ADDENDUM TO OPERABLE UNIT 1 TREATABILITY STUDY WORK PLAN OCTOBER 1991

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ADDENDUM

TO

OPERABLE UNIT 1 TREATABILITY STUDY WORK PLAN

OCTOBER 1991

Addendum
RI/FS Treatability Work Plan
Document date: October 10,1991
Revision date: January 3, 1992

Document Modification (1 of 4):

Replace existing Figure 1-3 (pages 18, 19, and 20 of 34, Section 1.0) with attached Figure 1-3.

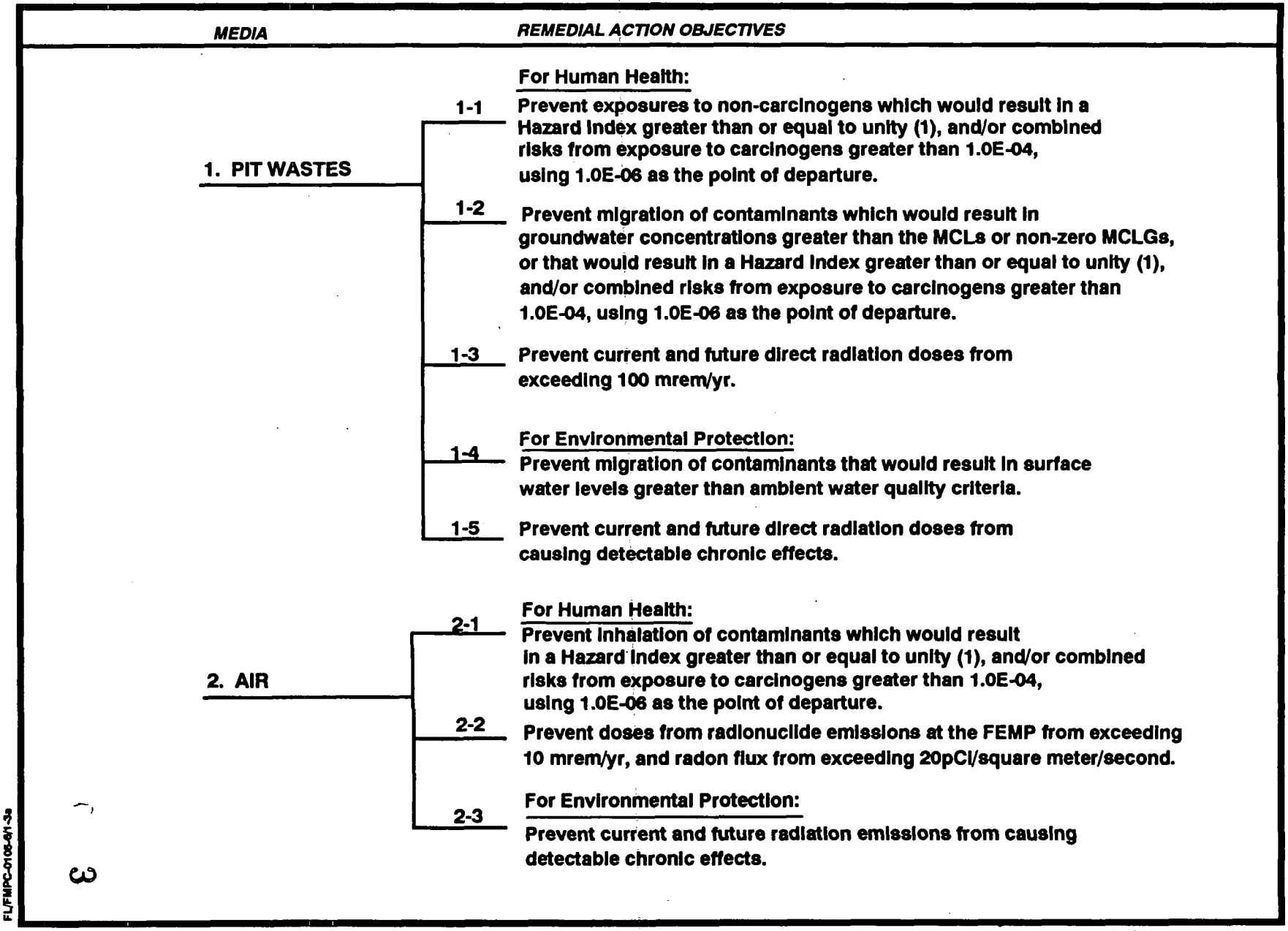

FIGURE 1-3. REMEDIAL ACTION OBJECTIVES

MEDIA		REMEDIAL ACTION OBJECTIVES
3. SOILS	3-1	For Human Health: Prevent inhalation of/ingestion of/direct contact with soils surrounding the waste pits which would result in a Hazard Index greater than or equal to unity (1), and/or combined risks from exposure to carcinogens greater than 1.0E-04, using 1.0E-06 as the point of departure.
	3-2	Prevent migration of contaminants which would result in groundwater concentrations greater than the MCLs or non-zero MCLGs, or that would result in a Hazard Index greater than or equal to unity (1), and/or combined risks from exposure to carcinogens greater than 1.0E-04, using 1.0E-06 as the point of departure.
	3-3	Prevent radium concentrations from exceeding 5 pCi/g in the first 15 cm of soil, and 15 pCi/g at lower depths. Prevent concentrations of other nuclides from exceeding levels that would result in doses greater than 100 mrem/yr.
	3-4	For Environmental Protection: Prevent migration of contaminants that would result in surface water contamination levels greater than ambient water quality criteria.
4. SEDIMENTS	4-1	For Human Health: Prevent ingestion of/direct contact with sediment contaminants which would result in a Hazard Index greater than or equal to unity (1), and/or combined risks from exposure to carcinogens greater than 1.0E-04, using 1.0E-06 as the point of departure.
	4-2	For Environmental Protection: Prevent releases of contaminants from sediments that would result in surface water contamination levels greater than ambient water quality criteria.

FL/FMPC-0105-4/1-3b

FIGURE 1-3.
(CONTINUED)

MEDIA		REMEDIAL ACTION OBJECTIVES
