ATTACHMENT 1

LABORATORY QUALITY CONTROL CRITERIA AND CALIBRATION SPECIFICATIONS

Table E1-1. Practical Quantitation Limits for Radionuclides

Analytical Method[a]	Analyte	Soil PQL (pCi/g)
EPA 901.1	Actinum-228	0.39
	Bismuth-212	0.8
	Bismuth-214	0.22
	Cesium-137	0.13
	Cobalt-60	0.16
	Lead-212	0.22
	Lead-214	0.24
	Potassium-40	1.5
	Radium-224	2.6
	Radium-226	See note b
	Thallium-208	0.12
	Thorium-228	0.22 via Pb-212
	Thorium-234	1.4
	Uranium-235	0.69
NAS/DOE 3050/RP	Uranium-233/234	0.8
	Uranium-235/236	0.8
	Uranium-238	0.8
NAS/DOE 3004/RP	Thorium-230	0.4
	Thorium-232	0.3
	Thorium-228	0.4

Notes:
[a]*Prescribed Procedures for Measurement of Radioactivity in Drinking Water.* Environmental Monitoring and Support Laboratory, Cincinnati, OH. EPA-600/4-80-032, August, 1980.

DOE Methods for Evaluating Environmental and Waste Management Samples, National Academy of Sciences/ U.S. Department of Energy, October 1994.

[b]Radium-266 requires a 21 day in-growth and is reported through its daughter product Bismuth-214

Table E1-2. Quality Control for Laboratory Data Evaluation: Radiological Parameters

Analytical Method[a]	Spiking Compounds	Accuracy Percent Recovery (%)	Precision (RER)[b]
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate			
EPA 901.1	Actinum-228	NA	≤1.0
	Bismuth-212	NA	≤1.0
	Bismuth-214	NA	≤1.0
	Cesium-137	NA	≤1.0
	Cobalt-60	NA	≤1.0
	Lead-212	NA	≤1.0
	Lead-214	NA	≤1.0
	Potassium-40	NA	≤1.0
	Radium-224	NA	≤1.0
	Radium-226	NA	≤1.0
	Thallium-208	NA	≤1.0
	Thorium-228	NA	≤1.0
	Thorium-234	NA	≤1.0
	Uranium-235	NA	≤1.0
NAS/DOE 3050/RP	Uranium-234	NA	≤1.00
	Uranium-235/236	NA	≤1.00
	Uranium-238	NA	≤1.00
	Tracer:		
	Uranium-232	40-120%	NA
NAS/DOE 3004/RP	Thorium-230	NA	≤1.00
	Thorium-232	NA	≤1.00
	Tracer:		
	Thorium-229	40-120%	NA

Notes:
NA = not applicable
[a]U.S. Environmental Protection Agency
Prescribed Procedures for Measurement of Radioactivity in Drinking Water.
Environmental Monitoring and Support Laboratory, Cincinnati, OH. EPA-600/4-80-032, August, 1980.

DOE Methods for Evaluating Environmental and Waste Management Samples, National Academy of Sciences/U.S. Department of Energy October 1994.

RER = replicate error ratio (calculated between parent sample and matrix duplicate).

Table E1-3. Isotopic Uranium: Calibration Specification and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
NAS/DOE 3050/RP Alpha spectrometry	Uranium–234,- 235,-238	Pulser check	Daily	Control chart ± 3 sigma	Recount once, if not in control limits, place detector on hold for maintenance as necessary
		Method blank	1 per preparation batch (≤20 samples)	Result ≤ Reporting limit	Recount/reanalyze preparation blank and all associated samples or NCM and note in narrative, as appropriate
		Matrix spike	See chemical recovery below	60-140 percent (guidance limits)	If not in guidance limits, flag and note in narrative
		Matrix Duplicate	1 per preparation batch (≤20 samples)	RPD ≤ 40 percent RER ≤ 1.0 (for values >MDA)	Recount/reanalyze sample and duplicate, if not in control limits, reanalyze batch or flag and note in narrative, as appropriate
		LCS	1 per preparation batch (≤20 samples)	63-128 percent	Recount LCS, and if fails second time, reanalyze LCS and all associated samples or NCM and note in narrative, as appropriate
		Chemical Recovery	Every sample (uranium-232 tracer)	20-120 percent	Recount/reanalyze sample, if not in control limits, flag and note in narrative

Notes:
LCS = laboratory control sample
MDA = minimum detectable activity
RER = relative error ratio
RPD = relative percent difference

Table E1-4. Isotopic Thorium: Calibration Specification and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
NAS/DOE 3004/RP Alpha spectrometry	Thorium – 228, 230, 232	Pulser check	Daily	Control chart ± 3 sigma	Recount once, if not in control limits, place detector on hold for maintenance, as necessary
		Method blank	1 per preparation batch (≤20 samples)	Result ≤ Reporting limit	Recount/reanalyze preparation blank and all associated samples or NCM and note in narrative, as appropriate
		Matrix spike	See chemical recovery below	60-140 percent (guidance limits)	If not in guidance limits, flag and note in narrative
		Matrix Duplicate	1 per preparation batch (≤20 samples)	RPD ≤ 40 percent RER ≤ 1.0 (for values >MDA)	Recount/reanalyze sample and duplicate, if not in control limits, reanalyze batch or flag and note in narrative, as appropriate
		LCS	1 per preparation batch (≤20 samples)	64-145 percent	Recount LCS, and if fails second time, reanalyze LCS and all associated samples or NCM and note in narrative, as appropriate
		Chemical Recovery	Every sample (thorium-229 tracer)	20-120 percent	Recount/reanalyze sample, if not in control limits, flag and note in narrative

Notes;
LCS = laboratory control sample
MDA = minimum detectable activity
RER = relative error ratio
RPD = relative percent difference

Table E1-5. Gamma Spectrometry: Calibration Specification and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
EPA 901.1 Gamma spectrometry	Actinum-228	Instrument Calibration Check	Daily	Control chart ± 3 sigma	Recount once, if not in control limits place detector on hold for maintenance, as necessary
	Bismuth-212	Instrument Background Check	Daily	Control chart ± 3 sigma	Recount twice, if not in control limits place detector on hold for maintenance, as necessary
	Bismuth-214	Instrument blank	1 per preparation batch (≤20 samples)	Result ≤ Reporting limit	Reanalyze blank and all associated samples analyzed on that detector
	Cesium-137	Matrix Duplicate	1 per preparation batch (≤20 samples)	RPD ≤ 40 percent RER ≤ 1.0 (for values >MDA)	Recount duplicate and/or sample, if not in control limits, flag and note in narrative
	Cobalt-60	LCS	1 per preparation batch (≤20 samples)	85-115 percent plus counting error	Reanalyze LCS and all associated samples analyzed on that detector
	Lead-212				To be determined:
	Lead-214				To be determined:
	Potassium-40				To be determined:
	Radium-224				To be determined:
	Radium-226				To be determined:
	Thallium-208				To be determined:
	Thorium-228				To be determined:
	Thorium-234				To be determined:
	Uranium-235				To be determined:

Notes:
LCS = laboratory control sample
MDA = minimum detectable activity
RER = relative error ratio
RPD = relative percent difference

Table E1-6. Inductively Coupled Plasma Metals Analysis: Quality Control Criteria for Laboratory Data Evaluation

		Accuracy[a] Recovery (%)	Precision[b] (RPD %)
Analytical Method[(a)]	**Spiking Compounds**	**TCLP Extract**	**Water**
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate[b]			
Metals—SW-846 6010B	Arsenic	74-126	21
	Barium	74-126	21
	Cadmium	74-126	21
	Chromium	74-126	21
	Lead	74-126	21
	Mercury	74-126	21
	Selenium	74-126	21
	Silver	74-126	21
Laboratory Control Sample			
Metals—SW-846 6010B	Arsenic	84-116	NA
	Barium	84-116	NA
	Cadmium	84-116	NA
	Chromium	84-116	NA
	Lead	84-116	NA
	Mercury	84-116	NA
	Selenium	84-116	NA
	Silver	84-116	NA

Notes:
NA = not applicable
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996
[b]RPD calculated between parent sample and matrix duplicate.

Table E1-7. Inductively Coupled Plasma Metals Analysis: Calibration Specification and Corrective Action Procedures

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 6010B (Trace) Inductively Coupled Plasma	Metals	Initial calibration (1 point + blank minimum)	Daily prior to analysis	Correlation coefficient (r) >0.995	• Recalibrate
		Interference check standard (ICS)	Beginning and end of each analytical run	Results ± 20% of true value	• Terminate analysis • Recalibrate instrument • Reanalyze all samples back to last acceptable ICS
		Initial calibration verification (ICV); Independent source	After calibration, prior to sample analysis	Results <10% from true value with <5% RSD from replicate (minimum of two) integrations	• Reanalyze ICV • Recalibrate, if ICV still out
		Continuing calibration verification; independent source	Every 10 samples and end of analytical sequence	Results < 10% from expected concentration	• Reanalyze affected samples back to the last acceptable CCV
		Calibration blank - Initial calibration blank , Continuing calibration blank	After initial calibration verification, each subsequent calibration verification, and at the end of the run	<3x the Method detection limit	• Reanalyze blank • Clean system • Reanalyze all samples back to last acceptable blank
		Internal Standards)	Every standard, blank and sample	Within ± 30% of internal standards in ICB	• Dilute sample and reanalyze • Raise the concentration of the internal standards • Use a different internal standard
		Method blank	1 per preparation batch (≤20 samples)	< Practical quantitation limit (PQL)	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate
		Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within project acceptance criteria	• LCS recoveries must be within control limits • Reprep/reanalyze once if problem cannot be attributed to matrix interference • Narrate all outliers
		Matrix spike duplicate	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within project acceptance criteria	• Same as MS
		Dilution Test	1per new or unusual matrix	If the analyte concentration is at least a factor of 10 above the IDL after dilution, an analysis of a 1:5 dilution should agree within 10% of the original determination	• If dilution concentration is outside criteria, a chemical or physical interference should be suspected
		Laboratory Control Sample (LCS)	1 per preparation batch (≤20 samples)	% Recovery within project acceptance criteria	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers

Table nots:
RPD = relative percent difference
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

Table E1-8. Inductively Coupled Plasma Metals Analysis: Practical Quantitation Limits

Analysis	Analytical Method[a]	Analyte	PQL[b] (mg/L)	MCL (mg/L)
Metals	6010B	Arsenic	0.5	5.0
		Barium	0.1	100.0
		Cadmium	0.03	1.0
		Chromium	0.05	5.0
		Lead	0.3	5.0
		Mercury	0.002	0.2
		Selenium	0.5	1.0
		Silver	0.05	5.0

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).
[b]PQLs established by contract laboratories based on the results of annual method detection limit studies. PQL's are base on analyses being performed on TCLP extract (SW846-1311)
MCL = maximum contaminant level
mg/l = milligrams per liter
PQL = practical quantitation limit

