the child age group for radionuclide 'i' (mrem/pCi).

The age group considered is the child group. The child's breathing rate is taken as $3700 \text{ m}^3/\text{yr}$ from Table E-5 of Regulatory Guide 1.109, Revision 1. The inhalation dose factors for the child, DFA_i , are presented in Table E-10 of Regulatory Guide 1.109 in units of mrem/pCi. The total body is considered as an organ in the selection of DFA_i .

The incorporation of breathing rate of a child and the unit conversion factor results in the following equation:

$$P_{iI} = 3.7 \times 10^9 * DFA_i \quad (B.1-2)$$

B.1.2 Ground Plane Pathway

The dose factor from ground plane pathway is calculated by:

$$P_{iG} = K' * K'' * DFG_i * \frac{1 - e^{-\lambda_i * t}}{\lambda_i} \quad (B.1-3)$$

where:

- P_{iG} = Dose parameter for radionuclide 'i' for the ground plane pathway (m²-mrem/yr per μ Ci/sec).
- K' = 10⁶, a constant of unit conversion (pCi/ μ Ci).
- K'' = 8760, a constant of unit conversion (hr/yr).
- DFG_i = The ground plane dose conversion factor for radionuclide 'i' (mrem/hr per ρ Ci/m²).
- λ_i = The radiological decay constant for radionuclide 'i' (sec⁻¹).
- t = 3.17x10⁷, the exposure period of 1 year (sec).

The deposition rate onto the ground plane results in a ground plane concentration that is assumed to persist over a year with radiological decay, the only operating removal mechanism for each radionuclide. The ground plane dose conversion factors for radionuclide 'i', DFG_i , are presented in Table E-6 of Regulatory Guide 1.109, Revision 1. Resolution of the units yields:

$$P_{iG} = 8.76 \times 10^9 * DFG_i * \frac{1 - e^{-\lambda_i * t}}{\lambda_i} \quad (B.1-4)$$

B.1.3 Milk

The dose factor from the cow/goat-milk-man pathway is calculated by:

$$P_{iM} = \frac{K' * r * Q_F * U_{ap} * F_m}{Y_p * (\lambda_i + \lambda_w)} * DFL_i * e^{-\lambda_i * t_f} \quad (B.1-5)$$

where:

- P_{iM} = Dose parameter for radionuclide 'i' for the cow milk or goat milk pathway (m²-mrem/yr per μ Ci/sec).
- K' = 10⁶, a constant of unit conversion (ρ Ci/ μ Ci).
- r = Fraction of deposited activity retained on cow's or goat's feed grass (dimensionless).
- Q_F = The cow's or goat's consumption rate of feed (kg/day, wet weight).
- U_{ap} = The child's milk consumption rate (liters/yr).
- F_m = The stable element transfer coefficient (ρ Ci/liter per ρ Ci/day).
- Y_p = The agricultural productivity by unit area (kg/m²).
- λ_i = The radiological decay constant for radionuclide 'i' (sec⁻¹).
- λ_w = 5.73x10⁻⁷ (corresponding to a 14 day half-life), the decay constant for removal of activity on leaf and plant surfaces by weathering (sec⁻¹).
- DFL_i = The maximum organ ingestion dose factor for radionuclide 'i' (mrem/ ρ Ci).
- t_f = The transport time from pasture, to cow or goat, to milk, to child (sec).

A fraction of the airborne deposition is captured by the ground plane vegetation cover. The captured material is removed from the vegetation (grass) by both radiological decay and weathering processes.

Various parameters which were utilized to determine the P_i values for the cow and goat milk pathways are provided in Table B-1. Table E-1 of Regulatory Guide 1.109, Revision 1, provides the stable element transfer coefficients, F_m ; and Table E-14 of the same regulatory guide provides the ingestion dose factors, DFL_i , for the child's organs. The organ with the maximum value of DFL_i was used in the determination of P_i for this pathway. The incorporation of the various constants of Table B-1 into Equation B.1-5 results in the following:

For radioiodines and particulates from cow's milk:

$$P_{iM} = 2.4 \times 10^{10} * \frac{r * F_m}{\lambda_i + \lambda_w} * DFL_i * e^{-\lambda_i * t_f} \quad (\text{B.1-6})$$

For radioiodines and particulates from goat's milk pathway:

$$P_{iM} = 2.8 \times 10^9 * \frac{r * F_m}{\lambda_i + \lambda_w} * DFL_i * e^{-\lambda_i * t_f} \quad (\text{B.1-7})$$

The concentration of tritium in milk is based on its airborne concentration rather than the deposition rate and is calculated by:

$$P_{TM} = K' * K''' * F_m * Q_F * U_{ap} * DFL_T * 0.75 * \frac{0.5}{H} \quad (\text{B.1-8})$$

where:

- P_{TM} = Dose parameter for tritium for the cow milk and goat milk pathways (mrem/yr per $\mu\text{Ci}/\text{m}^3$).
- K''' = 10^3 , a constant of unit conversion (gm/kg).
- DFL_T = Maximum organ ingestion dose factor for tritium (mrem/pCi).
- H = Absolute humidity of the atmosphere (gm/m^3).
- 0.75 = The fraction of total feed that is water (dimensionless).
- 0.5 = The ratio of the specific activity of the feed grass water to the atmospheric water (dimensionless).