5. SURFACE WATER	5-1	For Human Health: Prevent exposures to non-carcinogens which would result in a Hazard Index greater than or equal to unity (1), and/or combined risks from exposure to carcinogens greater than 1.0E-04, using 1.0E-06 as the point of departure.
	5-2	For Environmental Protection: Restore surface water to below ambient water quality criteria.
6. GROUNDWATER	6-1	For Human Health: Prevent ingestion of water having contaminant levels greater than the MCLs, non-zero MCLGs, TBCs, or which would result in a Hazard Index greater than or equal to unity (1), and/or combined risks from exposure to carcinogens greater than 1.0E-04, using 1.0E-06 as the point of departure.
	6-2	For Environmental Protection: Restore groundwater aquifer to contaminant concentrations below the MCLs.

FIGURE 1-3.
(CONTINUED)

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Document Modification (2 of 4):

Replace existing Table 3-3 (page 7 of 16, Section 3.0) with attached Table 3-3.

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TABLE 3-3. A COMPARISON OF ARARs, TBCs, PRELIMINARY REMEDIATION GOALS, DERIVED LEACHATE REFERANCE LEVELS, FEMP BACKGROUND CONCENTRATIONS, AND CONTRACT LAB REQUIRED DETECTION LIMITS FOR WATER

Chemical	TBC/ARAR[1] (mg/l)	PRGs[2] (mg/l)	DLRL[3] (mg/l)	FEMP[4] Background (mg/l)	CLRDL[5] (mg/kg)
Inorganics					
Aluminum	NA	[c]	NA	--	0.2
Arsenic	0.05	2.00×10^{-5}	2.00×10^{-2}	--	0.01
Barium	1	1.75×10^{0}	1.75×10^{2}	--	0.2
Beryllium	0.001[a]	8.14×10^{-6}	8.14×10^{-3}	--	0.005
Cadmium	0.005	1.75×10^{-2}	1.75×10^{0}	--	0.005
Chromium	0.1	1.75×10^{-1}	1.75×10^{1}	--	0.01
Cobalt	NA	[c]	NA	--	0.05
Copper	1.3[b]	[c]	NA	--	0.025
Lead	0.05	2.45×10^{-2}	2.45	--	0.005
Magnesium	NA	[c]	NA	--	5
Manganese	NA	3.50×10^{0}	3.50×10^{2}	--	0.015
Mercury	0.002	1.05×10^{-2}	1.05×10^{0}	--	0.0002
Molybdenum	NA	1.40×10^{-1}	1.40×10^{1}	--	NA
Nickel	0.1[a]	7.00×10^{-1}	7.00×10^{1}	--	0.04
Selenium	0.05	NA	NA	--	0.005
Silver	0.05	1.05×10^{-1}	1.05×10^{1}	--	0.01
Thallium	0.001[a]	2.45×10^{-3}	2.45×10^{-1}	--	0.01
Uranium	0.02	1.05×10^{-1}	1.05×10^{1}	--	NA
Vanadium	NA	2.45×10^{-1}	2.45×10^{1}	--	0.05
Zinc	NA	7.00×10^{0}	7.00×10^{2}	--	0.02
Organics					7
1,1,1-Trichloroethane	0.2	3.15×10^{0}	3.15×10^{2}	--	0.005
1,1-Dichloroethane	NA	3.50×10^{0}	3.50×10^{2}	--	0.005