Table E1-9. Mercury Analysis Calibration and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 7470A/7471A	Mercury	Initial multipoint calibration (3 point + blank minimum)	Daily, prior to analysis	Correlation coefficient (r) ≤0.995	• Recalibrate
		Initial calibration verification (ICV); mid-level standard	After calibration, prior to sample analysis	± 20% of true value	• Reanalyze ICV • Rerun initial calibration
		Continuing calibration verification (CCV); mid-level standard	Every 10 samples and at end of analytical sequence	± 20% of true value	• Reanalyze affected samples back to last acceptable CCV
		Calibration blank (ICB/CCB)	After calibration, and after each subsequent calibration verification	< Method detection limit (MDL)	• Reanalyze blank • Clean system if still out • Reanalyze affected samples back to last acceptable CCB
		Method blank	1 per preparation batch (≤20 samples)	< Practical quantitation limit (PQL)	• Reanalyze method blank. • If fails, analyze a calibration blank • Reprep/reanalyze analytical batch as appropriate
		Matrix spike (MS)	1 per preparation batch (≤20 samples)	% Recovery within project acceptance criteria	• If LCS recoveries are within acceptance criteria, matrix interference may be suspected • Reprep/reanalyze once if problem cannot be attributed to matrix • Narrate all outliers
		Matrix spike duplicate (MSD)	1 per preparation batch (≤20 samples)	% Recovery and/or RPD within project acceptance criteria	• Same as MS
		Laboratory control samples (LCS)	1 per preparation batch (≤20 samples)	% Recovery within project acceptance criteria	• Reanalyze LCS • Reprep/reanalyze LCS and affected samples • Narrate all outliers

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

MDL = method detection limit
RPD = relative percent difference

Table E1-10. Organochlorine Pesticides by Gas Chromatography Quality Control Criteria for Laboratory Data Evaluation

		Accuracy[b] (% Recovery)	Precision[c] (RPD %)
Method[a]	Spiking Compounds	TCLP extract	Water
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate[(c)]			
Pesticides	**Spike Compounds**		
SW-846 8081A	gamma-BHC (Lindane)	7-140	21
	Heptachlor	0.5-136	21
	Aldrin	0.5-133	21
	Dieldrin	39-117	21
	Endrin	15-119	21
	4,4'-DDT	51-132	21
	Surrogate Spike		
	DCB	59-162	NA
	TCMX	28-110	NA
Laboratory Control Sample			
Pesticides	**Spike Compounds**		
SW-846 8081A	gamma-BHC (Lindane)	42-129	NA
	Heptachlor	2-162	NA
	Aldrin	0.5-150	NA
	Dieldrin	54-115	NA
	Endrin	18-121	NA
	4,4'-DDT	55-133	NA
	Surrogate Spike		
	DCB	59-162	NA
	TCMX	28-110	NA

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III December 1996).
[b]U.S. Army Corps of Engineers Requirements for Contract Laboratory Validation (EM-200-1-1, July 1994).
[c]RPD calculated between parent sample and matrix duplicate.
NA = Not applicable

Table E1-11. Organochlorine Pesticides by Gas Chromatography Calibration Specification and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8081A Organochlorine Pesticides by Gas Chromatography	Organochlorine Pesticides	Column Evaluation Mix	Prior to analysis, both initial and daily	• Degradation of DDT and Endrin < 15%	• Evaluate the system • Repeat standard
		Initial calibration (5 point minimum) Lowest at or below PQL Mid level multi-component standards for pattern recognition and retention times	Prior to analysis and as required	• RSD < 20%, average CF may be used; linear calibration required	• Average RSD <20% across all analytes may be used if any analyte fails • Evaluate the system • Repeat initial calibration
		Initial calibration verification (ICV) Mid level standard Expected multi-component compounds	Prior to each 12 hour shift	• % Difference ≤15% of expected concentration compared to response from ICAL	• Average % difference ≤15% across all analytes may be used if any analyte fails • Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
		Continuing calibration verification (CCV) Mid level standard Expected multi-component compounds	After every 20 samples and at the end of the analytical sequence	• % Difference ≤15% of expected concentration compared to response from ICAL for each bracketing standard	• Average % difference ≤15% across all analytes may be used if any analyte fails • Evaluate system/standard • Reanalyze CCV and affected samples • For CCV with response > initial calibration response and % difference >15%, samples need not be reanalyzed if no target compounds are detected
		Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	• Retention times must be within retention time window established by the daily initial calibration standard • Every CCV and every sample	• Evaluate system/standard; pattern recognition may be sufficient for multi-component compounds only • Reanalyze CCV/affected samples

Table E1-11. Organochlorine Pesticides by Gas Chromatography Calibration Specification and Corrective Action Summary (concluded)

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8081 Organochlorine Pesticides by Gas Chromatography (con't)	Organochlorine Pesticides	Method Blank	1 per preparation batch (≤ 20 samples)	• <Practical Quantitation Limit (PQL)	• Reanalyze blank • Re-prep/reanalyze blank and associated samples
		Surrogate spike DCB and TCMX	Every sample, method blank, LCS and MS/MSD	• % Recovery within QC acceptance criteria (refer to Table E1-9) • one surrogate must fall within established control limits	• Re-extract/reanalyze once • If still out, report both sets of data • Narrate all outliers
		Matrix spike (MS)	1 per preparation batch (≤20 samples)	• % Recovery within QC acceptance criteria (refer to Table E1-9)	• Assess data (4 x rule) • If LCS and surrogate recoveries are within acceptance criteria, matrix interference maybe suspected • Re-extract/reanalyze once if matrix is not a factor • Narrate all outliers
		Matrix spike duplicate(MSD) or Matrix Duplicate (MD)	1 per preparation batch (≤20 samples)	• % Recovery and/or RPD within QC acceptance criteria (refer to Table E1-9)	• Same as MS
		Laboratory control sample (LCS)	1 per preparation batch (≤ 20 samples)	• % Recovery within QC acceptance criteria (refer to Table E1-9)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).
%RSD = Relative standard deviation
CF= =Calibration factor
QC = Quality control
RPD = relative percent difference

Table E1-12. Organochlorine Pesticides by Gas Chromatography: Practical Quantitation Limits

		Practical Quantitation Limits[a]	MCL
Analysis	Analyte[b]	Water[c] (µg/L)	mg/l
Organochlorine Pesticides			
	Gamma-BHC (Lindane)	0.2	0.4
	Chlordane (technical)	0.7	0.03
	Endrin	0.3	0.02
	Heptachlor	0.15	0.008
	Heptachlor epoxide	NA	0.008
	Methoxychlor	9	10.0
	Toxaphene	12	0.5

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).
[b]Additional analytes may be determined by this method; define in project-specific work plan.
[c]PQL's are base on analyses being performed on TCLP extract (SW846-1311)

Table E1-13. Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography Quality Control Criteria for Laboratory Data Evaluation

		Accuracy[b] (% Recovery)	Precision[b] RPD %)
Analytical Method[a]	Spiking Compounds	TCLP Leachate	TCLP Leachate
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate[c]			
Herbicides	**Spike Compounds**		
SW-846 8151A	2,4-D	63-159	21
	2,4,5-TP	33-155	21
	Surrogate Spike		
	DCAA	46-161	NA
Laboratory Control Sample			
Herbicides	**Spike Compounds**		
SW-846 8151A	2,4-D	68-140	NA
	2,4,5-TP	48-146	NA
	Surrogate Spike		
	DCAA	46-161	NA

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).
[b]U.S. Army Corps of Engineers (USACE) Requirements from Contract Laboratory Validation (EM-200-1-1, July 1994).
[c]RPD calculated between parent sample and matrix spike.
NA = Not applicable

Table E1-14. Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography Calibration Specifications and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8151A Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography	Organochlorine Herbicides and Pentachlorophenol	Initial calibration (5 point minimum) Lowest point at or below PQL	Prior to analysis and as required	• %RSD <20%, average CF may be used; linear calibration required	• Average RSD <20% across all analytes may be used if any analytes fail • Evaluate the system • Repeat initial calibration
		Initial calibration verification (ICV) second source Mid level standard	Prior to each daily analytical sequence	• % Difference ≤15% of expected concentration compared to response from ICAL	• Average %D ≤15% across all analytes may be used if any analytes fail • Evaluate system/standard • Reanalyze ICV standard • Repeat initial calibration
		Continuing calibration verification (CCV) Mid level standard	After every 20 samples and at the end of the analytical sequence	• % Difference ≤15% of expected concentration compared to response from ICAL for each bracketing standard	• Evaluate system/standard • Reanalyze CCV and all samples back to last acceptable CCV
		Retention time windows	Established with each new column installation Updated with each daily initial calibration standard	• Retention times must be within retention time window established by the daily initial calibration standard • Every CCV and every sample	• Evaluate system/standard; • Reanalyze CCV and affected samples
		Method blank	1 per preparation batch (≤20 samples)	• <Practical Quantitation Limit (PQL)	• Reanalyze blank • Re-prep/reanalyze blank and all associated samples

Table E1-14. Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography Calibration Specifications and Corrective Action Summary (concluded)

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8151A Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography (cont)	Organochlorine Herbicides and Pentachlorophenol	Surrogate spike DCAA	Every sample, method blank, LCS and MS/MSD	• % Recovery within project QC acceptance criteria (Refer to Table E1-12)	• Re-extract/reanalyze once • If still out, report both sets of data • Narrate all outliers
		Matrix spike (MS)	1 per preparation batch (≤20 samples)	• % Recovery within QC acceptance criteria (Refer to Table E1-12)	• Assess data (4x rule) • If LCS and surrogate recoveries are within acceptance criteria, matrix interference maybe suspected • Re-exact/reanalyze once if matrix is not a factor • Narrate all outliers
		Matrix spike duplicate (MSD) or Matrix duplicate (MD)	1 per preparation batch (≤20 samples)	• % Recovery and/or RPD within QC acceptance criteria (Refer to Table E1-12)	• Same as MS
		Laboratory control sample (LCS)	1 per preparation batch (≤20 samples)	• % Recovery within QC acceptance criteria (Refer to Table E1-12)	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).
%RSD = relative standard deviation
CF = calibration factor
QC = quality control

Table E1-15. Organochlorine Herbicides and Pentachlorophenol by Gas Chromatography Practical Quantitation Limits

Analysis	Analytical Method[a]	Analyte	PQL (µg/l)	MCL mg/l
Chlorinated Herbicides	SW-846 8151A	2,4-D	6	10.0
		2,4,5-TP (Silvex)	.85	1.0

