Appendix B

SCM Survey Design
Revision 0

FirstEnergy

SNEC CALCULATION COVER SHEET

CALCULATION DESCRIPTION

Calculation Number	Revision Number	Effective Date	Page Number
E900-03-016	0	7/28/03	1 of 9

Subject

Shonka Discharge and Intake Tunnels FSS Survey Design

Question 1 - Is this calculation defined as "In QA Scope"? Refer to definition 3.5. Yes ☒ No ☐

Question 2 - Is this calculation defined as a "Design Calculation"? Refer to definitions 3.2 and 3.3. Yes ☒ No ☐

Question 3 - Does the calculation have the potential to affect an SSC as described in the USAR? Yes ☐ No ☒

NOTES: If a "Yes" answer is obtained for Question 1, the calculation must meet the requirements of the SNEC Facility Decommissioning Quality Assurance Plan. If a "Yes" answer is obtained for Question 2, the Calculation Originator's immediate supervisor should not review the calculation as the Technical Reviewer. If a "YES" answer is obtained for Question 3, SNEC Management approval is required to implement the calculation. Calculations that do not have the potential to affect SSC's may be implemented by the TR.

DESCRIPTION OF REVISION

APPROVAL SIGNATURES

Calculation Originator	P. Donnachie/	Date	7/24/03
Technical Reviewer	R. Holmes/	Date	7/24/03
Additional Review		Date	
Additional Review		Date	
SNEC Management Approval	A. Paynter/	Date	7/25/03

1.0 PURPOSE

1.1 The purpose of this calculation is to provide the survey design guidance to be followed for conducting final status surveys (FSS) in the SSGS Discharge and Intake Tunnels. The Intake Tunnel consists of multiple parts: the Main Intake Tunnel and both the North and South Intake tunnels, which split off from the Main Tunnel. These latter tunnels are located under the SSGS footprint.

1.2 Shonka Research Associates (SRA) will conduct scan surveys using procedures reviewed and approved by SNEC. These procedures are attached as Appendices.

2.0 SUMMARY OF RESULTS

2.1 The following information will be used to conduct the applicable FSS for this survey design:

2.1.1 The Discharge Tunnel area is divided into nine (9) survey units, i.e. three (3) Class 1, two (2) Class 2 and four (4) Class 3 survey units.

2.1.2 The Discharge Tunnel Survey Unit (SU) Numbers are as follows:

SU Number	Area Description	Classification	Area (m^2)
SS1	Floor (first 150 ft)	1	120
SS2	Floor (next 235 ft)	2	175
SS3	Floor (last 315 ft)	3	234
SS4	Ceiling (first 150 ft)	2	120
SS5	Ceiling (last 550 ft)	3	400
SS6-1	South Wall (first 150 ft) (Includes ½ of east wall @ beginning of tunnel)	1	145
SS6-2	North Wall (first 150 ft) (Includes ½ of east wall @ beginning of tunnel)	1	145
SS7-1	West Wall (last 550 ft)	3	300
SS7-2	East Wall (last 550 ft)	3	300

Note: Area and linear dimensions are approximations.

2.1.3 The Intake Tunnel consists of three parts: Main Intake Tunnel, South Intake under SSGS footprint and the North Intake under the SSGS footprint. These areas are further subdivided into six (6) Class 2 and three (3) Class 3 survey units.

2.1.4 The Survey Unit Numbers for these tunnels are as follows:

SU Number	Area Description	Classification	Area (m^2)
SS19-1	Main Intake Tunnel floor	2	167
SS19-2	North Tunnel Floor	2	184
SS19-3	South Tunnel Floor	2	154
SS20-1	Main Intake Walls	2	269
SS20-2	North Tunnel Walls	2	324
SS20-3	South Tunnel Walls	2	359
SS21-1	Main Intake Ceiling	3	162
SS21-2	North Tunnel Ceiling	3	184
SS21-3	South Tunnel Ceiling	3	154

2.1.5 The number of static measurement points will be developed, as applicable, after SRA completes their survey and results are reviewed by the FSS group.

2.1.6 The minimum scan coverage for Class 1 areas will be 100%, Class 2 areas, 50% and for Class 3 areas, 10-50%.

2.1.7 Scan speed will be set in accordance with SRA procedures and the SNEC MDC_{scan} value calculated for structure surfaces.

2.1.8 The **surface $DCGL_w$** for this design is determined to be **6174 dpm/100 cm^2** based on the attached spreadsheet calculation (Attachment 3). This value is the 75% administrative limit of the calculated surrogate Cs-137 value (8233 dpm/100 cm^2).

2.1.9 The surface area **$DCGL_{emc}$** will use the Cs-137 surface area factor for a 1-m^2 area equal to 11. This value is calculated to be **67,914 dpm/100 cm^2**.

2.1.10 The **MDC_{scan}** value for this design that SRA must achieve is **3087 dpm/100 cm^2**.

2.1.11 The **volumetric DCGLw** for this design is determined to be **4.78 pCi/g** based on the attached spreadsheet calculation (Attachment 9). This value represents the 75% administrative limit of the calculated surrogate Cs-137 value (6.38 pCi/g).

2.1.12 Areas greater than the $DCGL_w$ must be identified, documented, marked, and bounded to include an area estimate.

2.1.13 Class 1 areas with surface deformations that cannot be surveyed by Shonka will be identified by marking or painting around the suspect area's perimeter.

2.1.14 Remediation is indicated when any area exceeds 3 x the $DCGL_w$ for any scan measurement or when the value for any area of ~1 square meter is greater than the $DCGL_{emc}$. **Note: If additional remediation is performed the survey unit design is void.**

2.1.15 Gas flow proportional counter (GFPC) will be used IAW SRA procedures.

3.0 REFERENCES

3.1 SNEC Facility License Termination Plan.

3.2 Procedure E900-IMP-4500.59, "Final Site Survey Planning and DQA".

3.3 SNEC procedure E900-IMP-4520.04, "Survey Methodology to Support SNEC License Termination".

3.4 SNEC procedure E900-IMP-4520.06, "Survey Unit Inspection in Support of FSS Design".

3.5 NUREG-1575, "Multi-Agency Radiation Survey and Site Investigation Manual", August 2000.

3.6 SRA Procedures – See Appendix Section 6.0.

3.7 SNEC Calculation E900-03-012, "Effective DCGL Worksheet Verification."

4.0 ASSUMPTIONS AND BASIC DATA

4.1 SRA procedures to be used to perform scan surveys.

4.2 SNEC LTP section 2.2.4.1.4 and Figure 2-18 provide a description of the SSGS Discharge Tunnel.

4.3 SNEC LTP section 2.2.4.1.7 and Figures 2-26 and 2-28 provide a description of the Main Intake Tunnels.

4.4 Remediation History

The Discharge Tunnel was contaminated as a result of radioactive liquid effluent discharges from the SNEC Facility. Ground water and several inches of silt on the floor of this below grade structure have been removed to adequately survey this area for characterization and final release. Several piping sections have been removed as they were near or above initial DCGLs values. In addition the north wall opposite Seal Chamber #3 has been remediated (scabbled). In the SNEC LTP, Figure 2-18 shows this tunnel in detail.

During operation of the SSGS, water was drawn from the Raystown Branch of the Juniata River. A dam was utilized to impound the river in the area of the intake structure, which included the Intake tunnel. The intake water system only provided intake of river water to the SSGS and no discharges to the river were made via this pathway. During freezing weather, warm water from the SSGS Discharge Tunnel was diverted and allowed to flow into the SSGS Intake Tunnel via a pathway that utilized the Spray Pond supply piping. This configuration was established in order to prevent ice formation on the intake tunnel screen wash and filtration system components. This flow path, by use of discharge tunnel water, would have provided a mechanism for low-level radioactivity to enter the SSGS intake tunnel. In the SNEC LTP, Figures 2-25 and 2-28 show the SSGS Intake Tunnel in detail.

Sediment and concrete core sampling was performed in the Intake Tunnel. Results of these samples are documented in the SNEC LTP. In summary a total of 174 sediment samples were taken throughout the Intake Tunnel. Of these, 142 samples showed only Cs-137 above MDC. The average Cs-137 value was 0.46 pCi/g and the highest, 1.8 pCi/g. Concrete core bores were obtained throughout the tunnel, analyzed and found to be <MDC.

4.5 This survey determines the effective $DCGL_w$ value for Cs-137 using the spreadsheet mix in Attachment 2. A 25% reduction to the effective $DCGL_w$ was performed to address de-listed radionuclides. The SNEC facility has instituted an administrative limit of 75% for the allowable dose for all measurement results. The de-listed radionuclide dose is accounted for within the 75% administrative limit. The 75% administrative limit is then applied to the calculated Cs-137 limit, e.g. 0.75 x 8,233 dpm/100 cm^2 = 6174 dpm/100 cm^2.

4.6 The MDC_{scan} calculation is determined based on LTP section 5.5.2.5. The calculation consists of the following: 8,233 dpm/100 cm^2 x 0.75 x 0.5 = 3,087 dpm/100 cm^2.

4.7 Special measurements including gamma-ray spectroscopy are not included in this survey design.

4.8 Static and other survey measurements may be conducted as applicable after review of the SRA survey is completed. This design will be revised to incorporate these surveys as determined by the FSS group.

4.9 The survey design checklist is listed in **Attachment 1.**

5.0 CALCULATIONS

- The required DCGLw = 8,233 x 0.75 = 6,174 dpm/100 cm^2.
- The MDC_{scan} = 6,174 x 0.5 = 3,087 dpm/100 cm^2.
- $DCGL_{emc}$ for 1 m^2 = 6,174 X AF of 11 = 67,914 dpm/100 cm^2.

6.0 APPENDICES

6.1 **Attachment 1,** Survey Design Checklist.

6.2 **Attachment 2,** Sample Results for Tunnels

6.3 **Attachment 3,** Effective Area & Volume DCGLs for Cs-137

6.4 **Attachment 4,** SRA SCM Procedure 001, Rev 6, Confirmation and Calibration of the Incremental Encoder.

6.5 **Attachment 5,** SRA SCM Procedure 005, Rev 6, Requirements for Completion of the Survey Using the SCM.

6.6 **Attachment 6,** SRA SCM Procedure 006, Rev 4, Performance of a Position Calibration on a PSPC.

6.7 **Attachment 7,** SRA SCM Procedure 007, Rev 7, Source Response Check and Performance Based Check of any PSPC Detector Configuration Installed on the SCM.

6.8 **Attachment 8,** SRA SCM Procedure 008, Rev 3, Conduct of Operations for Surveys Using the SCM/SIMS.

6.9 **Attachment 9,** SRA SCM Procedure 011, Rev 1, Survey Naming Convention when Using the SCM.

Attachment 1

Survey Design Checklist

Calculation No. 6900-03-	Location Code See Attached Design for locations. ~~CV2-23, CV3-1, CV3-2 & CV3-3~~ AP 7/24/03

ITEM	REVIEW FOCUS	Status (Circle One)	Reviewer Initials & Date
1	Has a survey design calculation number been assigned and is a survey design summary description provided?	(Yes) N/A	AP 7/24/03
2	Are drawings/diagrams adequate for the subject area (drawings should have compass headings)?	(Yes) N/A	AP 7/24/03
3	Are boundaries properly identified and is the survey area classification clearly indicated?	(Yes) N/A	AP 7/24/03
4	Has the survey area(s) been properly divided into survey units IAW EXHIBIT 10	(Yes) N/A	AP 7/24/03
5	Are physical characteristics of the area/location or system documented?	(Yes) N/A	AP 7/24/03
6	Is a remediation effectiveness discussion included?	(Yes) N/A	AP 7/24/03
7	Have characterization survey and/or sampling results been converted to units that are comparable to applicable DCGL values?	(Yes) N/A	AP 7/24/03
8	Is survey and/or sampling data that was used for determining survey unit variance included?	Yes, (N/A)	AP 7/24/03
9	Is a description of the background reference areas (or materials) and their survey and/or sampling results included along with a justification for their selection?	Yes, (N/A)	AP 7/24/03
10	Are applicable survey and/or sampling data that was used to determine variability included?	Yes (N/A)	AP 7/24/03
11	Will the condition of the survey area have an impact on the survey design, and has the probable impact been considered in the design?	(Yes) N/A	AP 7/24/03
12	Has any special area characteristic including any additional residual radioactivity (not previously noted during characterization) been identified along with its impact on survey design?	(Yes) N/A	AP 7/24/03
13	Are all necessary supporting calculations and/or site procedures referenced or included?	(Yes) N/A	AP 7/24/03
14	Has an effective DCGLw been identified for the survey unit(s)?	(Yes) N/A	AP 7/24/03
15	Was the appropriate $DCGL_{EMC}$ included in the survey design calculation?	(Yes) N/A	AP 7/24/03
16	Has the statistical tests that will be used to evaluate the data been identified?	Yes, (N/A)	AP 7/24/03
17	Has an elevated measurement comparison been performed (Class 1 Area)?	(Yes) N/A	AP 7/24/03
18	Has the decision error levels been identified and are the necessary justifications provided?	Yes, (N/A)	AP 7/24/03
19	Has scan instrumentation been identified along with the assigned scanning methodology?	(Yes) N/A	AP 7/24/03
20	Has the scan rate been identified, and is the MDCscan adequate for the survey design?	(Yes) N/A	AP 7/24/03
21	Are special measurements e.g., in-situ gamma-ray spectroscopy required under this design, and is the survey methodology, and evaluation methods described?	Yes, (N/A)	AP 7/24/03
22	Is survey instrumentation calibration data included and are detection sensitivities adequate?	(Yes) N/A	AP 7/24/03
23	Have the assigned sample and/or measurement locations been clearly identified on a diagram or CAD drawing of the survey area(s) along with their coordinates?	(Yes) N/A	AP 7/24/03
24	Are investigation levels and administrative limits adequate, and are any associated actions clearly indicated?	(Yes) N/A	AP 7/24/03
25	For sample analysis, have the required MDA values been determined.?	Yes (N/A)	AP 7/24/03
26	Has any special sampling methodology been identified other than provided in Reference 6.3?	Yes, (N/A)	AP 7/24/03

NOTE: a copy of this completed form or equivalent, shall be included within the survey design calculation.

