Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): D1-3

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated D1-3. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB D1-3 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB D1-3. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.35	ND	0.41	N/A	N/A	N/A	N/A
Co-60	ND	0.05	ND	0.32	N/A	N/A	N/A	N/A
Cs-134	ND	0.13	ND	0.26	N/A	N/A	N/A	N/A
K-40	8.88	(1.58)	7.18	(0.98)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

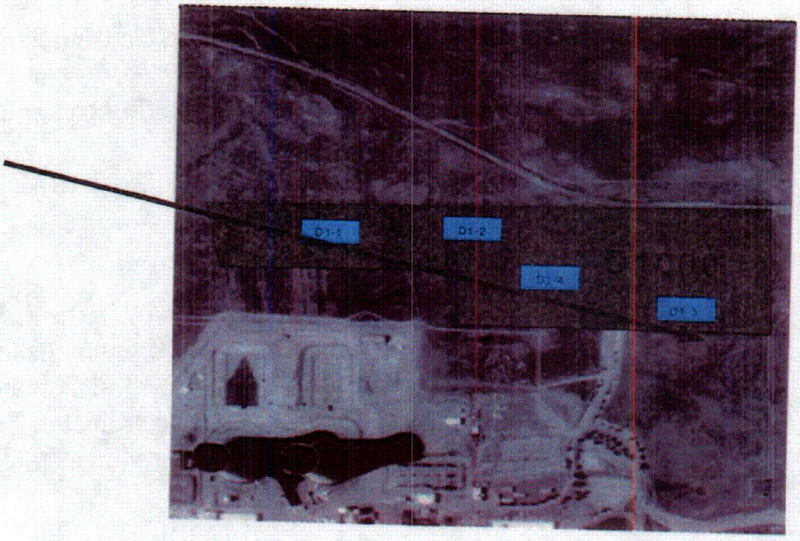
SAB D1-3 is located in the fenced pasture to the east of the main Rancho Seco entrance road. An iron pin was placed at the southwest corner of SAB D1-3. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB D1-3 Location Information

SAB D1-3

Latitude: 38° 20.923'
Longitude: 121° 6.912'
Bearing: 55°
Distance: 677 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/09/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB D1-3 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

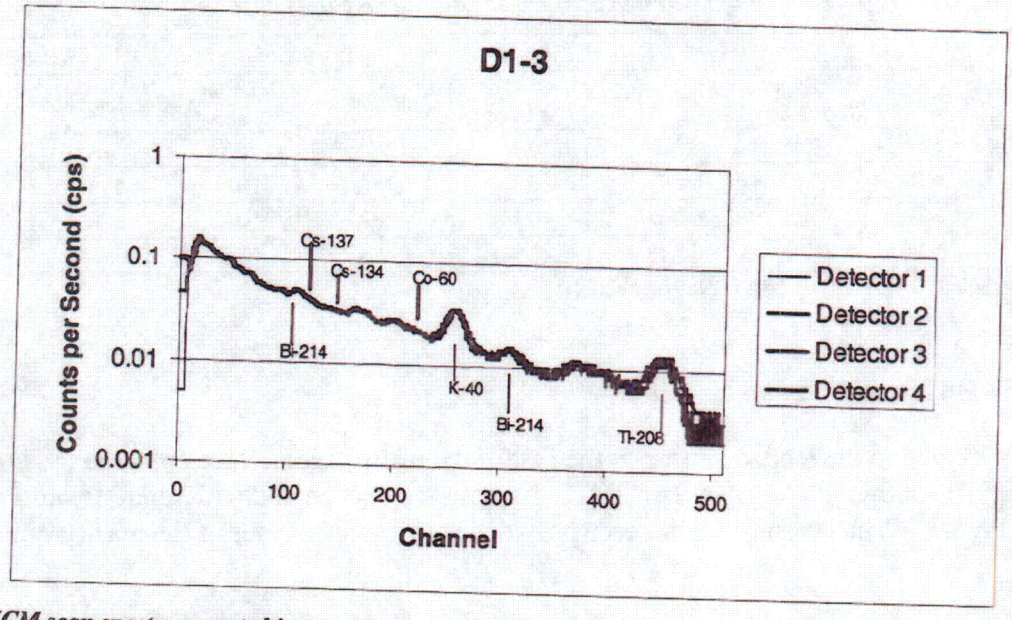


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. No soil sample was taken in D1-3.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB D1-3, complete with peak energy locations for nuclides of interest.

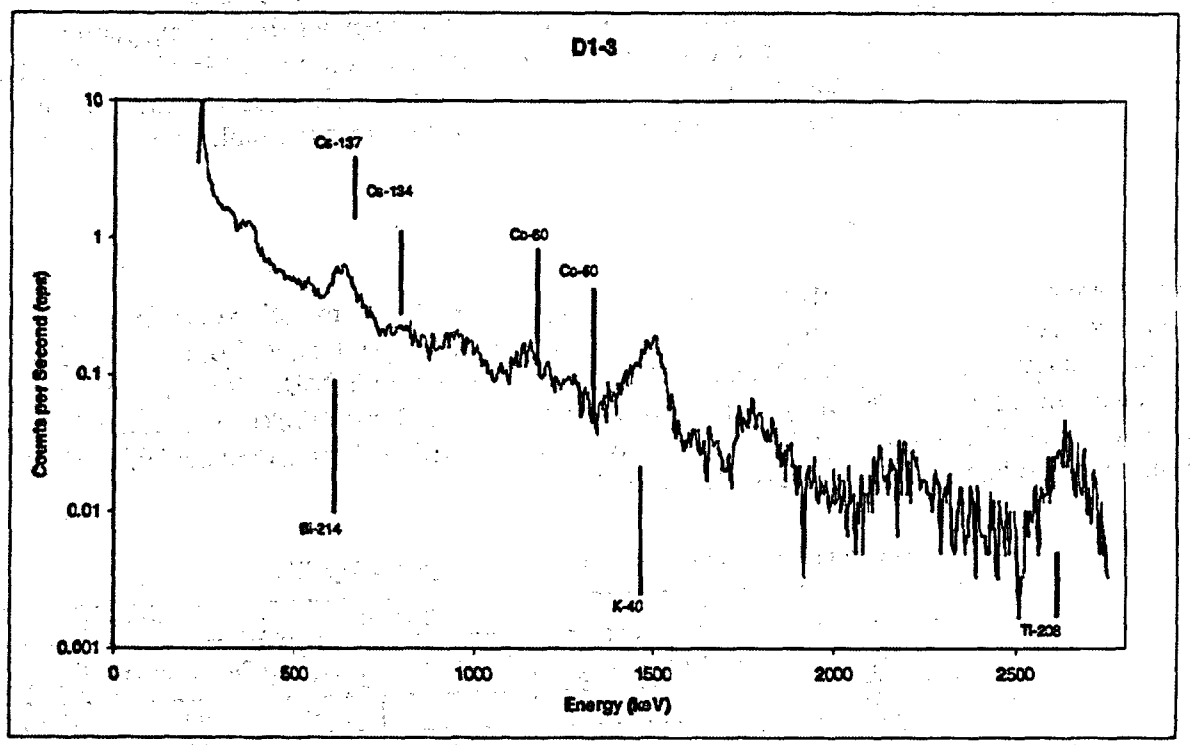


Figure 3 : In situ spectra for SAB D1-3 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): D1-4

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated D1-4. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB D1-4 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB D1-4. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.26	ND	0.43	0.18	(0.03)	0.14	(0.03)
Co-60	ND	0.05	ND	0.32	ND	0.04	ND	0.04
Cs-134	ND	0.11	ND	0.26	ND	0.03	ND	0.03
K-40	8.05	(1.57)	8.19	(0.92)	7.78	(0.56)	5.93	(0.46)

ND = None Detected N/A = Not Applicable

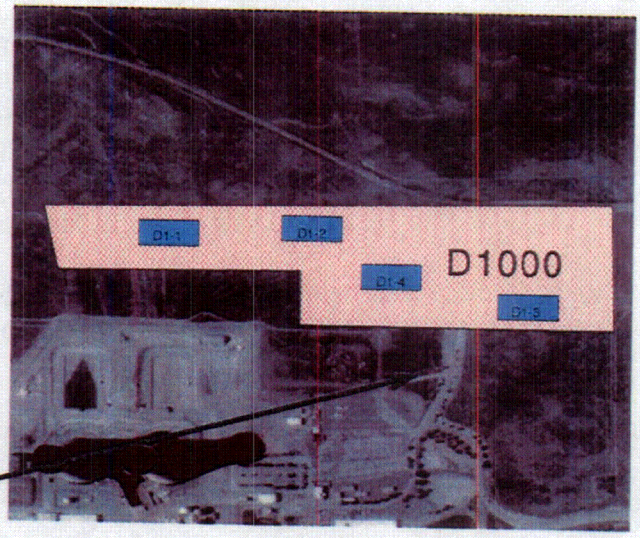
1.3. SAB Orientation and Location

SAB D1-4 is located in the middle of the D1000 Survey Area. An iron pin was placed at the southwest corner of SAB D1-4. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB D1-4 Location Information

SAB D1-4

Latitude: 38° 20.956'
Longitude: 121° 7.063'
Bearing: 34°
Distance: 539 meters



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/10/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB D1-4 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