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

Table E1-16. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry Calibration Specifications and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846, 8260B Volatile Organic Compounds By Gas Chromatography/Mass Spectrometry (GC/MS)	Halogenated and Aromatic Volatile Organic Compounds	Tune instrument with a 4-bromofluorobenzene standard (BFB)	Every 12 hours	Must meet key ions and ion abundance criteria established by method (refer to Table E1-18)	• Retune instrument • Repeat standard analysis
		Initial multi-point calibration; 5 point minimum. Lowest point at or below PQL. Includes calibration check compounds (CCC) and system performance check compounds (SPCC), and Internal Standards Compounds (IS).	Prior to analysis, and as required	RSD< 30 % for CCC; Average RF ≥ 0.1 for SPCC (≥0.3 for chlorobenzene, 1,1,2,2-Tetrachloroethane) If % RSD < 15% average RF may be used; linear calibration required	• Evaluate system • Repeat calibration
		Continuing calibration verification (CCV): CCC, SPCC, and IS	Every 12 hours	Percent difference <20% for CCC; RF ≥0.1 for SPCC (≥0.3 for chlorobenzene and 1,1,2,2-Tetrachloroethane).	• Evaluate system/standard • Reanalyze calibration check standard • Repeat initial calibration
		Method blank	1 per preparation batch (≤20 samples)	< Method detection limit (MDL)	• Reanalyze method blank • Recalibrate
		Internal standards (method recommends fluorobenzene, chlorobenzene-d5, 1,4-dichlorobenzene-d4, dibromofluoromethane)	Every sample, method blank, LCS, and MS/MSD	Retention time for each internal standard must be within 30 seconds of most recent CCV and the EICP area for all internal standards must be within -50% to +100% of the most recent CCV	• Evaluate system/standard • Reanalyze samples • If still out, report both sets of data • Narrate all outliers

Table E1-16. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry Calibration Specifications and Corrective Action Summary (concluded)

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846, 8260B Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)		Surrogate spike	Every sample, method blank, LCS, MS/MSD	No more than one surrogate outside QC acceptance criteria. No surrogate below 10% recovery.	• Reanalyze sample once • Re-extract and reanalyze if >1 surrogate outside QC acceptance limits • If still out, report both sets of data • Narrate all outliers
	Halogenated and Aromatic Volatile Organic Compounds	Matrix spike (MS)	1 per preparation batch (≤20 samples) using project-specific sample	Percent recovery within QC acceptance criteria (refer to Table E1-16)	• If LCS and surrogate recoveries are within acceptance criteria, matrix interference may be suspected • Reprep/reanalyze once if matrix is not a factor • If still out, report both sets of data • Narrate all outliers
		Matrix spike duplicate (MSD)	1 per preparation batch (≤20 samples) using project-specific samples	% Recovery and RPD within QC acceptance criteria (refer to Table E1-16)	• Same as MS
		Laboratory control sample (LCS)	1 per preparation batch (≤20 samples)	% Recovery within QC acceptance criteria (refer to Table E1-16)	• Reanalyze LCS • Reprep/reanalyze LCS and all associated samples • Narrate all outliers

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).
EICP = Extracted ion current profile
QC = Quality control
RF = Response factor
RPD = Relative percent difference
RSD = Relative Standard Deviation

Table E1-17. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry
Quality Control Criteria for Laboratory Data Evaluation

		Control Limits	
		Accuracy Recovery (%)	Precision (RPD %)
Analytical Method[a]	Spiking Compounds	TCLP Extract	TCLP Extract
Matrix Spike/Matrix Spike Duplicate Samples			
SW-846 8260B	Spiking Compounds		
	1,1-Dichloroethene	59-146	21
	Trichloroethene	70-121	21
	Chlorobenzene	74-131	21
	Toluene	NA	21
	Benzene	75-128	21
	Surrogate Spikes		
	1,2-Dichloroethane-d4	84-136	NA
	Toluene-d8	83-112	NA
	4-Bromofluorobenzene	80-111	NA
Laboratory Control Samples			
SW-846 8260B	Spiking Compounds		
	1,1-Dichloroethene	59-146	NA
	Trichloroethene	70-121	NA
	Chlorobenzene	74-131	NA
	Toluene	NA	NA
	Benzene	75-128	NA
	Surrogate Spikes		
	1,2-Dichloroethane-d4	84-136	NA
	Toluene-d8	83-112	NA
	Bromofluorobenzene	80-111	NA

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

Table E1-18. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry Practical Quantitation Limits

Parameter/ Analytical Method[a]	Analyte	TCLP Extract MDL (µg/l)	TCLP Extract PQL (µg/l)	MCL (mg/l)
Volatile Organic Compounds SW-846 8260B				
	Benzene	1.15	5	0.5
	2-Butanone	9.51	50	200
	Carbon tetrachloride	0.96	5	0.5
	Chlorobenzene	0.72	5	100
	Chloroform	0.83	5	5.0
	1,4-Dichlorobenzene	0.55	5	7.5
	1,2-Dichloroethane	0.91	5	0.5
	1,1 Dichloroethene	1.03	5	0.7
	Hexachlorobutadiene	NA	5	0.5
	Tetrachloroethene	0.91	5	0.7
	Trichloroethene	0.64	5	0.5
	Vinyl chloride	1.15	10	0.2

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA,August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

Table E1-19. Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry 4-Bromofluorobenzene (BFB) Mass Intensity Criteria

Mass	Required Intensity (relative abundance)
50	15 to 40% of mass 95
75	30 to 60% of mass 95
95	Base peak, 100% relative abundance
96	5 to 9% of mass 95
173	Less than 2% of mass 174
174	Greater than 50% of mass 95
175	5 to 9% of mass 174
176	Greater than 95%, but less than 101% of mass 174
177	5 to 9% of mass 176

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA,August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

Table E1-20. Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry Quality Control Criteria for Laboratory Data Evaluation

		Control Limits	
		Accuracy Recovery (%)	Precision (RPD %)
Analytical Method[a]	Spiking Compounds	TCLP Extract	TCLP Extract
Matrix Spike/Matrix Spike Duplicate Samples			
SW-846 8270C	Spiking Compounds		
	1,4-Dichlorobenzene	9-126	21
	2,4,5-Trichlorophenol	9-126	21
	2,4,6-Trichlorophenol	9-126	21
	2,4-Dinitrotoluene	9-126	21
	2-Methylphenol	9-126	21
	3 & 4-Methylphenol	9-126	21
	Hexachlorobenzene	9-126	21
	Hexachlorobutadiene	9-126	21
	Hexachloroethane	9-126	21
	Nitrobenzene	9-126	21
	Pentachlorophenol	9-126	21
	Pyridine	9-126	21
	1,4-Dichlorobenzene-d4	50-201	21
	Acenaphthene-d10	50-201	21
	Chrysene-d12	50-201	21
	Naphthalene-d8	50-201	21
	Phenanthrene-d10	50-201	21
	2,4,6-Tribromophenol	9-124	21
	2-Fluorobiphenyl	42-117	21
	2-Fluorophenol	20-111	21
	4-Terphenyl-d14	32-142	21
	Nitrobenzene-d5	33-115	21
	Phenol-d6	9-111	21
Laboratory Control Samples			
SW-846 8270C	1,4-Dichlorobenzene	9-126	NA
	2,4,5-Trichlorophenol	9-126	NA
	2,4,6-Trichlorophenol	9-126	NA
	2,4-Dinitrotoluene	9-126	NA
	2-Methylphenol	9-126	NA
	3 & 4-Methylphenol	9-126	NA
	Hexachlorobenzene	9-126	NA
	Hexachlorobutadiene	9-126	NA
	Hexachloroethane	9-126	NA
	Nitrobenzene	9-126	NA
	Pentachlorophenol	9-126	NA
	Pyridine	9-126	NA
	1,4-Dichlorobenzene-d4	50-201	NA
	Acenaphthene-d10	50-201	NA
	Chrysene-d12	50-201	NA
	Naphthalene-d8	50-201	NA
	Phenanthrene-d10	50-201	NA
	2,4,6-Tribromophenol	9-124	NA
	2-Fluorobiphenyl	42-117	NA
	2-Fluorophenol	20-111	NA
	4-Terphenyl-d14	32-142	NA
	Nitrobenzene-d5	33-115	NA
	Phenol-d6	9-111	NA

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA,August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

Table E1-21. Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry Calibration Specifications and Corrective Action Summary

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8270C Semi-Volatiles by GC/MS	Semi-Volatiles	Tune the instrument using a deca-fluorotriphenylphosiné (DFTPP) standard	Every 12 hours	Must meet the ion abundance criteria specified in the method Degradation of DDT < 20% Benzidine and PCP present at normal response without excessive tailing	• Retune instrument • Repeat standard analysis • Perform injection port, column maintenance as necessary
		Initial calibration (5 point minimum); includes Calibration Check Compounds (CCC), System Performance Calibration Check (SPCC), and Internal Standard Compounds (IS)	Prior to analysis and as required	% RSD for CCC <30% average RF >0.05 for SPCC If % RSD <15 % average RF may be used; linear calibration required	• Evaluate the system • Repeat calibration
		Continuing calibration verification (CCV); includes CCC, SPCC, and IS	Every 12 hours	CCV Percent difference for CCC <20% RF >0.05 for SPCC	• Evaluate system/standard • Reanalyze calibration check standard • Repeat the initial calibration as necessary
		Method blank	1 per preparation batch (≤20 samples)	<Method detection limit (MDL)	• Reanalyze blank • Reprep/reanalyze blank and all associated samples
		Internal Standard (method recommends 1,4-dichlorobenzene-d4, naphthalene-d8, acenaphthene-d10, phenanthrene-d10, chrysene-d12, and perylene-d12)	Every sample, method blank, LCS and MS/MSD	The EICP area for all internal standards must be within -50% and +100% of most recent CCV Retention time for each internal standard must be within 30 seconds of most recent CCV	• Evaluate system/standard • Reanalyze the sample • If still out, report both sets of data

Table E1-21. Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry Calibration Specifications and Corrective Action Summary (concluded)

Analytical Method[a]	Parameter	QC Element	Frequency	Acceptance Criteria	Corrective Action
SW-846 8270C Semi-Volatiles by GC/MS (con't)	Semi-Volatiles	Surrogate spike	Every sample, method blank, LCS and MS/MSD	No more than one surrogate per fraction outside of acceptance criteria (Refer to Table E1-19) No surrogate below 10% recovery	• Reanalyze sample once • Re-extract and reanalyze if >1 surrogate per fraction outside acceptance limits • Narrate all outliers
		Matrix spike (MS)	1 per preparation batch (≤20 samples) using project-specific samples	% Recovery within QC acceptance criteria (Refer to Table E1-19)	• If LCS recoveries and surrogates are within control limits, matrix interference may be suspected • Reprep/reanalyze once if matrix is not a factor • If still out, report both sets of data • Narrate all outliers
		Matrix spike duplicate (MSD)	1 per preparation batch (≤20 samples) using project-specific samples	% Recovery and RPD within QC acceptance criteria (Refer to Table E1-19)	• Same as MS
		Laboratory control sample	1 per preparation batch (≤20 samples)	% Recovery within project QC acceptance criteria for all spiked analytes	• Reanalyze LCS • Re-prep/reanalyze LCS and all associated samples • Narrate all outliers