B.2 Calculation of R_i Followign Regulatory Guide 1.109 Methodology

The radioiodine and particulate ODCM Specification 3.5.2.1 is applicable to the location in the unrestricted area where the combination of existing pathways and receptor age groups indicates that the maximum potential exposure occurs. The inhalation and ground plane exposure pathways shall be considered to exist at all locations. The grass-goat-milk, the grass-cow-milk, grass-cow-meat, and vegetation pathways are considered based on their existence at the various locations. R_i values have been calculated for the adult, teen, and child age groups for the inhalation, ground plane, cow milk, goat milk, vegetable, and beef ingestion pathways. R_i values have been calculated for the infant age group for the inhalation, ground plane, cow milk, and goat milk pathways. The methodology which was utilized to calculate these values (see Tables 3.5-1 through 3.5-19) is presented below and follows the guidance given in Regulatory Guide 1.109.

B.2.1 Inhalation Pathway

The dose factor from the inhalation pathway is calculated by:

$$R_{il} = K' * BR_a * (DFA_i)_a \tag{B.2-1}$$

where:

- R_{il} = Dose factor for each identified radionuclide 'i' of the organ of interest (mrem/yr per μCi/m³).
- K' = 10⁶, a constant of unit conversion (ρCi/μCi).
- BR_a = Breathing rate of the receptor of age group 'a' (m³/yr).
- (DFA_i)_a = Organ inhalation dose factor for radionuclide 'i' for the receptor of age group 'a' (mrem/ρCi).

The breathing rates BR_a for the various age groups are tabulated below, as given in Table E-5 of Regulatory Guide 1.109, Revision 1.

<u>Age Group (a)</u>	<u>Breathing Rate (m³/yr)</u>
Infant	1400
Child	3700
Teen	8000
Adult	8000

Inhalation dose factors (DFA_i)_a for the various age groups are given in Tables E-7 through E-10 of Regulatory Guide 1.109, Revision 1.

B.2.2 Ground Plane Pathway

The ground plane pathway dose factor is calculated by:

$$R_{iG} = I_i * K' * K'' * S_F * DFG_i * \frac{1 - e^{-\lambda_i * t}}{\lambda_i} \quad (\text{B.2-2})$$

where:

- R_{iG} = Dose factor for the ground plane pathway for each identified radionuclide 'i' for the organ of interest ($\text{m}^2\text{-mrem/hr per } \mu\text{Ci/sec}$).
- I_i = 1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Table 3.5-1 (dimensionless).
- K' = 10^6 , a constant of unit conversion ($\rho\text{Ci}/\mu\text{Ci}$).
- K'' = 8760, a constant of unit conversion (hr/yr).
- S_F = 0.7, the shielding factor suggested in Table E-15 of Regulatory Guide 1.109, Revision 1 (dimensionless).
- DFG_i = The ground plane dose conversion factor for radionuclide 'i'. A tabulation of DFG_i values is presented in Table E-6 of Regulatory Guide 1.109, Revision 1 ($\text{mrem/hr per } \rho\text{Ci/m}^2$).
- λ_i = The radiological decay constant for radionuclide 'i' (sec^{-1}).
- t = 4.73×10^8 , exposure time in seconds over 15 years (sec).

B.2.3 Grass Cow or Goat Milk Pathway

The dose factor for the cow milk or goat milk pathway for each radionuclide for each organ is calculated by:

$$\begin{aligned}
 R_{iM} = & I_i * K' * Q_F * U_{ap} * F_m * (DFL_i)_a * e^{-\lambda_i * t_f} \\
 & * \left[f_p * f_s * \left(\frac{r * (1 - e^{-\lambda_{E_i} * t_e})}{Y_p * \lambda_{E_i}} + \frac{B_{iV} * (1 - e^{-\lambda_i * t_b})}{P * \lambda_i} \right) \right] \\
 & + \left[(1 - f_p * f_s) * \left(\frac{r * (1 - e^{-\lambda_{E_i} * t_e})}{Y_s * \lambda_{E_i}} + \frac{B_{iV} * (1 - e^{-\lambda_i * t_b})}{P * \lambda_i} \right) * (e^{-\lambda_i * t_h}) \right]
 \end{aligned}
 \tag{B.2-3}$$

where:

- R_{iM} = Dose factor for the cow milk or goat milk pathway for each identified radionuclide 'i' for the organ of interest (m²-mrem/yr per μCi/sec).
- I_i = 1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Tables 3.5-8 through 3.5-15 (dimensionless).
- K' = 10⁶, a constant of unit conversion (ρCi/μCi).
- Q_F = The cow's or goat's consumption rate of feed (kg/day, wet weight).
- U_{ap} = The receptor's milk consumption rate for age group 'a' (liters/yr).
- F_m = The stable element transfer coefficient (ρCi/liter per ρCi/day).
- (DFL_i)_a = The organ ingestion dose for radionuclide 'i' for the receptor in age group 'a' (mrem/ρCi).
- λ_i = The radiological decay constant for radionuclide 'i' (sec⁻¹).
- t_f = The transport time from feed to cow or goat to milk to receptor (sec).
- f_p = Fraction of the year that the cow or goat is on pasture (dimensionless).
- f_s = Fraction of the cow or goat feed that is pasture grass while the animal is on pasture (dimensionless).
- r = Fraction of deposited activity retained on cow's or goat's feed grass (dimensionless).
- λ_{E_i} = λ_i + λ_w (sec⁻¹).

- λ_w = 5.73×10^{-7} , the decay constant for removal of activity on leaf and plant surfaces by weathering (corresponding to a 14 day half-life) (sec^{-1}).
- t_e = Period of pasture grass and crop exposure during the growing season (sec).
- Y_p = The agricultural productivity by unit area of pasture feed grass (kg/m^2).
- B_{iV} = Concentration factor for uptake of radionuclide 'i' from the soil by the edible parts of crops ($\rho\text{Ci}/\text{kg}$ wet weight per $\rho\text{Ci}/\text{kg}$ dry soil).
- t_b = Period of time that sediment is exposed to gaseous effluents (sec).
- P = Effective surface density for soil (kg dry soil/ m^2).
- Y_s = The agricultural productivity by unit area of stored feed (kg/m^2).
- t_h = The transport time for harvest, to cow or goat, to consumption (sec).

In lieu of site specific information regarding the fraction feed of milk cattle and goats, all feed will be considered to be from pasture grass. Therefore using the guidance from Regulatory Guide 1.109, Revision 1, the values of f_s and f_p are considered unity in lieu of site-specific information.

Table B-1 contains the appropriate parameter values and their source in Regulatory Guide 1.109, Revision 1.

The concentration of tritium in milk is based on the airborne concentration rather than the deposition. Therefore, the R_i is based on χ/Q :

$$R_{TM} = K' * K''' * F_m * Q_F * U_{ap} * (DFL_i)_a * 0.75 * \frac{0.5}{H} \quad (\text{B.2-4})$$

where:

- R_{TM} = Dose parameter for the cow or goat milk pathways for tritium for organ of interest (mrem/yr per $\mu\text{Ci}/\text{m}^3$).
- K''' = 10^3 , a constant of unit conversion (gm/kg).
- H = 8, used in lieu of site-specific information, absolute humidity of the atmosphere (gm/m^3).
- 0.75 = The fraction of total feed that is water (dimensionless).
- 0.5 = The ratio of the specific activity of the feed grass water to the atmospheric water (dimensionless).

All other terms remain the same as previously defined.

B.2.4 Grass-Cow-Meat Pathway

The integrated concentration in meat follows in a similar manner to the development for the milk pathway, therefore:

$$\begin{aligned}
 R_{iB} = & I_i * K' * Q_F * U_{ap} * F_f * (DFL_i)_a * e^{-\lambda_i * t_s} \\
 & * \left[f_p * f_s * \left(\frac{r * (1 - e^{-\lambda_{E_i} * t_e})}{Y_p * \lambda_{E_i}} + \frac{B_{iV} * (1 - e^{-\lambda_i * t_b})}{P * \lambda_i} \right) \right] \\
 & + \left[(1 - f_p * f_s) * \left(\frac{r * (1 - e^{-\lambda_{E_i} * t_e})}{Y_s * \lambda_{E_i}} + \frac{B_{iV} * (1 - e^{-\lambda_i * t_b})}{P * \lambda_i} \right) * (e^{-\lambda_i * t_h}) \right]
 \end{aligned}
 \tag{B.2-5}$$

where:

R_{iB} = Dose factor for the meat ingestion pathway for radionuclide 'i' for any organ of interest (m^2 -mrem/yr per μ Ci/sec).

I_i = 1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Tables 3.5-8 through 3.5-15 (dimensionless).

U_{ap} = The receptor's meat consumption rate for age group 'a' (kg/yr).

F_f = The stable element transfer coefficients (ρ Ci/Kg per ρ Ci/day).

t_s = The transport time from slaughter to consumption (sec).

t_e = Period of pasture grass and crop exposure during the growing season (sec).

t_h = The transport time from harvest to animal consumption (sec).

All other terms remain the same as defined in Equation B.2-3. Table B-2 contains the values which were used in calculating R_i for the meat pathway.

The concentration of tritium in meat is based on its airborne concentration rather than the deposition. Therefore, the R_i is based on χ/Q :

$$R_{TB} = K' * K''' * F_f * Q_F * U_{ap} * (DFL_i)_a * 0.75 * \frac{0.5}{H}
 \tag{B.2-6}$$

where:

R_{TB} = Dose parameter for the meat ingestion pathways for tritium for organ of interest (mrem/yr per μ Ci/ m^3).