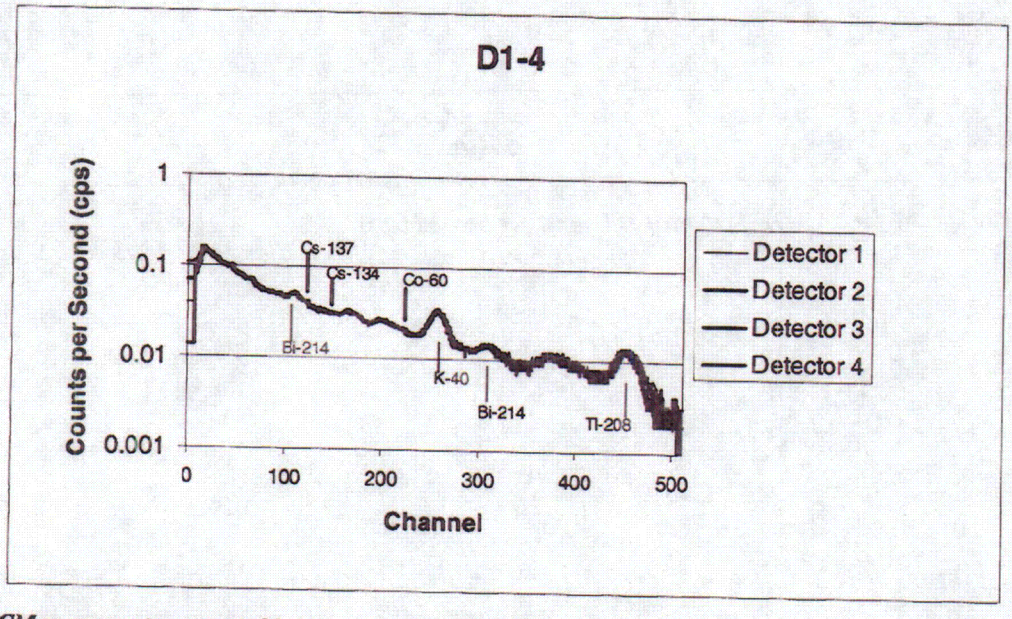


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Shonka took the soil sample at the pin location on 11/15/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 11/28/00 and again on 12/05/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB D1-4, complete with peak energy locations for nuclides of interest.

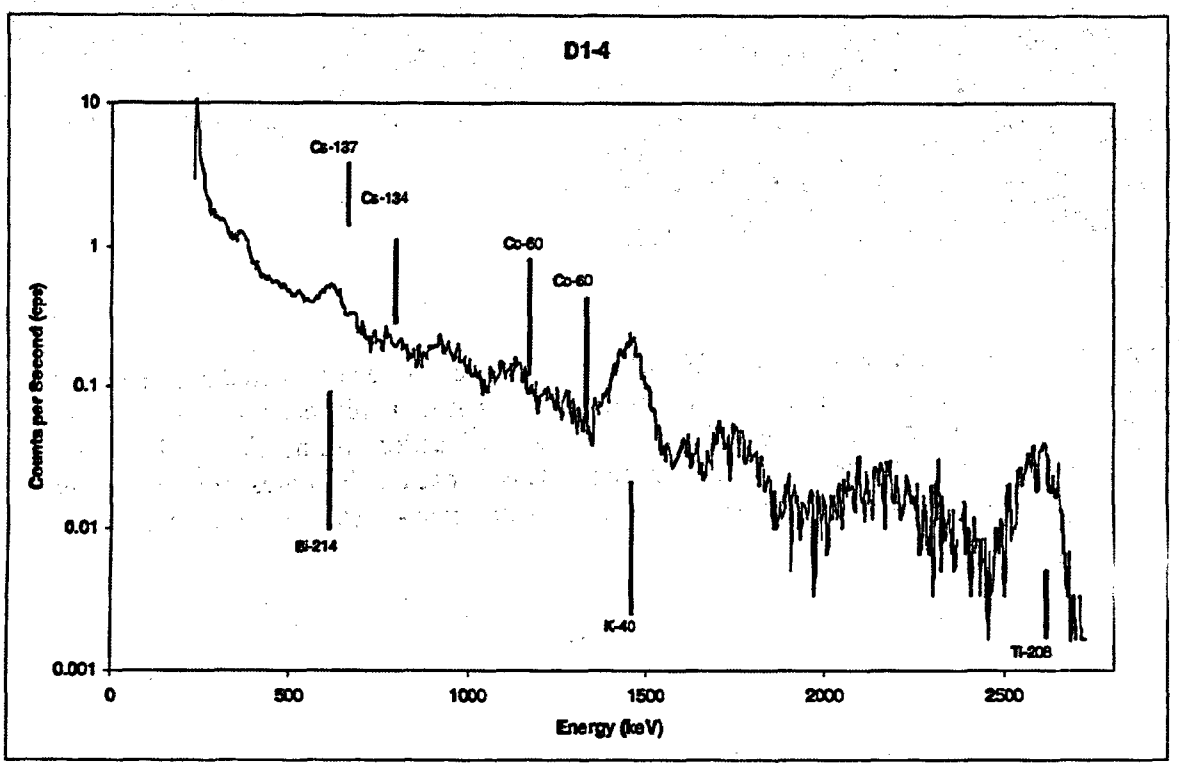


Figure 3 : In situ spectra for SAB D1-4 reported in Counts per Second (cps).

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SMUD Rancho Seco Non-Industrial Area Survey

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Survey Area Block (SAB): D3-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated D3-1. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB D3-1 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB D3-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.18	ND	0.36	0.11	(0.04)	0.08	(0.03)
Co-60	ND	0.04	ND	0.30	ND	0.04	ND	0.04
Cs-134	ND	0.11	ND	0.25	ND	0.03	ND	0.03
K-40	8.43	(0.56)	8.02	(0.89)	10.02	(0.72)	7.81	(0.59)

ND = None Detected N/A = Not Applicable

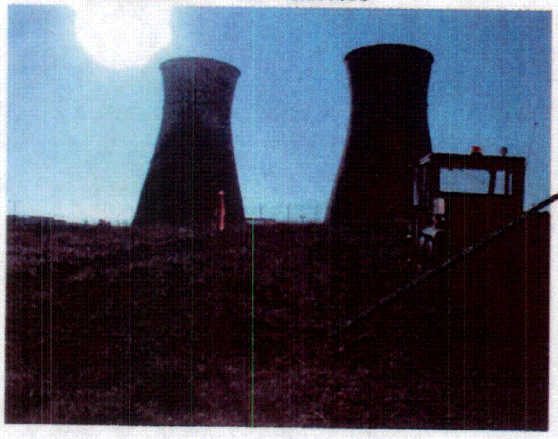
1.3. SAB Orientation and Location

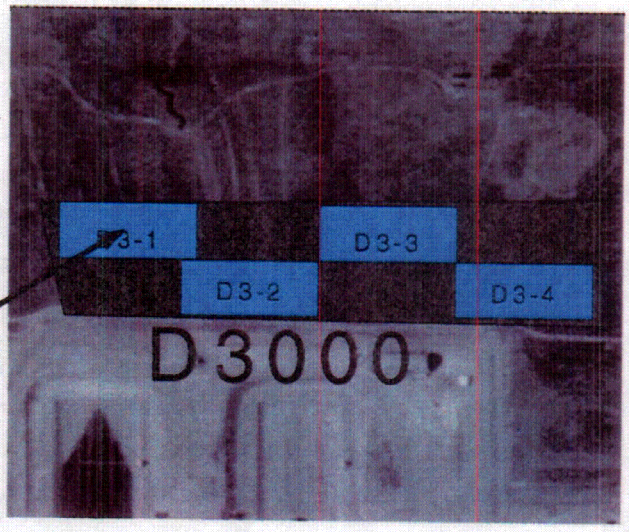
SAB D3-1 is located in the northwest corner of the D3000 Survey Area. An iron pin was placed at the southwest corner of SAB D3-1. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB D3-1 Location Information

SAB D3-1

Latitude: 38° 20.951'
Longitude: 121° 7.390'
Bearing: 332°
Distance: 497 meters





1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/10/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB D3-1 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

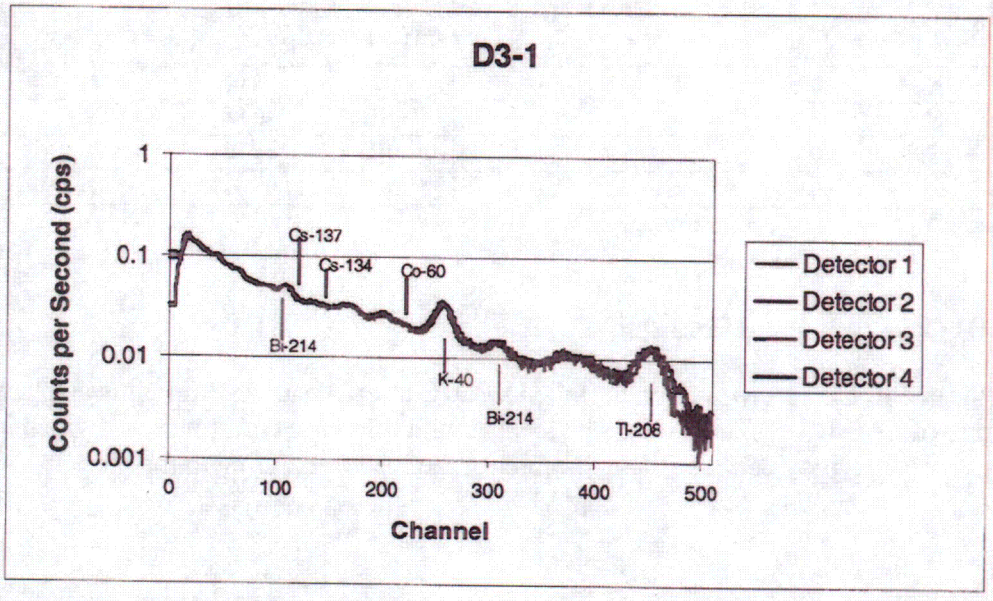


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Weismann took the soil sample at the pin location on 12/04/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 12/07/00 and again on 12/14/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB D3-1, complete with peak energy locations for nuclides of interest.