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).
EICP = Extracted ion current profile
QC = Quality control
RF = Response factor
RSD = Relative standard deviation

Table E1-22. Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry Practical Quantitation Limits

Parameter/ Analytical Method[a]	Analyte	Water MDL[(d)] (µg/l)	Water PQL (µg/l)	MCL (µg/l)
Semivolatile Organic Compounds				
SW-846 8270C	o-Cresol	1.23	50	200,000
	p+m-Cresol	1.27	50	200,000
	p-Cresol	NA	NA	200,000
	2,4-Dinitrotoluene	1.48	50	130
	Hexachloroethane	0.78	50	3,000
	Hexachlorobutadiene	0.57	50	500
	Nitrobezene	1.43	50	2,000
	Pentachlorophenol	1.23	250	100,000
	Pyridine	0.76	50	5,000
	2,4,5-Trichlorophenol	2.05	250	400,000
	2,4,6-Trichlorophenol	1.85	50	2,000

Notes:
[a]EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992;
Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

APPENDIX F
TITLE 10 *CODE OF FEDERAL REGULATIONS* § 40.42

[Code of Federal Regulations]
[Title 10, Volume 1]
[Revised as of January 1, 2001]
From the U.S. Government Printing Office via GPO Access
[CITE: 10CFR40.42]

[Page 637-640]

TITLE 10--ENERGY

CHAPTER I--NUCLEAR REGULATORY COMMISSION

PART 40--DOMESTIC LICENSING OF SOURCE MATERIAL--Table of Contents

Sec. 40.42 Expiration and termination of licenses and decommissioning of sites and separate buil

(a)(1) Except as provided in paragraph (a)(2) of this section, each specific license expires at the end of the day on the expiration date stated in the license unless the licensee has filed an application for renewal under Sec. 40.43 not less than 30 days before the expiration date stated in the existing license (or, for those licenses subject to paragraph (a)(2) of this section, 30 days before the deemed expiration date in that paragraph). If an application for renewal has been filed at least 30 days before the expiration date stated in the existing license (or, for those licenses subject to paragraph (a)(2) of this section, 30 days before the deemed expiration date in that paragraph), the existing license expires at the end of the day on which the Commission makes a final determination to deny the renewal application or, if the determination states an expiration date, the expiration date stated in the determination.

(2) Each specific license that has an expiration date after July 1, 1995, and is not one of the licenses described in paragraph (a)(3) of this section, shall be deemed to have an expiration date that is five years after the expiration date stated in the current license.

(3) The following specific licenses are not subject to, or otherwise affected by, the provisions of paragraph (a)(2) of this section:

(i) Specific licenses for which, on February 15, 1996, an evaluation or an emergency plan is required in accordance with Sec. 40.31(j);

(ii) Specific licenses whose holders are subject to the financial assurance requirements specified in 10 CFR 40.36, and on February 15, 1996, the holders either:

(A) Have not submitted a decommissioning funding plan nor certification of financial assurance for decommissioning; or

(B) Have not received written notice that the decommissioning funding plan or certification of financial assurance for decommissioning is acceptable;

(iii) Specific licenses whose holders are listed in the SDMP List published in NUREG 1444, Supplement 1 (November 1995);

(iv) Specific licenses whose issuance, amendment, or renewal, as of February 15, 1996, is not a categorical exclusion under 10 CFR 51.22(c)(14) and, therefore, need an environmental assessment or environmental impact statement pursuant to subpart A of part 51 of this chapter;

(v) Specific licenses whose holders have not had at least one NRC inspection of licensed activities before February 15, 1996;

(vi) Specific licenses whose holders, as the result of the most recent NRC inspection of licensed activities conducted before February 15, 1996, have been:

(A) Cited for a Severity Level I, II, or III violation in a Notice of Violation;

(B) Subject to an Order issued by the NRC; or

(C) Subject to a CAL issued by the NRC.

(vii) Specific licenses with expiration dates before July 1, 1995, for which the holders have submitted applications for renewal under 10 CFR 40.43 of this part.

(b) Each specific license revoked by the Commission expires at the end of

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the day on the date of the Commission's final determination to revoke the license, or on the expiration date stated in the determination, or as otherwise provided by Commission Order.

(c) Each specific license continues in effect, beyond the expiration date if necessary, with respect to possession of source material until the Commission notifies the licensee in writing that the license is terminated. During this time, the licensee shall--

(1) Limit actions involving source material to those related to decommissioning; and

(2) Continue to control entry to restricted areas until they are suitable for release in accordance with NRC requirements;

(d) Within 60 days of the occurrence of any of the following, consistent with the administrative directions in Sec. 40.5, each licensee shall provide notification to the NRC in writing and either begin decommissioning its site, or any separate building or outdoor area that contains residual radioactivity, so that the building or outdoor area is suitable for release in accordance with NRC requirements, or submit within 12 months of notification a decommissioning plan, if required by paragraph (g)(1) of this section, and begin decommissioning upon approval of that plan if--

(1) The license has expired pursuant to paragraph (a) or (b) of this section; or

(2) The licensee has decided to permanently cease principal activities, as defined in this part, at the entire site or in any separate building or outdoor area; or

(3) No principal activities under the license have been conducted for a period of 24 months; or

(4) No principal activities have been conducted for a period of 24 months in any separate building or outdoor area that contains residual radioactivity such that the building or outdoor area is unsuitable for release in accordance with NRC requirements.

(e) Coincident with the notification required by paragraph (d) of this section, the licensee shall maintain in effect all decommissioning financial assurances established by the licensee pursuant to Sec. 40.36 in conjunction with a license issuance or renewal or as required by this section. The amount of the financial assurance must be increased, or may be decreased, as appropriate, to cover the detailed cost estimate for decommissioning established pursuant to paragraph (g)(4)(v) of this section.

(1) Any licensee who has not provided financial assurance to cover the detailed cost estimate submitted with the decommissioning plan shall do so when this rule becomes effective November 24, 1995.

(2) Following approval of the decommissioning plan, a licensee may reduce the amount of the financial assurance as decommissioning proceeds and radiological contamination is reduced at the site with the approval of the Commission.

(f) The Commission may grant a request to delay or postpone initiation of the decommissioning process if the Commission determines that such relief is not detrimental to the public health and safety and is otherwise in the public interest. The request must be submitted no

later than 30 days before notification pursuant to paragraph (d) of this section. The schedule for decommissioning set forth in paragraph (d) of this section may not commence until the Commission has made a determination on the request.

(g)(1) A decommissioning plan must be submitted if required by license condition or if the procedures and activities necessary to carry out decommissioning of the site or separate building or outdoor area have not been previously approved by the Commission and these procedures could increase potential health and safety impacts to workers or to the public, such as in any of the following cases:

(i) Procedures would involve techniques not applied routinely during cleanup or maintenance operations;

(ii) Workers would be entering areas not normally occupied where surface contamination and radiation levels are significantly higher than routinely encountered during operation;

(iii) Procedures could result in significantly greater airborne concentrations of radioactive materials than are present during operation; or

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(iv) Procedures could result in significantly greater releases of radioactive material to the environment than those associated with operation.

(2) The Commission may approve an alternate schedule for submittal of a decommissioning plan required pursuant to paragraph (d) of this section if the Commission determines that the alternative schedule is necessary to the effective conduct of decommissioning operations and presents no undue risk from radiation to the public health and safety and is otherwise in the public interest.

(3) The procedures listed in paragraph (g)(1) of this section may not be carried out prior to approval of the decommissioning plan.

(4) The proposed decommissioning plan for the site or separate building or outdoor area must include:

(i) A description of the conditions of the site or separate building or outdoor area sufficient to evaluate the acceptability of the plan;

(ii) A description of planned decommissioning activities;

(iii) A description of methods used to ensure protection of workers and the environment against radiation hazards during decommissioning;

(iv) A description of the planned final radiation survey; and

(v) An updated detailed cost estimate for decommissioning, comparison of that estimate with present funds set aside for decommissioning, and a plan for assuring the availability of adequate funds for completion of decommissioning.

(vi) For decommissioning plans calling for completion of decommissioning later than 24 months after plan approval, a justification for the delay based on the criteria in paragraph (i) of this section.

(5) The proposed decommissioning plan will be approved by the Commission if the information therein demonstrates that the decommissioning will be completed as soon as practicable and that the health and safety of workers and the public will be adequately protected.

(h)(1) Except as provided in paragraph (i) of this section, licensees shall complete decommissioning of the site or separate building or outdoor area as soon as practicable but no later than 24 months following the initiation of decommissioning.

(2) Except as provided in paragraph (i) of this section, when decommissioning involves the entire site, the licensee shall request license termination as soon as practicable but no later than 24 months

following the initiation of decommissioning.

(i) The Commission may approve a request for an alternate schedule for completion of decommissioning of the site or separate building or outdoor area, and license termination if appropriate, if the Commission determines that the alternative is warranted by consideration of the following:

(1) Whether it is technically feasible to complete decommissioning within the allotted 24-month period;

(2) Whether sufficient waste disposal capacity is available to allow completion of decommissioning within the allotted 24-month period;

(3) Whether a significant volume reduction in wastes requiring disposal will be achieved by allowing short-lived radionuclides to decay;

(4) Whether a significant reduction in radiation exposure to workers can be achieved by allowing short-lived radionuclides to decay; and

(5) Other site-specific factors which the Commission may consider appropriate on a case-by-case basis, such as the regulatory requirements of other government agencies, lawsuits, ground-water treatment activities, monitored natural ground-water restoration, actions that could result in more environmental harm than deferred cleanup, and other factors beyond the control of the licensee.

(j) As the final step in decommissioning, the licensee shall--

(1) Certify the disposition of all licensed material, including accumulated wastes, by submitting a completed NRC Form 314 or equivalent information; and

(2) Conduct a radiation survey of the premises where the licensed activities were carried out and submit a report of the results of this survey, unless the licensee demonstrates in some other manner that the premises are suitable for release in accordance with the criteria for decommissioning in 10 CFR

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part 20, subpart E. The licensee shall, as appropriate--

(i) Report levels of gamma radiation in units of millisieverts (microroentgen) per hour at one meter from surfaces, and report levels of radioactivity, including alpha and beta, in units of megabecquerels (disintegrations per minute or microcuries) per 100 square centimeters removable and fixed for surfaces, megabecquerels (microcuries) per milliliter for water, and becquerels (picocuries) per gram for solids such as soils or concrete; and

(ii) Specify the survey instrument(s) used and certify that each instrument is properly calibrated and tested.

(k) Specific licenses, including expired licenses, will be terminated by written notice to the licensee when the Commission determines that:

(1) Source material has been properly disposed;

(2) Reasonable effort has been made to eliminate residual radioactive contamination, if present; and

(3)(i) A radiation survey has been performed which demonstrates that the premises are suitable for release in accordance with the criteria for decommissioning in 10 CFR part 20, subpart E; or

(ii) Other information submitted by the licensee is sufficient to demonstrate that the premises are suitable for release in accordance with the criteria for decommissioning in 10 CFR part 20, subpart E.