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TABLE 3-3 (Continued)

Chemical	TBC/ARAR[1] (mg/l)	PRGs[2] (mg/l)	DLRL[3] (mg/l)	FEMP[4] Background (mg/l)	CLRDL[5] (mg/kg)
1,2-cis-dichloroethane	0.07	3.50×10^{-1}	3.50×10^{1}	--	NA
2-Butanone	0.17[d]	1.75×10^{0}	1.75×10^{2}	--	0.01
2-Methylnaphthalene	NA	[c]	NA	--	0.01
Acenaphthalene	NA	2.10×10^{0}	2.10×10^{2}	--	0.01
Acetone	NA	3.50×10^{0}	3.50×10^{2}	--	0.01
Anthracene	NA	1.05×10^{1}	1.05×10^{3}	--	0.01
Aroclor-1242	0.0005	4.55×10^{-6}	4.55×10^{-3}	--	0.0005
Aroclor-1248	0.0005	4.55×10^{-6}	4.55×10^{-3}	--	0.0005
Aroclor-1254	0.0005	4.55×10^{-6}	4.55×10^{-3}	--	0.001
Aroclor-1260	0.0005	4.55×10^{-6}	4.55×10^{-3}	--	0.001
Benzo(a)anthracene	0.0001[a]	[c]	NA	--	0.01
Benzo(a)pyrene	0.0002[a]	[c]	NA	--	0.01
Benzo(b)fluoranthene	0.0002[a]	[c]	NA	--	0.01
Benzo(g,h,i)perylene	NA	[c]	NA	--	0.01
Benzo(k)fluoranthene	0.0002[a]	[c]	NA	--	0.01
Bis(2-ethyl hexyl)phthalate	NA	2.50×10^{-3}	2.50×10^{0}	--	0.01
Butyl benzyl phthalate	NA	7.00×10^{0}	7.00×10^{2}	--	0.01
Carbon disulfide	NA	3.50×10^{0}	3.50×10^{2}	--	0.005
Chloroform	0.1	5.74×10^{-3}	5.74×10^{0}	--	0.005
Chrysene	0.0002[a]	[c]	NA	--	0.01
DDT	NA	1.03×10^{-4}	1.03×10^{-1}	--	0.0001
Di-n-butyl-phthalate	NA	3.50×10^{0}	3.50×10^{2}	--	0.01
Di-n-octyl-phthalate	NA	7.00×10^{-1}	7.00×10^{1}	--	0.01
Ethyl parathion	NA	[c]	NA	--	8 NA
Ethylbenzene	0.7	3.50×10^{0}	3.50×10^{0}	--	0.005

TABLE 3-3 (Continued)

Chemical	TBC/ARAR[1] (mg/l)	PRGs[2] (mg/l)	DLRL[3] (mg/l)	FEMP[4] Background (mg/l)	CLRDL[5] (mg/kg)
Fluoranthene	NA	1.40×10^{0}	1.40×10^{2}	--	0.01
Fluorene	NA	1.40×10^{0}	1.40×10^{2}	--	0.01
Indeno(1,2,3-cd)pyrene	0.0004[a]	[c]	NA	--	0.01
Methyl parathion	NA	8.75×10^{-3}	8.75×10^{-1}	--	NA
Methylene chloride	0.005[a]	4.67×10^{-3}	4.67×10^{0}	--	0.005
Naphthalene	NA	1.40×10^{-1}	1.40×10^{1}	--	0.01
Pentachlorophenol	0.001[a]	2.92×10^{-4}	2.92×10^{-1}	--	0.05
Phenanthrene	NA	[c]	NA	--	0.01
Phenol	NA	2.10×10^{1}	2.10×10^{-3}	--	0.01
Pyrene	NA	1.05×10^{0}	1.05×10^{2}	--	0.01
Tetrachloroethene	0.005	6.86×10^{-4}	6.86×10^{-1}	--	0.005
Toluene	1	7.00×10^{0}	7.00×10^{2}	--	0.005
Trichloroethene	0.005	3.18×10^{-3}	3.18×10^{0}	--	0.005
Xylenes (total)	10	7.00×10^{1}	7.00×10^{3}	--	0.005

NA - not available
[a]Proposed maximum contaminant level.
[b]Current drinking water standard.
[c]Toxicity data were inadequate for risk-based calculation (EPA, 1990).
[d]Liftime Health Advisory.