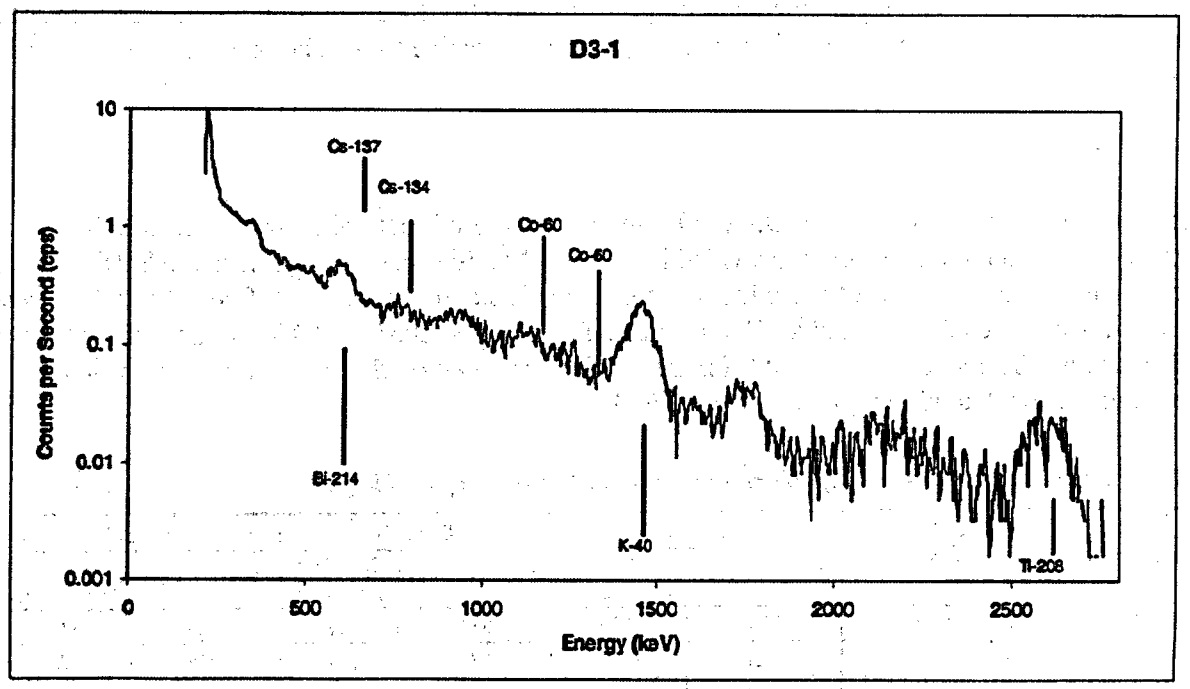


Figure 3 : In situ spectra for SAB D3-1 reported in Counts per Second (cps).

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SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): D3-2

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated D3-2. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB D3-2 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB D3-2. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.19	ND	0.36	N/A	N/A	N/A	N/A
Co-60	ND	0.05	ND	0.31	N/A	N/A	N/A	N/A
Cs-134	ND	0.12	ND	0.25	N/A	N/A	N/A	N/A
K-40	8.50	(0.61)	7.56	(0.88)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

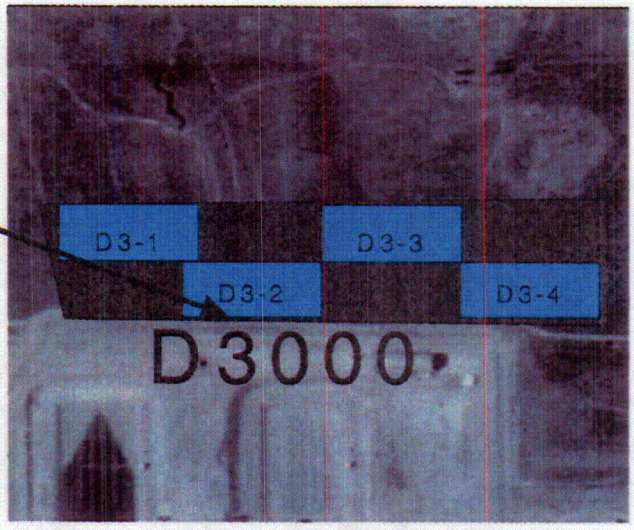
SAB D3-2 is located on the southern edge of the D3000 Survey Area. An iron pin was placed at the southwest corner of SAB D3-2. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB D3-2 Location Information

SAB D3-2

Latitude: 38° 20.924'
Longitude: 121° 7.332'
Bearing: 340°
Distance: 418 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/10/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB D3-2 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

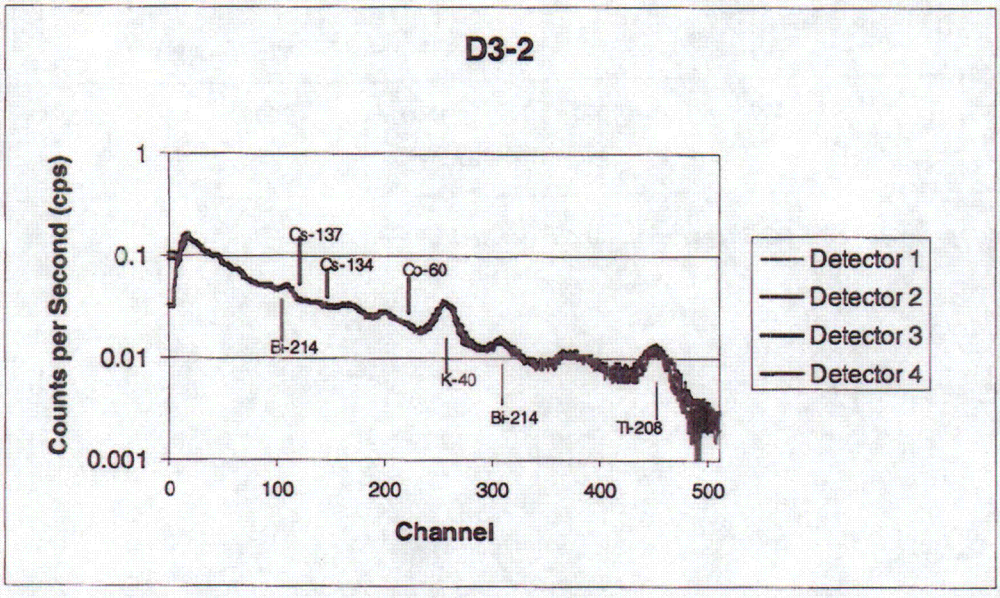


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB D3-2, complete with peak energy locations for nuclides of interest.

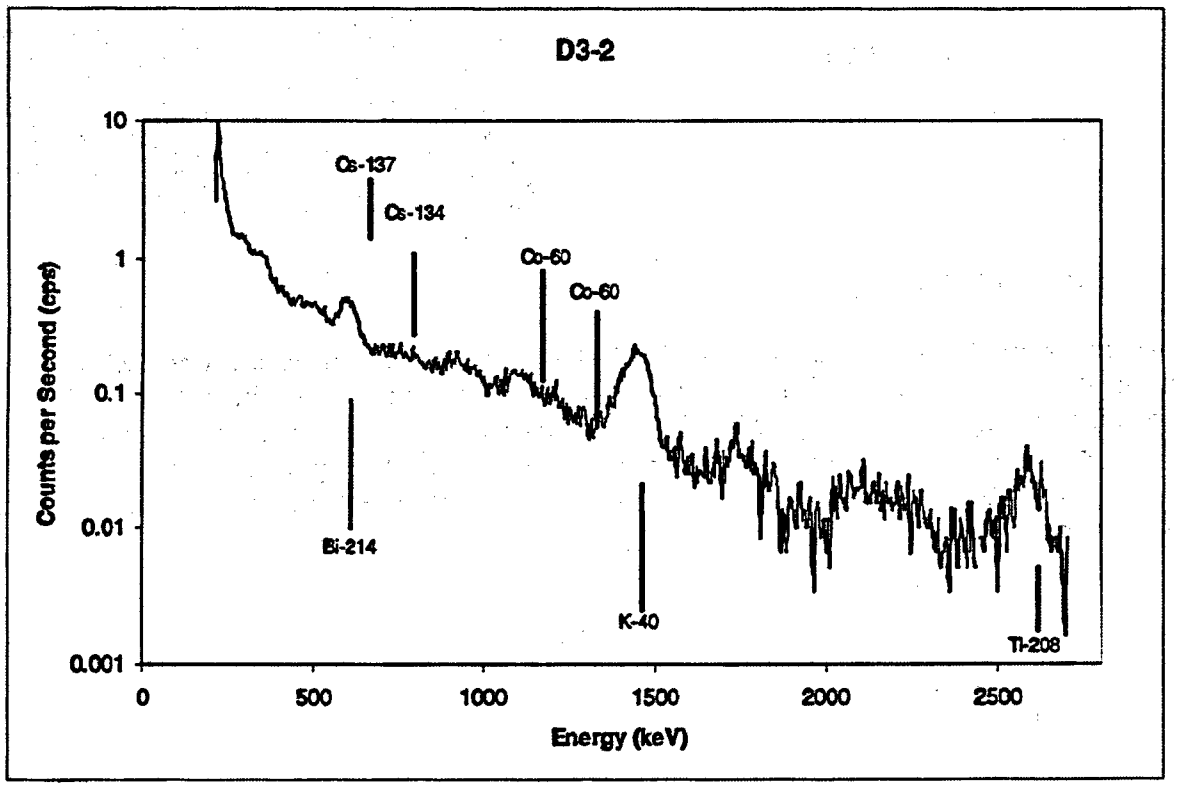


Figure 3 : In situ spectra for SAB D3-2 reported in Counts per Second (cps).