Attachment 2
Sample Results for Tunnels

Today
July 15, 2003

SNEC Sample No.	LAB No.	Location/Description	Sr-90	Co-60	Cs-137	Am-241	Pu-238	Pu-239	Ni-63	Analysis Date	Elapsed Hr
SXCF 971	BWXT, 0111066-09	SSGS Seal Chamber @ 7, SR-0013	0.2	0.01	1.05	0.032	0.015	0.015	7.59	June 13, 2001	782
SXSD344	113854	SSGS Tunnel 18" Pipe Sample From Robotic Entry		0.015	1.4	0.6	0.01	0.04		May 10, 2000	1161
SXCW3539	Teledyne; L21088-6	SSGS Discharge Tunnel @ 3' Concrete Wall Core - SR-56 Bucking Structure	0.0168	0.13	1.42	0.131	0.26	0.13	2.65	May 6, 2003	70
SXSSD99737	111029	[illegible] SSGS Discharge Tunnel Bed S.C. Sediment [illegible]		0.6	1.9					November 17, 1999	1336
SXSSD99735	111027	[illegible] SSGS Discharge Tunnel, 18" Pipe Inserted [illegible]		0.2	2.2					November 17, 1999	1336
SXSSD99736	111028	[illegible] SSGS Discharge Tunnel 8" Pipe Inserted [illegible]		0.15	2.2					November 17, 1999	1336
SX13SD003865	114720	SSGS DT 18" Line	0.019	0.07	3	0.07	0.01	0.007		May 24, 2000	1147
SX13SD003850	114721	SSGS DT 18" Line	0.02	0.07	3.1	0.03	0.007	0.007		May 24 2000	1147
SXSSD99732	111034	[illegible] 5-7/8" Pipe Inserted [illegible] SSGS Discharge Tunnel [illegible]		0.5	3.8					November 17, 1999	1336
SXSSD99731	111033	[illegible] SSGS Discharge Tunnel Floor Sediment [illegible]		0.4	4.3					November 17, 1999	1336
SXSSD99732	111034	[illegible] SSGS Discharge Tunnel Floor Sediment [illegible]		0.3	7					November 17, 1999	1336
SX105D980022	Teledyne- TI-16889	Discharge Tunnel Sediment - End of Tunnel	8	3	21.2	0.4	0.3	0.3	30	July 21, 1999	1455
SXCW3538	Teledyne; L21088-5	SSGS Discharge Tunnel @ 3' Concrete Wall Core - SR-56 Bucking Structure	0.0138	0.0683	28.9	0.0876	0.148	0.0119	2.43	May 6, 2003	70
SXSSD99730	111031	[illegible] SSGS Discharge Tunnel Floor Sediment [illegible]		0.9	27					November 17, 1999	1336
SXSSD99729	111030	[illegible] 2nd Seal Chamber Sediment [illegible]		0.3	43					November 17, 1999	1336
SX105D980034	109431	1st Seal Chamber Civil Pile Below 3" Vertical Drain Line		0.09	62	0.05	0.04	0.04		July 22, 1999	1454
SX105D980031	109430	Discharge Tunnel Wall Scraping		0.84	120	0.2	0.04	0.04		July 29, 1999	1447
SX105D980033	Teledyne- TI-16888	Discharge Tunnel 6" Drain Line Scraping	8	30	4800	5.4	1.6	2.5	55	July 22, 1999	1454
SXSSD255 & 256	111153	[illegible] SSGSDT 8" & 18" Pipe Inserted Composites (180 & 187) [illegible]				0.018	0.002	0.0081		November 17, 1999	1336
SXSSD2616, 262	111154	[illegible] SSGSDT Floor Sediment Composite @ 180 & 826' [illegible]				0.036	0.0005	0.0042		November 17, 1999	1336
SXSSD99752	111152	[illegible] SSGSDT 18" Pipe Inserted @ 1[illegible]				0.04	0.0018	0.02		November 17, 1999	1336
SXSSD99757	111155	[illegible] SSGSDT Seal Chamber @ 40' Sediment [illegible]				0.3	0.005	0.009		November 17, 1999	1336
SXSSD99758	111156	[illegible] SSGSDT Seal Chamber #3 Sediment [illegible]				0.02	0.0015	0.0071		November 17, 1999	1336
SXSSD99759	111157	[illegible] SSGS Discharge Tunnel Floor Sediment @ 32' [illegible]				0.021	0.0037	0.012		November 17, 1999	1336

	T 1/2 (d)	T 1/2 (d)	T 1/2 (d)	T 1/2 (d)	T 1/2 (d)	T 1/2 (d)	T 1/2 (d)
	10446.15	1925.23275	11019.5925	157861.05	32050.6875	8813847.75	36561.525
	Sr-90	Co-60	Cs-137	Am-241	Pu-238	Pu-239	Ni-63
	0.190	0.008	1.001	0.032	0.015	0.015	7.481
		0.010	1.301	0.597	0.010	0.040	
	0.017	0.127	1.414	0.131	0.260	0.130	2.646
		0.371	1.747				
		0.124	2.023				
		0.093	2.023				
	0.018	0.046	2.791	0.070	0.010	0.007	
	0.019	0.046	2.884	0.030	0.007	0.007	
		0.309	3.494				
		0.247	3.953				
		0.185	6.436				
	7.264	1.777	19.348	0.397	0.291	0.300	29.184
	0.014	0.065	26.782	0.088	0.148	0.012	2.427
		0.556	24.824				
		0.185	39.535				
		0.053	56.582	0.050	0.039	0.040	
		0.499	109.562	0.199	0.039	0.040	
	7.264	17.775	4380.561	5.366	1.550	2.500	53.505
				0.018	0.002	0.008	
				0.035	0.000	0.004	
				0.040	0.002	0.020	
				0.298	0.005	0.009	
				0.020	0.001	0.007	
				0.021	0.004	0.012	
Mean⇒	*2.11E+00*	*1.25E+00*	*2.60E+02*	*4.62E-01*	*1.49E-01*	*1.97E-01*	*1.90E+01*
% of Total⇒	*0.745%*	*0.440%*	*91.812%*	*0.163%*	*0.052%*	*0.069%*	*6.718%*
Median⇒	1.85E-02	1.56E-01	3.72E+00	5.97E-02	9.75E-03	1.35E-02	7.48E+00
Sigma⇒	3.52E+00	4.14E+00	1.03E+03	1.32E+00	3.85E-01	6.19E-01	2.22E+01
2 Sigma + Mean⇒	9.15E+00	9.54E+00	2.32E+03	3.10E+00	9.19E-01	1.43E+00	6.34E+01

Attachment 3
Effective Area DCGL for Cs-137 (dpm/100 cm^2)

Effective DCGL Calculator for Cs-137 (dpm/100 cm^2)

Gross Activity DCGLw		Removable Activity Administrative Limit	
8543	dpm/100 cm^2	6407	dpm/100 cm^2

25.0 mrem/y TEDE Limit

SAMPLE NO(s)=> Discharge Tunnel Surface Area

Cs-137 Limit		Cs-137 Administrative Limit	
8233	dpm/100 cm^2	6174	dpm/100 cm^2

SNEC AL: 75%

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	Individual Limits (dpm/100 cm^2)	Allowed dpm/100 cm^2	mrem/y TEDE	Beta dpm/100 cm^2	Alpha dpm/100 cm^2	
1	Am-241	3.10E+00	0.129%	27	11.00	10.19	N/A	11.00	Am-241
2	C-14		0.000%	3,700,000	0.00	0.00	0.00	N/A	C-14
3	Co-60	9.54E+00	0.396%	7,100	33.85	0.12	33.85	N/A	Co-60
4	Cs-137	2.32E+03	96.364%	28,000	8232.58	7.35	8232.6	N/A	Cs-137
5	Eu-152		0.000%	13,000	0.00	0.00	0.00	N/A	Eu-152
6	H-3		0.000%	120,000,000	0.00	0.00	Not Detectable	N/A	H-3
7	Ni-63	6.34E+01	2.633%	1,800,000	224.98	0.00	Not Detectable	N/A	Ni-63
8	Pu-238	9.19E-01	0.038%	30	3.26	2.72	N/A	3.26	Pu-238
9	Pu-239	1.43E+00	0.059%	28	5.07	4.53	N/A	5.07	Pu-239
10	Pu-241		0.000%	880	0.00	0.00	Not Detectable	N/A	Pu-241
11	Sr-90	9.15E+00	0.380%	8,700	32.47	0.09	32.47	N/A	Sr-90
			100.000%		8543	25.0	8299	19	
					Maximum Permissible dpm/100 cm^2				

Effective Volumetric DCGL for Cs-137 (pCi/g)

Effective DCGL Calculator for Cs-137 (in pCi/g)

SNEC AL:	75%	Total Activity Limit DCGLw		Administrative Limit	
		6.62	pCi/g	4.97	pCi/g

SAMPLE NUMBER(s)=> Discharge Tunnel Volumetric

Cs-137 Limit		Cs-137 Administrative Limit	
6.38	pCi/g	4.78	pCi/g

25.0 mrem/y TEDE Limit

2844.37% mrem/y Drinking Water (DW) Limit

☑ Check for 25 mrem/y

	Isotope	Sample Input (pCi/g, uCi, etc.)	% of Total	25 mrem/y TEDE Limits (pCi/g)	A - Allowed pCi/g for 25 mrem/y TEDE	B - Allowed pCi/g for 4 mrem/y DW	Value Checked from Column A or B	This Sample mrem/y TEDE	This Sample mrem/y DW	
1	Am-241	3.100	0.129%	9.9	0.01	0.11	0.01	7.83	0.00	Am-241
2	C-14		0.000%	2.0	0.00	0.00	0.00	0.00	0.00	C-14
3	Co-60	9.540	0.396%	3.5	0.03	0.04	0.03	68.14	0.00	Co-60
4	Cs-137	2320.00	96.364%	6.6	6.38	0.09	6.38	8787.88	0.00	Cs-137
5	Eu-152		0.000%	10.1	0.00	0.00	0.00	0.00	0.00	Eu-152
6	H-3		0.000%	132	0.00	0.00	0.00	0.00	0.00	H-3
7	Ni-63	63.40	2.633%	747	0.17	2.11	0.17	2.12	0.00	Ni-63
8	Pu-238	0.919	0.038%	1.8	0.00	0.03	0.00	12.76	0.00	Pu-238
9	Pu-239	1.430	0.059%	1.8	0.00	0.03	0.00	22.34	0.00	Pu-239
10	Pu-241		0.000%	86	0.00	0.00	0.00	0.00	0.00	Pu-241
11	Sr-90	9.150	0.380%	1.2	0.03	0.32	0.03	190.63	0.00	Sr-90
		2.41E+03	100.000%		6.62	84.64	6.62	9091.704	113.775	
					Maximum Permissible pCi/g (25 mrem/y)	Maximum Permissible pCi/g (4 mrem/y)		To Use This Information, Sample Input Units Must Be in pCi/g		

Attachment 4

Control Copy #_____

Shonka Research Associates, Inc.
4939 Lower Roswell Road, Suite 106
Marietta GA 30068
770-509-7606

Surface Contamination Monitor

SCM Procedure 001, Rev6

Confirmation and Calibration of the Incremental Encoder

Table A 1. Revision Table

REVISION	AUTHOR(S)	REVIEWED BY: D. DEBORD		BRIEF SUMMARY OF CHANGES
		REVIEWER(S)	DATE	
006	M. Marcial		9/7/01	Added details on how to name the survey name that is also the SCM filename.

QA REVIEW BY: D. SHONKA	DATE:
	9/7/01
EFFECTIVE DATE: 9/7/01	

1. Purpose

This procedure establishes the methods for calibration and verification of the incremental encoder included on the SCM.

2. Scope and Limitations

This procedure applies to version 2.0 or later of the process software. Any SCM used to conduct a rolling survey must have completed a valid encoder confirmation. Perform a new encoder confirmation if any of the following occur.

1. Maintenance on the encoder
2. Disassembly/re-assembly of the cart
3. Adding a new computer, software, or encoder to the cart.
4. 24 months since last confirmation
5. Operator notices anomalies in the reported strip length

Perform a calibration whenever the mean of an encoder confirmation exceeds 1% error.

3. Definitions and Acronyms

Table 1. Definitions and Acronyms.