(1) 40CFR140.141
(2) RAO for a noncarcinogen in water calculated from: Cleanup Level = (RFD*Body Weight); for an intake of 2 liters/day for a 70kg adult. (HEAST).
RAO for a carcinogen in water calculated from: Cleanup Level = (Risk Level *Body Weight)/(CSF *Intake); for a water intake of 2 liters/day for a 70kg adult and a risk level of 10e-6 for class A and B carcinogens and a risk level of 10e-5 for class C carcinogens.
Lowest resulting water concentration is reported as Preliminary Remediation Goal (PRG).
(3) Derived leachate reference level. Calculated using the same methodology used by EPA to determine regulatory levels found in 40CFR261. The dilution attenuation factor used was 100 and a risk level of 10e-5 was used for carcinogens (Federal Register Vol. 55, No. 61, 11796 - 11877.)
(4) Currently being determined
(5) Low Contact Lab Required Detection Limit (CLRDL).

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Document Modification (3 of 4):

Add attached Table of References to document preceding Appendix A.

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REFERENCES

American National Standard Institute, 1986, "American National Standard Measurement of the Leachability of Solidified Low-Level Radioactive Wastes by a Short-Term Procedure," ANSI/ANS-16.1-1986.

Army Corps of Engineers, Engineers Manual, EM 1110-2-1906, Laboratory Soils Testing, Appendix VII.

American Society for Testing and Materials (ASTM) D2166-85, Standard Test Method for Unconfined Compressive Strength of Cohesive Soil.

Diamond, W. J., 1981, Practical Experimental Designs for Engineering and Scientists, Von Nostrand Reinhold Co., New York, NY.

DePercin, P., E. Bates and D. Smith, 1991, "Designing Treatability Studies for CERCLA Sites: Three Critical Issues," J. of the Air and Waste Management Assn., Vol. 41, No. 45.

Jantzen, C. M. and N. E. Bibler, 1990, "Nuclear Waste Glass Product Consistency Test (PCT) - Version 3.0 (u)," WSRC-7R-90-539, Rev. 1, prepared by Westinghouse Savannah River Co. for the U.S. Dept. of Energy.

McLean, R. A. and V. L. Anderson, 1966, "Extreme Vertices Design of Mixture Experiments," Techometrics, Vol. 8, No. 3.

Method 1311 Toxicity Characteristic Leaching Procedure (TCLP), Federal Register, Vol. 55, No. 126, pp. 26986-26998.

U.S. Dept. of Energy, 1988, "Remedial Investigation and Feasibility Study, Feed Materials Production Center, Fernald, Ohio, Work Plan Requirements," Revision 3, DOE, Oak Ridge Operations Office, Oak Ridge, TN.

U.S. Dept. of Energy, 1991a, "Initial Screening of Alternatives for Operable Unit 1," DOE, Oak Ridge Operations Office, Oak Ridge, TN.

U.S. Dept. of Energy, 1991b, "Risk Assessment Work Plan Addendum (draft)," DOE, Oak Ridge Operations Office, Oak Ridge, TN.

U.S. Environmental Protection Agency, 1986, "Test Methods for Evaluating Solid Wastes, Method 9100," EPA SW-846, EPA, Washington, D.C.

U.S. Environmental Protection Agency, 1988, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," EPA/540-G-89/004, EPA, Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency, 1989a, "Guide for Conducting Treatability Studies Under CERCLA," EPA/540/2-89/058, Office of Emergency and Remedial Response, Washington, D.C.

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U.S. Environmental Protection Agency, 1989b, "Preparing Perfect Project Plans," EPA/600/9-89/087, EPA, Risk Reduction Engineering Laboratory, Cincinnati, OH.