(4) Records required by Sec. 40.61 (d) and (f) have been received.

(l) Specific licenses for uranium and thorium milling are exempt from paragraphs (d)(4), (f) and (g) of this section with respect to reclamation of tailings impoundments and/or waste disposal areas.

[59 FR 36035, July 15, 1994, as amended at 60 FR 38239, July 26, 1995; 61 FR 1114, Jan. 16, 1996; 61 FR 24674, May 16, 1996; 61 FR 29637, June 12, 1996; 62 FR 39090, July 21, 1997]

APPENDIX G
2000/2001 STATIC AND SCANNING GAMMA RADIATION MEASUREMENTS

Scanning Gamma Radiation Counts for Reference Area - Obtained 04/17/01

Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate
415673.57	1458487.07	11164	415835.41	1458408.72	11495	415677.42	1458433.39	12854	415819.99	1458419.65	12377	415690.12	1458457.07	11975	415804.43	1458390.99	13039
415673.80	1458486.89	11906	415836.03	1458403.20	11406	415676.95	1458439.05	12221	415819.85	1458414.35	11914	415689.95	1458457.23	12172	415805.86	1458388.60	12575
415675.70	1458486.63	12138	415836.18	1458397.52	11133	415677.12	1458447.45	12013	415819.74	1458412.92	12015	415689.92	1458457.28	11111	415807.44	1458385.43	12282
415678.43	1458486.69	11809	415836.56	1458392.55	11228	415676.96	1458452.27	12307	415819.73	1458412.60	12444	415690.12	1458457.10	12710	415808.47	1458383.02	12786
415681.26	1458486.83	11732	415836.77	1458385.43	11415	415676.90	1458456.50	12206	415819.78	1458409.47	11886	415693.92	1458456.71	12905	415807.45	1458381.98	12799
415681.90	1458486.93	12379	415837.39	1458378.98	11361	415676.26	1458463.85	12220	415820.24	1458403.84	11993	415699.14	1458456.26	12482	415807.55	1458382.06	12088
415682.53	1458487.02	12251	415838.00	1458372.79	11516	415676.11	1458467.85	11947	415820.57	1458398.40	11509	415705.35	1458455.86	11747	415805.88	1458381.98	12577
415686.36	1458486.79	11176	415838.61	1458366.44	11843	415675.68	1458472.89	12044	415821.37	1458391.22	11070	415710.74	1458455.17	13354	415800.95	1458382.37	12013
415690.00	1458486.50	11378	415839.10	1458361.25	12221	415675.81	1458477.33	11751	415821.82	1458385.26	10983	415711.54	1458454.99	12878	415796.04	1458382.20	12118
415694.16	1458486.96	11968	415839.15	1458355.89	12166	415675.07	1458478.62	11733	415821.89	1458379.93	10924	415711.52	1458455.16	12447	415790.22	1458382.26	12811
415698.92	1458487.14	12686	415837.92	1458352.81	12918	415676.15	1458477.52	11027	415822.36	1458373.83	11371	415715.41	1458454.53	11406	415787.62	1458382.54	13334
415703.02	1458486.63	12931	415833.81	1458352.58	11957	415677.65	1458477.67	11775	415823.21	1458369.14	12991	415720.29	1458454.23	12882	415782.61	1458382.67	13500
415707.49	1458486.92	12237	415828.60	1458352.66	12625	415681.56	1458473.70	12396	415822.40	1458368.12	13080	415726.19	1458453.88	12037	415777.66	1458382.67	12935
415710.89	1458486.81	12791	415823.99	1458352.20	12874	415682.28	1458472.44	12842	415821.54	1458368.26	13027	415730.41	1458454.34	12931	415771.53	1458382.21	12433
415714.80	1458486.62	12116	415819.96	1458352.40	12848	415682.17	1458471.90	13772	415820.42	1458368.46	13156	415737.06	1458454.42	12027	415763.77	1458382.54	12981
415718.91	1458486.44	11864	415813.16	1458352.58	12544	415682.20	1458471.98	12720	415815.79	1458368.52	12634	415741.35	1458454.83	11816	415758.94	1458382.77	12293
415724.21	1458486.09	11866	415808.39	1458352.56	12134	415682.80	1458471.83	12273	415810.52	1458368.36	13368	415747.49	1458455.09	12295	415753.99	1458382.48	12372
415728.43	1458486.06	12862	415803.18	1458352.43	11473	415686.55	1458471.36	12247	415804.77	1458368.84	12998	415753.42	1458455.14	11425	415749.37	1458382.32	12058
415732.24	1458485.77	11961	415799.10	1458352.29	12447	415691.51	1458471.44	12945	415798.88	1458368.75	13606	415757.81	1458455.26	12891	415745.17	1458381.98	13627
415737.03	1458485.77	11698	415793.15	1458352.69	11911	415696.79	1458470.99	13015	415794.43	1458369.10	13772	415764.24	1458454.70	12760	415740.70	1458381.28	12497
415742.02	1458485.17	11697	415787.87	1458352.97	12200	415700.97	1458470.78	11539	415788.38	1458368.78	14166	415768.64	1458455.14	12553	415734.06	1458381.69	12236
1.00	1458484.52	12068	415784.31	1458352.35	12462	415706.32	1458470.83	11658	415782.32	1458369.25	13723	415774.99	1458455.42	12800	415728.97	1458381.12	12494
415751.78	1458485.13	11904	415780.12	1458351.81	12453	415712.60	1458470.85	12094	415775.88	1458368.81	12431	415782.16	1458455.08	12529	415723.00	1458380.74	11953
415757.51	1458485.17	11112	415775.42	1458351.55	12248	415717.72	1458470.69	12033	415769.92	1458369.21	12729	415786.88	1458455.98	12658	415717.36	1458380.38	12936
415762.48	1458484.92	12363	415768.14	1458351.46	12244	415723.90	1458470.90	12220	415765.35	1458369.32	13136	415791.19	1458456.53	12386	415712.40	1458380.02	13189
415768.39	1458485.43	11960	415761.34	1458351.94	11503	415728.67	1458470.93	11351	415757.41	1458369.09	13096	415797.37	1458456.91	12077	415705.30	1458378.93	12289
415775.87	1458485.16	11541	415754.99	1458351.37	12715	415732.94	1458470.51	11781	415751.81	1458368.87	12234	415800.75	1458457.26	11913	415705.68	1458379.94	12346
415779.80	1458485.53	11094	415749.46	1458351.75	12887	415740.28	1458470.78	11242	415746.83	1458369.18	12845	415800.96	1458456.74	11670	415706.68	1458380.84	12577
415784.72	1458485.18	10902	415744.33	1458351.78	12434	415745.74	1458471.31	11419	415741.90	1458368.44	13294	415800.93	1458454.65	12305	415706.94	1458381.24	11844
415790.63	1458485.45	11539	415738.47	1458351.59	12081	415751.13	1458471.53	12261	415736.73	1458368.52	12688	415801.30	1458454.43	12285	415707.30	1458384.48	12535
415794.44	1458485.35	11505	415733.80	1458351.80	13308	415757.39	1458471.37	12658	415730.95	1458368.53	12323	415800.79	1458455.58	12547	415707.26	1458389.56	12651
415801.62	1458485.29	11202	415726.27	1458351.71	13539	415761.82	1458471.45	12712	415726.34	1458368.23	12457	415801.14	1458455.31	12136	415707.46	1458396.74	12065
415808.36	1458485.16	11828	415721.47	1458351.90	12465	415768.58	1458471.54	12052	415720.97	1458367.95	13044	415801.80	1458454.87	11839	415706.67	1458401.81	11324
415813.62	1458485.35	11877	415716.40	1458351.79	11910	415773.78	1458471.25	11860	415715.16	1458367.51	12225	415801.56	1458453.73	11844	415706.57	1458408.57	12212
415817.76	1458485.69	12157	415710.80	1458351.41	12531	415779.46	1458471.49	11988	415707.68	1458367.32	12788	415801.78	1458453.83	11857	415705.86	1458414.80	12563
415820.63	1458485.85	11621	415704.82	1458350.50	12315	415784.89	1458471.59	11430	415702.97	1458366.84	12697	415802.15	1458453.60	11678	415705.18	1458419.17	12748
415823.23	1458486.05	10809	415699.85	1458350.55	11854	415788.91	1458471.92	11251	415697.81	1458366.21	12402	415801.49	1458452.89	12142	415704.96	1458424.50	12837
415827.50	1458486.10	11115	415695.81	1458350.50	12204	415797.48	1458471.93	11713	415693.54	1458365.51	12451	415800.59	1458448.59	12935	415704.28	1458431.17	12162
415831.93	1458485.93	11144	415689.52	1458350.31	13311	415802.44	1458472.09	12255	415693.57	1458365.97	13293	415800.39	1458445.92	11813	415704.09	1458436.29	12426
415833.48	1458484.63	11524	415685.21	1458350.04	12579	415806.85	1458472.52	11793	415693.61	1458368.84	13214	415801.16	1458441.67	11279	415704.95	1458439.24	12083
415833.55	1458484.33	11074	415680.11	1458351.02	12524	415810.64	1458472.35	11748	415693.72	1458375.49	12735	415801.02	1458441.61	12996	415705.20	1458438.88	12076
415833.59	1458482.15	12324	415679.64	1458353.09	13213	415815.64	1458473.52	11217	415693.40	1458381.69	11965	415803.71	1458444.71	12436	415712.84	1458441.88	11932
415833.96	1458477.20	11432	415679.22	1458356.12	12325	415818.90	1458473.38	11622	415693.64	1458387.04	11813	415804.85	1458445.49	12737	415715.88	1458438.41	11542
415834.13	1458472.38	11577	415678.61	1458358.39	13291	415818.05	1458471.98	11810	415693.23	1458392.69	11975	415805.52	1458442.36	12399	415720.31	1458438.28	12150
415834.07	1458468.69	11646	415678.29	1458365.68	12251	415817.80	1458471.73	12140	415692.62	1458398.52	12388	415806.09	1458435.64	12032	415724.50	1458438.68	12025
415834.59	1458464.03	11233	415677.96	1458370.83	12921	415817.48	1458468.76	12333	415692.13	1458405.11	12368	415806.22	1458429.61	12333	415730.84	1458438.41	12105
415834.82	1458460.13	11634	415677.61	1458377.15	12746	415818.19	1458465.31	12098	415692.11	1458410.75	13758	415806.70	1458424.79	12522	415736.97	1458438.10	12310
415834.82	1458453.60	12478	415677.89	1458383.57	12520	415818.50	1458461.19	12256	415691.91	1458418.18	13679	415806.69	1458418.95	11251	415740.90	1458438.01	11660
415834.49	1458449.50	12285	415677.40	1458389.88	13548	415818.59	1458456.73	11539	415691.31	1458423.50	12902	415806.47	1458412.84	11539	415744.77	1458437.90	11006
415834.88	1458443.13	12041	415677.33	1458395.81	13167	415819.03	1458452.30	12467	415691.13	1458427.76	12705	415806.19	1458411.41	11927	415746.71	1458438.61	12112
415834.93	1458438.13	12425	415677.02	1458402.24	11993	415818.86	1458447.15	13148	415690.69	1458433.80	12820	415806.19	1458410.83	11959	415751.37	1458438.95	11851
415835.47	1458432.04	12436	415677.40	1458408.64	12970	415818.88	1458439.77	11940	415690.67	1458441.00	12462	415806.47	1458406.68	11731	415758.01	1458439.65	12431
415835.38	1458426.09	12268	415677.57	1458417.44	12626	415819.13	1458434.76	11611	415690.45	1458445.60	12799	415806.20	1458400.98	12971	415763.40	1458439.87	13251
415835.55	1458420.20	11529	415677.65	1458421.60	12368	415819.55	1458429.83	12243	415690.54	1458451.49	12953	415805.24	1458396.90	13255	415769.07	1458440.25	12814
415835.63	1458415.45	12056	415677.63	1458427.41	12787	415819.65	1458423.96	11987	415690.38	1458456.05	12514	415804.58	1458393.92	12364	415774.35	1458440.53	11203

Note: Coordinates are in U.S. State Plane 1927 New Mexico Central (3002)

Readings collected using bare 2-inch by 2-inch sodium iodide detector held at 18 inches above ground.