ITEM	DESCRIPTION
SCM	The Surface Contamination Monitor is a mobile platform containing detectors, support electronics, and data logger used for conducting radiological surveys.
Incremental Encoder	Electronic device used to measure rotation.
Target Survey Speed	Maximum survey speed determined to support required MDA
MDA	Minimum Detectable Activity

4. General Information

The incremental encoder provides a method of determining the distance traveled by the SCM. The encoder turns and generates TTL level pulses at regular intervals. A calibration factor in pulses per inch allows the SCM to determine distance by number of pulses. This calibration factor could be determined by dividing the pulses per rotation by the circumference of the wheel. To reduce the impact of measurement error this procedure determines the calibration factor by rolling the cart a known distance and dividing by the pulses received by the counter card in the SCM to get a pulse/in factor.

The user must be cautious to operate the SCM in straight lines parallel to the measuring tape. Failure to do so can result in distance errors of more than 1%.

5. Materials, Equipment, and Supplies

Table 2 . Materials, Equipment, and Supplies.

ITEM	SPECIFICATION
SCM	Model 3
SCM Process Software	Version 2.0 or later
Tape Measure	30 ft. 10 m. or longer
Tape	Tape must be suitable for securing tape measure to floor surface such as electrical tape.

6. Responsibilities

6.1. Operator

6.1.1. Reads and becomes familiar with this procedure before performing calibration.

6.1.2. Has successfully completed SCM I training.

6.1.3. Performs measurements in accordance to this procedure.

7. Procedure

NOTE: Any means that is suitable for securing the tape measure to the floor may be substituted for electrical tape.

7.1. Confirmation of encoder for use in US mode

7.1.1. Secure the tape measure to the floor with a piece of electrical tape at the zero inch mark.

7.1.2. Extend the tape measure and secure it to the floor at a distance not less than 30 feet with a second piece of electrical tape.

7.1.3. Record the distance in inches on the "Incremental Encoder Calibration Verification Data Sheet for Use in Inch Mode" provided in Appendix A.

7.1.4. If the SCM is powered off, turn on the system and launch the process software.

7.1.5. If the target survey speed is less than 2 in/sec, set the motor controller to 2 in/sec, else set the motor controller to the target survey speed.

7.1.6. Enter a new survey name. See SCM Procedure 011.

7.1.7. Position the SCM at either piece of electrical tape.

7.1.8. Initiate the measurement by pressing the <Enter> key.

7.1.9. Roll the cart forward until and line up with the opposite piece of electrical tape.

NOTE: The cart must be kept traveling in a straight line. The operator may use the tape measure and a fixed point on the frame to guide the cart. In addition, take care when aligning the cart to the tape to avoid parallax error.

7.1.10. Complete the measurement by pressing the <Enter> key.

7.1.11. Record the reported strip length in inches on the "Incremental Encoder Calibration Verification Data Sheet for Use in Inch Mode" provided in Appendix A.

7.1.12. Follow the software prompts and repeat steps 7.1.7- 7.1.11 two additional times.

7.1.13. Proceed to Section 8.1 and perform acceptance criteria calculations.

7.2. Confirmation of encoder for use in metric mode

7.2.1. Secure the tape measure to the floor with a piece of electrical tape at the zero meter mark.

7.2.2. Extend the tape measure and secure it to the floor at a distance of 10 meters or more with a second piece of electrical tape.

7.2.3. Record the distance in meters in the "Actual Distance" blank on the "Incremental Encoder Calibration Verification Data Sheet for Use in Metric Mode" provided in Appendix B.

7.2.4. If the SCM is powered off, turn on the system and launch the process software.

7.2.5. If the target survey speed is less than 2 in/sec, set the motor controller to 2 in/sec, else set the motor controller to the target survey speed.

7.2.6. Enter a new survey name. See SCM Procedure 011, "Survey Naming Convention when Using the SCM".

7.2.7. Position the SCM at either piece of electrical tape.

7.2.8. Initiate the measurement by pressing the <Enter> key.

7.2.9. Roll the cart forward and line up with the opposite piece of electrical tape.

NOTE: The cart must be kept traveling in a straight line. The operator may use the tape measure and a fixed point on the frame to guide the cart. In addition, take care when aligning the cart to the tape to avoid parallax error.

7.2.10. Complete the measurement by pressing the <Enter> key.

7.2.11. Record the reported strip lengths in inches in the Strip Distance Table on the form "Metric Mode Incremental Encoder Calibration Verification Form" provided in Appendix B.

7.2.12. Follow the software prompts and repeat steps 7.2.7- 7.2.11 two additional times.

7.2.13. Proceed to Section 8.2 and perform acceptance criteria calculations.

7.3. Encoder Calibration

This section uses the "Encoder Calibration Data Sheet" provided in Appendix C.

7.3.1. Perform confirmation measurements outlined in 7.1 or 7.2 depending on mode of operation.

7.3.2. Record the mean of the three confirmation measurements in the "$Distance_{Old}$" blank.

7.3.3. Record the old encoder calibration constant (found on line 7 of the FM.DEF file) in the "$Constant_{old}$" blank.

7.3.4. Record the target distance in the "$Distance_{Target}$" blank. For US mode the target distance will be the actual distance traveled. Use Equation 1 to calculate the target distance for Metric mode.

7.3.5. Calculate the new encoder constant using Equation 1.

Equation 1. Calculation for encoder constant.

$$CONSTANT_{New} = \frac{CONSTANT_{Old} * DISTANCE_{Old}}{DISTANCE_{Target}}$$

7.3.6. Record the new encoder constant in the "$Constant_{New}$" blank.

7.3.7. Update Line 7 of FM.DEF with the new encoder constant.

7.3.8. Perform encoder confirmation in steps 7.1 or 7.2 depending on mode of operation.

8. Acceptance Criteria

8.1. Acceptance Criteria for US mode

8.1.1. Calculate the mean of the three measurements and ensure that it is within 1% of the actual distance traveled by the SCM.

8.1.2. Calculate the percent deviation from the mean for each of the three measurements using equation 2 and ensure that the deviation for each measurement is below 3%.

Equation 2. Calculation for percent deviation from the mean.

$$Deviation_{\%} = \left| \frac{Mean_{inch} - Measurement_{inch}}{Mean_{inch}} \right|$$

8.1.3. Record the mean and percent deviation from the mean for each measurement on the "Incremental Encoder Calibration Verification Data Sheet for Use in Inch Mode" provided in Appendix A.

8.1.4. If the deviation from the mean is larger than 3% for any measurement, repeat the confirmation test or troubleshoot encoder system.

8.1.5. If the mean of the three measurements differs from the actual distance by more than 1%, proceed to 7.3 and perform calibration.

8.2. Acceptance Criteria for Metric mode

8.2.1. Convert the Actual Distance in meters to Target Distance in inches using Equation 4. Equation 3 provides the derivation.

Equation 3. Target distance in inches derivation.

$$TargetDistance_{inch} = ActualDistance_{meter} \times \frac{100_{cm/meter}}{5_{cm/pixel}} \times 2_{inch/pixel}$$

Equation 4. Calculation of target distance in inches.

$$TargetDistance_{inch} = ActualDistance_{meter} \times 40_{inch/meter}$$

8.2.2. Record target distance on the form "Incremental Encoder Calibration Verification Data Sheet for Use in Metric Mode" provided in Appendix B.

8.2.3. Record the mean and percent deviation from the mean for each measurement on the "Incremental Encoder Calibration Verification Data Sheet for Use in Metric Mode" provided in Appendix B.

8.2.4. Calculate the mean of the three measurements and ensure that it is within 1% of the target distance.

Equation 5. Calculation for percent deviation from the mean for metric mode.

$$Deviation_{\%} = \left| \frac{Mean_{inch} - Measurement_{inch}}{Mean_{inch}} \right|$$

8.2.5. Calculate the percent deviation from the mean for each of the three measurements using Equation 5 and ensure that the deviation for each measurement is below 3%.

8.2.6. If the deviation from the mean is larger than 3% for any measurement, repeat the confirmation test or troubleshoot encoder.

8.2.7. If the mean of the three measurements differs from the target distance by more than 1%, proceed to 7.3 and perform calibration.

9. References

9.1. N/A

10. Required Records

10.1. Incremental Encoder Calibration Verification Form

10.2. SCM Procedure 011, "Survey Naming Convention when Using the SCM"

11. Appendices

11.1. Appendix A: Incremental Encoder Calibration Verification Data Sheet for Use in Inch Mode

11.2. Appendix B: Incremental Encoder Calibration Verification Data Sheet for Use in Metric Mode

11.3. Appendix C: Encoder Calibration Data Sheet

Appendix A

Incremental Encoder Calibration Verification Data Sheet

for Use in Inch Mode

Inch Mode
Incremental Encoder Calibration
Verification Form

DATE: _____ SCM SERIALNUMBER: _____

SCM SPEED: _____IN/SEC

ACTUAL DISTANCE:_____IN

Note: Perform this test at the intended survey speed, unless the survey speed is less than 2 in/sec. If survey speed is less than 2 in/sec then perform test at 2 in/sec.

Table 3. Strip lengths.

MEASUREMENT	DISTANCE (INCHES)	DEVIATION FROM MEAN (%)
1		
2		
3		
MEAN		XXXXXXXX

MEAN VARIANCE FROM ACTUAL DISTANCE: _____ %

INITIALS ___	MEAN VARIANCE FROM ACTUAL DISTANCE LESS THAN 1%
INITIALS ___	DEVIATION FROM MEAN FOR EACH MEASUREMENT WITHIN 3% OF THE ACTUAL MEASUREMENTS
INITIALS ___	PASSED
INITIALS ___	FAILED WHY: _____

PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Appendix B

Incremental Encoder Calibration Verification Data Sheet

for Use in Metric Mode

Metric Mode
Incremental Encoder Calibration
Verification Form

DATE: _____ SCM SERIALNUMBER: _____

SCM SPEED: _____IN/SEC ACTUAL DISTANCE:_____METERS

TARGET DISTANCE: ____ INCHES

Note: Perform this test at the intended survey speed, unless the survey speed is less than 2 in/sec. If survey speed is less than 2 in/sec then perform test at 2 in/sec.

Table 4. Strip lengths.

MEASUREMENT	DISTANCE (INCHES)	DEVIATION FROM MEAN (%)
1		
2		
3		
MEAN		XXXXXXXX

MEAN VARIANCE FROM ACTUAL DISTANCE: _____ %

INITIALS ___ MEAN VARIANCE FROM ACTUAL DISTANCE LESS THAN 1%

INITIALS ___ DEVIATION FROM MEAN FOR EACH MEASUREMENT WITHIN 3% OF THE ACTUAL MEASUREMENTS

INITIALS ___ PASSED

INITIALS ___ FAILED WHY: _____

PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Appendix C

Encoder Calibration Data Sheet

Encoder Calibration Form

DATE: _____ SCM SERIALNUMBER: _____

SCM SPEED: _____IN/SEC ACTUAL DISTANCE:_____INCH

Note: Perform this test at the intended survey speed, unless the survey speed is less than 2 in/sec. If survey speed is less than 2 in/sec then perform test at 2 in/sec.

$DISTANCE_{OLD}$
(MEAN OF 3 DISTANCE MEASUREMENTS): _____ INCH

$CONSTANT_{OLD}$
(LINE 7 OF FM.DEF): _____ PULSE/INCH

$DISTANCE_{TARGET}$
(US – ACTUAL DISTANCE | METRIC – TARGET DISTANCE): _____ INCH

$$Constant_{New} = \frac{Constant_{Old} * Distance_{Old}}{TargetDistance}$$

$CONSTANT_{NEW}$: _____ %

INITIALS ___ LINE 7 OF FM.DEF UPDATED WITH $CONSTANT_{NEW}$

INITIALS ___ PERFORM ENCODER CONFIRMATION

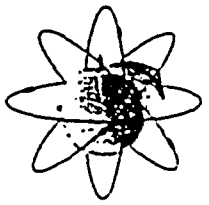
INITIALS ___ PASSED

INITIALS ___ FAILED WHY: _____

PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Attachment 5



Control Copy #_____

Shonka Research Associates, Inc.
4939 Lower Roswell Road, Suite 106
Marietta GA 30068
770-509-7606

Surface Contamination Monitor

SCM Procedure 005, Rev6

Requirements for Completion of a Survey Using the SCM

Table A 1. Revision Table

REVISION	AUTHOR(S)	REVIEWED BY		BRIEF SUMMARY OF CHANGES
		REVIEWER(S)	DATE	
005	M. Marcial		9/7.01	Updated responsibility section, general typos, made references to response and daily checks uniform, added reference to SCM Procedure 006 and 011.
006	J. Kelley	D. DeBord	7.17.03	Added text that references the MDCs set for by the client to sections 4.1 and 7.4.5

QA REVIEW BY: D. SHONKA	DATE:
Deborah Shonka	7/17/03
EFFECTIVE DATE: 7/17/03	

1. Purpose

This procedure details the requirements for completion of a survey using the SCM.

2. Scope and Limitations

This procedure applies to version 2.0 or later of the SCM process software.

3. Definitions and Acronyms

Table 1. Definitions and Acronyms.