U.S. Environmental Protection Agency, 1989c, "Stabilization/Solidification of CERCLA and RCRA Wastes," EPA/625/6-89/022, EPA, Office of Research and Development, Cincinnati, OH.

U.S. Nuclear Regulatory Commission, January 1991, "Technical Position on Waste Form," prepared by Low-Level Waste Management Branch, NRC, Washington, D.C.

Weston, Inc., Roy F., 1986, "Site Characterization of the Waste Storage Areas, Part 1: Evaluation of the Current Situation, U.S. Department of Energy Feed Materials Production Center, Fernald, Ohio," Weston, Inc., Westchester, PA, prepared for Westinghouse Materials Company of Ohio, Cincinnati, OH.

Weston, Inc. Roy F., 1987, "Characterization Investigation Study Volume 2: Chemical and Radiological Analyses of the Waste Storage Pits," FMPC/56B008 prepared for the Feed Materials Production Center, Westinghouse Materials Company of Ohio, Cincinnati, OH.

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Document Modification (4 of 4):

Add attached Procedures for Radon Leach Tests to the end of Appendix C.

PROPOSED MEASUREMENT OF RADON LEACHING IN WATER

1.0 Objective, Application, and Use of the Resulting Data

This procedure proposes a method for determining the leachability of radon (Rn) from stabilized Operable Unit 1 waste into a water leachant. The objective of the test is to measure the rate radon will leach out of the treated material as required by U.S. EPA. The test will determine the activity of radon leached or emitted from the stabilized waste form by measuring the radon activity in the water leachate. The detection limit goal for Rn will be 300 pCi/L. See Federal Register 56, p. 33050 - 33127, July 18, 1991. The results will be presented in tabular form in the FS.

2.0 Procedure

2.1 Summary

2.1.1 A stabilized material of known mass and approximate geometric surface area will be leached in deionized water for 7 and 30 days. The leachant volume (cm^3) to specimen geometric surface area (cm^2) will be maintained greater than 10. The measured Rn in the leachate will be back calculated to the amount of Rn leached from the stabilized mass during the leaching period.

Measurement of radon will be by either liquid scintillation or radon emanation. If liquid scintillation is used, the procedures given in EPA Draft Method 913.0 will be used.

2.2 Interference

No known interferences

2.3 Sample Handling, Preservation, and Holding Time

2.3.1 Application of these procedures on hazardous waste samples must consider the known or suspected hazardous compounds present. Project-specific selection of work area, safe working practices, and personal protective equipment shall be made based upon exposure potential to the hazardous components.

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2.3.2 All applicable safety and compliance guidelines set forth by IT Corporation and by federal, state, and local regulations must be followed during performance of this procedure. All work

must be stopped if a known or potential compromise to the health or safety of any IT Analytical Services (ITAS) Associate, and must be reported immediately to a laboratory supervisor.

2.3.3 There are no preservation requirements applicable to this procedure.

2.4 Required Equipment

2.4.1 Demonstrated sealable Teflon or glass container of known volume.

2.4.2 Timer

2.4.3 Agitator

2.4.4 Polymeric net to suspend sample in leachant.

2.5 Operation

2.5.1 Remove plastic mold or crucible from stabilized waste.

2.5.2 Determine approximate surface area of stabilized waste.

2.5.3 Insert stabilized waste into polymeric net.

2.5.4 Insert waste and net assembly into container. The waste should not contact the bottom or sides of the container.

2.5.5 Add deionized water to the container. Enough water shall be added to exceed the 10 to 1 leachant volume to sample geometric surface area requirement and to minimize vapor space to the extent possible in the container.

2.5.6 Close container, note the date and time the container was sealed.

2.5.7 Place container in agitator. Agitate slowly.

2.5.8 Agitate during normal working hours for 7 and 30 days.

2.5.9 Rapidly remove enough leachate to conduct the liquid scintillation or radon emanation test.

2.5.10 Perform liquid scintillation or radon emanation test.

2.5.11 Calculate the Rn in the liquid scintillation sample, in the original leachate solution, and the amount of Rn leached or emitted during the leaching period.

2.6 Quality Control

2.6.1 The data will be inspected by the QC officer. Deviations from the established procedure will be noted in nonconformance memos.

3.0 Nonconformance and Corrective Action

3.1 Any failure to follow this procedure will be noted on a nonconformance memo. The corrective action will be verified by the quality control coordinator and approved by the appropriate operations manager.

4.0 Records Management

4.1 All data will be recorded in standard laboratory notebooks.