Scanning Gamma Radiation Counts for Reference Area - Obtained 04/17/01

Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate
415779.54	1458439.87	12168	415739.45	1458424.44	12038	415814.30	1458380.44	12457	415785.33	1458479.54	12063	415739.08	1458357.93	13590	415747.41	1458463.86	12073
415784.49	1458440.50	11950	415745.48	1458423.96	12078	415815.85	1458381.48	11690	415789.39	1458478.95	11771	415734.28	1458357.25	14311	415753.24	1458463.97	12747
415786.73	1458440.45	11824	415754.34	1458424.00	12416	415812.87	1458391.09	11971	415794.97	1458478.77	12480	415729.25	1458355.62	12842	415758.45	1458464.26	11859
415789.57	1458440.96	12926	415759.20	1458423.94	12091	415814.02	1458394.91	12248	415800.82	1458478.95	13582	415722.22	1458358.51	13402	415763.88	1458463.96	12343
415794.97	1458441.76	12115	415765.76	1458425.61	12293	415816.58	1458402.73	12052	415807.08	1458477.88	10989	415717.02	1458358.58	12432	415769.46	1458464.58	11129
415795.19	1458440.86	12539	415771.46	1458426.13	13098	415817.68	1458410.43	12236	415812.13	1458477.66	12146	415712.01	1458358.53	13234	415776.41	1458464.27	12740
415792.35	1458438.93	12902	415778.82	1458428.35	11265	415818.46	1458415.37	12386	415815.50	1458477.91	12174	415706.86	1458357.95	12264	415781.91	1458464.86	12481
415791.50	1458434.00	11847	415780.17	1458425.38	11075	415818.20	1458422.70	12408	415818.26	1458478.77	11741	415702.25	1458356.58	13749	415786.93	1458465.19	13905
415791.24	1458429.69	12786	415780.75	1458422.72	11362	415820.37	1458423.57	11647	415822.84	1458479.34	13416	415696.92	1458356.86	13661	415793.60	1458464.74	12171
415791.42	1458423.23	12754	415781.36	1458417.58	11494	415816.22	1458434.03	11430	415826.06	1458479.95	11293	415691.84	1458355.89	12711	415799.22	1458464.24	12565
415791.42	1458417.81	13038	415779.96	1458412.13	13091	415815.91	1458441.68	11694	415827.60	1458479.54	11978	415687.20	1458355.54	14212	415803.80	1458464.59	11997
415790.59	1458417.89	12512	415778.69	1458407.60	11869	415813.61	1458446.49	12281	415827.49	1458481.44	13746	415683.42	1458354.33	12843	415808.48	1458465.18	13155
415791.66	1458415.34	12828	415776.72	1458406.35	11889	415807.36	1458452.06	12012	415827.28	1458482.32	13249	415684.78	1458352.62	12562	415812.42	1458466.61	11464
415791.36	1458411.48	12128	415773.41	1458406.37	12065	415804.21	1458454.83	11717	415827.54	1458480.47	11613	415684.42	1458352.75	13340	415813.89	1458466.06	13084
415790.47	1458408.39	11907	415768.55	1458405.92	12072	415797.47	1458458.11	12096	415827.50	1458475.81	11998	415684.11	1458356.11	13591	415813.73	1458469.01	11160
415790.81	1458403.39	12225	415763.21	1458406.08	11967	415791.07	1458461.35	11983	415827.43	1458471.39	13155	415683.92	1458359.45	13412	415813.39	1458472.25	11640
415790.70	1458399.94	12025	415757.79	1458406.40	11964	415785.13	1458462.56	11729	415826.04	1458467.63	12537	415682.72	1458364.59	11173	415811.39	1458472.32	12435
415791.08	1458397.86	11792	415752.23	1458405.21	13219	415778.99	1458465.24	11832	415825.64	1458462.62	10788	415682.58	1458370.33	13755	415811.01	1458469.54	13002
415788.82	1458400.41	12802	415745.54	1458405.19	12733	415773.45	1458467.34	12976	415826.02	1458457.09	12539	415682.58	1458377.87	12837	415810.98	1458464.75	11425
415791.15	1458394.28	11772	415738.73	1458404.56	12144	415767.35	1458470.42	11780	415825.17	1458451.56	12423	415682.88	1458383.84	13342	415811.26	1458460.31	12511
415790.05	1458391.05	12615	415731.68	1458405.59	11791	415758.53	1458473.99	12522	415825.59	1458446.65	12581	415683.02	1458390.94	13082	415811.29	1458458.13	12969
415790.65	1458390.53	12373	415726.83	1458405.67	12120	415752.58	1458475.24	12600	415822.90	1458439.46	11586	415682.41	1458397.44	12603	415811.29	1458449.40	11985
415790.55	1458392.19	12083	415720.74	1458404.12	12520	415747.58	1458476.35	12230	415824.10	1458434.34	12851	415682.80	1458403.53	11977	415810.76	1458447.55	12689
415789.76	1458393.84	12015	415711.58	1458404.77	13085	415740.39	1458479.40	12793	415825.12	1458428.88	12375	415683.12	1458410.11	12073	415810.78	1458437.94	12260
415787.66	1458394.34	12427	415705.24	1458407.00	12801	415735.69	1458482.22	11618	415825.35	1458423.20	12593	415683.45	1458414.43	12657	415810.80	1458432.77	11806
415782.87	1458395.08	12974	415697.44	1458408.00	12917	415729.40	1458486.48	11884	415825.44	1458417.69	12914	415683.89	1458420.92	13046	415810.91	1458426.83	11785
415779.22	1458395.81	12243	415690.48	1458406.45	12790	415722.67	1458490.28	12085	415825.65	1458411.23	13527	415683.57	1458427.39	12530	415811.47	1458424.02	12736
415773.24	1458396.59	12865	415691.32	1458400.11	12272	415717.22	1458494.17	12085	415825.44	1458404.90	11803	415683.96	1458433.89	12126	415812.11	1458418.37	12001
415768.57	1458396.88	12656	415690.12	1458394.78	12596	415672.95	1458478.76	12661	415825.91	1458400.17	12535	415683.23	1458441.13	13275	415811.93	1458413.66	12772
415763.21	1458396.35	12334	415689.70	1458386.52	12192	415674.57	1458478.65	12888	415826.13	1458393.61	12213	415683.59	1458446.16	13182	415813.22	1458412.60	11118
415758.67	1458395.37	12890	415689.23	1458377.96	12448	415676.37	1458478.19	12303	415826.46	1458387.87	12935	415682.45	1458452.06	12006	415812.47	1458412.02	12754
415754.48	1458395.92	12754	415689.39	1458372.66	13641	415677.85	1458477.98	12851	415826.69	1458382.00	12561	415683.39	1458455.88	13792	415812.62	1458409.74	13007
415746.34	1458395.72	12589	415689.78	1458366.29	14133	415679.78	1458478.23	11250	415826.68	1458375.62	12117	415682.47	1458459.33	12839	415813.21	1458400.78	13345
415742.38	1458395.81	12293	415693.67	1458364.14	12617	415681.06	1458478.22	12530	415827.47	1458369.64	13372	415682.11	1458465.45	13005	415812.90	1458394.43	13524
415734.70	1458394.61	12453	415701.68	1458364.84	13351	415684.30	1458478.82	14328	415827.83	1458363.80	12288	415680.11	1458470.51	11762	415811.94	1458388.42	14860
415732.29	1458393.48	12392	415707.94	1458365.47	12906	415689.17	1458479.53	12543	415829.17	1458359.77	12685	415680.36	1458474.15	12225	415812.29	1458380.43	12633
415732.95	1458393.97	12108	415716.26	1458366.29	12538	415695.55	1458478.41	13031	415832.00	1458358.52	12740	415679.44	1458474.91	12914	415812.83	1458375.99	11957
415733.47	1458394.15	12633	415722.97	1458365.18	12267	415699.78	1458479.45	12349	415831.16	1458358.64	12751	415679.18	1458473.09	13669	415813.21	1458371.10	13804
415732.37	1458393.91	12726	415727.34	1458364.96	12635	415703.99	1458479.00	12487	415827.60	1458357.92	11529	415679.02	1458469.47	12532	415814.01	1458369.66	12067
415731.87	1458393.89	12780	415733.02	1458364.62	12788	415708.78	1458479.04	12165	415823.81	1458357.05	12705	415680.38	1458465.20	11823	415817.96	1458372.50	12356
415729.03	1458393.68	12550	415740.57	1458362.35	12847	415712.11	1458478.13	12132	415819.53	1458357.35	12449	415679.85	1458461.33	11366	415820.36	1458374.68	12607
415723.58	1458393.43	12817	415749.46	1458363.52	12319	415716.47	1458476.36	10890	415814.72	1458357.60	12838	415679.88	1458462.07	11278	415820.62	1458373.90	13042
415720.42	1458393.61	12593	415755.95	1458364.52	12708	415720.86	1458477.06	11128	415809.62	1458357.31	11662	415680.12	1458462.25	14084	415814.74	1458374.51	13422
415720.35	1458393.60	12541	415762.88	1458365.05	12538	415724.76	1458477.30	12163	415804.49	1458358.14	13126	415680.91	1458461.71	13130	415812.52	1458374.13	11624
415720.19	1458397.14	12180	415770.70	1458365.63	13328	415728.31	1458477.69	11900	415798.95	1458357.75	13083	415685.18	1458462.95	11868	415804.01	1458374.19	12831
415720.30	1458401.21	11891	415777.56	1458366.08	12360	415732.88	1458477.95	12896	415794.20	1458357.60	12255	415690.82	1458462.28	12921	415797.81	1458373.84	13282
415719.98	1458407.26	12346	415785.56	1458367.54	12216	415736.95	1458477.59	12446	415788.66	1458357.46	11326	415698.42	1458461.98	12672	415794.64	1458374.55	11577
415719.83	1458413.13	12810	415791.39	1458368.32	12101	415742.16	1458476.81	13167	415785.24	1458357.49	11620	415701.97	1458461.69	12837	415785.21	1458374.12	13327
415719.73	1458419.72	12733	415794.51	1458368.90	11915	415746.72	1458476.82	13468	415779.47	1458357.81	12711	415708.77	1458462.22	12015	415782.04	1458374.43	12521
415719.60	1458422.73	11985	415804.04	1458368.15	12889	415752.85	1458477.81	13816	415775.15	1458357.15	12757	415712.72	1458462.58	12795	415773.67	1458375.86	11695
415719.68	1458424.66	11913	415810.58	1458367.70	12913	415760.83	1458476.72	12271	415769.44	1458356.70	11514	415718.37	1458461.92	12229	415767.18	1458376.37	13871
415722.23	1458424.45	11771	415815.68	1458366.22	12743	415764.75	1458476.95	12774	415761.28	1458356.48	13327	415724.48	1458462.87	11894	415764.13	1458375.74	12806
415725.99	1458424.68	12029	415821.58	1458365.41	12344	415770.03	1458478.51	11906	415756.51	1458357.66	12022	415729.27	1458462.57	12563	415755.41	1458375.34	13490
415730.05	1458424.13	11824	415820.15	1458366.87	12465	415774.84	1458478.58	12984	415750.16	1458358.69	12946	415734.55	1458462.63	11990	415752.28	1458376.01	13113
415734.85	1458424.40	13031	415817.19	1458372.01	12247	415780.50	1458479.02	11581	415744.95	1458358.14	12359	415740.20	1458463.44	11969	415743.49	1458375.29	12947

