ENCLOSURE II

Wolf Creek Nuclear Operating Corporation

Administrative Procedure AP 07B-004, Revision 13,

"Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program)"

WOLF CREEK
NUCLEAR OPERATING CORPORATION

AP 07B-004

OFFSITE DOSE CALCULATION MANUAL (RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM)

Responsible Manager

Manager Regulatory Affairs

Revision Number	13
Use Category	Reference
Administrative Controls Procedure	Yes
Management Oversight Evolution	No
Program Number	07B

DC38 1/30/2007

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1.0 PURPOSE

1.1 This procedure contains the Offsite Dose Calculation Manual (ODCM) Radiological Environmental Monitoring Program (REMP) requirements.

1.2 This procedure also contains the Special Scope Quality Program for the REMP to assure the quality of the results of measurements of radioactive materials in the environment.

2.0 SCOPE

2.1 Technical Specifications 5.6.2 and 5.5.1 shall be implemented by this procedure.

2.2 Procedure AP 07B-003, OFFSITE DOSE CALCULATION MANUAL has been split into two procedures. Requirements for the REMP are now contained in this procedure.

2.3 ATTACHMENT B, SPECIAL SCOPE QUALITY ASSURANCE FOR THE REMP, ensures the requirements of Technical Specification 5.4.1.c are met.

2.4 The requirements of the Special Scope Quality Program do not apply to hardware.

2.5 For Nuclear Energy Institute (NEI) Industry Initiative on Ground Water Protection reporting requirements, see AI 07B-004, REPORTING REQUIREMENTS OF THE RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM and AI 07-007, ONSITE GROUNDWATER MONITORING PROGRAM.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 AP 07B-003, OFFSITE DOSE CALCULATION MANUAL

3.1.2 Radiological Assessment Branch Technical Position on Environmental Monitoring, Revision 1, November 1979

3.1.3 PIR 1998-0112, Revising the ODCM with an OTSC

3.1.4 Technical Specification 5.5.1

3.1.5 Technical Specification 5.6.2

3.1.6 PIR 1998-3887, Wind Direction Frequency Rankings

3.1.7 Engineering Calculation AN-04-045, Calculation of Relative Deposition per Unit Area (D/Q)

3.1.8 Regulatory Guide 4.15 - Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment

3.1.9 WCGS Technical Specification 5.4.1.c

3.1.10 AP 20A-003, AUDIT/SURVEILLANCE SCHEDULING

3.1.11 PIR 2001-1604, REMP Quality Program Requirements

3.1.12 PIR 2001-1640, REMP Air Sample Control Location

3.1.13 PIR 2002-0975, Changes to the ODCM

3.2 Commitments

3.2.1 None

4.0 DEFINITIONS

4.1 None

5.0 RESPONSIBILITIES

5.1 Manager Regulatory Affairs

5.1.1 Ensures that a quality program has been developed for radiological environmental monitoring.

5.1.2 Ensures that the Offsite Dose Calculation Manual (Radiological Environmental Monitoring Program) has been established, implemented and is maintained in accordance with Technical Specification 5.5.1.

5.2 Manager Quality

5.2.1 Ensures that internal and external audits are performed and documented.

5.3 Supervisor Regulatory Support

5.3.1 Implements and maintains the radiological environmental monitoring program.

5.3.2 Ensures procedures are developed and maintained which describe sample collection, sample preparation and sample shipping.

5.3.3 Ensures procedures are developed and maintained which describe equipment maintenance and calibration.

5.3.4 Ensures procedures are developed and maintained which describe data review and reporting requirements.

5.3.5 Ensures personnel have received the required training prior to performing REMP-related activities.

5.4 Environmental Management

5.4.1 Ensures the REMP is established, implemented and maintained.

6.0 PROCEDURE

6.1 Revisions to This Procedure

NOTE

To comply with Technical Specification 5.5.1, revisions to this procedure are not permitted via APF 15C-004-04, ON THE SPOT CHANGE form (Reference Step 3.1.3).

6.1.1 Revisions to this procedure are to be submitted through the Manager Regulatory Affairs via APF 15C-004-01, DOCUMENT REVISION REQUEST (DRR).

6.1.2 Changes to ATTACHMENT A shall include:

1. Sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s) and (Reference Step 3.1.4)

NOTE

Changes to the REMP will have no impact upon the level of radioactive effluent control nor will impact the accuracy or reliability of effluent dose or setpoint calculations.

2. 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 not adversely impact the accuracy or reliability of effluent dose, or setpoint calculations. (Reference Step 3.1.4)

6.1.3 The changes shall become effective after the approval of the Plant Manager. (Reference Step 3.1.4)

6.1.4 IF Figure 5.2 or Figure 5.3 are revised, THEN Emergency Planning should be notified so that the Radiological Emergency Response Plan may be revised accordingly.

6.2 ODCM Submittal To NRC

NOTE

To comply with Technical Specification 5.5.1, a copy of this procedure must be submitted to the NRC with the Radioactive Effluent Release Report.

6.2.1 Changes to the ODCM 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, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented. (Reference Step 3.1.4)

7.0 RECORDS

7.1 The following is a lifetime QA Record:

7.1.1 AP 07B-004, OFFSITE DOSE CALCULATION MANUAL (RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM)

8.0 FORMS

8.1 None

- END -

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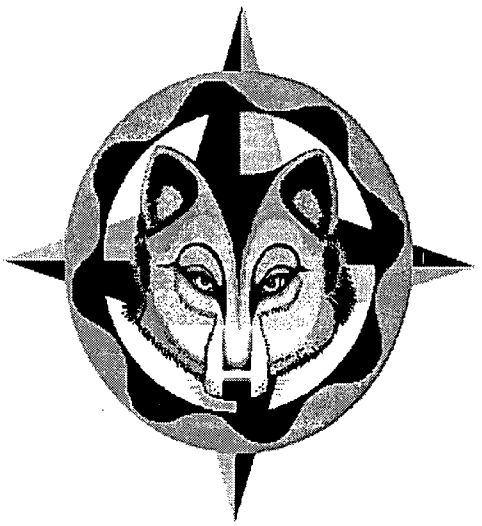
Wolf Creek Generating Station



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Radiological Environmental Monitoring Program

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1.0 Introduction

This attachment contains the ODCM for the Radiological Environmental Monitoring Program which was previously contained in AP 07B-003. This program is provided to monitor the radiation and radionuclides in the environs of the plant. The program provides (1) representative measurements of radioactivity in the highest potential exposure pathways, and (2) verification of the accuracy of the effluent monitoring program and modeling of environmental exposure pathways. This program conforms to the guidance of Appendix I to 10 CFR part 50 and includes the following:

1. Monitoring, sampling, analysis and reporting of radiation and radionuclides in the environment.

2. A Land Use Census to ensure that changes in the use of areas at and beyond the site boundary are identified and the modifications to the monitoring program are made if required by the results of this census, and

3. Participation in an Interlaboratory Comparison Program to ensure that independent checks on the precision and accuracy of the measurements of radioactive materials in environmental sample matrices are performed as part of the quality assurance program for environmental monitoring.

This attachment also provides a description of the information that should be included in the Annual Radiological Environmental Operating Report.

2.0 Liquid Effluents (Contained in AP 07B-003)

3.0 Gaseous Effluents (Contained in AP 07B-003)

4.0 Total Dose (Contained in AP 07B-003)

5.0 Radiological Environmental Monitoring Program

This section describes the Radiological Environmental Monitoring Program for Wolf Creek Generating Station.

5.1 Monitoring Program

Table 5-1 provides a schedule which describes the pathways, specific locations, sample collection frequencies, and analyses to be performed to implement the Radiological Environmental Monitoring Program.

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Figures 5.1 through 5.5 contain maps depicting sampling locations in relation to the WCGS site. Table 5-2 lists distances and directions to these locations from the WCGS site.

Table 5-3 lists required detection capabilities for the analyses performed.

5.2 Land Use Census

A Land Use Census shall be conducted annually during the growing season to identify the nearest (1) milk animal, (2) residence, and (3) garden of greater than 500 square feet producing broadleaf vegetation in each of the 16 meteorological sections within five miles of the WCGS site. (Broadleaf vegetation sampling of available vegetation 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 broadleaf vegetation sampling in Table 5-1 shall be followed, including analysis of control samples.) Methods shall be used in conducting the census that provide the best results, such as door-to-door surveys, telephone surveys, consulting the U.S.D.A. office in Burlington, inspection of aerial photographs of the area, or reviewing leasing records for area farms and residences.

If a location(s) is identified which yields a calculated dose or dose commitment (via the same exposure pathway) 20% greater than at a location from which samples are currently being obtained, and the cooperator agrees, the new location(s) shall be added to the Radiological Environmental Monitoring Program. The indicator sampling location(s) having the lowest calculated dose or dose commitment may then be deleted from the monitoring program.

The results of the Land Use Census shall be included in the Annual Radiological Environmental Operating Report described in Section 7.1.

5.3 Interlaboratory Comparison Program

The analysis laboratory contracted to analyze samples from the Radiological Environmental Monitoring Program participates in a Laboratory Intercomparison Program.

A summary of intercomparison results shall be included in the Annual Radiological Environmental Operating Report described in Section 7.1.

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5.4 Reporting Requirements

5.4.1 Annual Radiological Environmental Operating Report

To meet the requirements of Wolf Creek Technical Specification 5.6.2, the Annual Radiological Environmental Operating Report covering the operation of the unit during the previous calendar year shall be submitted to the NRC before May 1 of each year. The content of this report is described in Section 7.1.

5.4.2 Special Reports

A special report shall be prepared and submitted to the NRC within 30 days if levels of radioactivity as a result of plant effluents detected in an environmental medium at a specified location exceed the reporting levels of Table 5-4 when averaged over any calendar quarter. The special report shall identify the cause(s) for exceeding the limit(s) and define 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 Wolf Creek Technical Specification 5.5.4. When one or more of the radionuclides in Table 5-4 is detected in the sampling medium, this report shall be submitted if:

$$\frac{\text{Concentration (1)}}{\text{Reporting Level (1)}} + \frac{\text{Concentration (2)}}{\text{Reporting Level (2)}} + \ldots \geq 1.0$$

When radionuclides other than those in Table 5-4 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 from all radionuclides is equal to or greater than the calendar year limits of Technical Specification 5.5.4. (*The methodology and parameters used to estimate the potential annual dose to a member of the public shall be indicated in this report.)

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TABLE 5-1
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway/ Sample Type	Number of Samples and Sample Locations (1)	Sample Collection Frequency	Type and Frequency of Analysis
1. AIRBORNE	FIGURES 5.1 & 5.5		
Radioiodine and Particulates	Samples from six locations	Continuous sampler operation with sample collection weekly, or more frequently if required, by dust loading	Analyze radioiodine canister weekly for I-131
	Samples from locations near the site boundary in three sectors having the highest calculated annual average D/Q (Locations 2, 37, 49 and supplemental location 18 on Figure 5.1);		Analyze particulate filter weekly for gross beta activity (2); perform quarterly gamma isotopic analysis (3) composite (by location).
	Sample from the vicinity of a community having the highest calculated annual average D/Q (Location 32 on Figure 5.1, New Strawn);		
	Sample from a control location 9.5 to 18.5 miles distant in a low ranked D/Q sector (Location 48 on Figure 5.5). (11)		
2. DIRECT RADIATION (4)	FIGURES 5.2 AND 5.5		
	40 routine monitoring stations with two or more dosimeters measuring dose continuously, placed as follows:	Quarterly	Gamma dose quarterly **01/07**
	An inner ring of stations, one in each meteorological sector 0-3 mile range from the site (Locations 1, 7, 9, 11-13, 18, 26, 27, 29, 30, 37, 38, 46, 47 & 49 on Figure 5.2).		**01/07**

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TABLE 5-1 (Continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway/ Sample Type	Number of Samples and Sample Locations (1)	Sample Collection Frequency	Type and Frequency of Analysis
DIRECT RADIATION (4) (CONTINUED)	An outer ring of stations, one in each meteorological sector in the 3 to 5 mile range from the site (Locations 4, 5, 15-17, 19, 22-25, 32, 34-36, 50 & 51 on Figure 5.2). Four sectors [A, B, G & J] contain an additional station (Locations 2, 8, 14 & 20)		**01/07**
	The balance of the stations to be placed in special interest areas such as population centers (Locations 23, 32 & 52), nearby residences (many locations are near a residence), schools (Locations 23 & 52), Environmental Education Area (44), CCL Public Fishing Area (46) and in two areas to serve as control stations 10-20 miles distant from the site (Locations 39 and 48 on Figure 5.5)(11)		**01/07**
3. WATERBORNE	FIGURE 5.3		
Surface	One sample upstream (5) (Location JRR on Figure 5.3) and one sample down-stream (Location SP on Figure 5.3)	Monthly grab sample	Monthly gamma isotopic analysis (3) and composite for tritium analysis quarterly.
Ground	Samples from one or two sources only if likely to be affected Indicator samples at locations hydrologically down-gradient of the site (Locations C-10, C-49, F-1, G-2, J-1 and J-2 on Figure 5.3); control sample at a location hydrologically upgradient of the site (Location B-12 on Figure 5.3)(6)	Quarterly grab sample	Quarterly gamma isotopic analysis (3) and tritium analysis.