All other terms are defined in Equations B.2-4 and B.2-5.

B.2.5 Vegetation Pathway

The integrated concentration in vegetation consumed by man follows the expression developed in the derivation of the milk factor. Man is considered to consume two types of vegetation (fresh and stored) that differ only in the time period between harvest and consumption, therefore:

$$\begin{aligned}
 R_{iV} = & I_i * K' * (DFL_i)_a \\
 & * \left[U_a^L * f_L * e^{-\lambda_i * t_L} * \left(\frac{r * (1 - e^{-\lambda_{E_i} * t_e})}{Y_V * \lambda_{E_i}} + \frac{B_{iV} * (1 - e^{-\lambda_i * t_b})}{P * \lambda_i} \right) \right] \\
 & + \left[U_a^S * f_g * e^{-\lambda_i * t_h} * \left(\frac{r * (1 - e^{-\lambda_{E_i} * t_e})}{Y_V * \lambda_{E_i}} + \frac{B_{iV} * (1 - e^{-\lambda_i * t_b})}{P * \lambda_i} \right) \right]
 \end{aligned}
 \tag{B.2-7}$$

where:

- R_{iV} = Dose factor for the vegetable pathway for radionuclide 'i' for any organ of interest (m²-mrem/yr per μCi/sec).
- I_i = 1.0, factor to account for fractional deposition of radionuclide 'i'. For radionuclides other than iodine, the factor I_i is equal to 1.0. For radioiodines, the value of I_i may vary. However, a value of 1.0 was used in calculating the R values in Tables 3.5-8 through 3.5-15 (dimensionless).
- K' = 10⁶, a constant of unit conversion (pCi/μCi).
- U_a^L = Consumption rate of fresh leafy vegetation by receptor in age group 'a' (kg/yr).
- f_L = 1.0, used in lieu of site-specific data, fraction of the annual intake of fresh leafy vegetation grown locally. Value of 1.0, obtained from Table E-15 of Regulatory Guide 1.109, Revision 1, was used in the calculations of R_{iV} (dimensionless).
- t_L = Average time between harvest of leafy vegetation and its consumption (sec).
- t_e = Period of leafy vegetable exposure during growing season (sec).
- Y_V = Vegetation areal density (kg/m²).
- U_a^S = Consumption rate of stored vegetation by receptor in age group 'a' (kg/yr).

f_g = 0.76, used in lieu of site-specific data, fraction of annual intake of stored vegetation grown locally. Value of 0.76, obtained from Table E-15 of Regulatory Guide 1.109, Revision 1, was used in the calculations of R_{IV} (dimensionless).

t_h = Average time between harvest of stored vegetation and its consumption (sec).

All other factors as defined before.

Table B-3 presents the appropriate parameter values and their source in Regulatory Guide 1.109, Revision 1.

The concentration of tritium in vegetation is based on the airborne concentration rather than the deposition. Therefore, the R_i is based on χ/Q :

$$R_{TV} = K' * K''' * (U_a^L * f_L + U_a^S * f_g) * (DFL_i)_a * 0.75 * \frac{0.5}{H} \quad (\text{B.2-8})$$

where:

R_{TV} = Dose factor for the vegetable pathway for tritium for organ of interest (mrem/yr per $\mu\text{Ci}/\text{m}^3$).

All other terms are defined in Equations B.2-4 and B.2-7.

B.3

The calculations that support the 2500 CFM maximum instantaneous flow rate for a C.V. pressure relief as calculated by CP&L Nuclear Fuels Section, Project 86-0015, as found in File 2486-0015 and were performed by Mr. Talmage Clements, 10 February 1986.

TABLE B-1
PARAMETERS FOR COW AND GOAT MILK PATHWAYS

Parameter	Value	Reg. Guide 1.109, Rev. 1 Reference
Q _F (kg/day)	50 (cow)	Table E-3
	6 (goat)	Table E-3
Y _p (kg/m ²)	0.7	Table E-15
t _f (seconds)	1.73 x 10 ⁵ (2 days)	Table E-15
r (dimensionless)	1.0 (radioiodines)	Table E-15
	0.2 (particulates)	Table E-15
(DFL _i) _a (mrem/ρCi)	Each radionuclide	Tables E-11 to E-14
F _m (ρCi/liter per ρCi/day)	Each stable element	Table E-1 (cow)
		Table E-2 (goat)
t _b (seconds)	4.73 x 10 ⁸ (15 yr)	Table E-15
Y _s (kg/m ²)	2.0	Table E-15
Y _p (kg/m ²)	0.7	Table E-15
t _h (seconds)	7.78 x 10 ⁶ (90 days)	Table E-15
U _{ap} (liters/yr)	330 infant	Table E-5
	330 child	Table E-5
	400 teen	Table E-5
	310 adult	Table E-5
t _e (seconds)	2.59 x 10 ⁶ (pasture)	Table E-15
	5.18 x 10 ⁶ (stored feed)	Table E-15
B _{iv} (ρCi/kg wet weight per ρCi/kg dry soil)	Each stable element	Table E-1
P kg (dry soil/m ²)	240	Table E-15