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SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): D3-3

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated D3-3. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB D3-3 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB D3-3. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.32	ND	0.37	ND	0.03	0.19	(0.19)
Co-60	ND	0.07	ND	0.32	ND	0.04	ND	0.04
Cs-134	ND	0.17	ND	0.26	ND	0.03	ND	0.03
K-40	8.72	(1.43)	7.70	(0.91)	8.93	(0.61)	7.23	(0.52)

ND = None Detected N/A = Not Applicable

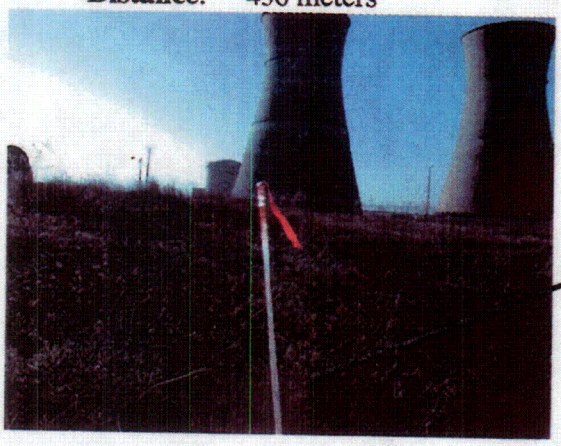
1.3. SAB Orientation and Location

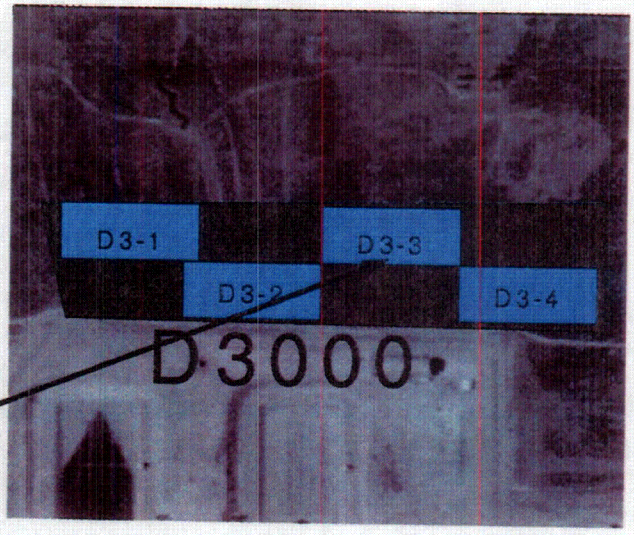
SAB D3-3 is located on the northern edge of the D3000 Survey Area. An iron pin was placed at the southwest corner of SAB D3-3. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB D3-3 Location Information

SAB D3-3

Latitude: 38° 20.949'
Longitude: 121° 7.265'
Bearing: 356°
Distance: 436 meters





1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/10/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB D3-3 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

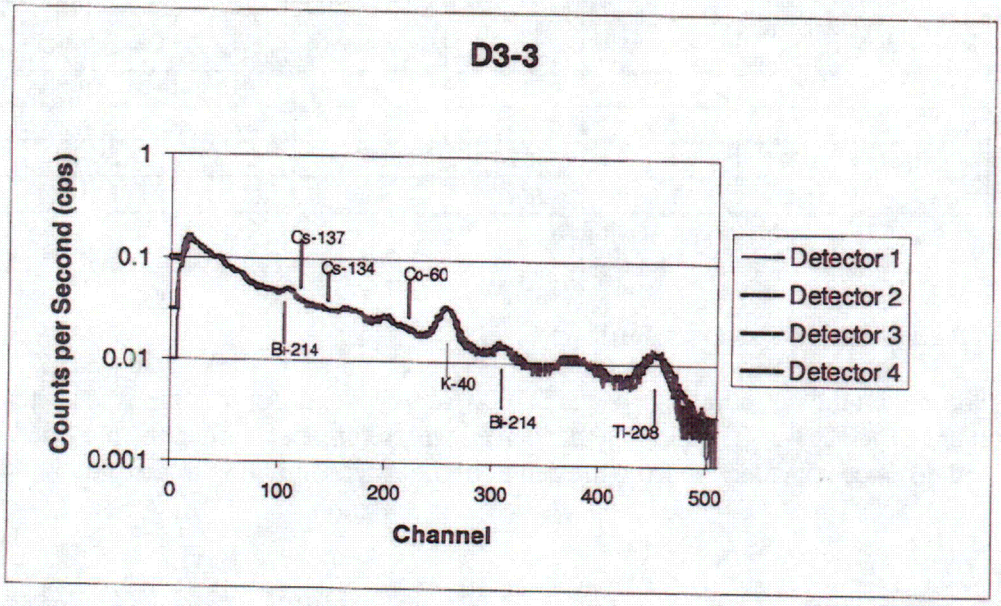


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Shonka took the soil sample at the pin location on 11/15/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 11/28/00 and again on 12/05/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB D3-3, complete with peak energy locations for nuclides of interest.

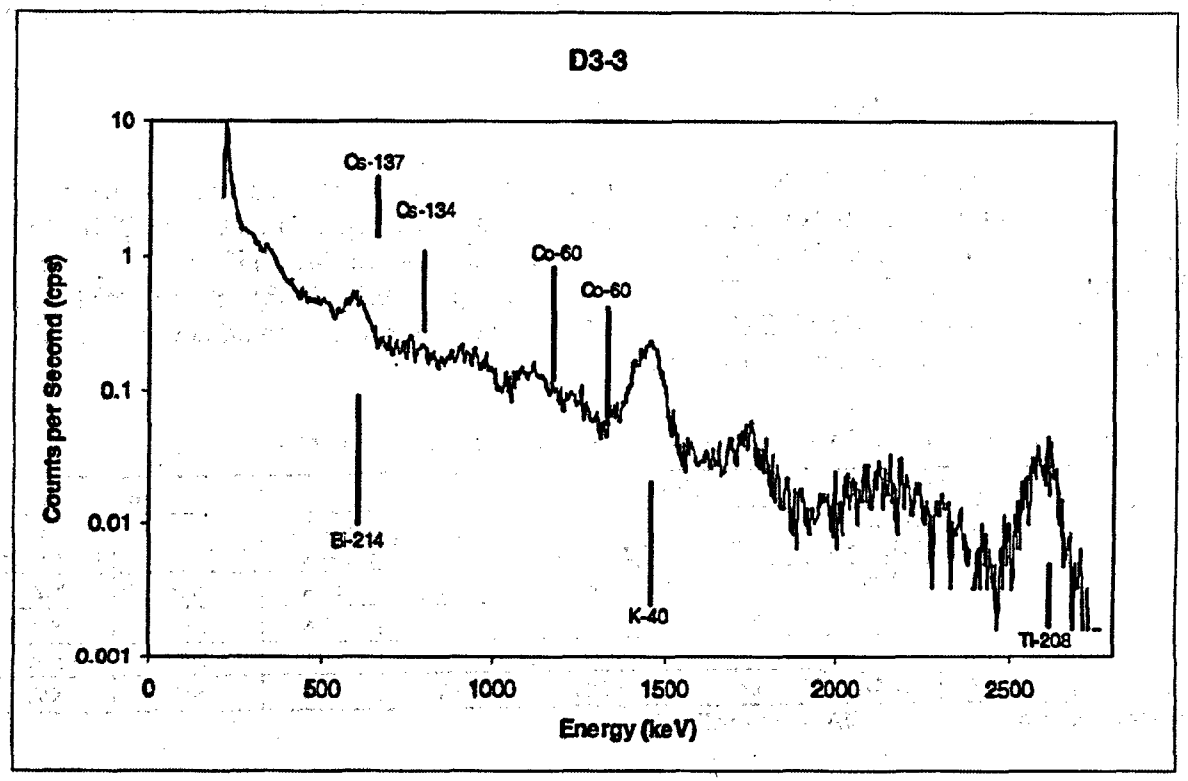


Figure 3 : In situ spectra for SAB D3-3 reported in Counts per Second (cps).

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Survey Area Block (SAB): D3-4

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated D3-4. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB D3-4 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB D3-4. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.28	ND	0.34	N/A	N/A	N/A	N/A
Co-60	ND	0.06	ND	0.29	N/A	N/A	N/A	N/A
Cs-134	ND	0.10	ND	0.24	N/A	N/A	N/A	N/A
K-40	8.36	(1.47)	5.84	(0.71)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

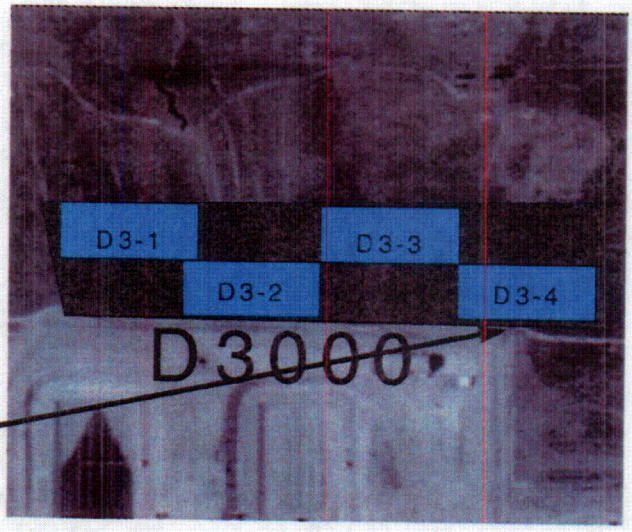
1.3. SAB Orientation and Location

SAB D3-4 is located in the southeast corner of the D3000 Survey Area. An iron pin was placed at the southwest corner of SAB D3-4. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB D3-4 Location Information

SAB D3-4

Latitude: 38° 20.922'
Longitude: 121° 7.201'
Bearing: 11°
Distance: 397 meters



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/10/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB D3-4 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