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TABLE 5-1 (Continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway/ Sample Type	Number of Samples and Sample Locations (1)	Sample Collection Frequency	Type and Frequency of Analysis
3. WATERBORNE (CONT.) Drinking	Sample of municipal water supply at an indicator location downstream of the site (Location IO-DW on Figure 5.5); control sample from location upstream of the site (Location BW-15 on Figure 5.3)	Monthly composite (7)	Monthly gamma isotopic analysis (3) and gross beta analysis of composite sample. Quarterly tritium analysis of composites (8).
Shoreline Sediment	One sample from the vicinity of Coffey County Lake discharge cove (Location DC on Figure 5.3); control sample from John Redmond Reservoir (Location JRR on Figure 5.3).	Semiannually	Semiannual gamma isotopic analysis (3)
4. INGESTION	FIGURES 5.4 AND 5.5		
Milk	Samples from milking animals at three indicator locations within 5 miles of the site having the highest dose potential (currently there are no locations producing milk for human consumption within 5 miles of the site); one sample from a control location greater than 10 miles from the site if indicator locations are sampled. (11)	Semimonthly April to November; monthly December-March (9)	Gamma isotopic analysis (3) and I-131 analysis of each sample.
Fish	Indicator samples of 1 to 3 recreationally important species from Coffey County Lake (several sampling areas indicated in Figure 5.4); control samples of similar species from John Redmond Reservoir Spillway (indicated on Figure 5.4).	Semiannually	Gamma isotopic analysis (3) on edible portions

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TABLE 5-1 (Continued)
RADIOLOGICAL ENVIRONMENTAL MONITORING PROGRAM

Exposure Pathway/ Sample Type	Number of Samples and Sample Locations (1)	Sample Collection Frequency	Type and Frequency of Analysis
4. INGESTION (CONT.) Food Products	Samples of available broadleaf vegetation from two indicator locations (using the criteria from the "Land Use Census" section) with highest calculated annual average D/Q (Locations Q-6 and N-1 and alternate Location C-2 on Figure 5.4); sample of similar broadleaf vegetation from a control location 9.5 to 18.5 miles distant in a low ranked D/Q sector (Location D-1 or alternate location D-2 on Figure 5.5).(11)	Monthly when available (9)	Gamma isotopic analysis (3) on edible portions.
Food Products	Sample of crops irrigated with water from the Neosho River downstream of the Neosho River-Wolf Creek confluence (locations will vary from year to year, e.g., Location NR-D1 & NR-D2 on Figure 5.5).	At time of harvest (10)	Gamma isotopic analysis (3) on edible portions

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TABLE 5-1 (Continued)
TABLE NOTATIONS

(1) Deviations are permitted from the required sampling schedule if specimens are unobtainable due to hazardous conditions, seasonal unavailability, malfunction of automatic sampling equipment, and other legitimate reasons. If specimens are unobtainable due to sampling equipment malfunction, every effort shall be made to complete corrective action prior to the end of the next sampling period. All deviations from the sampling schedule shall be documented in the Annual Radiological Environmental Operating Report described in Section 7.1.

It is recognized that, at times, it may not be possible or practicable to continue to obtain samples of the media of choice at the most desired location or time. In these instances, suitable specific alternative media and locations may be chosen for the particular pathway in question and appropriate substitutions made.

(2) Airborne particulate sample filters shall be analyzed for gross beta radioactivity 24 hours or more, preferably after 72 hours, after sampling to allow for Rn-220 and Rn-222 daughter decay. If gross beta activity in air particulate samples is greater than 10 times the yearly mean of control samples, gamma isotopic analysis shall be performed on the individual samples.

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

(4) 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. The 40 stations are not an absolute number. The number of direct radiation monitoring stations may be reduced according to geographical limitations, e.g., some sectors are over water so that the number of dosimeters may be reduced accordingly. The frequency or analysis or readout for the TLD system depends upon the characteristics of the specific system used and is selected to obtain optimum dose information with minimal fading.

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TABLE 5-1 (Continued)
TABLE NOTATIONS

(5) The "upstream" sample is taken at a distance beyond significant influence of the discharge.

(6) 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.

(7) A composite sample is one in which the quantity (aliquot) of liquid sampled is consistent over the sampling period and in which the method of sampling employed results in a specimen that is representative of the liquid concentrate. In this program, composite sample aliquots shall be collected at time intervals that are very short (e.g., every two hours) relative to the compositing period (e.g., monthly) in order to assure obtaining a representative sample.

(8) If the dose calculated for consumption of water (using ODCM methodology and parameters) exceeds one millirem per year, composite sampling at the indicator location shall be performed every two weeks and I-131 analysis shall be performed on the composite samples.

(9) Milk and broadleaf vegetation samples are often temporarily, but not permanently, unavailable at the scheduled sample collection times. Alternate sampling locations may therefore be listed in the Table and used at these times to provide continued monitoring of these pathways. If samples are considered permanently unavailable at a location, another location will be selected (if available) as described in Note (1).

(10) 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.

(11) The purpose of this sample is to obtain background information. If it is not practical to establish control locations in accordance with the distance and wind direction criteria, other sites that provide valid background data may be substituted.

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TABLE 5-2

SAMPLING LOCATION NUMBERS, DISTANCES (miles) AND DIRECTIONS

Sample Type	Location Identifier	Distance from Reactor	Direction	Sector
Air Particulates and Radioiodine	2	2.7	N	A
	18	3.0	SSE	H
	32	3.1	WNW	P
	37	2.0	NNW	R
	48	14.7	ENE	D
	49	0.8	NNE	B
TLDs	1	1.4	N	A
	2	2.7	N	A
	4	4.1	NNE	B
	5	4.1	NE	C
	7	2.1	NE	C
	8	1.7	NNE	B
	9	2.0	ENE	D
	11	1.7	E	E
	12	1.9	ESE	F
	13	1.6	SE	G
	14	2.5	SE	G
	15	4.6	ESE	F
	16	4.3	E	E
	17	3.7	SE	G
	18	3.0	SSE	H
	19	3.9	SSE	H
	20	3.3	S	J
	22	3.9	SSW	K
	23	4.3	SW	L
	24	4.1	WSW	M
	25	3.4	W	N
	26	2.4	WSW	M
	27	2.2	SW	L
	29	2.7	SSW	K
	30	2.5	W	N
	32	3.1	WNW	P
	34	4.4	NW	Q
	35	4.6	NNW	R
	36	4.2	N	A
	37	2.0	NNW	R
	38	1.2	NW	Q
	39	13.1	N	A
	44	3.0	NNW	R **01/07**
	46	1.6	WNW	P **01/07**

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TABLE 5-2 (Cont.)
SAMPLING LOCATION NUMBERS, DISTANCES (miles) AND DIRECTIONS

Sample Type	Location Identifier	Distance from Reactor	Direction	Sector
TLDs	47	0.16	S	J
	48	14.7	ENE	D
	49	0.8	NNE	B
	50	3.6	ENE	D **01/07**
	51	4.0	S	J **01/07**
	52	3.6	SW	L **01/07**
Surface Water	JRR	3.7	W	N
	SP	3.2	SSE	H
Ground Water	B-12	1.9	NNE	B
	C-10	2.7	W	N
	C-49	2.8	SW	L
	F-1	2.5	ESE	F
	G-2	3.6	SE	G
	J-1	3.8	S	J
	J-2	4.3	S	J
Drinking Water	BW-15	3.9	SW	L
	IO-DW	26.1	SSE	H
Shoreline Sediment	DC	0.8	WNW	P
	JRR	3.6	W	N
Fish	CCL	0.6	WNW	P
	JRR	3.7	W	N
Food/Garden	C-2	1.9	NE	C
	D-1	14.7	ENE	D
	D-2	14.8	ENE	D
	N-1	2.4	W	N
	Q-6	2.4	NW	Q
Crops	NR-D1	8.9	S	J
	NR-D2	11.5	S	J

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TABLE 5-3

DETECTION CAPABILITIES FOR ENVIRONMENTAL SAMPLE ANALYSIS (1)(2)
Lower Limit of Detection (LLD) (3)

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m^3)	FISH (pCi/kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/kg, wet)	SEDIMENT (pCi/kg, dry)
Gross Beta	4*	0.01				
H-3	2,000**					
Mn-54	15		130			
Co-58	15		130			
Fe-59	30		260			
Co-60	15		130			
Zn-65	30		260			
Zr-Nb-95	15					
I-131	1***	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	15			15		

* LLD for drinking water samples.
** LLD for drinking water and ground water samples. For surface water samples, a value of 3,000 pCi/l may be used.
***LLD for drinking water and ground water samples. For surface water samples, a value of 15 pCi/l may be used.

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TABLE 5-3 (Continued)
TABLE NOTATIONS

(1) This list does not mean that only these nuclides are to be considered. Other peaks that are identifiable, together with those of the above nuclides, shall also be analyzed and reported in the Annual Radiological Environmental Operating Report described in Section 7.1.

(2) Required detection capabilities for thermoluminescent dosimeters used for environmental measurements shall be in accordance with the recommendations of Regulatory Guide 4.13, Revision 1, 1977.

(3) 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:

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

Where:

LLD = the "a priori" lower limit of detection (picoCuries per unit mass or volume),

S_b = the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (counts per minute),

E = the counting efficiency (counts per disintegration),

V = the sample size (units of mass or volume),

2.22 = the number of disintegrations per minute per picoCurie,

Y = the fractional radiochemical yield, when applicable,

λ = the radioactive decay constant for the particular radionuclide (sec^{-1}), and

Δt = the elapsed time between sample collection, or end of the sample collection period, and time of counting (sec).

Typical values of E, V, Y, and Δt should be used in the calculation.

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TABLE 5-3 (Continued)
TABLE NOTATIONS

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 described in Section 7.1.

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TABLE 5-4

REPORTING LEVELS FOR RADIOACTIVITY CONCENTRATIONS IN ENVIRONMENTAL SAMPLES

ANALYSIS	WATER (pCi/l)	AIRBORNE PARTICULATE OR GASES (pCi/m^3)	FISH (pCi/kg, wet)	MILK (pCi/l)	FOOD PRODUCTS (pCi/kg, wet)
H-3	20,000*				
Mn-54	1,000		30,000		
Co-58	1,000		30,000		
Fe-59	400		10,000		
Co-60	300		10,000		
Zn-65	300		20,000		
Zr-Nb-95	400				
I-131	2**	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	

* For drinking water and ground water samples. This is 40 CFR Part 141 value. For surface water samples, a value of 30,000 pCi/l may be used.
** For drinking water and ground water samples. For surface water samples, a value of 20 pCi/l may be used.