TABLE B-2
PARAMETERS FOR THE MEAT PATHWAY

Parameter	Value	Reg. Guide 1.109, Rev. 1 Reference
r (dimensionless)	1.0 (radioiodines)	Table E-15
	0.2 (particulates)	Table E-15
F_f (pCi/kg per pCi/day)	Each stable element	Table E-1
U_{ap} (kg/yr)	0 infant	Table E-5
	41 child	Table E-5
	65 teen	Table E-5
	110 adult	Table E-5
$(DFL_i)_a$ (mrem/pCi)	Each radionuclide	Tables E-11 to E-14
Y_p (kg/m ²)	0.7	Table E-15
Y_s (kg/m ²)	2.0	Table E-15
t_b (seconds)	4.73×10^8 (15 yr)	Table E-15
t_s (seconds)	1.73×10^6 (20 days)	Table E-15
t_h (seconds)	7.78×10^6 (90 days)	Table E-15
t_e (seconds)	2.59×10^6 (pasture)	Table E-15
	5.18×10^6 (stored feed)	Table E-15
Q_F (kg/day)	50	Table E-3
B_{iV} (pCi/kg wet weight per pCi/kg dry soil)	Each stable element	Table E-1
P (kg dry soil/m ²)	240	Table E-15

TABLE B-3
PARAMETERS FOR THE VEGETABLE PATHWAY

Parameter	Value	Reg. Guide 1.109, Rev. 1 Reference
r (dimensionless)	1.0 (radioiodines)	Table E-1
	0.2 (particulates)	Table E-1
(DFL _i) _a (mrem/Ci)	Each radionuclide	Tables E-11 to E-14
Q _F (kg/day)	50 (cow)	Table E-3
	6 (goat)	Table E-3
U _a ^L (kg/yr)	0 Infant	Table E-5
	26 Child	Table E-5
	42 Teen	Table E-5
	64 Adult	Table E-5
U _a ^S (kg/yr)	0 Infant	Table E-5
	520 Child	Table E-5
	630 Teen	Table E-5
	520 Adult	Table E-5
t _L (seconds)	8.6 x 10 ⁴ (1 day)	Table E-15
t _h (seconds)	5.18 x 10 ⁶ (60 days)	Table E-15
Y _V (kg/m ²)	2.0	Table E-15
t _e (seconds)	5.18 x 10 ⁶ (60 days)	Table E-15
t _b (seconds)	4.73 x 10 ⁸ (15 yr)	Table E-15
P (kg dry soil/m ²)	240	Table E-15
B _{iV} (pCi/kg wet weight per pCi/kg dry soil)	Each stable element	Table E-1

APPENDIX C: LOWER LIMIT OF DETECTABILITY

C.1 Radiological Environmental Monitoring Program

The LLD^{1,2} 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% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 * S_b}{E * V * 2.22 * Y * e^{-\lambda * \Delta t}}$$

where:

LLD = "A priori" lower limit of detection as defined above, as picocuries per unit mass or volume.

S_b = Standard deviation of the background counting rate or of the counting rate of a blank sample, as appropriate, as counts per minute.

E = Counting efficiency, as counts per disintegration.

V = Sample size in units of mass or volume.

2.22 = Number of disintegrations per minute per picocurie.

Y = Fractional radiochemical yield, when applicable.

λ = Radioactive decay constant for the particular radionuclide.

Δt = The elapsed time between sample collection or end of the sample collection period and time of counting.

Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay correction time (Δt) are to be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement. Analyses shall be performed in such a manner that the stated LLDs will be achieved under routine conditions. Occasionally background fluctuations, unavoidable small sample sizes, the presence of interfering nuclides, or other uncontrollable circumstances may render these LLDs unachievable. In such cases, the contributing factors shall be identified and described in the Annual Radiological Environmental Operating Report pursuant to Technical Specification 5.6.2.

C.2 Radioactive Waste Sampling and Analysis Program

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% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. For a particular measurement system, which may include radiochemical separation:

$$LLD = \frac{4.66 * S_b}{E * V * 2.22 \times 10^6 * Y * e^{-\lambda * \Delta t}}$$

where:

- LLD = "A priori" lower limit of detection as defined above, as microcuries per unit mass or volume.
- S_b = Standard deviation of the background counting rate or of the counting rate of a blank sample, as appropriate, as counts per minute.
- E = Counting efficiency, as counts per disintegration.
- V = Sample size in units of mass or volume.
- 2.22×10^6 = Number of disintegrations per minute per microcurie.
- Y = Fractional radiochemical yield, when applicable.
- λ = Radioactive decay constant for the particular radionuclide.
- Δt = The elapsed time between sample collection or end of the sample collection period and time of counting.