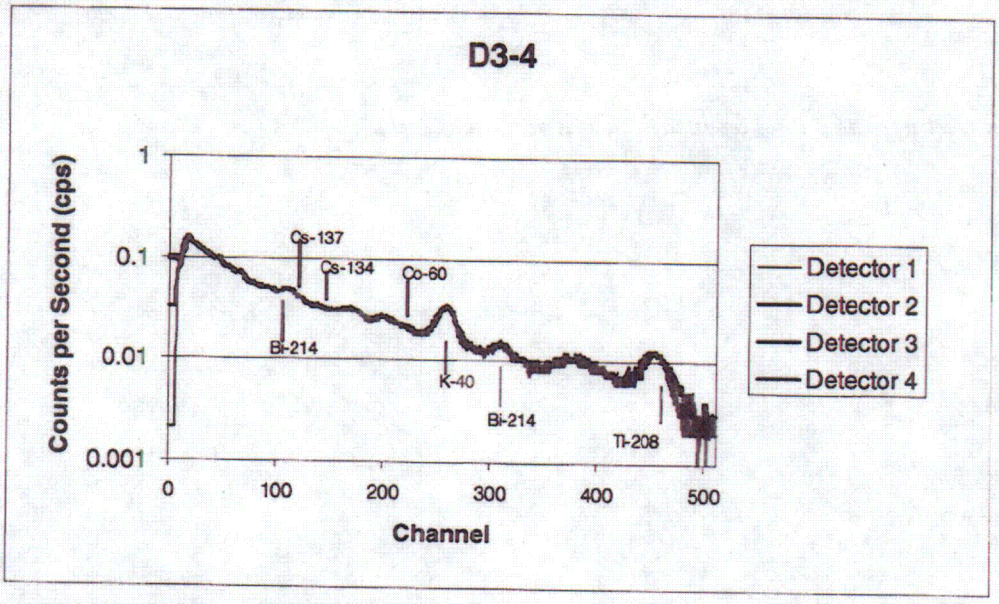


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB D3-4, complete with peak energy locations for nuclides of interest.

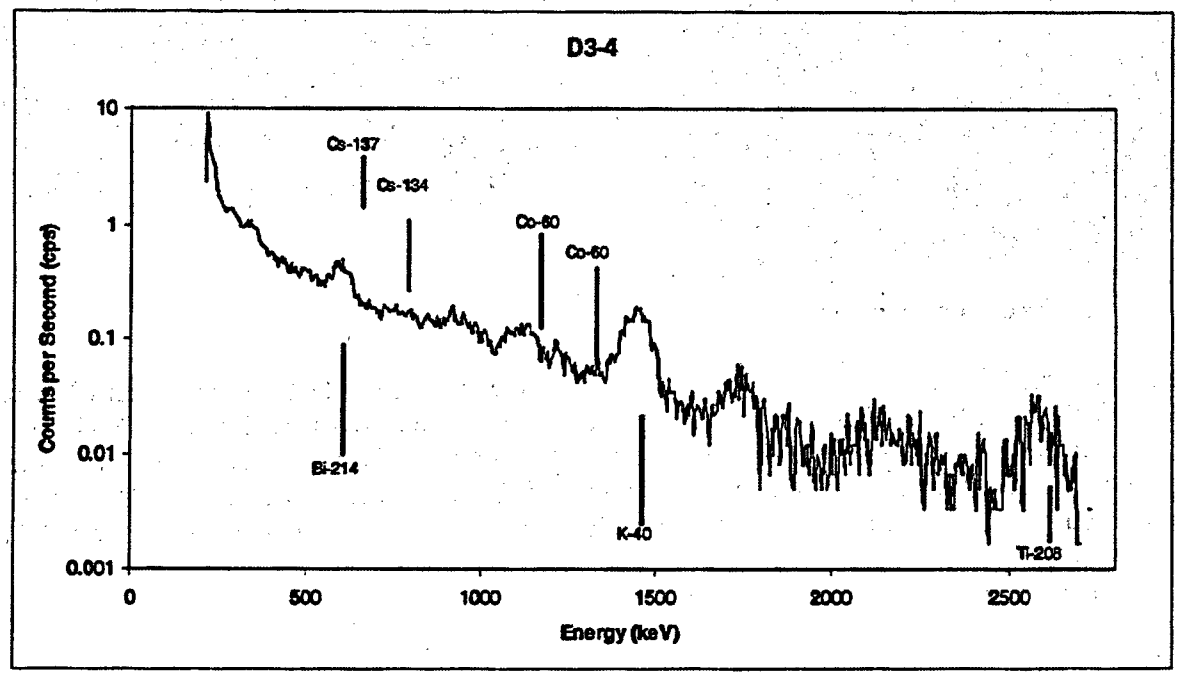


Figure 3 : In situ spectra for SAB D3-4 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): E2-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated E2-1. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB E2-1 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB E2-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.22	ND	0.35	N/A	N/A	N/A	N/A
Co-60	ND	0.06	ND	0.28	N/A	N/A	N/A	N/A
Cs-134	ND	0.13	ND	0.23	N/A	N/A	N/A	N/A
K-40	8.39	(0.48)	7.07	(0.90)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

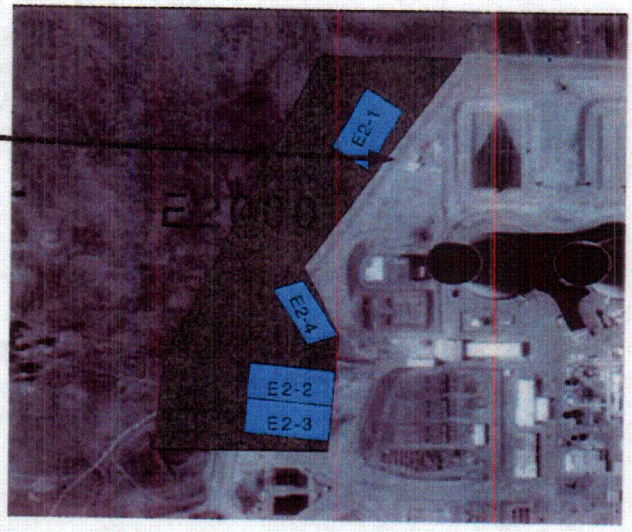
SAB E2-1 is located on the north side of the E2000 Survey Area, along the edge of the industrial area boundary. An iron pin was placed at the southwest corner of SAB E2-1. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB E2-1 Location Information

SAB E2-1

Latitude: 38° 20.857'
Longitude: 121° 7.500'
Bearing: 304°
Distance: 504 meters

No photo available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/11/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB E2-1 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

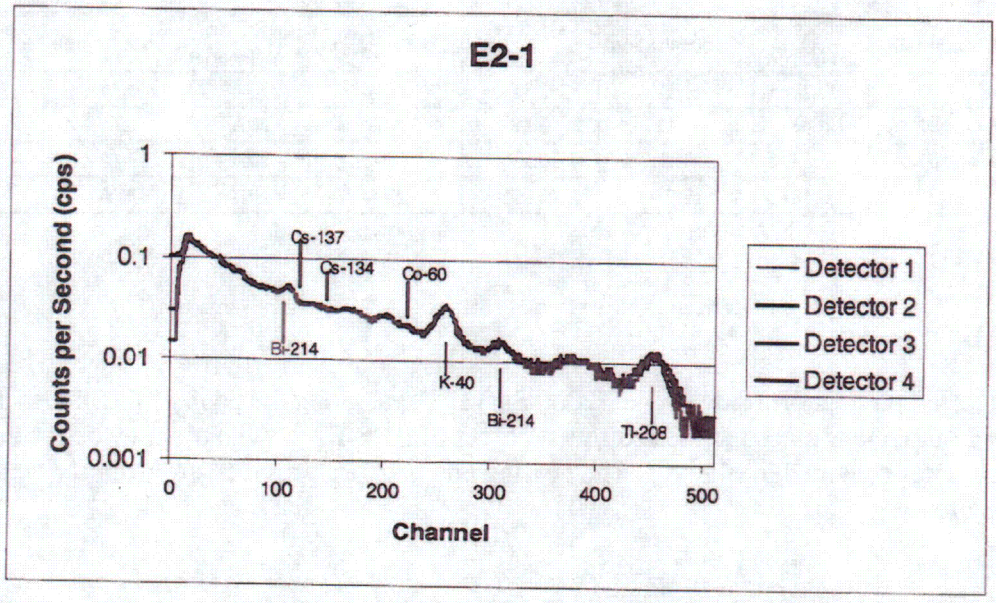


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C33

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/13/00 by D. DeBord. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB E2-1, complete with peak energy locations for nuclides of interest.