Note: Coordinates are in U.S. State Plane 1927 New Mexico Central (3002)

Readings collected using bare 2-inch by 2-inch sodium iodide detector held at 18 inches above ground.

Scanning Gamma Radiation Counts for Reference Area - Obtained 04/17/01

Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate	Easting	Northing	Count Rate
415738.44	1458375.35	12104	415798.80	1458450.02	11814	415712.59	1458381.39	12620	415768.37	1458405.99	12977	415684.70	1458425.59	12615
415733.33	1458375.19	13094	415798.59	1458450.27	12033	415713.59	1458383.48	13651	415762.81	1458406.01	12676	415679.85	1458432.11	12721
415728.47	1458373.77	12368	415797.09	1458453.23	12799	415713.57	1458389.37	14435	415758.24	1458406.04	11599	415677.10	1458435.88	13395
415722.89	1458374.51	12533	415796.09	1458455.51	12711	415713.34	1458396.41	12129	415753.76	1458404.74	12207	415676.89	1458441.75	12672
415717.11	1458374.00	12491	415795.90	1458456.52	12314	415713.21	1458403.19	11940	415748.30	1458404.56	11428	415679.41	1458446.83	11337
415712.13	1458373.52	10590	415795.93	1458456.86	13963	415712.15	1458411.40	13286	415743.68	1458403.61	13666	415679.81	1458452.27	12678
415706.28	1458372.57	12257	415795.86	1458456.72	12385	415711.78	1458415.94	12523	415736.98	1458403.30	12201	415680.09	1458457.68	13459
415701.35	1458373.00	13321	415795.51	1458454.23	12586	415711.19	1458418.87	12647	415732.47	1458403.02	12162	415680.86	1458462.77	12991
415695.93	1458372.20	12555	415795.14	1458453.00	12794	415711.02	1458423.47	13128	415731.77	1458403.00	12512	415682.01	1458467.40	11717
415697.48	1458369.08	13467	415793.13	1458448.86	12642	415710.90	1458430.90	12115	415735.76	1458402.05	13599	415682.48	1458473.50	11397
415699.75	1458365.88	12991	415794.44	1458445.03	12002	415706.23	1458433.39	12539	415737.46	1458401.17	12685	415683.33	1458478.79	12225
415699.96	1458368.81	11987	415795.63	1458441.17	13410	415704.46	1458432.03	12041	415735.17	1458401.23	13115	415683.62	1458482.15	14256
415699.96	1458374.81	12734	415796.76	1458440.57	12050	415706.22	1458432.06	12715	415730.05	1458401.99	13824			
415700.06	1458380.79	11363	415798.52	1458443.12	12768	415709.71	1458432.32	12914	415725.66	1458401.35	12069			
415701.07	1458387.34	12935	415798.91	1458443.75	11515	415714.16	1458431.86	12567	415726.36	1458397.93	12589			
415700.29	1458393.40	12696	415800.09	1458439.64	11339	415718.60	1458431.31	12883	415727.97	1458395.95	12179			
415699.86	1458399.98	12568	415800.09	1458434.38	10503	415723.81	1458431.41	13472	415727.24	1458398.88	12903			
415698.35	1458406.02	13445	415800.38	1458428.64	12311	415729.02	1458432.01	12647	415726.90	1458404.14	12386			
415698.55	1458411.85	13005	415795.82	1458422.04	12012	415734.17	1458432.26	13135	415726.56	1458410.24	12918			
415697.09	1458417.62	13310	415795.29	1458415.01	14175	415740.30	1458431.63	11666	415726.32	1458413.90	11155			
415699.81	1458423.14	12108	415797.41	1458412.69	12346	415743.43	1458431.78	13884	415725.33	1458419.09	12037			
415698.47	1458429.50	13176	415799.26	1458413.04	12336	415746.49	1458432.78	10490	415724.90	1458420.77	12459			
415697.84	1458435.67	12891	415799.14	1458409.84	12726	415752.10	1458433.30	12783	415725.05	1458419.79	11631			
415696.86	1458441.43	12993	415799.14	1458405.39	12457	415758.51	1458433.65	11726	415723.64	1458417.99	12712			
415695.93	1458446.51	12212	415799.37	1458399.97	11646	415763.78	1458433.73	15155	415723.97	1458417.00	12397			
415696.37	1458451.66	14908	415798.84	1458395.89	11917	415767.20	1458433.39	12489	415728.50	1458417.60	11432			
415692.87	1458452.94	12391	415797.98	1458392.23	11275	415771.61	1458432.80	12420	415735.48	1458417.54	11964			
415690.64	1458451.95	12782	415797.89	1458390.90	12517	415777.85	1458433.59	11718	415741.48	1458417.73	11720			
415689.86	1458451.36	12978	415799.91	1458388.11	13712	415782.19	1458434.73	11015	415748.00	1458418.87	12320			
415689.98	1458449.27	12091	415800.86	1458384.42	12362	415782.93	1458435.45	13918	415753.55	1458419.11	12250			
415690.04	1458449.30	12043	415802.54	1458382.70	12457	415787.71	1458435.11	12180	415760.27	1458418.67	11276			
415692.63	1458448.80	10427	415803.66	1458386.40	12582	415789.65	1458438.51	13533	415767.13	1458419.77	12360			
415698.59	1458447.33	12749	415806.08	1458387.77	13267	415788.29	1458440.44	13310	415773.68	1458420.12	11340			
415704.53	1458446.80	11244	415806.51	1458387.90	11831	415786.22	1458438.61	11662	415776.60	1458420.85	13391			
415708.24	1458447.07	12192	415800.50	1458388.44	11232	415784.42	1458435.34	13216	415775.62	1458420.36	13841			
415709.21	1458447.03	12139	415795.05	1458388.99	12949	415784.30	1458429.16	12863	415776.11	1458417.77	13360			
415710.80	1458447.29	11236	415789.55	1458389.25	12277	415783.30	1458423.46	13884	415775.81	1458415.44	12212			
415715.39	1458447.02	12057	415786.32	1458389.14	12062	415782.70	1458419.49	12792	415775.56	1458414.52	12403			
415721.21	1458446.45	11831	415780.98	1458389.73	13256	415785.44	1458420.99	11952	415772.88	1458414.09	11552			
415725.48	1458446.61	12236	415774.94	1458389.67	13458	415785.41	1458419.53	11892	415772.59	1458413.12	11754			
415730.95	1458447.89	13462	415768.92	1458389.53	13081	415782.89	1458413.26	13800	415768.99	1458413.17	12074			
415737.36	1458447.93	11851	415762.67	1458389.38	11835	415781.70	1458407.64	12502	415763.70	1458413.38	12066			
415741.38	1458446.28	12830	415757.92	1458389.75	13572	415781.63	1458404.47	12114	415757.80	1458414.77	15379			
415750.16	1458449.57	11182	415752.48	1458388.87	12038	415783.01	1458403.82	13792	415753.02	1458414.20	12338			
415754.66	1458449.04	12143	415747.17	1458389.08	11845	415783.23	1458402.21	13987	415747.00	1458413.91	11488			
415760.11	1458448.23	13929	415741.99	1458387.81	13505	415784.18	1458398.45	11591	415741.01	1458413.25	11233			
415765.57	1458448.52	12570	415737.21	1458387.79	12499	415784.39	1458394.26	12477	415735.02	1458413.13	12724			
415770.92	1458448.28	12598	415732.69	1458387.22	13208	415784.70	1458393.64	12555	415729.26	1458413.40	13357			
415777.10	1458448.05	11662	415727.50	1458387.27	11910	415786.45	1458395.83	13842	415723.27	1458413.58	12917			
415782.59	1458448.37	12008	415722.01	1458386.98	13194	415788.24	1458398.48	12370	415717.51	1458413.95	11352			
415788.68	1458448.52	13133	415716.37	1458386.09	12089	415791.04	1458401.02	12120	415711.47	1458414.50	13752			
415793.30	1458448.98	11328	415712.00	1458385.43	11593	415789.15	1458402.02	12592	415705.84	1458415.25	13474			
415797.69	1458450.77	12700	415710.26	1458384.00	13714	415784.17	1458402.67	13154	415700.01	1458416.69	13187			
415797.38	1458450.72	11773	415708.18	1458384.29	12602	415779.41	1458403.92	12222	415693.86	1458418.21	12531			
415797.50	1458451.17	13230	415708.70	1458382.42	12300	415774.68	1458404.68	12404	415687.53	1458423.39	12010			

Note: Coordinates are in U.S. State Plane 1927 New Mexico Central (3002)

Readings collected using bare 2-inch by 2-inch sodium iodide detector held at 18 inches above ground.