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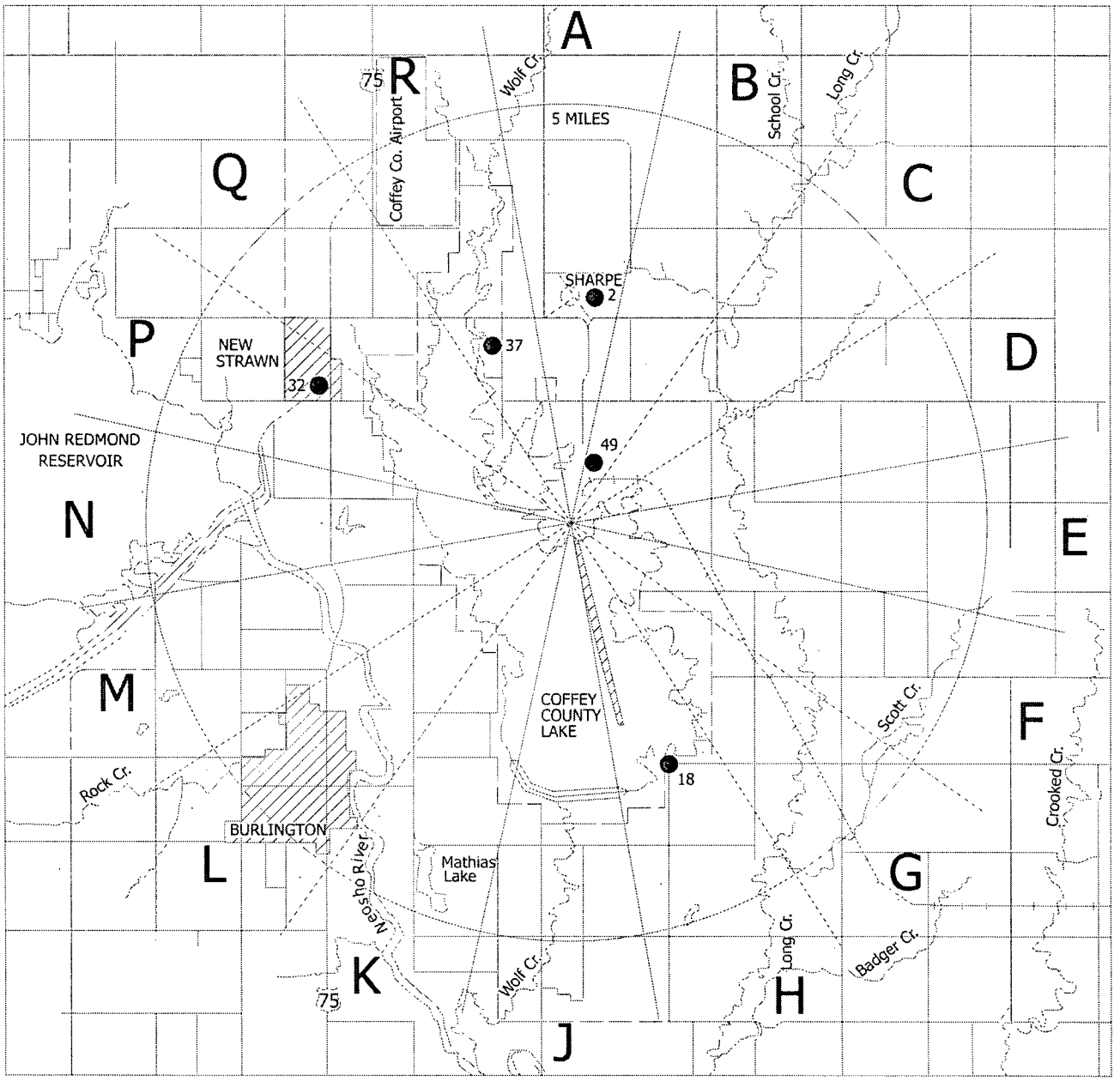
OFFSITE DOSE CALCULATION MANUAL (REMP)

FIGURE 5.1



AIRBORNE PATHWAY SAMPLING LOCATIONS

● = AIRBORNE PARTICULATE AND RADIOIODINE

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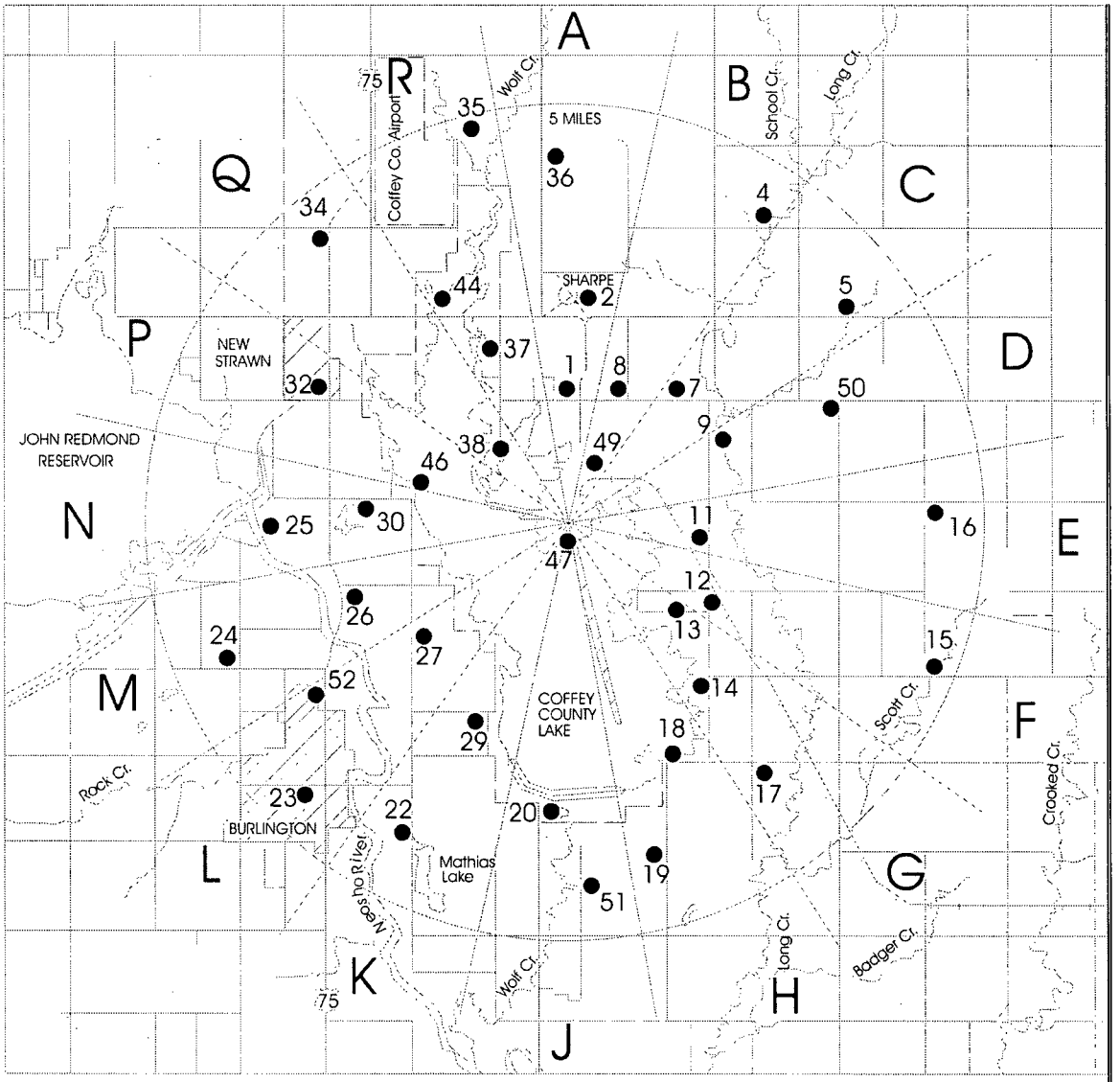
OFFSITE DOSE CALCULATION MANUAL (REMP)

FIGURE 5.2



DIRECT RADIATION PATHWAY SAMPLING LOCATIONS

● = TLD LOCATIONS

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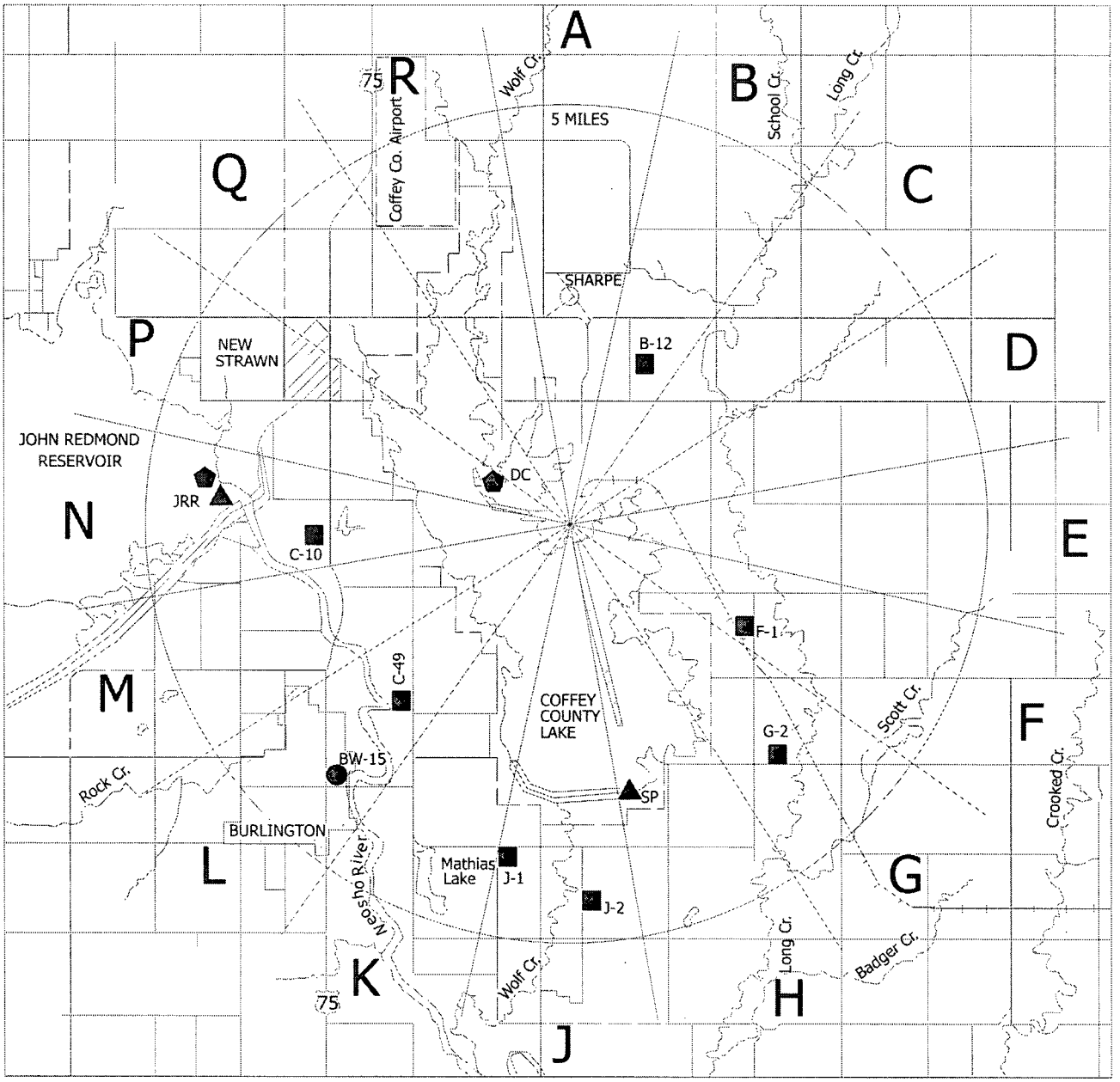
FIGURE 5.3