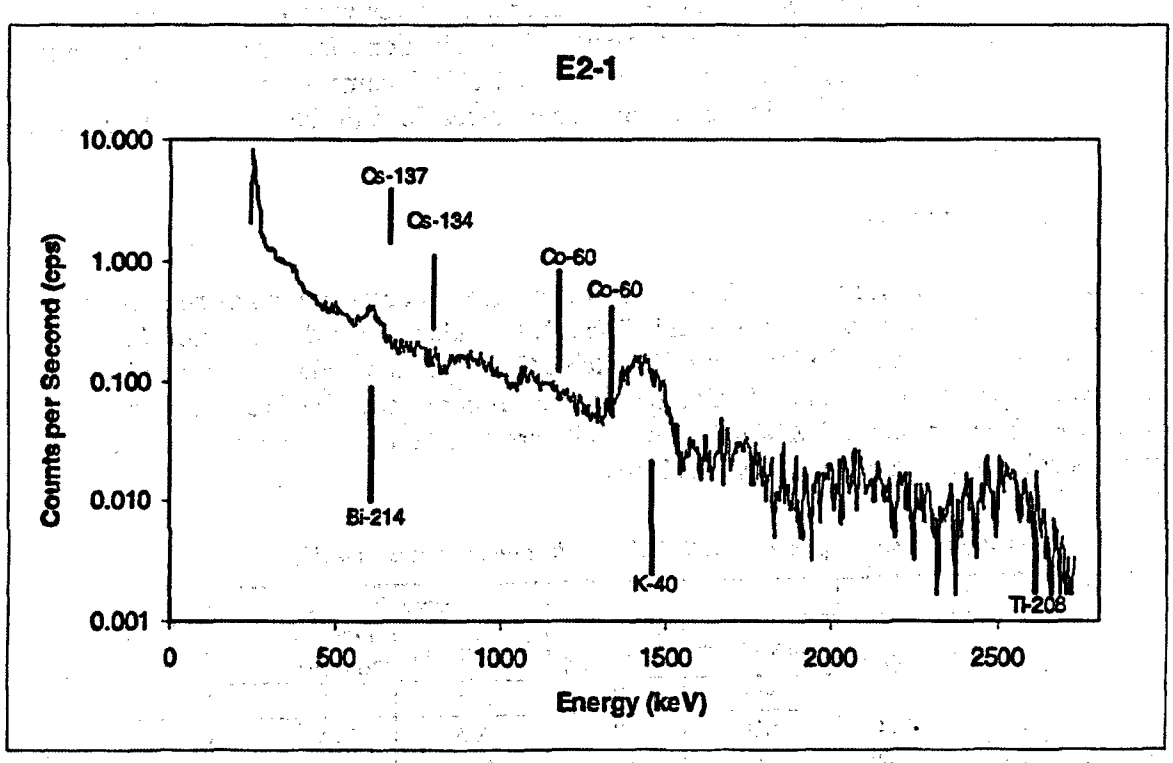


Figure 3 : In situ spectra for SAB E2-1 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): E2-2

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated E2-2. The survey consisted of a surface area scan of 2944 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB E2-2 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB E2-2. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.58	N/A	N/A	N/A	N/A	N/A	N/A
Co-60	ND	0.14	N/A	N/A	N/A	N/A	N/A	N/A
Cs-134	ND	0.38	N/A	N/A	N/A	N/A	N/A	N/A
K-40	7.99	(1.18)	N/A	N/A	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

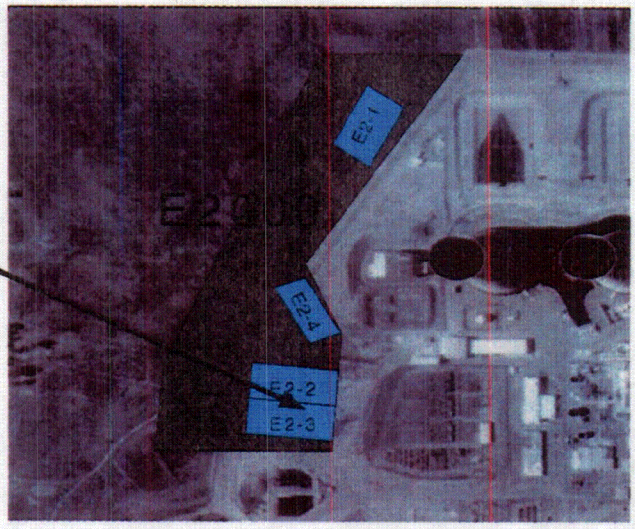
SAB E2-2 is located inside the Rancho Seco Industrial Area, in the retired sewage treatment area. An iron pin was placed at the southwest corner of SAB E2-2. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the E2-2 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB E2-2 Location Information

SAB E2-2

Latitude: 38° 20.668'
Longitude: 121° 7.570'
Bearing: 267°
Distance: 532 meters

No photo available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/11/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB E2-2 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

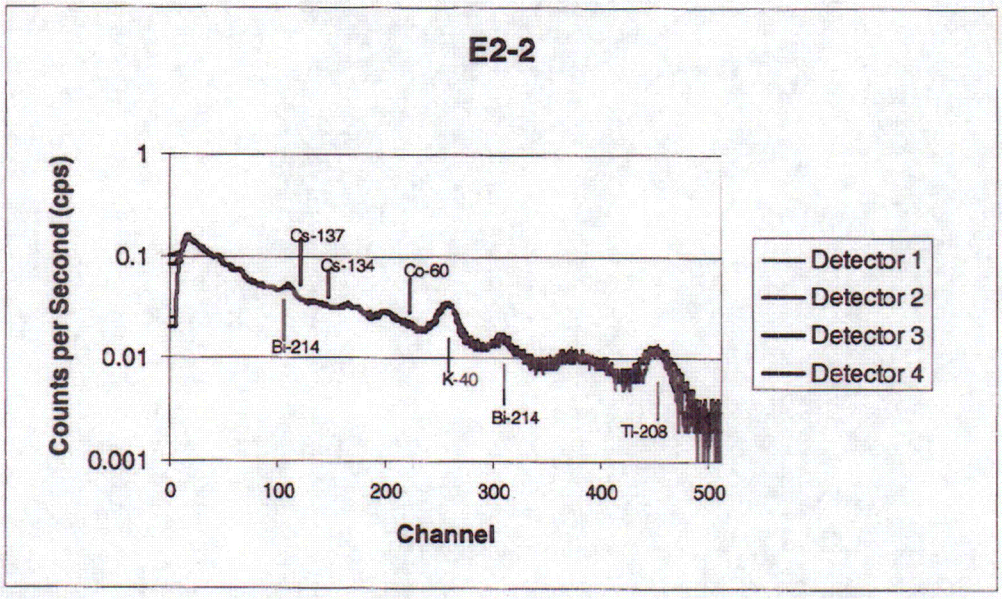


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C34

1.5. *In situ* Measurement and Soil Sample

No static *in situ* measurement was taken at this location.

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): E2-3

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated E2-3. The survey consisted of a surface area scan of 2976 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB E2-3 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB E2-3. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.48	N/A	N/A	0.03	(0.03)	0.04	(0.02)
Co-60	ND	0.14	N/A	N/A	ND	0.04	ND	0.04
Cs-134	ND	0.33	N/A	N/A	ND	0.03	ND	0.03
K-40	8.02	(1.11)	N/A	N/A	10.2	(0.76)	7.58	(0.62)

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

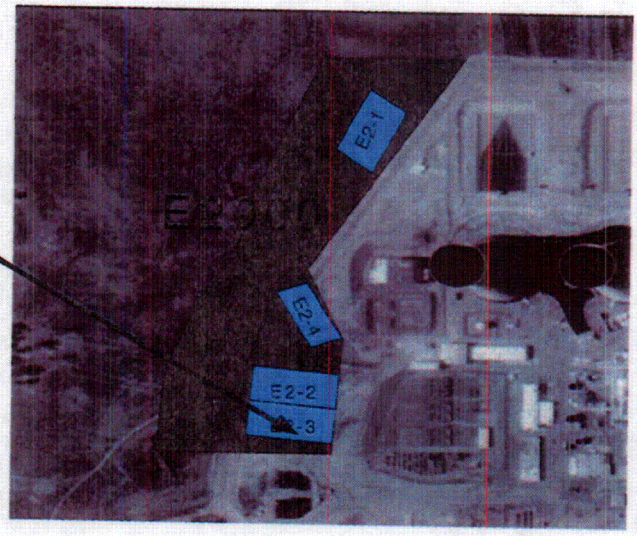
SAB E2-3 is located in the southwest corner of the E2000 Survey Area. An iron pin was placed at the southwest corner of SAB E2-3. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the E2-3 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB E2-3 Location Information

SAB E2-3

Latitude: 38° 20.646'
Longitude: 121° 7.573'
Bearing: 263°
Distance: 540 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/11/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB E2-3 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

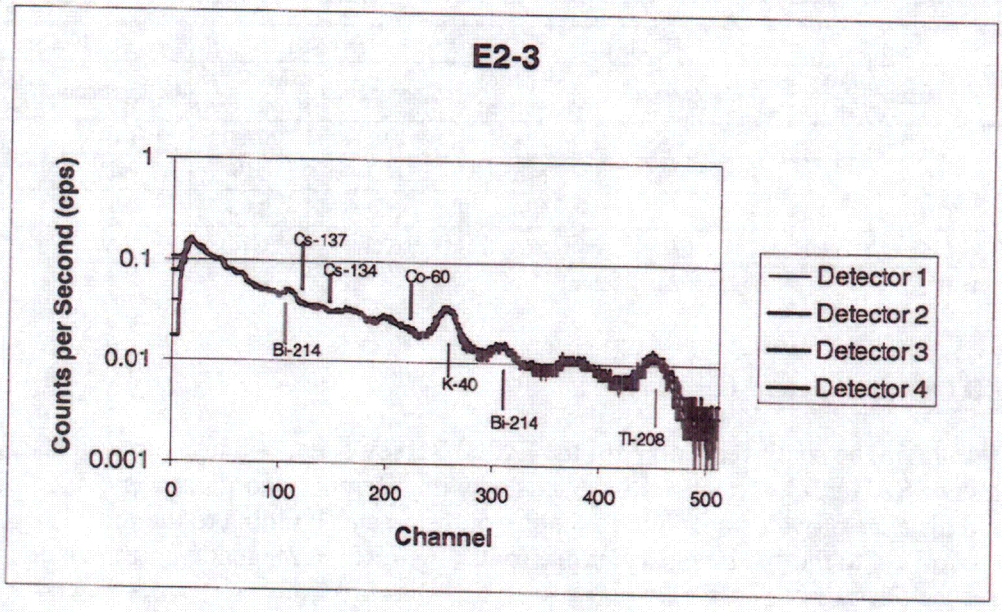


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C35

1.5. *In situ* Measurement and Soil Sample

No static *in situ* measurement was taken at this location.