ITEM	DESCRIPTION
SCM	The Surface Contamination Monitor is a mobile platform containing detectors, support electronics, and data logger used for conducting radiological surveys.
SIMS	Survey Information Management System – SIMS is flexible and comprehensive interfacing software for the SRA SCM. SIMS processes the SCM instrument data with a sophisticated data parser, integrated spreadsheet, and powerful special functions such as spatial data filters. SIMS provides the most flexible reporting system available for printing survey records or complete stand-alone survey reports. SIMS contains all the tools needed to meaningfully communicate between the SCM and the data analysis team.
PSPC	Position Sensitive Proportional Counter – This is a radiation detector that is capable of establishing where along the detector a pulse is sensed (the system is described in NUREG/CR-6450). The detectors are similar in efficiency to other counters, but have backgrounds associated with small area detectors (5cm x 5cm). This results in improved sensitivity, due to low background, and specific identification of the location of the radioactivity. The PSPCs may be fabricated in any length.
SRC	Source Response Check – Determines if the system is operating the same from day-to-day.
PBC	Performance Based Check – Determines the system efficiency and performance.

4. General Information

4.1. Rolling Mode

Check the wheel encoder upon arrival on site per "SCM Procedure 001". Check the PSPC per "SCM Procedure 007".

The Project Manager establishes the survey speed based on the isotopes of concern and the desired sensitivities set forth by the client. The SCM system is capable of concurrent alpha, beta and gamma surveys.

An SCM survey uses the concept of survey strips. SIMS reassembles the strips to provide complete documentation of a survey without requiring any manual transfer of data. The operator makes a crude sketch of the area and indicates the direction and start point of each strip. Record the filename of the survey on the sketch and, if available, note a reference coordinate for one of the corners of the survey area. The surface does not need to be pre-gridded. Mark the surface into survey lanes using a chalk line or other markings. The wheel encoder enables tracking of distance down each lane. Markings on the detector housing allow the operator to align the detector to the lane. Each lane is twice as wide as the detector. Typical survey lanes are about 12 feet wide.

Start the SCM software if it is not already active and enter the survey parameters:

- Survey Name (Filename),
- Room ID, and
- Equipment ID.

Use the speed indicator on the computer display to adjusted to the proper survey speed. After establishing the speed, disengaged the motor and position the SCM with the front of the first PSPC at least 10 cm before the start of the first survey lane. Start the motor and begin logging data as the leading edge of the first PSPC enters the survey lane by pressing the <Record> button. The motor maintains a constant speed, while the operator guides the cart down the lane unless using the fly-by-wire or autonomous carts. Upon reaching the end of the lane, press the <Stop> button on the SCM screen and optionally disengaged the motor. Position the cart to record the next lane. Repeat this process until completing the survey.

Change the filename and optionally the Room ID to prepare the instrument for the next survey area. The display provides information during the survey process, such as, survey name, strip number, distance traveled in strip, target speed and current speed, alarm set points, and detector data. Two different display types for the detector data exist in the SCM process software. For a pixilated image of the flux from the floor with color corresponding to intensity, select the visualization screen. For a more

traditional feel, select the bar graph screen that has rows corresponding to roughly 4-inch bins across the detector. The system also provides visual and audible alarms to the user to indicate problems with operating parameters such as speed. The SCM logs data to the disk drive from any combination of the detectors while the <Record> key is active. This permits reassembly of the data in the SIMS application.

4.2. Corner Mode

Use the corner detector operated in a data-logging mode to survey areas not accessible with the SCM attached to the motor driven cart. The output of corner mode is compatible with SIMS. The corner detector is a PSPC operated in a similar fashion to the SCM rolling survey, but with a fixed time interval for each detector placement and data acquisition. The Project Manager establishes the time interval to provide a sensitivity that is consistent with that established for the rolling mode.

Measure out 10 cm strips along the surface being measured. Start the SCM software if it is not already active and enter the survey parameters: Survey Name (Filename), Room ID, and Equipment ID. Position the detector between the first set of marks and press <Record> button in the SCM process software. At the end of the preset time interval, the system stops recording. Move the detector into the next position, and record the next strip. Repeat this process until completing the survey.

5. Materials, Equipment, and Supplies

Table 2. Materials, Equipment, and Supplies.

ITEM	SPECIFICATION
SCM	Model 3
SCM Process Software	Version 2.0 or later
PSPC	Typical lengths include 0.9 and 1.8 meter
Tape Measure	30 ft, 10 m, or longer
Chalk Line	30 ft, 10 m, or longer depending on survey lane length
Check Source	Alpha, beta or gamma as appropriate

6. Responsibilities

6.1. Project Manager

6.1.1. Reads and becomes familiar with this procedure.

6.1.2. Ensures all surveys are performed according to this procedure.

6.1.3. Establishes the rolling mode speed and detector height.

6.1.4. Establishes the corner mode count time and detector height.

6.2. Operator

6.2.1. Reads and becomes familiar with this procedure before performing calibration.

6.2.2. Performs all surveys according to this procedure.

6.2.3. Operates the SCM during the survey.

6.2.4. Guides and monitors the SCM's speed throughout the surveys.

6.2.5. Has successfully completed SCM I training.

7. Procedure

7.1. SCM Preparation

7.1.1. Remove the protective cover from the detector housing.

7.1.2. Set the detector housing to the proper height for the survey. Perform alpha surveys with the detector set at 1/4" above the surface or as directed by the Project Manager. Beta surveys may vary from 1/4" to 3/4" depending on the isotope. Verify the setting with the Project Manager.

7.1.3. Set the high voltage control on the electronics module to "Alpha" for alpha surveys and "Beta" for beta surveys.

7.1.4. Power on the GM Rate Meter, if conducting a concurrent GM survey.

7.1.5. Purge the detector and insure that P-10 gas flow is indicated on the outlet flow gauges.

7.1.6. If this is the initial project survey, perform steps 7.2; else proceed to step7.3.

7.2. Confirmation of Operation (Performed at beginning of project and as required by referenced procedures)

7.2.1. Launch SCM process software.

7.2.2. Verify PSPC position response. In addition, if required, perform a position calibration in accordance with "SCM Procedure 006".

7.2.3. Perform encoder calibration per "SCM Procedure 001". Perform the encoder calibration at the beginning of each project, and after maintenance affecting the encoder wheel.

7.3. Survey Setup

7.3.1. If this is the beginning of a shift, perform PSPC daily source response check (SRC) per "SCM Procedure 007". Perform the SRC at the beginning of each shift. Perform periodic performance based response checks (PBC) during the survey in accordance with "SCM Procedure 007".

7.3.2. Make a crude sketch of the survey area including distances, if a CAD drawing is not available.

7.3.3. Identify and mark survey lanes using a tape measure and chalk line or other markings.

7.3.4. Indicate strip locations and directions on sketch with arrows.

7.3.5. Record the filename of the survey on the sketch.

7.3.6. Identify SW corner on drawing and if available provide a reference coordinate.

7.4. Rolling Survey Operations

7.4.1. When prompted, enter a survey name and record the name on the sketch. See "SCM Procedure 011" for survey naming conventions.

7.4.2. Confirm the PSPC detector in the "Supervisor/Select Detectors" screen.

7.4.3. Confirm the operation mode is set to "Encoder".

7.4.4. Return to the operations screen.

7.4.5. Set the survey speed in the "Operator/Alarm Set Points" screen. Survey speed for alpha surveys is normally 1"/sec. Beta survey speeds may vary from 2"/sec. to 6"/sec. Verify the speed for the survey with the Project Manager who will determine one that meets the survey MDCs.

7.4.6. Engage the motor and adjust the speed.

7.4.7. Disengage the motor.

7.4.8. Select the "Visualization" Screen.

7.4.9. Position the SCM with the front of the first PSPC at least 10 cm before the start of the first survey lane.

7.4.10. Start the motor and begin logging data as the leading edge of the first PSPC enters the survey lane by pressing the <Record> button.

7.4.11. Guide the SCM down the strip.

7.4.12. Upon reaching the end of the strip, disengage the motor.

NOTE:
Any deviation from the survey lane (strip path) will result in errors in the mapping of surface activity.

7.4.13. Press the <Stop> button on the operations screen.

7.4.14. Position the detector at the beginning of the next strip aligning the markings on the detector housing with the chalk lines on the floor. The detector housing is typically marked 10cm from each end.

7.4.15. Repeat steps 7.4.9 to 7.4.14 for all strips in the survey.

7.4.16. Perform performance based checks in accordance with "SCM Procedure 007".

7.5. Corner Detector Operations

7.5.1. Use the Corner detectors to acquire data in areas that are normally not accessible to the SCM used with the motor driven cart.

7.5.2. Set up of the corner detectors for binning constants, high voltage settings, and baseline source response checks is the same as other PSPCs.

7.5.3. Confirm the operation mode is set to "Corner".

7.5.4. Set the timer for the time necessary to obtain count times consistent with the speed of the motor driven SCM for the same area. The timer should be set for a value equal to the width of the detector, typically 10 cm, divided by the travel speed. Verify the timer setting with the Project Manager.

7.5.5. If a survey name has not been provided, enter a survey name that reflects the area (consistent with the survey name used with the motor driven cart). The "SCM Procedure 011" details the naming of surveys.

7.5.6. Draw a sketch of the area, if a CAD drawing is not available.

7.5.7. Denote the location of each strip taken with the corner detector, including any overlaps with other strips.

7.5.8. Press the <Enter> key on the keyboard or press the remoted pendant <Record> button to acquire a strip. The count will complete at the end of the preset time.

7.5.9. Perform performance based checks in accordance with SCM Procedure 007.

8. Acceptance Criteria

None - Specific procedures provide acceptance criteria for calibration activities.

9. References

9.1. SCM Procedure 001 "Confirmation and Calibration of the Incremental Encoder on Encoder Equipped Models of the SCM".

9.2. SCM Procedure 007 "Source Response Check and Performance based Checks of any PSPC Detector Configuration Installed on the SCM".

9.3. SCM Procedure 008 "Conduct of Operations for Surveys Using the SCM/SIMS". SCM Procedure 011 "Survey Naming Convention when Using the SCM".

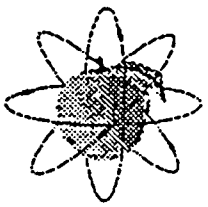
10. Required Records

All data acquired during the survey is transferred to SIMS for processing. The "SCM Procedure 008" details the maintenance of all survey records.

11. Appendices

N/A

Attachment 6



Control Copy #_____

Shonka Research Associates, Inc.
4939 Lower Roswell Road, Suite 106
Marietta GA 30068
770-509-7606

Surface Contamination Monitor

SCM Procedure 006, Rev4

Performance of a Position Calibration on a PSPC

Table A 1. Revision Table

REVISION	AUTHOR(S)	REVIEWED BY: D. DEBORD		BRIEF SUMMARY OF CHANGES
		REVIEWER(S)	DATE	
004	M. Marcial		9/7/01	Added cover sheet and revision sheet.

QA REVIEW BY: D. SHONKA	DATE:
	9/7/01
EFFECTIVE DATE: 9/7/01	

1. Purpose

This procedure details the requirements for performing a position calibration of a PSPC detector array.

2. Scope and Limitations

This procedure applies to version 2.0 or later of the Surface Contamination Monitor process software.

3. Definitions and Acronyms

Table 1. Definitions and Acronyms.

ITEM	DESCRIPTION
SCM	The Surface Contamination Monitor is a mobile platform containing detectors, support electronics, and data logger used for conducting radiological surveys.
SIMS	Survey Information Management System – SIMS is flexible and comprehensive interfacing software for the SRA SCM. SIMS processes the SCM instrument data with a sophisticated data parser, integrated spreadsheet, and powerful special functions such as spatial data filters. SIMS provides the most flexible reporting system available for printing survey records or complete stand-alone survey reports. SIMS contains all the tools needed to meaningfully communicate between the SCM and the data analysis team.
PSPC	Position Sensitive Proportional Counter – This is a radiation detector that is capable of establishing where along the detector a pulse is sensed (the system is described in NUREG/CR-6450). The detectors are similar in efficiency to other counters, but have backgrounds associated with small area detectors (5cm x 5cm). This results in improved sensitivity, due to low background, and specific identification of the location of the radioactivity. The manufacturer of PSPCs makes them in any length.
Peak Edge	The channel that is halfway between the maximum and minimum of the peak on the side of the peak facing the nearest MHV connector.

4. General Information

The design of the SCM acquisition system allows several detector configurations. To this end, the acquisition engine and software provides for adjustments to allow for the differences between the attributes of the different detector configurations. The most important of these adjustments is the position calibration.

The position calibration allows the software to take the recorded information by the acquisition system and map it to a position on the detector.

5. Materials, Equipment, and Software

Table 2. Materials, Equipment, and Software.