2000/2001 Investigation Static Gamma Measurement/Soil Sample Locations

Training Sites 5 and 6

Sample Location	Easting	Northing
TS5-01	413,269	1,459,852
TS5-02	413,307	1,459,807
TS5-03	413,299	1,459,737
TS5-04	412,910	1,459,378
TS5-05	412,730	1,459,488
TS5-06	412,654	1,459,517
TS5-07	412,714	1,459,556
TS5-08	412,640	1,459,635
TS5-09	412,615	1,459,744
TS5-10	412,709	1,459,774
TS5-11	412,779	1,459,686
TS5-12	412,796	1,459,620
TS5-13	412,830	1,459,599
TS5-14	412,897	1,459,538
TS5-15	412,980	1,459,562
TS5-16	412,912	1,459,647
TS5-17	413,015	1,459,682
TS5-18	412,918	1,459,848
TS5-19	413,087	1,459,763
TS5-20	413,030	1,459,609
TS6-01	414,492	1,459,674
TS6-02	414,607	1,459,665
TS6-03	414,546	1,459,666
TS6-04	414,443	1,459,840
TS6-05	414,467	1,459,851
TS6-06	414,481	1,459,895
TS6-07	414,452	1,460,032
TS6-08	414,412	1,459,685
TS6-09	414,242	1,460,109
TS6-10	414,210	1,460,063
TS6-11	414,209	1,460,004
TS6-12	414,283	1,459,976
TS6-13	414,445	1,460,113
TS6-14	414,714	1,459,722
TS6-15	414,653	1,459,447
TS6-16	414,420	1,460,219
TS6-17	414,332	1,460,028
TS6-18	414,467	1,459,551
TS6-19	414,254	1,459,918
TS6-20	414,603	1,459,801

Training Sites 7 and 8

Sample Location	Easting	Northing
TS7-01	415,745	1,458,129
TS7-02	415,745	1,458,002
TS7-03	415,884	1,457,920
TS7-04	415,619	1,458,229
TS7-05	415,424	1,458,229
TS7-06	415,550	1,458,143
TS7-07	415,407	1,457,946
TS7-08	415,472	1,458,095
TS7-09	415,364	1,458,088
TS7-10	415,365	1,458,046
TS7-11	415,597	1,458,106
TS7-12	415,563	1,458,116
TS7-13	415,865	1,458,149
TS7-14	415,405	1,458,120
TS7-15	415,396	1,458,093
TS7-16	415,400	1,458,066
TS7-17	415,866	1,458,094
TS7-18	415,502	1,458,083
TS7-19	415,339	1,458,132
TS7-20	415,533	1,458,093
TS8-01	412,080	1,463,290
TS8-02	412,005	1,463,300
TS8-03	411,969	1,463,399
TS8-04	411,878	1,463,617
TS8-05	411,881	1,463,566
TS8-06	411,881	1,463,507
TS8-07	411,861	1,463,439
TS8-08	411,819	1,463,393
TS8-09	411,824	1,463,583
TS8-10	411,845	1,463,536
TS8-11	411,750	1,463,434
TS8-12	411,719	1,463,493
TS8-13	411,753	1,463,519
TS8-14	411,840	1,463,455
TS8-15	411,835	1,463,493
TS8-16	411,796	1,463,427
TS8-17	411,781	1,463,503
TS8-18	411,824	1,463,447
TS8-19	411,764	1,463,441
TS8-20	411,783	1,463,485

Reference Area

Sample Location	Easting	Northing
RA-01	415,694	1,458,463
RA-02	415,737	1,458,461
RA-03	415,764	1,458,467
RA-04	415,799	1,458,463
RA-05	415,837	1,458,458
RA-06	415,697	1,458,432
RA-07	415,739	1,458,428
RA-08	415,763	1,458,435
RA-09	415,797	1,458,431
RA-10	415,828	1,458,426
RA-11	415,699	1,458,398
RA-12	415,736	1,458,393
RA-13	415,764	1,458,401
RA-14	415,792	1,458,396
RA-15	415,830	1,458,397
RA-16	415,700	1,458,362
RA-17	415,731	1,458,368
RA-18	415,769	1,458,367
RA-19	415,800	1,458,371
RA-20	415,830	1,458,366

Notes:

Coordinates are in U.S. State Plane 1927 New Mexico Central (3002).

ERG Form 2.09B

Ratemeter/Scaler Model 2221 Dector Model 44-10
Serial Number 117336 Serial No. PR150851

Count Time (if applicable) ONE Reading units cpm
Technician KB

Shielded Location I.D.	Reading
TS8-01	12915
TS8-02	12972
TS8-03	11690
TS8-04	16555
TS8-05	15854
TS8-06	17230
TS8-07	16956
TS8-08	5303
TS8-09	26341
TS8-10	7601
TS8-11	9370
TS8-12	32628
TS8-13	34818
TS8-14	31563
TS8-15	27926
TS8-16	11,111
TS8-17	55,111
TS8-18	60618
TS8-19	20335
TS8-20	242261

Unshielded Location I.D.	Reading
TS8-01	4006
TS8-02	4186
TS8-03	3334
TS8-04	5193
TS8-05	4821
TS8-06	4962
TS8-07	5117
TS8-08	18124
TS8-09	8725
TS8-10	24155
TS8-11	31424
TS8-12	11119
TS8-13	11680
TS8-14	10746
TS8-15	8831
TS8-16	37555
TS8-17	18038
TS8-18	21047
TS8-19	59960
TS8-20	89246

ERG Form 2.09B

Ratemeter/Scaler Model 2221
Serial Number 117736

Dector Model 44-10
Serial No. PK 150851

Count Time (if applicable) ONE

Reading units CPM
Technician KB

UNSHIELDED

Location I.D.	Reading
TS7-5	21383
TS7-4	18355
TS7-13	17884
TS7-17	17621
TS7-1	14195
TS7-3	12510
TS7-2	12261
TS7-7	15895
TS7-19	31280
TS7-9	30225
TS7-10	27709
TS7-16	55638
TS7-15	54404
TS7-14	38642
TS7-8	14374
TS7-18	34195
TS7-20	95371
TS7-12	39703
TS7-6	16096
TS7-11	29535

SHIELDED

Location I.D.	Reading
TS7-5	7274
TS7-4	5752
TS7-13	5983
TS7-17	5747
TS7-1	4545
TS7-3	3778
TS7-2	3817
TS7-7	4618
TS7-19	11497
TS7-9	9944
TS7-10	8559
TS7-16	22064
TS7-15	19458
TS7-14	14189
TS7-8	3904
TS7-18	11087
TS7-20	36068
TS7-12	17305
TS7-6	~~47~~ 4575
TS7-11	9460

ERG Form 2.09B

Ratemeter/Scaler Model 2221
Serial Number 117336

Dector Model 44-10
Serial No. PR150851

Count Time (if applicable) ONE

Reading units CPM
Technician KS

Shielded

Location I.D.	Reading
TS-601	16303
TS6-02	5428
TS6-03	6769
TS6-04	18533
TS6-05	44692
TS6-06	10321
TS6-07	5830
TS6-08	17922
TS6-09	5637
TS6-10	8059
TS6-11	14063
TS6-12	26616
TS6-13	5596
TS6-14	4115
TS6-15	4030
TS6-16	~~[illegible]~~ 5316
TS6-17	8861
TS6-18	14270
TS6-19	7505
TS6-20	~~1708~~ 4742

Unshielded

Location I.D.	Reading
	49411
	70359
	26337
	57324
	13354
	32284
	20018
	68228
	21727
	27968
	44047
	72644
	19503
	14156
	14089
	~~[illegible]~~ 18610
	29552
	40769
	28432
	17087

DATA VOID — TAKEN WITH SOME POINTS WITH SCA WINDOW IN.

TS-5
4/10/01

ERG Form 2.09B

Ratemeter/Scaler Model 2221 Dector Model 44-10
Serial Number 117336 Serial No. PR 15-0851

Count Time (if applicable) [illegible] Reading units COUNTS
Technician KB

Rechecked

unshielded Location I.D.	Reading	shielded Location I.D.	Reading
TS 5-04	17750	TS5-04	5060
TS5-05	61312	TS5-05	21566
TS5-06	19202	TS5-06	5394
TS5-07	45807	TS5-07	14371
TS5-08	32624	TS5-08	9685
TS5-09	17823	TS5-09	4661
TS5-10	30196	TS5-10	8648
TS5-11	89348	TS5-11	25777
TS5-12	57500	TS5-12	16647
TS5-13	46577	TS5-13	14596
TS5-14	50906	TS5-14	14726
TS5-15	41829	TS5-15	13252
TS5-17	29734	TS5-17	9027
✓ TS5-19	~~13621~~ 12966	TS5-19	~~3159~~ 4678
✓ TS5-18	~~15506~~ 18876	TS5-18	~~3647~~ 5287
✓ TS5-16	26032	TS5-16	~~4358~~ 6245
TS5-20	26948	TS5-20	8224

collected after TS5-15

Found window out near end of work - need to recheck.

ERG Form 2.09B

Ratemeter/Scaler Model 2221

Serial Number 117336

Dector Model 44-10

Serial No. PR 150857

Count Time (if applicable) ONE MIN

Reading units Counts

Technician KS

Unshielded

Location I.D.	Reading
TS5-Ø4	18,202
TS5-Ø5	61,462
TS5-Ø6	19,429
TS5-Ø8	33,875
TS5-Ø9	17,923
TS5-1Ø	30,2Ø2
TS5-11	91,110
TS5-15	56,829
TS5-13	47,215
TS5-16	26,7Ø4
TS5-18	19,865
TS5-19	16,798
TS5-17	30,442
TS5-2Ø	28,048
TS5-14	49,700
TS5-Ø7	46,545
TS5-12	56,783
TS5-01	13,895
TS5-02	14,112
TS5-03	14554

Shielded

Location I.D.	Reading
TS5-Ø4	5Ø36
TS5-Ø5	~~6121Ø32~~ 21,032
TS5-Ø6	5379 — 5,379
TS5-Ø8	9961
TS5-Ø9	4,758
TS5-1Ø	8,923
TS5-11	26,147
TS5-15	16,127
TS5-13	14,397
TS5-16	6,71Ø
TS5-18	5,442
TS5-19	4,91Ø
TS5-17	9,246
TS5-2Ø	8,Ø3Ø
TS5-14	14,658
TS5-Ø7	14,711
TS5-12	15,715
TS5-01	4087
TS5-02	4252
TS5-03	4317

ERG Form 2.09B

Ratemeter/Scaler Model LMI 2221
Serial Number 117376

Dector Model LMI 44-10
Serial No. PR150857

Count Time (if applicable) 1.4 min

Reading units counts
Technician KB

shielded

Location I.D.	Reading
RA1	3901
RA2	3842
RA3	3938
RA4	3841
RA5	3865
RA6	3957
RA7	3902
RA8	3878
RA9	3952
RA10	3932
RA11	3951
RA12	3956
RA13	3964
RA14	3907
RA15	3936
RA16	4016
RA17	3818
RA18	4193
RA19	3958
RA20	4027

unshielded

Location I.D.	Reading
12305	
12692	
12508	
12296	
12239	
12243	
12448	
12533	
12621	
12102	
12924	
13045	
12357	
12491	
12277	
12978	
12398	
12975	
12621	
12911	

Kenneth K Baker
4/17/01