WATERBORNE PATHWAY SAMPLING LOCATIONS

● = DRINKING WATER
▲ = SURFACE WATER
■ = GROUND WATER
⬟ = SHORELINE SEDIMENT

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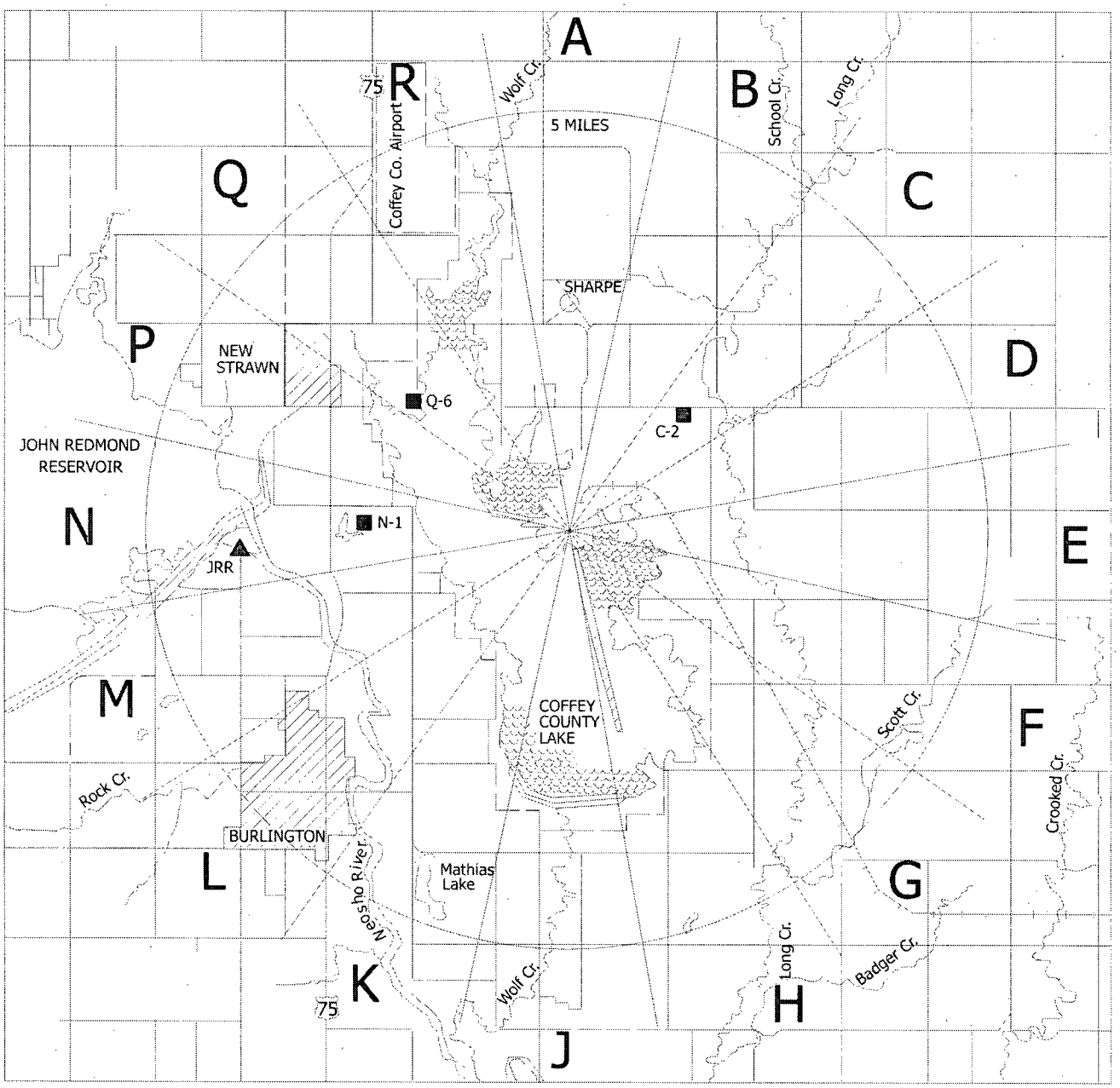
OFFSITE DOSE CALCULATION MANUAL (REMP)

FIGURE 5.4



INGESTION PATHWAY SAMPLING LOCATIONS

▲ = FISH (JRR) ■ = BROADLEAF VEGETATION

= FISH (CCL)

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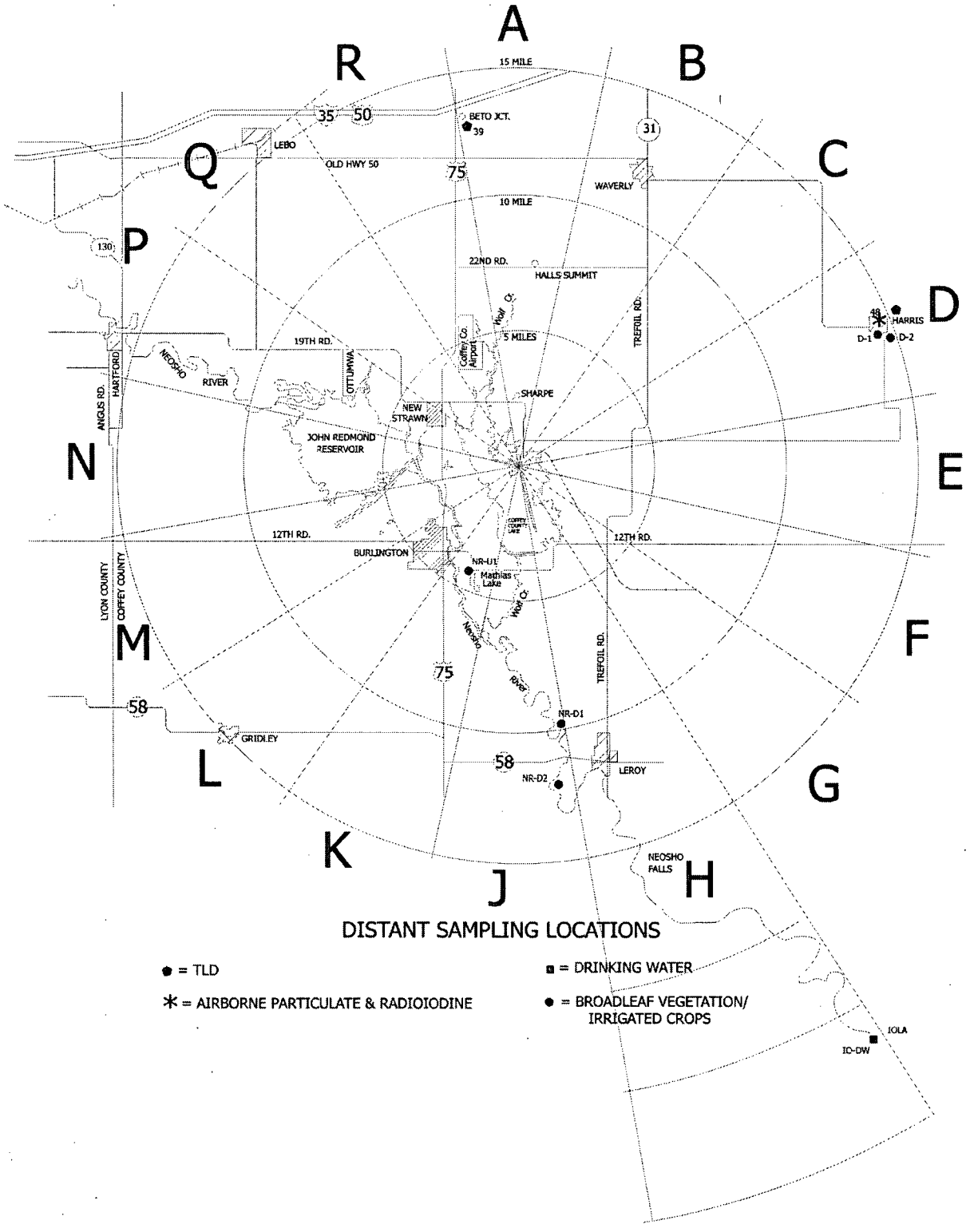
OFFSITE DOSE CALCULATION MANUAL (REMP)

FIGURE 5.5



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OFFSITE DOSE CALCULATION MANUAL (REMP)

6.0 Bases

The bases contained on the succeeding pages summarize the general requirements of Section 5.0 of the ODCM (REMP).

Section 2.0 Liquid Effluents (Contained in AP 07B-003)

Section 3.0 Gaseous Effluents (Contained in AP 07B-003)

Section 4.0 Total Dose (Contained in AP 07B-003)

Section 5.0 Radiological Environmental Monitoring Program

Section 5.1 Monitoring Program

The Radiological Environmental Monitoring Program 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, Revision 1, November 1979.

The required detection capabilities for environmental sample analyses are tabulated in terms of the lower limits of detection (LLDs). The LLDs 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 an 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).

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OFFSITE DOSE CALCULATION MANUAL (REMP)

Section 5.2 Land Use Census

This section is provided to ensure that changes in the use of areas at and beyond the SITE BOUNDARY are identified and that modifications to the Radiological Environmental Monitoring Program given in the ODCM are made if required by the results of this census. Information that will provide the best results, such as door-to-door survey, aerial survey, or consulting with local agricultural authorities, shall be used. 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 50 m^2 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 assume in Regulatory Guide 1.109 for consumption by a child.

To determine this minimum garden size, the following assumptions were made: (1) 20% of the garden was used for growing broadleaf vegetation (i.e., similar to lettuce and cabbage), and (2) a vegetation yield of 2 kg/m^2.

Section 5.3 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.

7.0 Reports

7.1 Annual Radiological Environmental Operating Report

The Annual Radiological Environmental Operating Report shall include summaries, interpretations, and analysis of trends of the results of the Radiological Environmental Monitoring Program for the reporting period. The material provided shall be consistent with the objectives outlined in (1) the ODCM and (2) Sections IV.B.2, IV.B.3 and IV.C of Appendix I to 10 CFR Part 50 (Reference Step 3.1.5), including a comparison with preoperational studies, with operational controls and with previous environmental surveillance reports, and an assessment of the observed impacts of the plant operation on the environment. The report shall also include the results of the Land Use Census described in Section 5.2.

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OFFSITE DOSE CALCULATION MANUAL (REMP)

The Annual Radiological Environmental Operating Report 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 Table 5-1 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 report shall also include the following: a summary description of the Radiological Environmental Monitoring Program; 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 and the corrective actions being taken if the specified program is not being performed as required by Section 5.3; reasons for not conducting the Radiological Environmental Program as required by Section 5.1 with plans for preventing a recurrence and discussion of all deviations from the sampling schedule of Table 5-1; discussion of environmental sample measurements that exceed the reporting levels of Table 5-4 but are not the result of plant effluents, and discussions of all analyses in which the LLD required by Table 5-3 was not achieved.

7.2 Annual Radioactive Effluent Release Report (Contained in AP 07B-003)

APPENDIX A Dose Conversion Factor Tables (Contained in AP 07B-003)

APPENDIX B Meteorological Model (Contained in AP 07B-003)

- END -

ATTACHMENT B
(Page 1 of 3)
SPECIAL SCOPE QUALITY ASSURANCE FOR THE REMP

B.1 QUALITY REQUIREMENTS

B.1.1 Review and Reporting of Data

1. Data from sample analysis are reviewed in accordance with approved procedures.

B.1.2 Organization

1. Section 5 of this procedure identifies the organizational structure, management positions and responsibilities.

B.1.3 Personnel Qualifications

1. Personnel responsible for collection and preparation of radiological environmental monitoring samples shall be qualified in accordance with approved procedures.

2. Personnel responsible for calibration of air sampler rotameters shall be qualified in accordance with approved procedures.

B.1.4 Procurement Document Control

1. Purchase orders for contracted services shall:

   a. Include quality requirements

   b. Specify technical requirements

   c. Identify documentation requirements

   d. Detail records requirements

   e. Extend applicable procurement document requirements to lower tier suppliers; and

   f. Specifying special requirements such as reporting program deficiencies, documentation requirements and applicable acceptance criteria.

2. Purchase orders for contracted laboratory services shall require participation in an interlaboratory comparison program.