ITEM	SPECIFICATION
SCM	Model 3
SCM Process Software	Version 2.0 or later
PSPC	Typical lengths include 0.9 and 1.8 meter
Check Source	Collimated alpha source or other source if collimated alpha is not available
STITCHER	Version 3.0 or later
VISUSPECT	Version 3.0 or later

6. Responsibilities

6.1. Operator

6.1.1. Reads and becomes familiar with this procedure before performing calibration.

6.1.2. Performs all measurements according to this procedure.

6.1.3. Has successfully completed SCM I and SCM II Training.

7. Procedure

7.1. Perform Confirmation of Position Calibration

7.1.1. Connect a pre-amp module to each end of the detector array.

7.1.2. Place the source at the end of the intended active area of the array.

7.1.3. Press the <Acquire> button in the SCM process software to start a one-minute acquisition.

7.1.4. Verify that the peak occurs at the outer edges of the display screen.

7.1.5. If the peak does not occur at the outer edge of the display, perform steps 7.2.

7.1.6. Repeat steps 7.1.2 to 7.1.5 for the left end of the intended active area of the array.

7.1.7. Return to the operations screen.

7.2. Set Binning Constants

7.2.1. Press the <Setup> button.

7.2.2. Press the <Supervisor> button.

7.2.3. Press the <Calibrations> button.

7.2.4. Press the <Detector Position> button.

7.2.5. Enter the position analyzer by pressing <Use Position Analyzer> button.

7.2.5.1. Edit Detector Binning Constants using the following steps:

7.2.5.2. Place a high-count rate, collimated alpha source at the far left end (as you are looking at the detector from the operator's position). When using a recount detector, place the source at the left end of the primary (rear) detector. Detector ends are normally marked with tape and are inboard of the MHV connectors. Typically, detector ends are 10 cm from the outside edge of the PSPC.

7.2.5.3. Press the <B> (Binning Constants) button.

7.2.5.4. Press the <L> button to start an acquisition. This function positions the cursor near the left peak.

7.2.5.5. Use the left or right arrows as necessary to position the cursor at the peak edge.

7.2.5.6. When the cursor is set, move the source to the right end of the detector. For a recount assembly, place the source under the left edge of the recount (front) detector.

7.2.5.7. Press the <L> button again to set the left channel. This action causes the cursor to move to the right peak.

7.2.5.8. Use the left or right arrows as necessary to position the cursor at the peak edge.

7.2.5.9. Press the <R> button to set the right channel.

7.2.5.10. Press the <ESC> key to return to the position analyzer screen.

7.2.6. The computer will calculate the slope and intercept using the left and right channels identified by the peaks.

7.2.7. If the detector array contains more than 1 detector, perform step 7.3.

7.3. Set Detector Endpoints using the Following Steps:

7.3.1. Press the <Acquire> button to start a one-minute acquisition.

7.3.2. Move a high-count rate, collomated alpha source to each end of each detector.

7.3.3. Record the peak edge of each peak.

7.3.4. Press the <Quit> button to exit the position analyzer.

7.3.5. Press the <Set Detector End Points> button to edit the detector endpoints.

7.3.6. Enter the endpoint for each detector.

7.3.7. Press the <Save> button.

7.3.8. Press the <Return to Operations> button.

8. Acceptance Criteria

End point verification indicates that the peak from the collimated source appears at the outer edges of the computer display screen.

9. Appendices

9.1. None

Attachment 7

Control Copy #_____

Shonka Research Associates, Inc.
4939 Lower Roswell Road, Suite 106
Marietta GA 30068
770-509-7606

Surface Contamination Monitor

SCM Procedure 007, Rev7

Source Response Check and Performance Based Check of any PSPC Detector Configuration Installed on the SCM

Table A 1. Revision Table

REVISION	AUTHOR(S)	REVIEWED BY: D. DEBORD		BRIEF SUMMARY OF CHANGES
		REVIEWER(S)	DATE	
006	M. Marcial		9/7/01	Added cover sheet, revision sheet, Project Manager responsibilities, made uniform the naming of checks and added reference SCM Procedure 011. Added sigma evaluation to acceptance criteria. Quality Control >> Performance Based
007	J. Kelley	D. DeBord	7/17/03	Added action upon failure to meet acceptance criteria. Section 8.1.2 and 8.2.1 include the changes. In step 7.1.10 the steps to repeat are 7.1.7 to 7.1.9 not 7.1.5 to 7.1.7. Formatting was added to section 8.

QA REVIEW BY: D. SHONKA	DATE:
Deborah B Shonka	7/17/03
EFFECTIVE DATE: 7/17/03	

1. Purpose

This procedure details the requirements for baseline source response checks (SRC), daily SRCs and Performance Based Checks (PBC) of any PSPC detector configuration installed on the SCM.

2. Scope and Limitations

This procedure applies to version 2.0 or later of the SCM process software.

3. Definitions and Acronyms

Table 1. Definitions and Acronyms.

ITEM	DESCRIPTION
SCM	The Surface Contamination Monitor is a mobile platform containing detectors, support electronics, and data logger used for conducting radiological surveys.
SIMS	Survey Information Management System – SIMS is flexible and comprehensive interfacing software for the SRA SCM. SIMS processes the SCM instrument data with a sophisticated data parser, integrated spreadsheet, and powerful special functions such as spatial data filters. SIMS provides the most flexible reporting system available for printing survey records or complete stand-alone survey reports. SIMS contains all the tools needed to meaningfully communicate between the SCM and the data analysis team.
PSPC	Position Sensitive Proportional Counter – This is a radiation detector that is capable of establishing where along the detector a pulse is sensed (the system is described in NUREG/CR-6450). The detectors are similar in efficiency to other counters, but have backgrounds associated with small area detectors (5cm x 5cm). This results in improved sensitivity, due to low background, and specific identification of the location of the radioactivity. The PSPCs may be fabricated in any length.
SRC	Source Response Check – Determines if the system is operating the same from day-to-day.
PBC	Performance Based Check – Determines the system efficiency and performance.

4. General Information

Normal operation of the SCM with a PSPC requires daily SRCs to assure that the PSPC is performing within acceptable limits. Perform this procedure at the beginning and end of each shift for each detector in use. Compare the results to the results of the daily SRC to the baseline SRC for this project. Use the initial daily SRC for a project as the baseline SRC.

Any time a system parameter changes, take a new baseline SRC for comparison with proceeding days. Examples of altered parameters would be:

1. Change in high voltage.
2. Calibration source changed.

Perform Performance Based Checks (PBC) frequently through out the course of the survey. The PBCs establish the system performance during the survey and are the basis for the detector efficiency. Moreover, the PBCs affect the reported surface activity output by SIMS.

5. Materials, Equipment, and Supplies

Table 2. Materials, Equipment, and Supplies.

ITEM	SPECIFICATION
SCM	Model 3
SCM Process Software	Version 2.0 or later
PSPC	Typical lengths include 0.9 and 1.8 meter
Check Source	NIST traceable source for PBCs used to establish efficiency. Use the same source for all comparisons between the baseline SRC and the daily SRC (need not be NIST traceable).

6. Responsibilities

6.1. Project Manager

6.1.1. Reads and becomes familiar with this procedure.

6.1.2. Evaluates SRCs that fail the acceptance criteria.

6.2. Operator

6.2.1. Reads and becomes familiar with this procedure before performing calibration.

6.2.2. Performs all measurements are according to this procedure.

6.2.3. Has successfully completed SCM Level I training.

7. Procedure

7.1. Source Response Check Measurement.

7.1.1. If this is a baseline SRC, use the form in Appendix A, "Baseline Source Response Check Form"; otherwise, use the form in Appendix B, "Daily Source Response Check Form". Use this procedure for all detectors regardless of configuration. Perform all source response checks with the detector and source stationary. If desired, use a source holder so that the placement of the source to the detector is repeatable.

7.1.2. Enter the Energy/Position analyzer by following these steps:

7.1.2.1. Press the <Setup> button.

7.1.2.2. Press the <Supervisor> button.

7.1.2.3. Press the <Calibrations> button.

7.1.2.4. Press the <Detector Position> button.

7.1.2.5. Press the <Use Position Analyzer> button.

7.1.3. Make sure that there are no sources under the detector.

7.1.4. Start Acquisition by pressing the <Acquire> button.

7.1.5. When the 1-minute timed acquisition ends, integrate the entire spectrum and record the measured background for the entire spectrum.

7.1.6. Record the measured background on the appropriate form in the column labeled "Total Counts" and the row labeled "Background for Entire Array".

7.1.7. Place calibration source under the center of the detector or in contact with mylar or protective screen. When the SCM is setup for rolling mode, it is often quicker to place the source on the ground and roll the cart to position the source under the detector. When surveying in corner mode, it is often quicker to turn the PSPC over and place the source directly on the mylar or protective screen. In any case, assure that the source to detector geometry is the same as when the baseline SRC was taken.

7.1.8. Start Acquisition by pressing the <Acquire> button.

7.1.9. When the 1-minute count is complete, record the count with calibration source on the data table in the appropriate row for the given detector of the appropriate form in the column labeled "Total Counts".

7.1.10. Repeat Steps 7.1.7-7.1.9 for each detector in the PSPC array.

7.2. Source Response Check Evaluation

7.2.1. For each detector, subtract the recorded background entered in the data table in the row labeled "Background for Entire Array" from the recorded "Total Counts" for each detector. Enter the result in the block "Total Background Subtracted Counts".

Note: If this procedure is being done to establish a baseline, it is now complete. If this is a comparison to baseline, proceed to step 7.2.2

7.2.2. Copy values in the column labeled "Total Background Subtracted Counts" from the baseline form for each detector onto the form "Daily Source Response Check Form" in the column labeled "Total Baseline Background Subtracted Counts" provided in Appendix B.

7.2.3. For each detector perform the calculation shown in Equation 1 and record the value in the block "Percent Difference from Baseline Measurement" on the form in Appendix B.

Equation 1. Calculation of percent difference from baseline.

$$100 \cdot \frac{\left|\textit{Total Background Subtracted Counts} - \textit{Total Baseline Background Subtracted Counts}\right|}{\textit{Total Baseline Background Subtracted Counts}}$$

7.2.4. Compare these values with the acceptance criteria contained in Step 8.1.2. If the value is greater than the acceptance criteria, notify the Project Manager.

7.3. Performance Based Check

Note: Perform the Performance Based Check (PBC) with the detectors operating in the mode in which the surveys bounded by the Performance Based Checks will be performed.

7.3.1. Perform periodic PBCs throughout the course of the survey. Perform PBCs at the beginning of the shift, at least once per 4 hours of surveying, and at the completion of each shift.

7.3.2. Perform all PBCs using the same source. The source used for efficiency determination is acceptable but not required to be used.

7.3.3. Obtain PBCs in the same performance manner as normal surveys, i.e. SCM speed and detector height, or timer setting and height for corner detectors.

7.3.4. Establish a survey file name for the Performance Based Checks. See SCM Procedure 011 for file naming conventions.

7.3.5. Place the source on the floor and perform a survey of the area, operating the SCM in accordance with SRA Procedure 005. For rolling surveys, center the source along the PSPC axis 1.0 m from the leading edge of the first detector before rolling the cart over the source. For corner surveys place source on detector mylar or protective screen.

7.3.6. For corner surveys, press the <Record> button and wait until acquisition is complete. For rolling surveys press record, then start motor. Continue strip until last detector is 1.0 m past the source.

7.3.7. Repeat the survey 3 times for each PBC.

7.3.8. Record the time, filename, strip numbers, and the source used in the logbook or survey form.

7.3.9. Evaluation of the PBCs for the duration of the survey occurs in the survey report issued upon completion of the survey.

8. Acceptance Criteria

8.1. SRCs

8.1.1. For baseline SRCs, there is no acceptance criteria.

8.1.2. Daily SRCs are acceptable if all "Percent Difference from Baseline Measurement" values are less than 20%. If a system fails to meet the acceptance criteria, all survey data taken since the last acceptable PBC or SRC will be rejected. Also, the system should be removed from service until the failure is resolved.

8.2. PBCs

8.2.1. Use SIMS software to process the PBC data files. Establish a control chart indicating the mean and "2-sigma" and "3-sigma" values. Evaluate subsequent PBCs against the "2-sigma" and "3-sigma" criteria and for indications of adverse trends. If more than 1 of the 3 measurements obtained during a PBC is greater than the "2-sigma" or if any measurement is greater than "3-sigma", the PBC fails. Surveys bounded by a failed PBC are considered invalid. If a system fails to meet the acceptance criteria, all survey data taken since the last acceptable PBC or SRC will be rejected. Also, the system should be removed from service until the failure is resolved.

9. References

9.1. SCM Procedure 005 "Requirements for Completion of a Survey Using the SCM".

9.2. SCM Procedure 011 "Survey Naming Convention when using the SCM".

10. Required Records

None.