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): E2-4

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated E2-4. The survey consisted of a surface area scan of 3344 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB E2-4 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB E2-4. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.29	ND	0.33	N/A	N/A	N/A	N/A
Co-60	ND	0.07	ND	0.29	N/A	N/A	N/A	N/A
Cs-134	ND	0.17	ND	0.23	N/A	N/A	N/A	N/A
K-40	8.45	(1.21)	8.28	(0.85)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

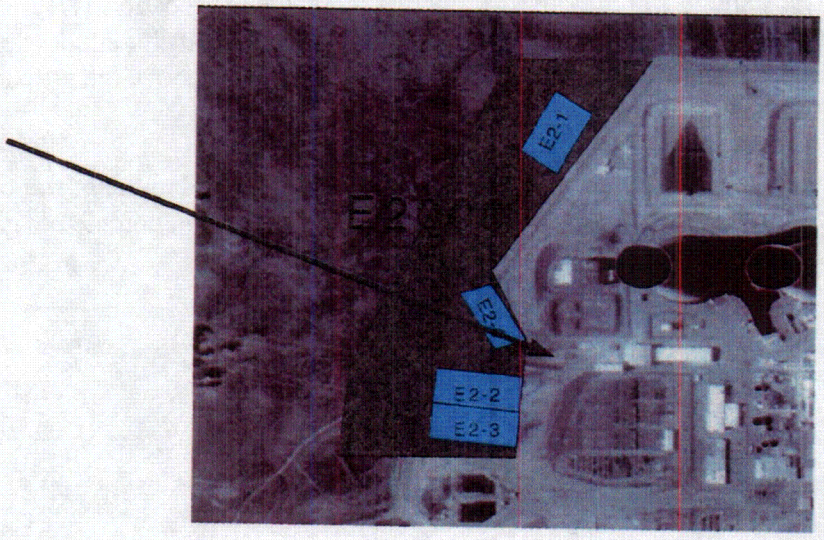
SAB E2-4 is located on the eastern edge of the E2000 Survey Area. An iron pin was placed at the southwest corner of SAB E2-4. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the E2-4 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB E2-4 Location Information

SAB E2-4

Latitude: 38° 20.712'
Longitude: 121° 7.522'
Bearing: 276°
Distance: 455 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/11/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB E2-4 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

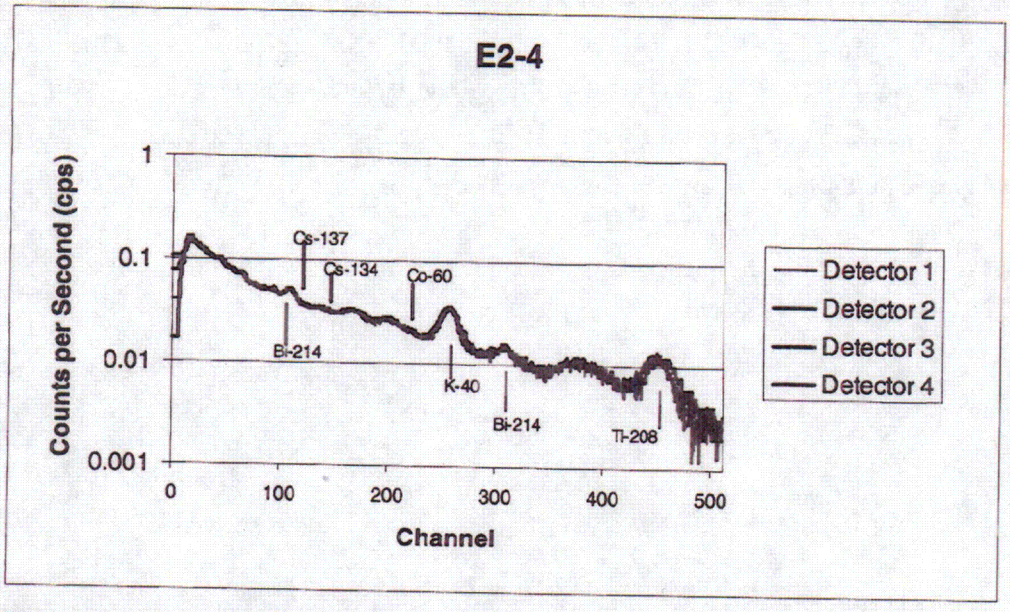


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C36

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/13/00 by D. DeBord. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB E2-4, complete with peak energy locations for nuclides of interest.

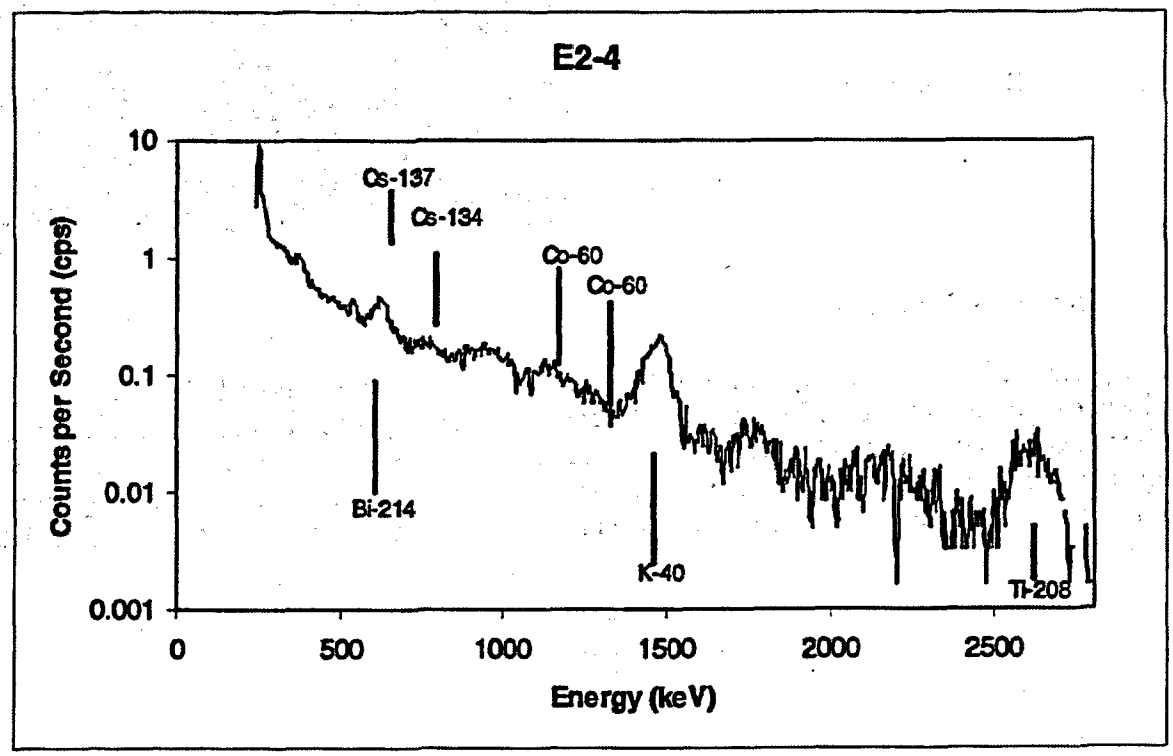


Figure 3 : In situ spectra for SAB E2-4 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): F1-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated F1-1. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB F1-1 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB F1-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.62	ND	0.40	0.28	(0.04)	0.22	(0.04)
Co-60	ND	0.12	ND	0.31	ND	0.04	ND	0.04
Cs-134	ND	0.29	ND	0.24	ND	0.03	ND	0.03
K-40	6.96	(1.25)	5.78	(0.91)	8.45	(0.66)	6.33	(0.54)

ND = None Detected N/A = Not Applicable

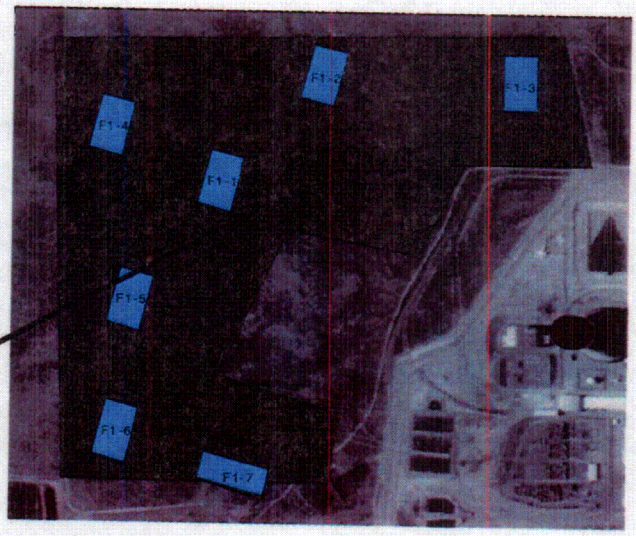
1.3. SAB Orientation and Location

SAB F1-1 is located in the middle of the F1000 Survey Area. An iron pin was placed at the southwest corner of SAB F1-1. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the F1-1 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB F1-1 Location Information

SAB F1-1

Latitude: 38° 20.892'
Longitude: 121° 7.766'
Bearing: 292°
Distance: 919 meters



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/04/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB F1-1 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

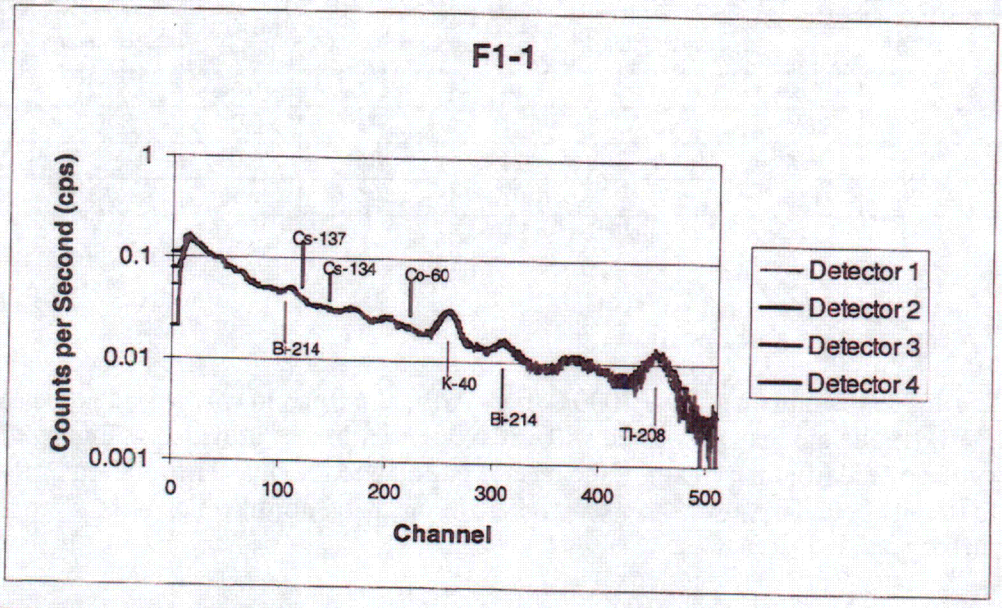


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Weismann took the soil sample at the pin location on 12/04/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 12/07/00 and again on 12/14/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the* in situ *count. Figure 3 shows the NaI(Tl) spectrum for the* in situ *count performed at SAB F1-1, complete with peak energy locations for nuclides of interest.