ATTACHMENT B
(Page 2 of 3)
SPECIAL SCOPE QUALITY ASSURANCE FOR THE REMP

B.1.5 Instructions, Procedures and Drawings

1. This criterion applies to:

   a. Surveillances, test and calibrations,

   b. Environmental sampling, and

   c. Data processing and evaluation

2. Activities shall be accomplished using procedures, instructions and drawings approved prior to use.

3. Instructions, procedures or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

B.1.6 Control of Purchased Services

1. Controls shall be established to ensure that purchased services conform to procurement document requirements.

2. Controls shall include evaluation and selection of suppliers and surveillance or audit of supplied services.

B.1.7 Control of Measuring and Test Equipment

1. Measures shall be established to assure that tools, gages, instruments, and other measuring and testing devices used in activities affecting quality are properly controlled, calibrated and adjusted at specified periods to maintain accuracy within necessary limits.

B.1.8 Inspection, Test and Operating Status for Purchased Calibration Services

1. These inspections and tests shall be completed in accordance with approved procedures.

ATTACHMENT B
(Page 3 of 3)
SPECIAL SCOPE QUALITY ASSURANCE FOR THE REMP

B.1.9 Quality Assurance Records

1. All documentation shall be legible, reproducible and or microfilmable quality.

2. Documented records shall be maintained to show objective evidence of quality.

3. Quality records shall not be destroyed or disposed of without written authorization.

4. For the vendor laboratory, data sheets and finished records shall be retained by the contactor for a period of five years.

B.1.10 Audits

1. Audits shall be performed in accordance with USAR step 17.2.18.5 to verify compliance to requirements and to verify the effectiveness of the implemented activities affecting quality. **01/07**

2. Vendor audits shall be performed a minimum of once every 3 years unless commitments require more frequent audits.

- END -

ENCLOSURE III

Wolf Creek Nuclear Operating Corporation

Administrative Procedure AP 31A-100, Revision 6,

"Solid Radwaste Process Control Program"

WOLF CREEK
NUCLEAR OPERATING CORPORATION

AP 31A-100

SOLID RADWASTE PROCESS CONTROL PROGRAM

Responsible Manager

Manager Chemistry/Radiation Protection

Revision Number	6
Use Category	Reference
Administrative Controls Procedure	Yes
Management Oversight Evolution	No
Program Number	25A

DC12 09/01/2006

TABLE OF CONTENTS

1.0 PURPOSE

1.1 This procedure provides instructional guidance and a description of the solid waste Process Control Program (PCP). The PCP describes the methods used for processing wet low-level radioactive waste into a waste form acceptable for disposal, in accordance with 10 CFR 61 requirements, at a licensed land disposal facility.

2.0 SCOPE

2.1 This procedure describes current and planned practice for sampling, sample evaluation, classification, processing and packaging of radioactive material. This procedure does not address irradiated hardware which will be managed on a case-by-case basis under the direction of the Manager Chemistry/Radiation Protection. System descriptions and operating practices are described in the following steps.

2.2 Waste Steam Identification - The station had initially identified eight different waste streams and treats each separately for classification purposes. The identification listing may be consolidated, expanded and streams deleted at the discretion of radwaste management without revising the PCP.

EXAMPLES

For Information Only

- o Dry Active Waste (DAW)
- o Steam Generator Blowdown Bead Resin
- o Chemical and Volume Control System Bead Resin (1) (CVCS)
- o Reactor Coolant System Filters
- o Ultra Filtration Skid Waste
- o Spent Fuel Pool Filters
- o Radwaste Resins
- o Steam Generator Blowdown Filters (2)

(1) May contain combination of CVCS, Diversified, and Spent Fuel Pool Resins

(2) May be disassembled and components handled as DAW

2.3 Non-Waste Stream Identification - The station has identified two different sources and treats each separately for classification purposes.

- o Non-irradiated material removed from the Spent Fuel Pool.
- o Any other radioactive material generated by the station.

2.4 Disposition of Radioactive Material Sent to a Vendor for Intermediate Processing - Practices include sending radioactive material packages generated by the station to Duratek, Studsvik or other vendors for volume reduction (VR)/processing instead of directly to a burial site.

2.4.1 This procedure addresses the requirements for 10 CFR 61.55 (Waste Classification) for radioactive material sent to vendor facilities.

2.4.2 This procedure does NOT address the requirements for 10 CFR 61.56 (Waste Characteristics), since the final processing and packaging are performed at the vendor facilities.

2.4.3 Possible types of radioactive material include, but are NOT limited to the following:

- o DAW
- o Surface Contaminated Objects
- o Bead Resins and Charcoal
- o Cartridge Filters
- o Contaminated Oil
- o Contaminated Soil

2.5 Disposition of Waste Sent Directly to a Burial Site - This procedure addresses both the 10 CFR 61.55 and 61.56 requirements for the waste streams listed in Step 2.2.

2.6 Waste Management Practices

2.6.1 DAW

- o This waste stream consists of plastic, wood, paper, metal, cloth, etc. generated at various locations within the station.
- o The material may be sent to intermediate processors or directly to a burial site.

- The station may preprocess DAW by compacting.
- Practices include shipping DAW classified as either SCO or LSA in numerous possible containers, such as:
  - 30 to 85 gallon drums
  - B-25 type boxes
  - SeaLand containers
  - Large liners
- Prepacking inspection criteria includes the removal of liquid, protective clothing and equipment, paints, solvents, lead, instruments, gages and other valuable plant equipment.

2.6.2 Steam Generator Blowdown Bead Resin (S/G BD)

- This waste stream consists of only S/G blowdown resin. The depleted resins are sluiced from the individual processing vessels to the S/G Blowdown Resin Storage Tank and then to a CNSI 6-80 or 8-120 High Integrity Container (HIC), OR any other container approved by the Health Physics Supervisor Radwaste (HPSR).
- Once a container is full, the resins are then dewatered using plant equipment and approved vendor dewatering procedures.
- Practice may include shipping resins to a volume reduction processor for incineration or release.

2.6.3 Chemical and Volume Control System Bead Resin (CVCS)

- This waste stream consists of CVCS, various DURATEK media and Spent Fuel Pool resins. The depleted charcoal filter media and resins are sluiced from the individual processing vessels to a common Spent Resin Storage Tank. The media is then transferred in a batch mode to a CNSI 6-80 or 8-120 HIC, OR any other container approved by the HPSR.
- Once a container is full or the transfer has been terminated, the filter media (charcoal) and resins are then dewatered per RPP 07-131, BEAD RESIN/ACTIVATED CARBON DEWATERING PROCEDURE FOR CNSI 14-215 OR SMALLER LINERS.

2.6.4 Cartridge Filters

- This category includes several waste streams which were defined in Step 2.2 and includes all filters generated by the station.
- Filters are removed from service based on operating parameters determined by the Operations Department.
- The filter housings are drained prior to filter removal. The filters are then gravity drained prior to being placed into an intermediate storage container OR the final disposal container.
- With containers equipped with a dewatering internal, a final dewatering verification is performed on the disposal container after it has been loaded with filters.
- Absorbent material may be added to the disposal liner after final dewatering verification at the discretion of the HPSR.

2.6.5 Solidification/Encapsulation Methods

- Present and planned practice is NOT to solidify or encapsulate any waste streams.
- All liquid waste is dewatered to less than 0.5 percent or 1 percent depending on the container type by volume prior to shipment.

2.6.6 Operation and Maintenance of dewatering Systems and Equipment

- Present and planned practice is to utilize station personnel to operate and maintain dewatering systems and equipment using station procedures.
- All disposal liners are manufactured by and purchased from QA approved vendors.

2.6.7 High Integrity Container Usage

- High Integrity Containers (fabricated from high density cross-linked polyethylene) may be used as the disposal package for any waste.
- All classes of waste, unless specifically exempted by the South Carolina Department of Health and Environmental Control must be disposed in vaults (approved concrete overpack structures) at the Barnwell burial site.

3.0 REFERENCES AND COMMITMENTS

3.1 References

3.1.1 WCGS Technical Specifications, Section 6.13 (TR 5.5.4)

3.1.2 RPP 07-101, CONTROL OF RADIOACTIVE MATERIAL MANAGEMENT SOFTWARE AND DATA BASES

3.1.3 RPP 07-120, PREPARATION AND SHIPMENT OF RADIOACTIVE WASTE

3.1.4 RPP 07-121, PREPARATION AND SHIPMENT OF RADIOACTIVE MATERIAL

3.1.5 RPP 07-131, BEAD RESIN/ACTIVATED CARBON DEWATERING PROCEDURE FOR CNSI 14-215 OR SMALLER LINERS

3.1.6 10 CFR 20, "Standard For Protection Against Radiation"

3.1.7 10 CFR 61, "Licensing Requirements for Land Disposal of Radioactive Waste"

3.1.8 10 CFR 71, "Packaging and Transportation of Radioactive Materials"

3.1.9 40 CFR 302, "Reportable Quantity Adjustment - Radionuclides"

3.1.10 49 CFR 171, "General Information, Regulations, and Definitions"

3.1.11 49 CFR 172, "Shippers' General Requirements for Shipments and Packaging"

3.1.12 49 CFR 177, "Carriage by Public Highway"

3.1.13 Barnwell Waste Management Facility Site Disposal Criteria; CNSI-S20-AD-010

3.1.14 CNSI's South Carolina Department of Health and Environmental Control (DHEC) Radioactive Materials License No. 097

3.1.15 South Carolina DHEC Regulation 61-83, Transportation of Radioactive Waste Into or Within South Carolina

3.1.16 USNRC Branch Technical Position on Radioactive Waste Classification, May 1983

3.1.17 USNRC Branch Technical Position on Waste Form, January 1991

3.1.18 USNRC Branch Technical Position on Concentration Averaging and Encapsulation, Revision in Part To Waste Classification Technical Position, January 1995

3.1.19 NRC Bulletin No. 79-19, "Packaging of Low Level Radioactive Waste for Transport and Burial"

3.1.20 NRC Information Notice No. 80-24, "Low Level Radioactive Waste Burial Criteria"

3.1.21 NRC Information Notice No. 83-33, "Non-Representative Sampling of Contaminated Oil"

3.1.22 NRC Information Notice No. 85-92, "Surveys of Wastes Before Disposal from Nuclear Reactor Facilities"

3.1.23 NRC Information Notice No. 86-20, "Low Level Radioactive Waste Scaling Factors, 10 CFR 61"

3.1.24 NRC Information Notice No. 88-101, "Shipment of Contaminated Equipment Between Nuclear Power Stations"

3.1.25 WMG-SW-006, "Computer Software Quality Assurance Program"

3.1.26 WMG-QA-001, "Quality Assurance Program"

3.1.27 WMG-P-065 "RADMAN Operating Manual"

3.1.28 RADMAN Computer Code, Main Topical Report to the USNRC

3.1.29 WMG-P-069, "FILTRK Operating Procedure"

3.1.30 WMG-P-070, "RAMSHP Operating Procedure"

3.1.31 WMG-P-075, "OSM Operating Procedure"

3.1.32 WMG Report #9006, "Computer Program Dose to Curie Methodology Verification and Validation"

3.1.33 U.S. Nuclear Regulatory Commission, "Radiological Effluent Technical Specifications for PWRs," NUREG-0472

3.1.34 NRC Guidelines for Preparation and Implementation of Solid Waste Process Control Program "DRAFT," Revision 4, October 1986

3.1.35 CNSI FO-AD-002, "Operating Guidelines for Use of Polyethylene High Integrity Containers"

3.1.36 CNSI, FO-OP-023, "Bead Resin/Activated Carbon Dewatering Procedure for CNSI 14-215 or Smaller Liners"

3.1.37 NRC Generic Letter No. 91-02, "Reporting Mishaps Involving LLW Forms Prepared For Disposal"

3.1.38 WMG-9217, "10 CFR 61 Practice Assessment at Wolf Creek Generating Station, 1992"

3.1.39 AP 25-001, RADIATION PROTECTION QUALITY PROGRAM REQUIREMENTS

3.1.40 Letter from Rodney Wingard to Jimmy Still concerning the disposal of dried solids (HP 01-00601)

3.2 Commitments

3.2.1 None

4.0 DEFINITIONS

4.1 Abbreviations

4.1.1 Activity/A_2/g - Package activity divided by (A_2) divided by gram

4.1.2 BTP - Branch Technical Position

4.1.3 CNSI - Chem Nuclear System, Inc.

4.1.4 HPSR - Health Physics Supervisor Radwaste

4.1.5 LLD - Lower Limit of Detection

4.1.6 MCA - Multi-Channel Analyzer

4.2 Activity Correction Factor

4.2.1 The µCi/cc or µCi/g values may have to be corrected (plus or minus) if the waste stream specific 10 CFR 61 sample results (independent laboratory) and the replicate in-house specific activity values differ by more than 20 percent, and the differences cannot be resolved to the satisfaction of the HPSR, alternatively, the dose-to-curie characterization methodology can be used without applying correction factors.