11. Appendices

11.1. Appendix A, Baseline Source Response Check Measurements Form

11.2. Appendix B, Daily Source Response Check Measurements Form

Appendix A

Baseline Source Response Check Form

Baseline Source Response Check Form

SCM CONFIGURATION: _____ SCM SERIALNUMBER: _____

HIGH VOLTAGE SETTING: _____

SOURCE SERIAL NUMBER OR ID: _____ ISOTOPE: _____

DETECTOR	SERIAL NUMBER	TOTAL COUNTS	TOTAL BACKGROUND SUBTRACTED COUNTS
BACKGROUND FOR ENTIRE ARRAY	N/A		N/A
DETECTOR #1			
DETECTOR #2			
DETECTOR #3			
DETECTOR #4			
DETECTOR #5			

ENTER N/A FOR ALL NON-EXISTING DETECTORS

PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Appendix B

Daily Source Response Check Form

Daily Source Response Check Form

DAILY SOURCE RESPONSE CHECK CONFIGURATION

SCM CONFIGURATION: _____ SCM SERIALNUMBER: _____

HIGH VOLTAGE SETTING: _____

SOURCE SERIAL NUMBER OR ID: _____ ISOTOPE: _____

BASELINE SOURCE RESPONSE CHECK CONFIGURATION DATE: _____

SCM CONFIGURATION: _____ SCM SERIALNUMBER: _____

HIGH VOLTAGE SETTING: _____

SOURCE SERIAL NUMBER OR ID: _____ ISOTOPE: _____

DETECTOR	SERIAL NUMBER	TOTAL COUNTS	TOTAL BACKGROUND SUBTRACTED COUNTS	TOTAL BASELINE BACKGROUND SUBTRACTED COUNTS	PERCENT DIFFERENCE FROM BASELINE MEASUREMENT
BACKGROUND FOR ENTIRE ARRAY	N/A		N/A	N/A	N/A
DETECTOR #1					
DETECTOR #2					
DETECTOR #3					
DETECTOR #4					
DETECTOR #5					

ENTER N/A FOR ALL NON-EXISTING DETECTORS

INITIALS ___ NO MEASUREMENT VARIES MORE THAN 20% FROM BASELINE

INITIALS ___ PASSED

INITIALS ___ FAILED WHY: _____

PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

Attachment 8

Control Copy #_____

Shonka Research Associates, Inc.
4939 Lower Roswell Road, Suite 106
Marietta GA 30068
770-509-7606

Surface Contamination Monitor

SCM Procedure 008, Rev3

Conduct of Operations for Surveys Using the SCM/SIMS

Table A 1. Revision Table

REVISION	AUTHOR(S)	REVIEWED BY: D. DEBORD		BRIEF SUMMARY OF CHANGES
		REVIEWER(S)	DATE	
003	M. Marcial		9/7/01	Updated survey documentation control form. added reference to SCM Procedure 011.

QA REVIEW BY: D. SHONKA	DATE:
Debra B. Shonka	9/7/01
EFFECTIVE DATE: 9/7/01	

1. Purpose

This procedure establishes guidance and requirements for processing, documenting, and archiving data in support of surveys conducted with the SCM/SIMS.

2. Scope and Limitations

This procedure applies to version 2.0 or later of the SCM process software.

This procedure applies to all surveys performed by SRA to fulfill contractual obligations to clients or for in-house use.

This procedure does not apply to the documentation for clients that require use of their own data handling procedures; however, the requirements contained herein may still be appropriate for such instances if they do not conflict with client requirements.

3. Definitions and Acronyms

Table 1. 3. Definitions and Acronyms.

ITEM	DESCRIPTION
SCM	The Surface Contamination Monitor is a mobile platform containing detectors, support electronics, and data logger used for conducting radiological surveys.
SIMS	Survey Information Management System – SIMS is flexible and comprehensive interfacing software for the SRA SCM. SIMS processes the SCM instrument data with a sophisticated data parser, integrated spreadsheet, and powerful special functions such as spatial data filters. SIMS provides the most flexible reporting system available for printing survey records or complete stand-alone survey reports. SIMS contains all the tools needed to meaningfully communicate between the SCM and the data analysis team.
Batch Processing	A data processing feature of SIMS that allows group processing of multiple survey block files. A group of files may be saved as a Batch Processing File so that the batch may be run again at a later date.
SIMS Survey Directory	The DOS directory titled with the Project Name. This directory is used to store all elements of the survey. A detailed directory structure is identified in this procedure.

ITEM	DESCRIPTION
PSPC	Position Sensitive Proportional Counter – This is a radiation detector that is capable of establishing where along the detector a pulse is sensed (the system is described in NUREG/CR-6450). The detectors are similar in efficiency to other counters, but have backgrounds associated with small area detectors (5cm x 5cm). This results in improved sensitivity, due to low background, and specific identification of the location of the radioactivity. The PSPCs may be fabricated in any length.
Contact Sheet	A list of phone numbers and addresses.
Packing List	A detailed list of all items shipped or carried by survey team members in support of the survey.
Plan of the Day (POD)	A daily meeting attended by survey team members conducted prior to beginning any work. The meeting serves to assign tasks and inform members of any operations by team members or by other teams that may affect survey activities. A daily safety meeting should be conducted as part of the Plan of Day meeting.
Scope of Work	A detailed description of the contractual requirements for the survey.
OOS	Out-of-scope work
MSDS	Material Safety Data Sheets
QA	Quality Assurance (SRCs and PBCs)
CAD	Computer Aided Design
Master Drawing	A diagram, map, or other drawing of the survey areas.
Logbook	A daily record of survey activities maintained by the Survey Technician. The logbook contains any observations, problems, or obstacles encountered during the survey. If survey forms are not provided, it may be used to document survey sketches.
Survey Notebook	A notebook used to organize and provide quick access to logistical, procedural, and administrative survey documentation.
Survey Block	A survey is divided into sections called survey blocks. The size of the survey block is typically limited for convenience to 15 meters by 15 meters or 20 meters by 10 meters.
Survey Name	The name assigned to the individual survey blocks. The name should be a valid DOS file name of no more than 8 characters as it will be used to archive electronic files. See SCM Procedure 011 for file naming conventions.

ITEM	DESCRIPTION
Auto Generated Survey Records	Stylized survey records automatically generated by SIMS without operator intervention.
Auto Generated Survey Table Summary	Text file automatically generated by SIMS without operator intervention. This file typically has the Survey Name, highest 100 cm^2 area, number of meters, number of meters exceeding 100 cm^2 limit, highest microR/hr and PSPC efficiency.
Master Survey Table	A compilation of the Auto Generated Survey Table Summaries for each section of the survey.
Survey Report Volume	The Survey Report Volume (SRV) serves to catalog the Auto Generated Survey Records. The SRV will consist of one or more binders sectioned with dividers using the same structure as the sub-directories in the SIMS data directory. Substitution of CD presentation of the data instead of hard copy files in binders is a client option. The Master Survey Table should appear as the first page and an Auto Generated Survey Table Summary should be the first sheet for each survey section.
Verification	The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements. With respect to computer code development, verification is the process of evaluating the products of a software development phase to provide assurance that they meet the requirements defined for them by the previous phase. As applied to completed computer codes, verification means to demonstrate the capability of the code to produce valid results for test problems encompassing the range of permitted usage defined by the code's documentation.

4. General Information

Performance of surveys requires designation of the following staff members:

1. Project Manager,
2. Survey Technicians,
3. Office Manager, and
4. Quality Assurance (QA) Reviewer.

The size of the survey dictates the number of Survey Technicians, but for small surveys the Project Manager may assume the responsibilities of the Survey Technician. Persons directly involved with the survey may not serve as Quality Assurance Reviewer.

The Project Manager is responsible for planning, organizing logistics, supervising survey performance, documenting the survey, and processing survey data. The Project Manager is responsible for choosing the methods and procedures needed to complete all

deliverable items for the survey, for performing the required tasks, and for documenting the process in a manner that reflects high professional standards.

Survey Technicians are responsible for operation and maintenance of the SCM during the course of the survey. They perform surveys in accordance with SRA and local site procedures. Survey Technicians must complete the SRA training courses required for operation of the SCM. In the event more than one individual is involved in the accumulation of survey data, each individual shall be considered a Survey Technician. For larger surveys the Project Manager may appoint a Survey Lead Technician. The Survey Lead Technician will assist the Project Manager in supervising and organizing survey activities.

The Office Manger assists the survey team by providing clerical and logistical support. The Office Manager is responsible for maintaining controlled copies of any documents provided to the client. The Office Manager approves all revisions to any deliverable documents. Additionally, the Office Manager maintains the survey archive upon completion of the final deliverables of the survey. The Office Manager may function at the survey site, the home office, or at a remote location.

The QA reviewer insures completion of all required elements of the survey; that the completed survey is in accordance with all applicable procedures; and addresses all contractual survey items. In addition, the QA reviewer performs a final check on deliverable documents to ensure that there are no grammatical, spelling, or punctuation type errors; that page numbering is correct; that all tables agree with Auto Generated Survey Records; that all cross-references are correct; etc. Survey documentation must be completed and ready for delivery (i.e. resolution of comments must be finished) before QA review can take place.

5. Materials, Equipment and Supplies

Table 2. Materials, Equipment, and Supplies.

ITEM	SPECIFICATION
SCM	Model 3
SCM Process Software	Version 2.0 or later
PSPC	Typical lengths include 0.9 and 1.8 meter
SIMS Workstation	Capable of running the current version of SIMS
SIMS	Current Version
Removable Media	Zip Disk® or other removable disk media for use with the IOMEGA Zip Drive or compatiable drive.
File Compression Software	PKZIP® or WINzip (current version) data compression utilities. Software should be capable of creating self-extracting files.

ITEM	SPECIFICATION
Backup Hardware and Software	Seagate Backup (current version) - utility for transferring data to tape cartridges. Tape cartridges must be compatible with tape drive.
Binders	3-ring or other binders for securing loose paper.
Logbooks	Suitable for using in the field.

6. Responsibilities

6.1. Project Manager

6.1.1. Has completed SCM Level I and Level II training and SIMS Level I and Level II.

6.1.2. Reads and becomes familiar with this procedure.

6.1.3. Conducts planning of survey logistics and performance requirements.

6.1.4. Determines relevant procedures.

6.1.5. Coordinates survey logistics.

6.1.6. Assembles Survey Notebook.

6.1.7. Ensures that the survey is performed in accordance with SRA procedures.

6.1.8. Reads daily Survey Technician logs and compiles master log.

6.1.9. Distributes and collects daily QA documents.

6.1.10. Conducts daily Plan of Day meeting to each shift.

6.1.11. Maintains Survey Notebook in accordance with this procedure.

6.1.12. Collects, maintains, and processes survey data using SIMS.

6.1.13. Transfers survey data and documents to Office Manager for storage upon completion of survey.

6.2. Survey Technician

6.2.1. Has completed SCM Level I training at a minimum.

6.2.2. Reads and becomes familiar with this procedure before conducting surveys.

6.2.3. Performs surveys in accordance with this procedure and procedures provided by the Project Manager.

6.2.4. Provides text and diagrams describing survey pattern for each survey block in accordance with this procedure.

6.2.5. Maintains daily logbook in accordance with this procedure.

6.2.6. Performs and documents daily QA checks.

6.3. Office Manager

6.3.1. Transmits completed report and other deliverables to the client.

6.3.2. Maintains control of deliverable documents throughout the revision process.

6.3.3. Maintains the survey archive in accordance with this procedure.

6.4. Quality Assurance Reviewer

6.4.1. Reads and becomes familiar with this procedure before reviewing survey documentation.

6.4.2. Reviews completed survey documentation to insure completion of all required elements, that the completed survey is in accordance with all applicable procedures, and addresses all contractual items.

7. Procedure

7.1. Pre Deployment Preparation

7.1.1. Designate the Project Manager.

7.1.2. Choose a project name. SIMS uses this name to catalog documents in the SIMS directory structure. The project name should be a single word of no more than 8 characters.

7.1.3. The Project Manager creates a directory on the SIMS workstation using the Project Name.

7.1.3.1. The Project Manager maintains control of the documents in these directories during the course of the survey; however, control transfers to the Office Manager upon completion of the survey.

7.1.3.2. Any of the directories may include sub-directories to organize the stored data. For example, on large surveys a directory may contain multiple sub-directories for separate sections of the survey. The naming convention should aid in identification of the particular areas. For example, use directory names such as exterior, interior, bldg1, elev1, etc. If using a Survey Identification Code, then use that code as the directory name. Typically, the "_QRaw" and "_SRaw" directories do not have sub-directories. Create at a minimum the following sub-directories under the Project name directory as shown in Table 3. Any references this procedure makes to the directories in Table 3 includes the sub-directories created under them.

Table 3. Directories on SIMS computer.

DIRECTORY NAME	USAGE
_QRaw	Stores all SCM Source Response Check and Performance Based Check files transferred from the SCM and not processed by SIMS.
_SRaw	Stores all SCM survey files transferred from the SCM and not processed by SIMS.
CAD	Site drawings and maps.
Admin	Time sheets, expense reports, etc.
Correspondence	Any correspondence between SRA staff and client.
Documents	Completed Auto Generated Survey Records (ASGR) and tables.
Documents\Backup	This directory contains original AGSRs and tables before they were revised. Copy original AGSRs here before generating new or revised reports or records. The backup directories should be numbered sequentially.
Data	Use this directory to store survey data.
Pictures	This directory contains digital images of the site and survey process.
Reports	This directory contains any reports or survey records issued internally or to a client. Reports may include status reports, final reports, executive summaries, survey records, etc. Each type of report should have its own directory. For example, all alpha reports could go into the alpha sub-directory.

7.1.4. Develop the survey plan.

7.1.5. Compile a packing list to include both company and personnel items. Management and all survey team members should review the initial draft. Management and each survey team member should receive a copy of the packing list prior to departure. Use the packing list in Appendix B, "Sample Packing List", as a guide.

7.1.6. Assemble a Survey Notebook as outlined in this section. The Survey Notebook shall contain at a minimum the following sections

7.1.6.1. Contact Sheet – The contact sheet provides an easily accessible list of phone numbers and addresses. Place the sheet on the cover or insert as the first page of the Survey Notebook. Appendix A, "Sample Contact Sheet", lists a sample contact sheet and should contain the following information at a minimum as shown in Table 4.

Table 4. Contact sheet information in Survey Notebook.