Typical values of efficiency (E), volume/mass (V), chemical yield (Y), and radionuclide decay correction time (Δt) are to be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

C.3 Radioactive Gaseous Waste Monitoring System

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% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal. For a particular measurement system³:

$$LLD = \frac{4.66 * \sqrt{\frac{Bkg}{2 * \tau}}}{E}$$

where:

LLD = "A priori" lower limit of detection as defined above, as microcuries per cubic centimeter.

Bkg = the background counting rate as counts per minute.

E = counting efficiency, as counts per minute over microcurie per cubic centimeter.

τ = the time constant for the particular measurement system.

Typical values of E, and Bkg should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

Appendix C References

1. HASL-300 (Suppl. 4), HASL Procedures Manual, (1972).
2. NBS SP456 "The Minimum Detectable Activity Concept," J. C. Lockamy (1976).
3. NUREG/CR-4007, Lower Limit of Detection: Definition and Elaboration of a Proposed Position for Radiological Effluent and Environmental Measurements, (September 1984).

APPENDIX D: LIQUID AND GASEOUS PROCESS MONITORS AND RADWASTE SYSTEMS

D.1

This appendix contains tables and figures describing the liquid and gaseous process monitors and radwaste systems.

TABLE D-1
LIQUID PROCESS MONITORS

<u>Name</u>	<u>R #</u>	<u>ID #</u>	<u>Drawing #</u>
Containment Vessel Fan Cooling Water	16	R-16	C997261
Component Cooling Water	17	R-17	C997246
Liquid Waste Disposal	18	PI 871109	NRC Industries 4PI Liquid Sample Manual
Condensate Polisher Liquid Waste	37	R-37	Plant Mod.-723, H.B.R.-2-9065
	19A	R-19A	
Steam Generator Blowdown	19B	R-19B	Mod 898
	19C	R-19C	

Liquid Radwaste Flow Measurement Devices

Liquid Radwaste Flow Indicator	N/A	FIT 1064	A-190299 5379-00920 Sheet 4 (EC 60209)
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TABLE D-2
GASEOUS PROCESS MONITORS

<u>Name</u>	<u>R #</u>	<u>ID #</u>	<u>Drawing #</u>	<u>Sample Flow Rate Measurement Device</u>	<u>System Flow Rate Measurement Device</u>
Containment Vessel Particulate	11	R-11	D997556	F&P Co. Flow Tube FP- 3/4-27-G 10/80	UGC Microflow 3000 (if sampling stack)
Containment Vessel Gaseous	12	R-12	D997556	F&P Co. Flow Tube FP- 3/4-27-G 10/80	UGC Microflow 3000 (if sampling stack)
Plant Vent Low Range	14C	R-14	EC 52464	1) Fluid Components Intl, AF89S Mass Flowmeter 2) F&P Flowmeter FP-1-35-G-10/55	F-14 Plant Vent Stack Flow Monitor (Kurz)
Fuel Handling Building Basement Exhaust	20	R-20	C998233	Fisher Porter Flowmeter Mod. 10A35755Z Serial 6908A0837A1	None (Use fan ratings)
Fuel Handling Building Upper Level Exhaust	21	R-21	C9988233	Fisher Porter Flowmeter Mod. 1043565 Serial 6908A0837A1	None (Use fan ratings)