4.3 As Generated Waste

4.3.1 Radioactive waste generated at a frequency contrary to the sampling requirements of waste classes A, B or C.

4.4 Batch

4.4.1 An isolated quantity of feed waste to be processed having essentially constant physical and chemical characteristics. (The addition or removal of water will not be considered to create a new batch).

4.5 Chelating Agents

4.5.1 EDTA, DTPA, hydroxyl-carboxylic acids, citric acid, carbolic acid and glucinic acid.

4.6 Confirmatory Analysis

4.6.1 Verification of Gross radioactivity measurements using MCA and independent laboratory sample data.

4.7 Density Correction

4.7.1 Density corrections may be required to convert sample data reported in µCi/g to µCi/cc or vice versa when comparing sample data with unlike units.

4.8 Dewatered Waste

4.8.1 Dewatered Waste refers to wet waste that has been processed by means other than solidification, encapsulation, or absorption to meet the free standing liquid requirements of 10 CFR 61.56 (a)(3) and (b)(2).

4.9 Encapsulation

4.9.1 Encapsulation is a means of providing stability for certain types of waste by surrounding the waste by an appropriate encapsulation media.

4.10 Gamma-Spectral Analysis

4.10.1 Also known as IG, MCA, GE/Li and gamma spectroscopy.

4.11 Gross Radioactivity Measurements

4.11.1 More commonly known as Dose to Curies conversion for packaged waste characterization and classification.

4.12 Homogeneous

4.12.1 Of the same kind or nature; essentially alike. Most waste streams are considered to have the radioactivity distributed throughout for purposes of waste classification.

4.13 Legacy Waste

4.13.1 Radioactive waste generated from past Plant processes.

4.14 Low-Level Radioactive Waste (LLW)

4.14.1 Those low-level radioactive wastes containing source, special nuclear, or by-product material that are acceptable for disposal in a land disposal facility. For the purposes of this definition, low-level radioactive waste has the same meaning as in the Low-Level Waste Policy Act, that is, radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or by-product material as defined in Section 113.(2) of the Atomic Energy Act (uranium or thorium tailings and waste).

4.15 Measurement of Specific Radionuclides

4.15.1 More commonly known as core sample or package sample using MCA data for packages waste characterization and classification.

4.16 Operable

4.16.1 A system, subsystem, train, component or device shall be OPERABLE or have OPERABILITY when it is capable of performing its specified function(s), and when all necessary attendant instrumentation, controls, electrical power, cooling or seal water, lubrication or other auxiliary equipment that are required for the system, subsystem, train, component, or device to perform its function(s) are also capable of performing their related support function(s).

4.17 Pre-qualification Program

4.17.1 The testing program implemented to demonstrate that the proposed method of wet waste processing will result in a waste form acceptable to the land disposal facility.

4.18 QA Verification Sample

4.18.1 A representative sample of the waste that is tested to demonstrate control of the waste processing. The sample shall be obtained from at least every tenth batch of each type of wet radioactive waste processed for stabilization.

4.19 Quality Assurance/Quality Control

4.19.1 As used in this document, "quality assurance" comprises all those planned and systematic actions necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service. Quality assurance includes quality control, which comprises those quality assurance actions related to control of the physical characteristics and quality of a material structure, component, or system to predetermined requirements.

4.20 Sampling Plan

4.20.1 A sampling program implemented to ensure that representative samples from the feed waste and the final waste form are obtained and tested for conformance with parameters stated in the PCP and waste form acceptance criteria.

4.21 Scaling Factor

4.21.1 A dimensionless number which relates the concentration of an easy to measure nuclide (gamma emitter) to one which is difficult to measure (beta/alpha emitters).

4.22 Shipping Paper

4.22.1 At WCGS the shipping paper consists of an NRC form 540 and 541(or equivalent). Additional documentation may be provided (i.e., bill of lading) but is not consecutively number as part of the shipping papers.

4.23 Significant Quantity

4.23.1 For purposes of sample evaluation, waste classification and manifesting radionuclides on shipping papers, the following radionuclide limits shall be considered significant:

- Any LLD value for a 10 CFR Part 20, Appendix G required radionuclide.
- Any radionuclide representing greater than 5 percent of the relative A_2 fraction hazard.

- o Any real value for a radionuclide specifically listed in 10 CFR Part 61.55.
- o Any radionuclide representing greater than 1 percent of the total activity.
- o Any radionuclide greater than 0.5 RQ value.

4.24 Special Nuclides

4.24.1 RADMAN Computer Code user term for 10 CFR Part 20, Appendix G required nuclides.

4.25 Stability

4.25.1 As used in this document, "stability" means structural stability. Stability requires that the waste form maintain its structural integrity under the expected disposal conditions.

4.26 Waste Container

4.26.1 A vessel of any shape, size, and composition used to contain the final or intermediate processed waste.

4.27 Waste Form

4.27.1 Waste in a stable waste form or container acceptable for disposal at a licensed disposal facility.

4.28 Waste Processing

4.28.1 Changing, modifying, packaging the commercial nuclear power plant generated wet radioactive waste into a form that is acceptable to a disposal facility.

4.29 Waste Stream

4.29.1 A station specific and constant source of waste with a distinct radionuclide content and distribution.

4.30 Waste Type

4.30.1 A single packaging configuration tied to a specific waste stream, or multiple package types tied to the same waste stream.

5.0 RESPONSIBILITIES

5.1 Health Physics Supervisor Radwaste is responsible for:

5.1.1 Implementing this procedure.

5.1.2 Ensuring that radioactive waste is classified and characterized in accordance with 10 CFR 61.55 receiving facility criteria.

5.1.3 Designating other approved procedures (if required) to be implemented in the packaging of any specific batch of waste.

6.0 PROCEDURE

6.1 The precautions/limitations of this procedure are listed below.

6.1.1 All plant personnel that have any involvement with the RADMAN, TRASHP, and FILTRK computer codes shall be familiar with its functions, operation, and maintenance.

6.1.2 Only authorized personnel will characterize or package radioactive waste or radioactive materials.

6.1.3 Radioactive materials shall be handled in accordance with applicable Radiation Protection Procedures.

6.1.4 Pressure and heat may be encountered during the operation of liquid waste processing systems.

1. Caution must be exercised during disassembly and disconnection of lines or equipment and valve realignments.

6.1.5 Each HIC is matched with specific closure components and seals at time of manufacture.

1. All components are identified using a common serial number.

2. Should components become mismatched, contact the HPSR for instructions prior to use.

6.1.6 Waste must NOT be packaged for disposal in cardboard or fiberboard boxes.

6.1.7 Liquid waste must be solidified or packaged in sufficient absorbent material to absorb twice the volume of the liquid.

6.1.8 Solid waste containing liquid shall contain as little free standing and non-corrosive liquid as is reasonably achievable, but in no case shall the liquid exceed 1 percent of the volume in HIC's and 0.5% in a steel liner.

6.1.9 Waste must NOT be readily capable of detonation or of explosive decomposition or reaction at normal pressures and temperatures, or of explosive reaction with water.

6.1.10 Waste must NOT contain, or be capable of generating, quantities of toxic gases, vapors, or fumes harmful to persons transporting, handling, or disposing of the waste. This does NOT apply to radioactive gaseous waste packaged in accordance with Step 6.1.12 of this section.

6.1.11 Waste must NOT be pyrophoric. Pyrophoric materials contained in waste shall be treated, prepared, and packaged to be non-flammable.

6.1.12 Waste in a gaseous form must be packaged at a pressure that does not exceed 1.5 atmospheres at 20°C. Total activity must not exceed 100 curies per container.

6.1.13 Waste containing hazardous, biological, pathogenic, or infectious material must be treated to reduce to the maximum extent practicable the potential hazard from the non-radiological materials.

6.1.14 All data entries should use three significant figures only (i.e., X.XXE-x). IF more significant figures are provided, round off to generate three significant figures.

6.1.15 Use only those isotopes reported as real values, ignore all isotopes reported as LLD values, except those nuclides listed in Step 6.6.7.

6.1.16 Ignore all radioisotopes with half-lives less than eight (8) days based on I-131.

6.1.17 Changes to this procedure shall be documented with a form APF 31A-100-04, PROCESS CONTROL PROGRAM CHANGE RECORD submitted with the revised procedure and form APF 15C-004-01, DOCUMENT REVISION REQUEST. Form APF 31A-100-04 shall contain (Step 3.1.1):

1. Sufficient information to support the change together with the appropriate analyses or evaluation justifying the change(s).

   AND

2. A determination that the change will maintain the overall conformance of the waste product to existing requirements of Federal, State, or other applicable regulations.

6.2 Special equipment, material, and parts needed to perform tasks are shown below.

6.2.1 Required tools and equipment will vary depending on the specific process and waste container that is used.

6.2.2 The various tools and equipment which may be required are detailed in the vendor procedures listed in Steps 3.1.36 and 3.1.37.

6.3 Prerequisites before beginning work with this procedure.

6.3.1 Ensure that a current set of DOT, NRC and burial site regulations is maintained at the station and is available for reference.

6.3.2 Ensure that representative sample data is on file for each waste stream. Data is considered to be current if it meets the following:

1. The waste stream must be sampled at least every two years for NRC Class A waste.

2 The waste stream must be sampled at least every year for NRC Class B or C waste. Exceptions are:

a.legacy waste

b.as generated waste

3. Non-waste radioactive material shall be sampled on an annual or as generated basis with (non-irradiated) fuel pool material differentiated from balance of plant material.

6.3.3 A training program shall be developed and implemented for personnel having responsibilities related to waste processing operations to ensure the waste processing shall be performed within the requirements of the PCP.

1. The training program shall be repeated and the personnel requalified on a periodic schedule, not to exceed three years.

2. The individual's training records shall be maintained and available for audit and inspection.

6.3.4 Additional requirements for contracted vendors processing waste.

1. Management shall review vendor(s) topical reports.

NOTE

The PCP does NOT have to include the vendors Topical Report if it has NRC approval, or has been previously submitted to the NRC.

a. This review will assure the vendors operations and requirements are compatible with the responsibilities and operation of the plant.

b. The training requirements and records listed in Step 6.3.3 also apply to contracted vendors.

c. The station shall maintain copies of records to verify training of vendor personnel.

6.4 Procedure For Performing Work

6.4.1 Methods and frequency for determining the radionuclide concentration for each waste stream.

1. Ensure samples are representative of the final waste form.

2. Determine the base line density for each waste stream (NOT applicable for DAW and filters). The density is determined by waste weight and volume.

NOTE

For WCGS, waste stream radionuclide content is considered to be distributed throughout for purpose of waste classification.

6.4.2 Treat each waste stream separately for classification purposes.

6.4.3 Send all NRC Class A waste samples to an independent laboratory for gamma, beta and alpha analysis at least once every two years.

1. Perform an in-house analysis for gamma emitting radionuclides for each sample sent to an independent lab for future comparison.

2. Periodically perform in-house analysis for gamma emitting nuclides for comparison to the current data base values for gamma emitters (the current data base is usually based on the most recent independent laboratory results).

6.4.4 Send all NRC Class B and C waste samples to an independent laboratory for gamma, beta and alpha analysis at least once a year, except as defined in 6.3.2. The additional steps required are identical to Substeps 1 and 2 of Step 6.4.3.