ITEM
Client phone number and address.
Emergency contact phone numbers for all team members.
Hotel phone number and address. Room numbers should be added as they become available.
Local internet access numbers.
Site phone number and address.
A contact number in the event that the notebook is found.

7.1.6.2. Maps and directions.

7.1.6.3. Scope of Work.

7.1.6.4. Safety – The safety section should at a minimum contain the following items as shown in Table 5.

Table 5. Safety Items in Survey Notebook.

ITEM
Site Safety Plan.
Applicable MSDS Sheets.
Medical – Includes items such as immunization records, respirator qualification, staff medicines, etc.

7.1.6.5. Procedures – All SRA and site procedures to be used during survey.

7.1.6.6. Source Certification Documentation.

7.1.6.7. Training Records.

7.1.6.8. Packing List.

7.1.6.9. Shipping – The shipping section should at a minimum contain the following items as shown on Table 6.

Table 6. Shipping sheet information.

ITEM
Blank Commercial Invoice
Blank Shipper's Declaration for Dangerous Goods form
Client shipping labels
DOT Label with UN number
Federal Express Airbill
Federal Express Dangerous Goods Airbill
Instructions for shipping P-10
Insurance certificate
NON-FLAMMABLE GAS labels
SRA shipping labels

7.1.6.10. Parts and Expenses – Envelope for receipts.

7.1.6.11. Travel – Reservations, flight information, and envelope for tickets.

7.1.6.12. Backup copies of all software to be used on site.

7.1.7. Ensure that all items on the packing list have been shipped or prepared for transport.

7.2. Deployment

7.2.1. Arrival and Initial Start-up

7.2.1.1. Check in with site contact. Confirm requirements for security and disposition of check sources and P-10 cylinders.

7.2.1.2. Conduct Safety Meeting.

7.2.1.3. Conduct Plan of Day Meeting.

7.2.1.4. The Project Manager should distribute logbooks, initial QA forms, and daily QA forms.

7.2.1.5. Conduct a walk through inspection of the survey area to assess any needed adjustments to the survey plan.

7.2.1.6. Identify a staging area, a secure storage area, and an area to set up data processing (SIMS).

7.2.1.7. Place all shipped and hand carried equipment into the designated staging area and conduct an inventory check using the Packing List.

7.2.1.8. The Project Manager assembles the SIMS workstation and tests SIMS while the Survey Technicians assemble and perform required QA checks on the SCM(s).

7.2.1.9. As each SCM completes QA checks, the Project Manager will collect and verify the generated QA documentation.

7.2.1.10. Create a directory titled "C:\FM5\Data\Transfer" in the SCM software directory of each SCM. If the directory already exists, delete its contents.

7.2.1.11. The Survey Team assures the SCM's is ready for field operations and assigns a survey area. The Project Manager ensures the Survey Technician(s) understand the survey naming convention and orientation.

7.2.2. Daily Startup

7.2.2.1. Conduct Safety Meeting

7.2.2.2. Conduct Plan of Day Meeting

7.2.2.3. Distribute logbooks and daily QA forms.

7.2.2.4. As each SCM completes daily QA checks, the Project Manager collects and verifies its QA documentation.

7.2.3. Daily Survey Activities

7.2.3.1. Survey Technicians perform surveys in accordance with SRA Procedure 005. Direct any questions regarding procedures to the Project Manager.

7.2.3.2. Survey Technicians record in the logbook the sketch of each survey block detailing the pattern used to conduct the survey. Use arrows to designate the start point, end point and direction of each survey strip. **Place an asterisk in the southwest corner (or as designated by the Project Manager) of the survey block to identify the orientation of the survey block in SIMS.** If the survey block is not oriented to the cardinal directions, provide another indication of orientation.

7.2.3.3. Maintain the logbook with the following formats as shown in Table 7.

Table 7. Logbook formats.

ITEM
Each day should begin on a new page.
The date should appear in the upper right corner of each page.
Each morning the Survey Technician should note P-10 Gas level, time on site, and action items from the Plan of Day meeting..
The name and start time of each survey block should be noted in the left margin.
If survey forms are not provided, use the logbook to record the survey sketch.
Note any obstacles, problems, or unique observations in the logbook as they occur.
Each recorded observation should include time of day.

7.2.3.4. The Project Manager transfers survey data files from each SCM to SIMS periodically throughout the day. Files should be transferred a minimum of twice a day. Every SCM should participate in each transfer session. The individual file transfers should occur between survey blocks so as not to impede survey efforts. Each transfer should be conducted as shown in Table 8.

Table 8. Transfering data from the SCM to removable media*.

STEP	DESCRIPTION
1	Label a floppy disk with each SCM serial number or ID.
2	Exit the SCM software.
3**	Using file compression software, create a transfer file that contains all of the Survey Header Files (*.svy) and Survey Data Files (*.0??) in the SCM directory.
4	Move the transfer file to the floppy disk.
5	Once the transfer file resides on the floppy disk, move all Survey Header Files and Survey Data Files to the "C:\FM5\Data\Transfer" directory.
6	Restart the SCM software and return control to the Survey Technician.

*Repeat the steps in this table for each SCM.

**The detector configuration files currently have a similar file extension as the Survey Data Files. DO NOT transfer or delete the detector configuration files!

Table 9. Transfer of data from removable media to SIMS.

STEP	DESCRIPTION
1	Using file compression software, extract the Survey Header Files and Survey Data Files from each floppy into the "Data" directory of the SIMS Survey Directory.
2	If a removable media has not been prepared, insert a blank removable media into the removable media drive and create a directory labeled "Transfer".
3	Copy the Survey Header Files and Survey Data Files from the "Data" directory of the SIMS Survey Directory into the "Transfer" directory of the removable media. This serves as a temporary archive of survey data.
4	Move the Survey Header Files and Survey Data Files from the "Data" directory of the SIMS Survey Directory into their respective sub directories. Source Response Checks and Performance Based Checks survey files go into the "_QRaw" directory. Survey files go into the "_SRaw" directory.
5	Erase the files from the removable media used to transfer SCM data to prepare them for the next file transfer.

7.2.3.5. Print and review Master Survey Table for comparison with reports and survey records.

7.2.3.6. If time and resources permit, compare values in Auto Generated Survey Records with corresponding values on Master Survey Tables.

NOTE: All reports and survey records should be printed and reviewed before demobilization.

7.2.4. Daily Data Processing

7.2.4.1. Update Survey Report Volume.

- Verify Auto Generated Survey Table Summary (STS File) entries with values in the corresponding individual Auto Generated Survey Records (AGSRs).
- Place AGSRs into the proper sections of the Survey Report Volume.
- Place an updated copy of the Master Survey Table at the beginning of the Survey Report Volume.

7.2.4.2. Complete any outstanding data transfers.

7.2.4.3. Move completed Auto Generated Survey Records to the "Documents" directory.

7.2.4.4. Consolidate any tables created by Batch Processing into the Master Survey Table.

7.2.4.5. Process outstanding data files as described in Table 10.

Table 10. Steps to process data files.

STEP	DESCRIPTION
1	Draw the survey block on the Master Drawing if available.
2	Label the grid with the Survey Name and place an asterisk in the lower left corner of the survey block as viewed in SIMS if available. The lower left corner typically represents the southwest corner.
3	Using SIMS and the survey sketch stitch the survey.
4	Repeat steps 1 through 3 for all transferred survey files.
5*	Batch process Auto Generated Survey Records and tables for all recently stitched surveys. Apply appropriate background values to activity limits if backgrounds have been calculated.
6	Move completed Auto Generated Survey Records to the "Document" directory.
7	Consolidate any tables created by Batch Processing into the Master Survey Table.
8**	Print and review Master Survey Table.
9	If time and resources permit, print any unprinted Auto Generated Survey Records .
10	If time and resources permit, compare values in AGSRs with corresponding values on Master Survey Tables.

* The SIMS Batch Processor writes the auto-generated tables to the directory in which the Batch Processing File is stored.

**All reports and survey records should be printed and reviewed before demobilization.

7.2.5. Revision of Auto Generated Survey Records

7.2.5.1. Create a backup sub-directory in the relevant "Document" directory.

7.2.5.2. Move current version of Auto Generated Survey Records into the backup directory. The backup directories should be numbered sequentially.

7.2.5.3. Follow steps 5 through 8 in Table 10 to regenerate records.

7.3. Post Deployment

7.3.1. Records

7.3.1.1. The Office Manager maintains all controlled copies of any final record, report or executive summary.

7.3.1.2. The Office Manager may revise any controlled copies. The Office Manager distributes any revised document to the survey team members for comments.

7.3.1.3. Upon completion of the final revision, the Office Manager presents the report and other deliverables to the QA Reviewer for verification.

7.3.1.4. After QA approval of the report, the Office Manager conveys the report and other deliverables to the client.

7.3.2. Survey Archive

7.3.2.1. Upon completion of all reports, the Project Manager turns over all survey documentation and materials to the Office Manager.

7.3.2.2. The Office Manager places all finalized material into the survey archive that includes at a minimum the items shown in Table 11.

Table 11. Materials turned over and archived.

ITEM
Logbook(s)
SIMS Software
SIMS Survey Directory
Master Drawing and other site drawings
Contract paper work
Survey Notebook
Survey Report Volume (i.e. printouts of Auto Generated Survey Records)
Video Tape(s), if taped
Computer media containing survey data file backup
Copies of any other paper work provided to the client

7.3.2.3. The SIMS Survey Directory should be archived to backup tape.

7.3.2.4. Secure all of the items listed in Table 11, the backup tape of the SIMS Survey Directory, and any other documentation pertaining to the survey in a document storage box labeled with the Project Name and date.

7.3.2.5. After QA review, the box should be stored in accordance with office document archive procedures.

7.3.2.6. Place a sign out sheet in the box. Log any removal of any material from the box.

7.4. Quality Assurance Review

7.4.1. As soon as is practical following the receipt of a survey for review, the Quality Assurance reviewer shall:

7.4.1.1. Verify general grammar, spelling, punctuation, etc. for correctness.

7.4.1.2. Verify that statements are clear and precise.

7.4.1.3. Recalculate numerical problems to insure that no "calculator type" errors have occurred (this includes verification of spreadsheet cell formulas).

7.4.1.4. Verify that all assumptions are clearly documented and are valid.

7.4.1.5. Verify that data tables are correct, valid and that table entries are consistent with the data from the Auto Generated Survey Records.

7.4.1.6. Verify that the survey documentation contains all of the information necessary for complete reconstruction at a later date.

7.4.1.7. Verify that the SIMS Survey Directory matches what was archived on the tape backup.

7.4.2. Upon full completion of the QA review, hold a meeting with the Project Manager and Office Manager to discuss comments and resolve issues if necessary.

7.4.3. Upon receipt of a revised survey, the QA reviewer shall first ascertain the scope of the revisions (major or minor).

7.4.4. If only minor edits (those that do not affect results or conclusions) have been made, then QA review should consist of a read through of the documentation to insure that the changes made were appropriate and that no more are necessary.

7.4.5. If major changes have been made, then a full review as described in step 7.4.1 is required.

7.4.6. Once all issues have been resolved satisfactorily, complete and sign the Survey Documentation Control Sheet. (see Appendix C, "Survey Documentation Control Sheet").

7.4.7. Complete and sign the Survey QA Review Sheet. (see Appendix D, "Survey QA Review Sheet").

7.4.8. Return the survey documentation to the Office Manager.

8. Acceptance Criteria

Survey Documentation Control Sheet and Survey QA Review Sheet (with signatures) are complete.

All survey documentation has been archived.

All voided/superseded survey revisions are marked as such on their respective Survey Document Control Sheets.

9. References

9.1. SRA Procedure 005 "Requirements for Completion of a Survey Using the SCM"

10. Required Records

The following records shall be maintained for the life of the company as shown in Table 12. Record maintained upon completion the survey.

Table 12. Record maintained upon completion the survey.