FIGURE D-1
***H.B. ROBINSON LIQUID RADWASTE PROCESS / EFFLUENT SYSTEM**

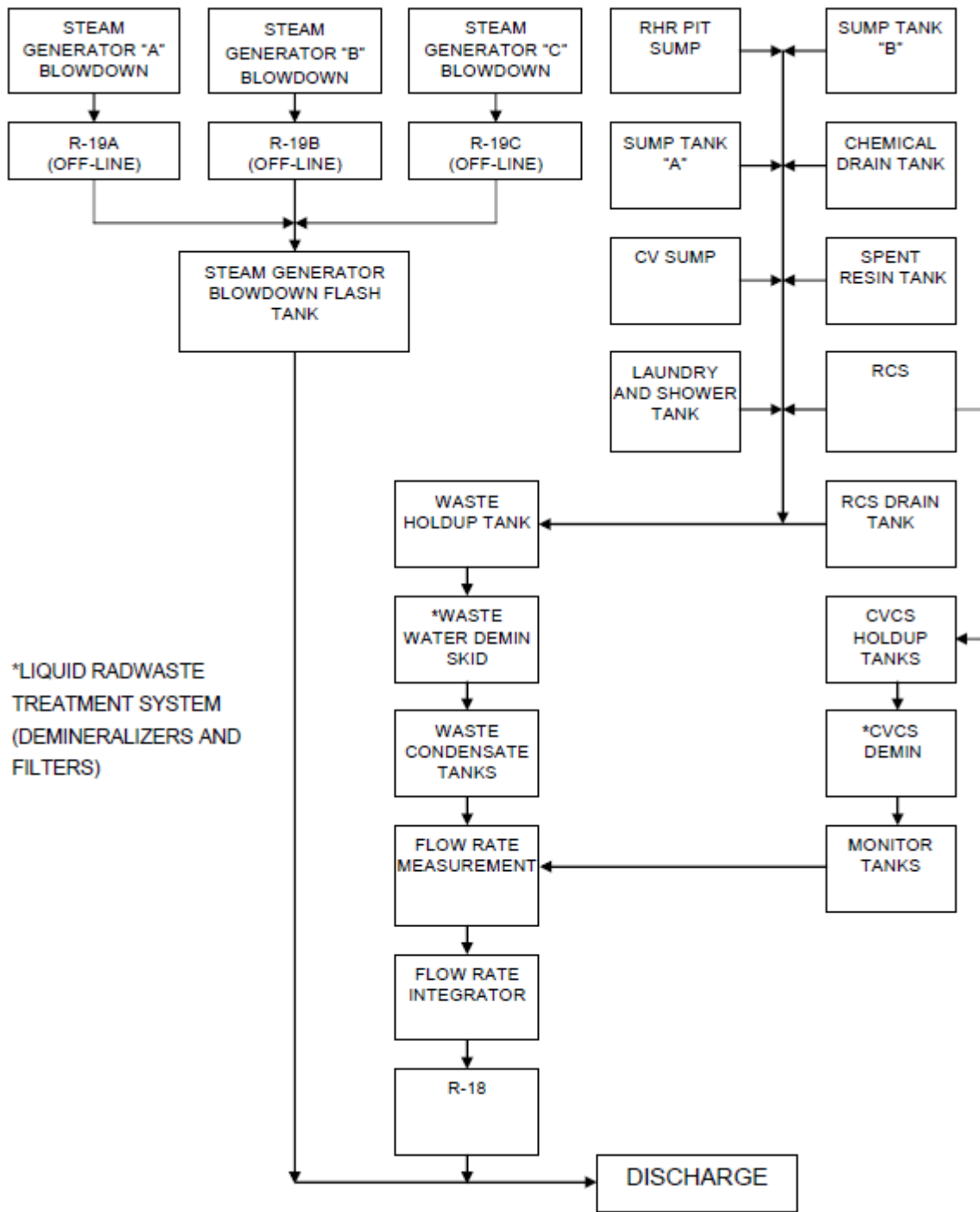
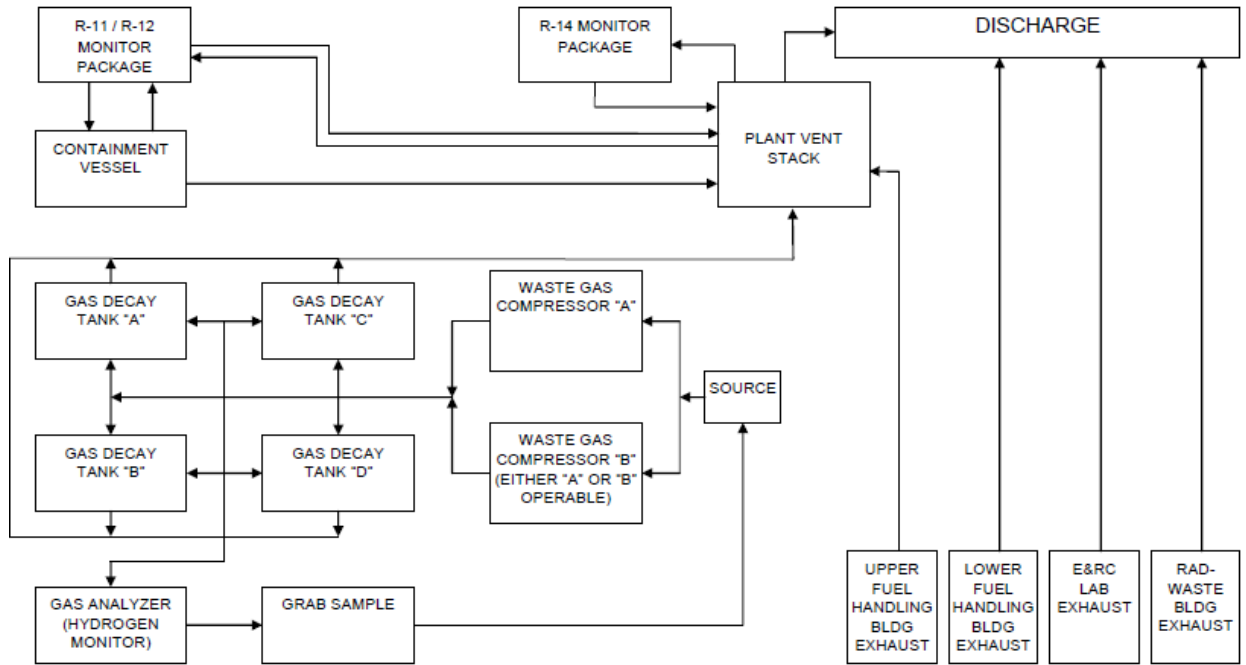


FIGURE D-2
***H.B. ROBINSON GASEOUS RADWASTE PROCESS / EFFLUENT SYSTEM**



*SIMPLIFIED BLOCK FLOW DIAGRAM; THE GASEOUS RADWASTE SYSTEM MAY BE COMPRISED OF ONE WASTE GAS COMPRESSOR AND ONE WASTE GAS DECAY TANK.