6.4.5 Determine the status (real value, LLD or not present) of the 10 CFR 20 Appendix G required nuclides for each waste stream from the recent independent laboratory data.

6.4.6 Document and track all samples per RPP 07-101, CONTROL OF RADIOACTIVE MATERIAL MANAGEMENT SOFTWARE AND DATA BASES.

6.5 Current and planned practice for each waste stream is as follows:

6.5.1 DAW

1. Obtain composite smears from various contaminated areas of the plant on a semi-annual basis and analyze (IG) them in-house for gamma emitters.

2. Compare the results of the semi-annual samples to the database to ensure adequacy of sample frequency.

3. Send the most recent group of composite smears to an independent laboratory for analysis biennially or more often IF determined necessary by the HPSR.

4. Maintain records for all samples for nuclide identification, distribution and scaling factors.

NOTE

The specific activity (µCi/cc or µCi/g) is NOT required since all characterization/classification calculations are performed using a dose/curie methodology which only relies on fractional abundance.

5. Both in-house and independent laboratory results are normally reported in µCi/sample.

6. Forward the results from the independent laboratory to the HP Dosimetry/Calibration Lab for evaluation on RPF 01-405-05, "DETERMINATION OF DETECTABLE VS. NON-DETECTABLE ACTIVITY FOR RELEASE FROM THE RCA".

6.5.2 S/G Blowdown Resin

1. Obtain several (as determined by the HPSR) composite samples from the resin transfer line during liner loading operations on an "as generated" basis.

NOTE

Each liner is considered a different batch for sampling and classification purposes.

2. Analyze the samples in-house (IG) and retain the results for future comparison to the replicate independent laboratory results.

3. Send the samples to an independent laboratory for analysis biennially or as generated.

4. Maintain records for all samples for nuclide identification, distribution and scaling factors.

5. Both in-house independent laboratory results are normally reported in the same units (µCi/g or µCi/cc).

6.5.3 CVCS Resin

1. The sampling procedure is exactly the same as listed above for S/G Blowdown Resin in Step 6.5.2 except the analysis frequency is annual or as generated.

6.5.4 Filters

1. Obtain samples from each individual filter waste stream defined in Step 2.2 on an annual OR as generated basis.

NOTE

Samples may be taken from the actual filter media, from a smear of the filter media, from a smear of the filter housing, or a crud sample, as determined by the HPSR.

2. Perform an in-house (IG) analysis of the sample (or replicate sample) and retain the output record for future comparison to the independent laboratory results.

3. Send the sample to an independent laboratory for analysis once per year or more often if determine necessary by the HPSR.

4. Maintain records for all samples for nuclide identification, distribution and scaling factors.

NOTE

CORRECTIVE ACTION FOR ADJUSTING Co-58 SCALING FACTORS FOR FILTERS DURING CRUD BURSTS ENCOUNTERED WITH CHEMICAL INJECTIONS AND 100% LOAD REJECTIONS

5. The Co-58 scaling factors should be adjusted when the total radioactivity increases for filters during the above conditions, the activity increase is primarily Co-58 not Co-60, if the scaling factors are not adjusted the filters can be overestimated for NRC waste classification.

   a. Step 1, Obtain a filter sample.

   b. Step 2, Count the sample in-house, it is not necessary to perform an independent laboratory analysis.

   c. Step 3, Divide the Co-58 value by the Co-60 value, this is the scaling factor.

   d. Step 4, Obtain a hard copy of the Part 61 filter waste stream.

e. Step 5, Apply the Step 3 scaling factor to the database Co-60 value.

f. Step 6, Create a new (crud burst) Part 61 waste stream with the new Co-58 value.

g. Step 7, Characterize filters.

NOTES

- **Document that there are two Part 61 waste streams for the same filters depending on operating conditions.**
- **The specific activity (µCi/cc or µCi/g) is not required since all characterization/classification calculations are performed using a dose/curie methodology which only relies on fractional abundance.**

6. Both in-house and laboratory results are normally reported in µCi/sample.

6.6 Sample Evaluation

6.6.1 Infrequent or Abnormal Waste Types

1. Infrequent or abnormal waste types that may be generated must be evaluated on a case-by-case basis.

2. The HPSR will determine if the waste can be correlated to an existing waste stream.

3. If the radioactive material cannot be correlated to an existing waste stream, the HPSR shall determine specific off-site sampling and analysis requirements necessary to properly classify the material.

6.6.2 Examples of these radioactive materials include, but are not limited to:

- Contaminated Soil
- Contaminated Oil
- Special Filters or Resin
- A mixture of radioactive material types in one container.

6.6.3 Requirements for analysis to be performed by an off-site vendor are as follows:

1. All sample results must reference the quantity received.

2. All sample results shall be decay corrected to a reference date provided by the station which is normally the sample date.

3. The sample results shall be reported in µCi/sample, µCi/g or µCi/cc as determined the HPSR.

NOTE

Outside analysis is NOT performed for any radionuclides with a half-life less than eight days.

6.6.4 The vendor shall perform analysis for the following radionuclides listed in Table 1 of 10 CFR 61.55.

1. C-14, Tc-99, I-129, Pu-241, Cm-242 and the following alpha emitting transuranics (TRUs) with half-lives greater than five years, Np-237, Pu-238, Pu-239/240, Pu-242, Am-241, and Cm-243/244.

   a. Additionally Ni-59 and Nb-94 are required for Rx cavity and fuel pool filters.

NOTE

If evaluation of several sets (i.e., three or more) of waste stream specific historical sample data shows that some TRUs with half-life greater than five years are consistently reported as LLD values, sample analysis may be discontinued for those specific radionuclides.

2. Analysis for the "activated metal" radionuclides listed in Table 1 of 10 CFR Part 61 are only required for the fuel pool filters and reactor cavity filters waste streams identified at WCNOC.

3. It is NOT necessary to contract for an offsite vendor to perform analysis for enriched uranium or other naturally occurring radionuclides not delineated in this procedure.

4. Radionuclides listed in Table 1 of 10 CFR 61.55 shall be specifically identified and the quantities reported on shipping manifests if they are significant for purposes of classification.

6.6.5 The vendor shall perform analysis for the following radionuclides listed in Table 2 of 10 CFR 61.55.

1. H-3, Co-60, Ni-63, Sr-90 and Cs-137

2. Radionuclides listed in Table 2 of 10 CFR 61.55 shall be specifically identified and the quantities reported on shipping manifests if they are significant for purposes of classification.

6.6.6 The vendor shall perform analysis for the following radionuclides NOT listed in Table 1 or Table 2 of 10 CFR 61.

1. Activation Products - Cr-51, Mn-54, Fe-55, Co-58, Fe-59, Sb-124, Sb-125, Zn-65, Ag-110M and any other nuclides identified in significant quantities by in-house IG equipment.

2. Fission Products - Zr-95, Nb-95, Ru-103, Ru-106, Cs-134, Ce-141, Sr-89, Ce-144 and any other nuclides identified in significant quantities by in-house IG equipment.

6.6.7 A waste stream specific database must include the following radionuclides, even if they are reported as LLD values:

1. H-3, C-14, Tc-99, I-129 required by 10 CFR 20 Appendix G (H-3 is considered real or LLD for DAW because "not present" cannot be substantiated).

2. Co-60, Cs-137, and Ce-144 (only if TRUs are reported) required by the RADMAN computer code. They are used as the primary scaling radionuclides.

3. The HPSR can change the base scaling radionuclides.

NOTE

Samples sent to offsite laboratories for analysis should contain sufficient activity to determine the presence of transuranic nuclides. The minimum recommended sample activity level is 50,000 dpm. If that level cannot be attained, the highest activity should be used for offsite analysis.

6.7 Sample Analysis and Comparison

6.7.1 Whenever a sample is sent off-site for analysis, count the same sample (or replicate) in-house with the station IG system.

NOTE

Isotopic results that are not considered statistically positive at the 99.9% confidence level are considered "suspect" values and shall be discarded as necessary.

6.7.2 Comparison of on-site versus off-site analysis shall be evaluated by the HPSR to identify and resolve any discrepancies. As a minimum, the comparison shall include:

- o Specific activity by gamma emitting radionuclides. (NOT applicable for DAW or filter samples.)
- o Co-60/Cs-137 Ratio
- o Presence or absence of radionuclides
- o Predominant radionuclides
- o Individual radionuclide fractional abundance
- o Scaling factors

6.7.3 Records of on-site and off-site sample analysis and evaluations by waste type are maintained by the HPSR.

6.7.4 IF a comparison between the in-house and independent laboratory results shows a variance of 20 percent or greater for specific activity, the MCA results may be adjusted until the discrepancy is resolved. Reported MDC should be consistent with the measurement uncertainty. The relative uncertainty (1σ) of the measurement should be ~30% at the MDC and should get smaller as the measured concentration increases above the MDC level.

1. Any discrepancies should be resolved (if possible) in-house or with the independent laboratory as soon as possible.
2. The use of these activity correction factors is only valid if other conditions defined in Step 6.7.2 above compare favorably, otherwise the sample set should be considered suspect and the data should not be used. This would require another sample as soon as possible. (3.1.38)

6.7.5 Radionuclides with a half-life less than eight days are also ignored from internal MCA reports.

6.7.6 New sample data shall be periodically obtained and evaluated.

6.7.7 New sample data may be either off-site analysis or in-house MCA analysis.

6.7.8 Once a database has been established, based on off-site analysis, the MCA results are primarily used as a "flag" to obtain and send additional samples off-site. Exceptions to this may occur during crud burst situations were it is necessary to adjust the scaling factor relationship of the activation products. An example would be the $^{58}Co/^{60}Co$ ratio after hydrogen peroxide additions.

6.7.9 The analyze utility program may be utilized to evaluate multiple sets of data.

NOTE

Isotopic results that are NOT considered statistically positive at the 99.9% confidence level are considered "suspect" values and shall be discarded as necessary.

6.7.10 Several comparisons to the existing database shall be considered when evaluating new sample data.

1. Radionuclide fractional abundance and scaling factor relationships
2. Specific activity by radionuclide
3. Swings in driving classifications radionuclides
4. Radionuclides present in database, but NOT present in new sample or vice versa
5. Total activity by sample set

6.8 Sample Frequency

6.8.1 The following may require increased sampling:

1. Increase in failed fuel fraction as determined by:
   - o D.E.I. 25% of Technical Specification limit
   - o Increase of I-131/I-133
   - o Np-239 greater than 0.01 μCi/cc in reactor coolant
   - o Positive in-house gross alpha sample results on any type of smear survey
2. Crud burst during 100% load rejection or chemical cleaning
3. Extended reactor shutdown (>90 days)
4. Changes to liquid waste processing, such as bypassing filters, utilizing filters or a change in ion exchange media

6.9 Scaling Factors

6.9.1 WCGS has established an inferential measurement program, whereby, concentrations of radioisotopes which cannot be readily measured are estimated through ratioing to concentrations of radioisotopes which can be readily measured.

6.9.2 Scaling factors have been developed on a facility and waste stream specific basis, and are periodically confirmed through direct measurements.

6.9.3 Correlations between measured and inferred radionuclides are currently as follows, but can be changed at the HPSR discretion:

1. Ce-144 to transuranic nuclides
2. Co-60 to activation product nuclides and C-14
3. Cs-137 to fission product nuclides

6.10 Waste Classification

NOTE

The volume and mass of the waste form (not the waste container) is used for most waste classification calculations.

6.10.1 Determine the waste classification (Class A stable or unstable, Class C) by the concentration of certain radionuclides in the final waste form as listed in 10 CFR 61.55.

6.10.2 Determine the radionuclide concentrations per RPP 07-120, PREPARATION AND SHIPMENT OF RADIOACTIVE MATERIAL, as follows:

1. DAW - "Gross Radioactivity Measurements" in conjunction with the RADMAN computer code or hand calculations

2. Filters - "Gross Radioactivity Measurements" in conjunction with the FILTRK computer code or hand calculations

3. All other waste streams - "Direct Measurement of Individual Radionuclides" in conjunction with the RADMAN computer code or hand calculations

6.11 Quality Control For Sampling And Classification

6.11.1 The RADMAN computer code provides a mechanism to assist WCGS in conducting a quality control program to aid in compliance with the waste classification requirements listed in 10 CFR 61.55.