ITEM
All completed survey reports regardless of revision status
Logbook
SIMS Software Version used in survey
SIMS Survey Directory
Site Drawings
Survey Notebook
Survey Report Volume
Video Tape or digital photos
Computer media containing survey data file backup

11. Appendices

11.1. Appendix A, "Sample Contact Sheet"

11.2. Appendix B, "Sample Packing List"

11.3. Appendix C, "Survey Documentation Control Sheet"

11.4. Appendix D, "Survey QA Review Sheet"

Appendix A

Sample Contact Sheet

SRA CONTACT SHEET

HANFORD DEPLOYMENT

NAME	PHONE NUMBER
INTERNET ACCESS INFO	
National AOL Accesss Number	(800) 245-0113
Local AOL Accesss Number	(630) 435-1054
DON'S EMERGENCY CONTACTS	
Wife Cell	(404) 351-1680
Home	(770) 781-9292
Cell	(404) 668-7606
BOB'S EMERGENCY CONTACTS	
Wife	(770) 578-8362
Cell	(678) 296-4815
CHARLIE'S EMERGENCY CONTACTS	
Wife	(352) 628-5707
Cell	(720) 841-5377
SITE INFO	
Marty Phalen (Job Site Contact) (Cell)	(815) 263-9001
SRA INFO	
Shonka Research Associates, Inc.	(770) 509-7606

Hotel Address and Phone Number:	Site Address and Phone Number:	Client Address and Phone Number:
Holiday Inn 205 Remmington Blvd. Boling Brook IL 60440 Phone: (509)943-4400		

If this notebook is found please contact
Shonka Research Associates at (888) 509-7606

Appendix B

Sample Packing List

BONUS Packing List

Don
Knit Cap
Bag
Brief Case
Cold Weather Gear
Hard Hat
Hot Sauce
Leatherman
Organizer
- Hotel # w/Confirmation (N.E. Power Rate!)
- Car Confirmation #
- Map

Safety Glasses
Safety Shoes (Substantial Foot Wear)
Shaving Kit

Joe
Knit Cap
Bag
Cold Weather Gear
Hard Hat
Safety Glasses
Safety Shoes (Substantial Foot Wear)
Shaving Kit

SCM #1
Cables, BNC, HVPA-DLG (2)
Cables, DB37 (2)
Cable, DB9, Encoder cable.
Cables, Power, AC (2)
Detector Mounting Brackets (2)
Detector, Model 2 PSPC, 6' (2)
Detector, Model 2 PSPC, 4' (2)
Electronics (NIM, DLG, HVPA)
Extension Cord (1)
Flow Gauge, Inlet
Flow Gauge, Outlet
Frame, SCM, Motorized
Lunch Box PC
Das1402
CTR-5
MHV Cables (2)
Motor
Motor Controller
P-10 bottles (1)
Plug, gas, quick connect (3)
Regulator
Surge Suppresser, ISOBAR, 120db Filter
Tubing, Tygon (3)

SCM #2
Cables, BNC, HVPA-DLG (2)
Cables, DB37 (2)
Cable, DB9, Encoder cable.
Cables, Power, AC (2)
Detector Mounting Brackets (2)
Detector, Model 2 PSPC, 6' (2)
Detector, Model 2 PSPC, 4' (2)
Electronics (NIM, DLG, HVPA)
Extension Cord (1)

Toolbox, Electronics (Gray)
37Pin Terminal Block
Alligator Leads (3)
Connector, MHV (2)
Connector, BNC (2)
Connector, BNC, T (1)
Electrical Tape
GLPT, Red
Liquid Tape
Heat Gun
Heat Shrink
NIM Extended Cables
Pin extension leads
Q-Dope
Scotch Tape
Solder
Tie-Wraps (small, med, large)
Tweeker
Wire
Wire Strippers

Toolbox, Mylar (Red)
Anode Wire Roll (1)
Mylar Roll (3)
Razzor Blades
Scotch Tape
Silver Solder
Solder Extractor
Soldering Iron
Uher Tape Roll (3)

Toolbox, SCM (Yellow)
Adapter, BNC Female to Banana
Bottle Wrench
Bungy Cords (3)
Chalk, Powdered
Chalk, Sticks or Paint Sticks
Chalk Line
Channel Locks
Crescent Wrench (2)
Detector, Combustible Gas W/charger
Dykes
Exacto Knife
Flash Light
Hex Wrenches, ball ended (Metric)
Hex Wrenches, ball ended (US)
Measure Tape, 100'
Pliers, Needle Nose
Screw Driver, Philips (3).
Screw Driver, Standard (2)
Socket Set
Source, Cs-137, 100 cm^2
Spare BNC (1)
Spare DB37 (1)
Tape, Scotch
Teflon Tape
Tie Wraps, Large (25)
Tweeker

Flow Gauge, Inlet
Flow Gauge, Outlet
Frame, SCM, Motorized
Lunch Box PC
Das1402
CTR-5
MHV Cables (2)
Motor
Motor Controller
P-10 bottles (1)
Plug, gas, quick connect (3)
Regulator
Surge Suppresser, ISOBAR, 120db Filter
Tubing, Tygon (3)

GM

Probe
ESP-II
DB9-BNC Cable
MHV Cable

Camera

Cable, BNC, Remote to DLG (1)
Camcorder Power supply and power cable
Camcorder Remote
Camcorder Tapes (2S)
Camcorder to Snappy Cable (Phono)
Camcorder W/ease
Camcorder wide angle lens
Mount Plate, Tripod
Snappy

SIMS

CABLE, LAP LINK
Computer
Mouse
Keyboard
Phone Cable
Monitor (21")
Mini Isobar

Test Equipment

BNC cables (2)
Scope, Hand Held, Fluke 105B
Test Leads

Misc.

Clip Board (2)
Disk, 3.5" (1 box)
Legal Pad
Pencils (4)
Pens (4)
Batteries, C cell (6)
Batteries, D cell (2)

Check Sources

Soruce, Cs, 100cm^2
Cs Certificate
Source, Am-241

Software and Data Files

Copy of New SCM version 4.x
Copy of Bonus SCM version
Copy of Visuspect 3.x
Copy of Stitcher 3.x

Documentation

Logbook (2)
Marketing Folders (2)
Procedures Manual
Rad Worker II
Respirater qual/fit test
Survey Notebook
Complete Set of Schematics

Spare Parts

Cable, Power, AC
DAS1402
Keyboard
Leeson Motor Board
Mouse, BSI
P-10 Bottles (2)
Tubing (1 Box)
Extension Cord (12 Guage)

* Hard Drives Removed and hand carried.

Shipping Containers

Frame & 2' Detector	Box #1
Electronics	Box #2
Tool Boxes	Box #3
P-10 (4)	Box #4
Detectors, 4'	Box #5
Don's Suitcase	Checked
Luggable	Carry-on

Appendix C

Survey Documentation Control Sheet

SHONKA RESEARCH ASSOCIATES, INC.

Survey Documentation Control Sheet

DESCRIPTION	VALUE
CLIENT	
PROJECT / TASK NUMBER	
CLIENT TRACKING NUMBER	

DESCRIPTION		EXAMPLE	VALUE
SURVEY NAME	SURVEY AREA CODE	A1(XX)-B	
	SURVEY UNIT CODE	(XX)1	
	SURVEY LOCATION ELEMENT	FZ(X)1	
SURVEY TYPE	SURVEY CLASSIFICATION ELEMENT	1	
	SURVEY REASON CODE	F(0)1	
	SURVEY MEDIA CODE	C(X)1	
	SURVEY DETECTOR ELEMENT	AB-(X)1-251-()	
SURVEY RECORD NUMBER OR SCM FILENAME		AB60401Z	
SURVEY MAP FILENAME AND REFERENCE COORDINATES IN (X, Y, Z) [METERS]		Floor1.DXF (29.5, 12.5, 0)	

PERFORMED BY: _____ DATE: _____

PERFORMED BY: _____ DATE: _____

REVIEWED BY: _____ DATE: _____

THIS SURVEY HAS BEEN VOIDED OR SUPERSEDED BY:

_____

(SURVEY IDENTIFICATION CODE)

_____

Appendix D

Survey QA Review Sheet

SHONKA RESEARCH ASSOCIATES, INC.

Survey QA Review Sheet

THE UNDERSIGNED HAS REVIEWED THIS SURVEY IN ACCORDANCE WITH THE METHOD(S) INDICATED BELOW.

1. SURVEY REPORT	
A	Review to determine that the data tables are consistent with the Auto Generated Survey Records.
B	Review report to ensure that backgrounds have been considered and applied.
C	Review body of report and verify that general grammar, spelling, punctuation, etc. are correct
D	Other:
2. DOCUMENTATION	
A	Review to determine that the survey documentation has been validated, meets all requirements for deliverable items, and that the documentation contains all necessary information for reconstruction at a later date.
B	Review to verify that the tape backup is complete.
C	Ensure that the Survey Archive has been performed.
D	Other:
3. DELIVERABLE ITEMS	
A	Ensure that all deliverable items due the client have been completed.
B	Ensure that all deliverable items are prepared for transmission to client.
C	Other:
4. OTHER	
A	

REVIEWED BY: _____ DATE: _____

Attachment 9

Control Copy #_____

Shonka Research Associates, Inc.
4939 Lower Roswell Road, Suite 106
Marietta GA 30068
770-509-7606

Surface Contamination Monitor

SCM Procedure 011, Rev1

Survey Naming Convention when Using the SCM

Table A 1. Revision Table

REVISION	AUTHOR(S)	REVIEWED BY: D. DEBORD		BRIEF SUMMARY OF CHANGES
		REVIEWER(S)	DATE	
001	M. Marcial		9/7/01	Initial write.

QA REVIEW BY: D. SHONKA	DATE:
Deborah B. Shonka	9/7/01
EFFECTIVE DATE: 9/7/01	

1. Purpose

This procedure establishes the methods for naming surveys when using the SCM. The SCM saves data to a filename that is identical to the survey name entered by the SCM operator into the process software. Therefore, the survey name is currently limited to 8 alphanumerics.

2. Scope and Limitations

This procedure applies to any use of the SCM when logging data.

3. Definitions and Acronyms

Table 1. Definitions and Acronyms.

ITEM	DESCRIPTION
SCM	The Surface Contamination Monitor is a mobile platform containing detectors, support electronics, and data logger used for conducting radiological surveys.
Survey Measurement Type Code	This code identifies the type of survey: alpha, beta, gamma, quality assurance, etc.
Survey Operating Mode Code	This code identifies the operating mode: rolling, corner or merged.
SCM ID Code	This code identifies the SCM serial number.
Survey Sequence Code	This code identifies the survey number. This number starts at 1 and increments throughout the survey for a given Survey Measurement Type Code, Survey Operating Mode Code, and SCM ID Code.
Survey Interrelated Code	This code identifies when a survey relates to another previous survey of the same survey block.
Survey Identification Code (SIC)	This code provides a naming convention for surveys.
SCM SIC Objects	The defined objects are: Survey Measurement Type Code, Survey Operating Mode Code, SCM ID Code, Survey Sequence Code, and the Survey Interrelated Code.
SCM SIC Fundamental Objects	The SIC is made up of elements and numbers. An element is an alphanumeric.
Fundamental Object Data Type	Each SCM SIC Fundamental Object has a data type defined as 1 alphanumeric or 1 digit.
Survey Strip	A continuous data set logged by the SCM.

ITEM	DESCRIPTION
Survey Stitch	A process of assembling survey strips into on file for data analysis.
Survey Block	A group of survey strips stitched into one spatial image.

4. General Information

The survey name holds values to help the SIMS data processor immediately identify the file. The survey name is made up of SCM Survey Identification Code (SIC) objects: Survey Measurement Type Code. Survey Operating Mode Code. SCM ID Code. Survey Sequence Code. and the Survey Interrelated Code.

5. Materials, Equipment, and Supplies

Table 2 . Materials, Equipment, and Supplies.

ITEM	SPECIFICATION
SCM	Model 3
SCM Process Software	Version 2.0 or later

6. Responsibilities

6.1. Operator

6.1.1. Reads and becomes familiar with this procedure before performing an SCM survey.

6.1.2. Has successfully completed SCM I training.

7. Procedure

7.1. Survey Naming Convention

The diagram in Appendix A. "SCM 8-Character SIC Diagram", shows the SCM SIC.

7.1.1. The first two characters designate the Survey Measurement Type and Purpose. Table 3 shows the allowed values.

Table 3. Allowed values for the Survey Measurement Type and Purpose.

SURVEY PURPOSE CODE	DESCRIPTION
R	Source Response Check
P	Performance Based Check
C	Calibration Check
S	Survey
B	Background Survey
Z	Informational Survey
A	Alpha Survey
SURVEY MEASUREMENT TYPE CODE	**DESCRIPTION**
A	Alpha Survey
B	Beta Survey
G	Gamma Survey
N	Nuetron Survey
X	Alpha Beta and Gamma Survey
Y	Alpha and Beta Survey
W	Wheel Encoder Confirmation

7.1.2. The third character designates as the Survey Operating Mode Code. Table 4 shows the allowed values. Use the merged code when combining the survey strips in a rolling survey with the survey strips of a corner survey.

Table 4. Allowed values for the Survey Operating Mode Code.

SURVEY OPERATING MODE CODE	DESCRIPTION
R	Rolling or scanning survey.
C	Corner or static measurement survey.
M	A merged survey.

7.1.3. The fourth character designates as the SCM ID Code. This code is the serial number of the SCM and will be a digit from zero thru 9. When merging survey data from 2 different SCMs, then enter this object as "Z".

Table 5. Allowed values for the SCM ID Code.

SCM ID CODE	DESCRIPTION
0-9	SCM serial number.
Z	Use this code when merging data from 2 different SCMs that where used on the same survey block.

7.1.4. The fifth, sixth and seventh characters is designated as the Survey Sequence Code. This code is a sequentially incrementing number used for a given Survey Measurement Type Code, Survey Operating Mode Code, and SCM ID Code.

Table 6. Allowed values for the Survey Sequence Code.

SURVEY SEQUENCE CODE	DESCRIPTION
(XX)-999	Sequential survey number.

7.1.5. The eighth character designates the Survey Interrelated Code. Use this code when performing a repeat, investigation, or other survey of a previous survey.

Table 7. Allowed values for the SCM ID Code.

SCM ID CODE	DESCRIPTION
A thru Y	A sequential character that increments for each repeated survey or related survey.
Z	Use the "Z" code as a placeholder so that the SCM file names are all 8-characters long.

8. References

8.1. N/A

9. Required Records

9.1. N/A

10. Appendices

10.1. Appendix A, "SCM 8-Character SIC Diagram"

Appendix A

SCM 8-Character SIC Diagram

Figure 1. SCM 8-Character SIC.