APPENDIX E: MAP OF LAKE ROBINSON

E.1

This appendix contains map sections of Lake Robinson.

FIGURE E-1
MAP OF THE FIVE SECTIONS OF LAKE ROBINSON

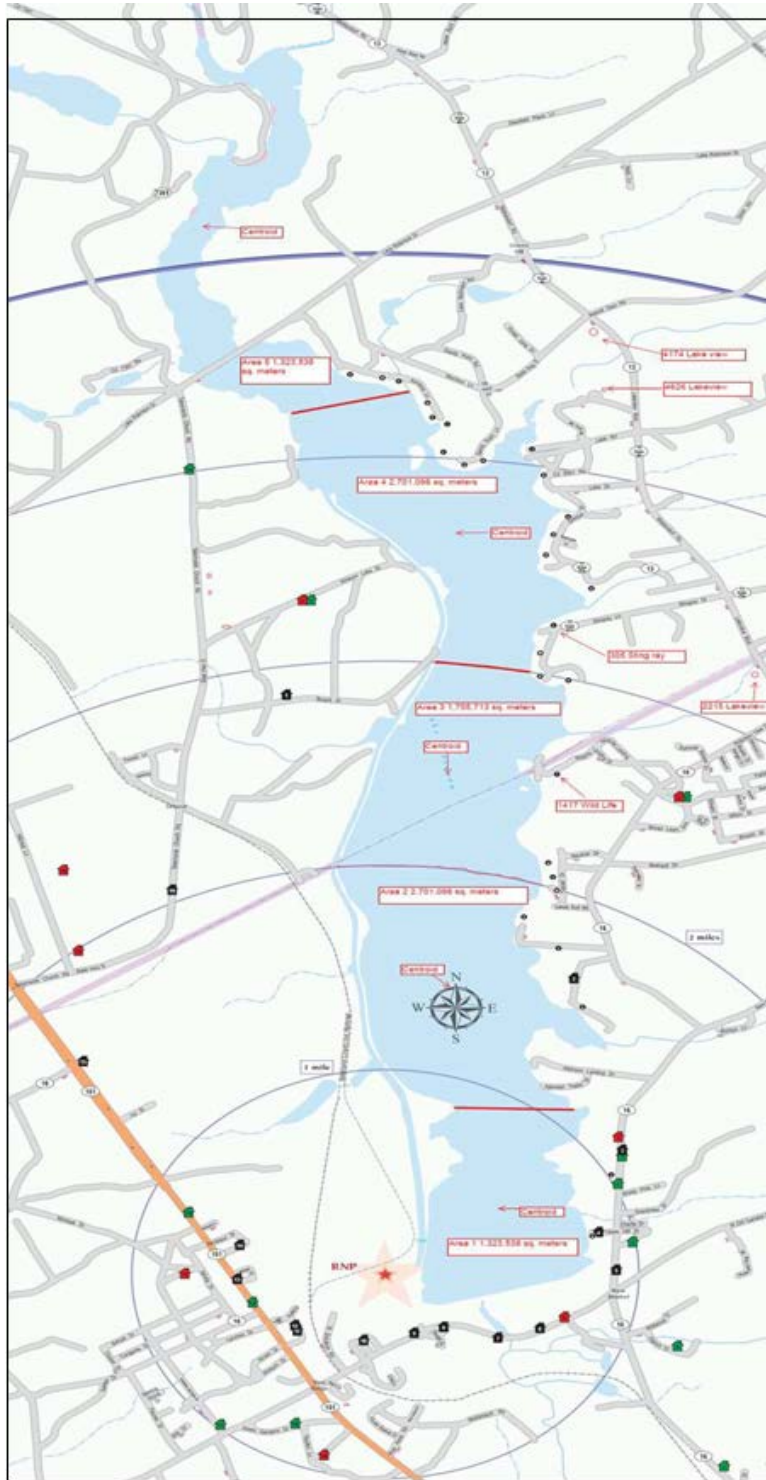


FIGURE E-1 (continued)
MAP OF THE FIVE SECTIONS OF LAKE ROBINSON

Lake Robinson is about 10 kilometers long and about 1 kilometer wide. Black Creek empties into the Lake at the North end of the Lake. The hot water released from the heat exchangers is discharged in the Lake about 6 kilometers north of the plant. Temperature in the Lake varies from north to south. In order to get a more accurate tritium evaporation analysis, the lake is divided into five sections. Section 5 is the northern most section, and Section 1 is the southernmost. The hot water discharge point (weir) is located in Section 4. The following table shows area of each section.

Section 1 Area 1323538 square meters
Section 2 Area 2701098 square meters
Section 3 Area 1755713 square meters
Section 4 Area 2161223 square meters
Section 5 Area 1285791 square meters