6.11.2 Management audits of the WCNOC Sampling and Classification Program shall be performed in accordance with AP 25-001, RADIATION PROTECTION QUALITY PROGRAM REQUIREMENTS.

6.11.3 The audits are performed and documented by any of the following:

*Health Physics Department

*Corporate Radwaste and Document Services Department

*Quality Assurance Department

OR

*Qualified Vendors

6.12 Non-Waste Classification

6.12.1 Determine the radioactive material classification (Excepted Package, LSA, SCO, Type A, >Type A or Type B) by the total activity or activity as listed in DOT regulations and the receiver's radioactive material licenses.

6.12.2 Determine the radionuclide concentrations per RPP 07-121, PREPARATION AND SHIPMENT OF RADIOACTIVE MATERIAL, as follows:

1. Non-irradiated material removed from the spent fuel pool - "Gross Radioactivity Measurements," "Direct Measurement of Individual Radionuclides", or "Measurement of Surface Contamination Levels" for non-radioactive material contaminated with radioactive material in conjunction with the RAMSHP computer code or hand calculations.

2. Any other radioactive material generated by the station - The same methods listed for fuel pool material may be used with a separate radionuclide database.

6.13 Processing General Requirements

NOTE

The dewatering capabilities are verified by vendor Topical Reports or operating and testing procedures.

6.13.1 Verify the wastes contain only trace amounts of drainable liquid, and in NO case may the volume of free liquid exceed one percent of the waste volume when wastes are disposed of in containers designed to provide stability.

NOTE

The following verification is performed on a case-by-case basis for each package using independent laboratory data and MCA data in conjunction with computer codes or hand calculations.

6.13.2 Verify that resins are NOT processed that have loadings which will produce greater than 1.0 E+8 rads (350 μCi/cc) total accumulated dose. This only applies to two radionuclides, Cs-137 and Sr-90.

6.13.3 The as generated waste must be compatible with the disposal container.

6.14 Processing Requirements During Dewatering Operations

6.14.1 Perform all dewatering operations per RPP 07-131, BEAD RESIN/ACTIVATED CARBON DEWATERING PROCEDURE FOR CNSI 14-215 OR SMALLER LINERS.

NOTE

This procedure may only be used to dewater CNSI's 14-215 or smaller liners containing bead-type ion exchange resins and activated carbon with less than 1 percent oil.

6.14.2 Complete form RPF 07-131-01, HIC DEWATERING COMPLETION RECORD, for each liner prior to final closure.

6.14.3 Form RPF 07-131-01, HIC DEWATERING COMPLETION RECORD, must be included in the shipping paperwork package with the shipment.

6.14.4 The final transfer/dewatering cycle shall be counted as the first pumping cycle IF after the transfer is completed, the liner is dewatering per this procedure.

6.14.5 Final dewatering verification is determined by the following:

1. 1% Free-Standing Water or Less

   a. After a minimum of two (2) pumping cycles for bead resins or five (5) cycles for activated carbon, a measured volume of less than five (5) gallons on the next eight (8) hours of pumping shall be the acceptance criteria.

   b. IF five (5) gallons or more are collected, the waiting/pumping cycle shall be repeated until less than five (5) gallons are collected.

2. 0.5% Free-Standing Water or Less

   a. After a minimum of five (5) pumping cycles for bead resins or eight (8) pumping cycles for activated carbon, a measured volume of less than two (2) gallons on the next eight (8) hours of pumping shall be the acceptance criteria.

   b. IF two (2) gallons or more are collected, the waiting/pumping cycle shall be repeated until less than two (2) gallons are collected.

6.15 Packaging General Requirements

NOTE

The following general requirements are normally verified by review of a HIC's Certificate of Compliance (C of C) and State/NRC approval.

6.15.1 Ensure that the waste is in a container or structure that provides stability after disposal.

6.15.2 Ensure that the container is resistant to degradation caused by radiation effects.

6.15.3 Ensure the container is resistant to bio-degradation.

6.15.4 Verify that the container will remain stable under the compressive loads inherent in the disposal environment.

6.15.5 Verify that the container will remain stable if exposed to moisture or water after disposal.

6.15.6 Ensure that the "as generated" waste is compatible with the container.

6.16 Packaging Vendor Requirements

6.16.1 Perform all inspection, handling and loading operations per CNSI, FO-AD-002.

NOTE

Prior to use, each user will have on file within Chem-Nuclear System, Inc. Regulatory Affairs Department a "Polyethylene High Integrity Container Certification Statement."

6.16.2 IF not already on file, complete form FO-AD-002 HIC USER'S CHECKLIST, and transmit it to CNSI, maintain a copy of file in the HPSR office.

6.16.3 Complete form FO-AD-002 HIC USER'S CHECKLIST, for each HIC liner to be shipped to CNSI.

6.16.4 Form FO-AD-002 HIC USER'S CHECKLIST, must be included in the shipping paperwork package with the shipment.

6.16.5 Complete form FO-AD-002 CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE HIGH INTEGRITY CONTAINERS, for each HIC liner to be shipped to CNSI.

6.16.6 Form FO-AD-002 CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE HIGH INTEGRITY CONTAINERS, must be included in the shipping paperwork package with the shipment.

6.16.7 Storage Conditions

NOTES

- **Containers stored out-of-doors in direct sunlight must be used within one year of fabrication.**
- **The design of the storage facility must preclude the possibility of a wet or damp environment and any prolonged exposure of the container to any source of ultraviolet light.**

1. Ensure that containers are stored out of direct sunlight (if possible) and away from any other sources of ultraviolet radiation.
2. Store all containers in such a way that the bottom is flat and that no weight is located over the manway/fill port area.
3. Each container shall be stored with its designated closure assemblies to prevent mismatching.
4. Following filling and closure of the container, it may be stored on-site prior to shipment for burial.

6.16.8 Inspection Prior To Use

1. Visually inspect thread and seal areas to verify they are free of foreign matter that could impair the seal or thread engagement.
2. Visually inspect the exterior surfaces for damage that may have occurred during transport or storage that could lessen container integrity.

6.16.9 Handling And Lift Requirements

NOTE

Due to the nature of the container material, some bowing and deformation may be evident during lifting.

1. Use only lift band(s), lift lugs and slings provided with the liner for lifting.

2. Inspect the underdrain assembly prior to use if the container was dropped or banged against another object.

6.17 Additional Barnwell Waste Management Facility Requirements

6.17.1 Each package of waste must be clearly labeled to identify whether it is Class A, Class B, or Class C waste, in accordance with 10 CFR 61.55.

6.17.2 All waste received at the Barnwell facility must be disposed in approved disposal overpacks.

6.17.3 Void spaces within the waste and between the waste and its packaging shall be reduced to the extent practicable, but in NO case shall the container be less than eighty-five percent (85%) full. This requirement is not applicable to waste in DHEC approved HICs and irradiated hardware containers.

NOTE

The South Carolina DHEC and CNSI recognize that filters and irradiated hardware will NOT routinely meet the 85% condition. Provided that containers of these waste types are packaged to the fullest extent practicable, no written justification is required.

6.17.4 The HPSR must apply for a variance request prior to shipment if the 85 percent fill requirement is NOT achievable.

6.17.5 Ensure that a copy of the Certificate of Compliance (C of C) for the approved High Integrity Container(s) as issued and amended by DHEC is on file with Barnwell Regulatory Affairs/Licensing Department.

7.0 RECORDS

7.1 The following QA Records are generated by this procedure.

7.1.1 Completed HIC USER'S CHECKLIST (FO-AD-002)

7.1.2 Completed CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE HIGH INTEGRITY CONTAINERS (FO-AD-002)

7.1.3 Completed PROCESS CONTROL PROGRAM CHANGE RECORD (APF 31A-100-04)

7.2 The following Non-QA Record is generated by this procedure.

7.2.1 Completed POLYETHYLENE HIGH INTEGRITY CONTAINER CERTIFICATION STATEMENT (FO-AD-002)

8.0 FORMS

8.1 FO-AD-002, HIC USER'S CHECKLIST

8.2 FO-AD-002, CERTIFICATION STATEMENT FOR DISPOSAL OF POLYETHYLENE HIGH INTEGRITY CONTAINERS

8.3 FO-AD-002, POLYETHYLENE HIGH INTEGRITY CONTAINER CERTIFICATION STATEMENT

8.4 APF 31A-100-04, PROCESS CONTROL PROGRAM CHANGE RECORD

- END -

ATTACHMENT A
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TECHNICAL SPECIFICATION AMENDMENT CHANGES

Solidification

The conversion of wet wastes into a form that meets shipping and burial ground requirements.

ADMINISTRATIVE CONTROLS AND REPORTING REQUIREMENTS

Limiting Condition of Operation

Radioactive wastes shall be solidified or dewatered in accordance with the Process Control Program to meet shipping and transportation requirements during transit, and disposal site requirement when received at the disposal site.

Applicability

At all times

Remedial Action

a. With solidification or dewatering not meeting disposal site and shipping and transportation requirements, suspend shipment of the inadequately processed wastes and correct the Process Control Program, the procedures and/or the Solid Wastes System as necessary to prevent recurrence.

b. With solidification or dewatering not performed in accordance with the Process Control Program, test the improperly processed waste in each container to ensure that it meets burial ground shipping requirements and take appropriate administrative action to prevent recurrence.

Surveillance Requirements

Solidification of at least one representative test specimen from at least every tenth batch of each type of wet radioactive wastes (e.g., filter sludges, spent resins, evaporator bottoms, boric acid solutions and sodium sulfate solutions) shall be verified in accordance with the Process Control Program:

ATTACHMENT A
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TECHNICAL SPECIFICATION AMENDMENT CHANGES

a. If any test specimen fails to verify solidification, the solidification of the batch under test shall be suspended until such time as additional test specimens can be obtained, alternative solidification parameters can be determined in accordance with the Process Control Program, and a subsequent test verifies solidification.

   Solidification of the batch may then be resumed using the alternative solidification parameters determined by the Process Control Program;

b. If the initial test specimen from a batch of waste fails to verify solidification, the Process Control Program shall provide for the collection and testing of representative test specimens from each consecutive batch of the same type of wet waste until at least three consecutive initial test specimens demonstrate solidification. The Process Control Program shall be modified as required, as provided in WCGS Technical Specifications 6.13 (TR 5.5.4), to assure solidification of subsequent batches of waste; and

c. With the installed equipment incapable of meeting this Administrative Control or declared out-of-service, restore the equipment to operable status or provide for contract capability to process wastes as necessary to satisfy all applicable transportation and disposal requirements.

Basis

This Administrative Control implements the requirements of 10 CFR 50.36.a and General Design Criteria 60 Appendix A to 10 CFR 50. The process parameters included in establishing the Process Control Program may include, but are not limited to, waste type, waste pH, waste/liquid/solidification agent/catalyst ratios, waste oil content, waste principal chemical constituents, and mixing and curing times.

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TECHNICAL SPECIFICATION AMENDMENT CHANGES

REPORTING REQUIREMENTS

Annual Radioactive Effluent Release Report

The Annual Radioactive Effluent Release Reports covering the operation of the unit during the previous calendar year shall be submitted before May 1 of each year. The report shall include a summary of the quantities of radioactive liquid, gaseous effluents and solid waste released from the Unit. The material provided shall be (1) consistent with the objectives outline in the ODCM and PCP, and (2) in conformance with 10 CFR 50.36a and Section IV.B.1 of Appendix I to 10 CFR Part 50.

Changes to the PCP

a. Shall be documented and records of reviews performed shall be retained for the duration of the Unit Operating License. This documentation shall contain:

   1. Sufficient information to support the change together with the appropriate analyses or evaluations justifying the change(s).

   2. The determination that the change will maintain the overall conformance of solidified waste product to existing requirements of Federal, State, or other applicable regulations.

b. Shall become effective after review and acceptance by the PSRC and the approval of the Plant Manager.

- END -