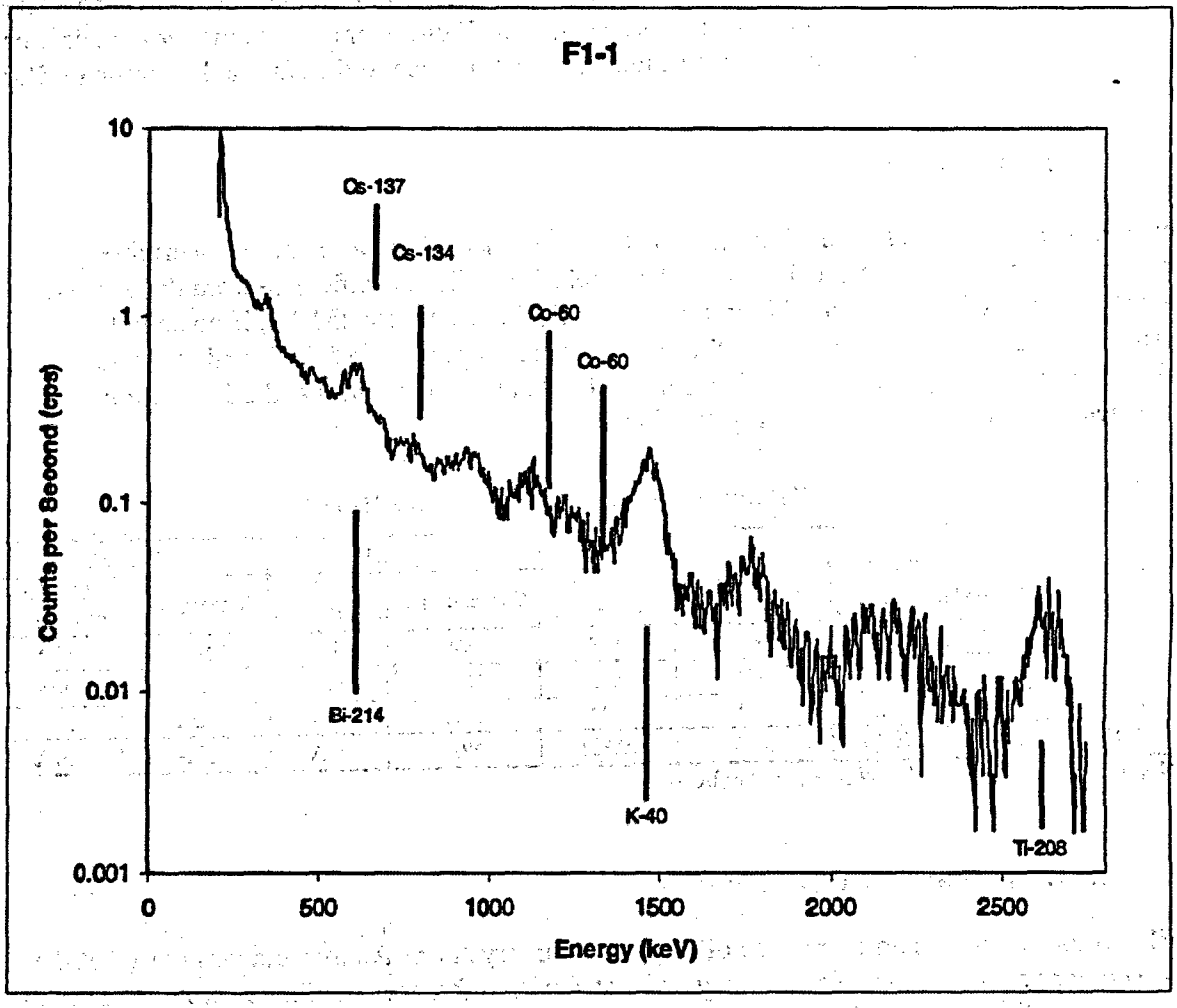


Figure 3 : In situ spectra for SAB F1-1 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): F1-2

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated F1-2. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB F1-2 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB F1-2. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.57	ND	0.38	N/A	N/A	N/A	N/A
Co-60	ND	0.13	ND	0.29	N/A	N/A	N/A	N/A
Cs-134	ND	0.27	ND	0.23	N/A	N/A	N/A	N/A
K-40	6.81	(0.77)	5.74	(0.83)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

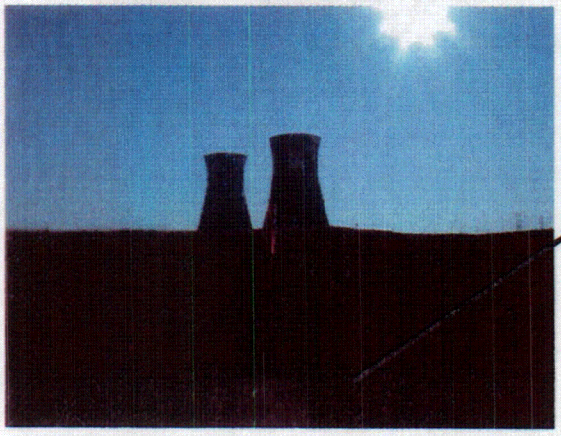
1.3. SAB Orientation and Location

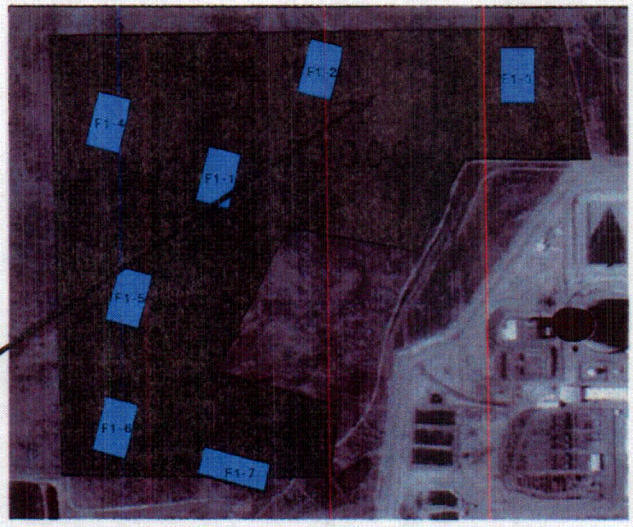
SAB F1-2 is located on the northern edge of the F1000 Survey Area. An iron pin was placed at the southwest corner of SAB F1-2. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the F1-2 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB F1-2 Location Information

SAB F1-2

Latitude: 38° 20.990'
Longitude: 121° 7.666'
Bearing: 306°
Distance: 853 meters





1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/05/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB F1-2 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

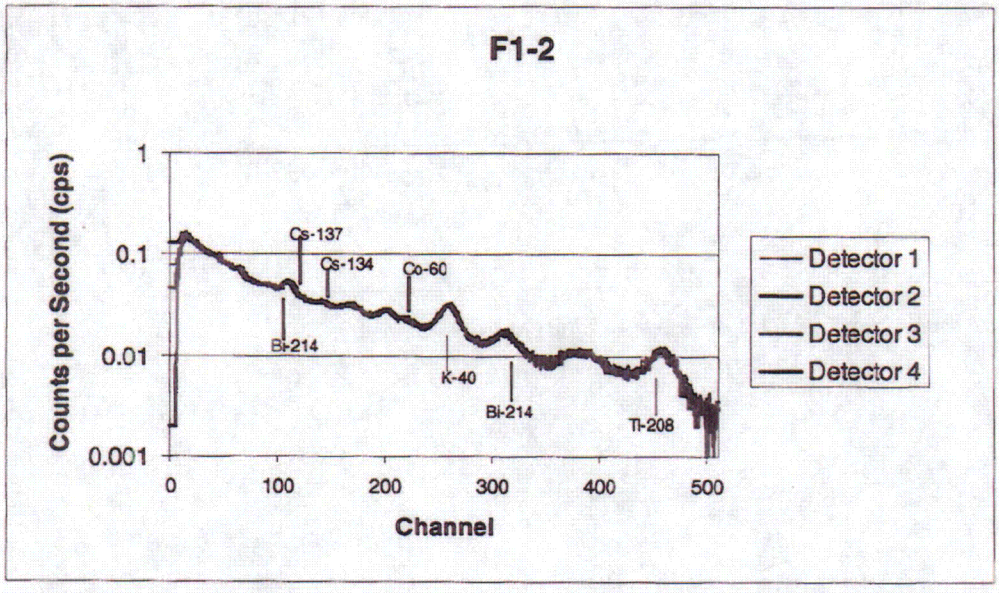


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C38

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB F1-2. Nuclides identifiers are provided here as well.

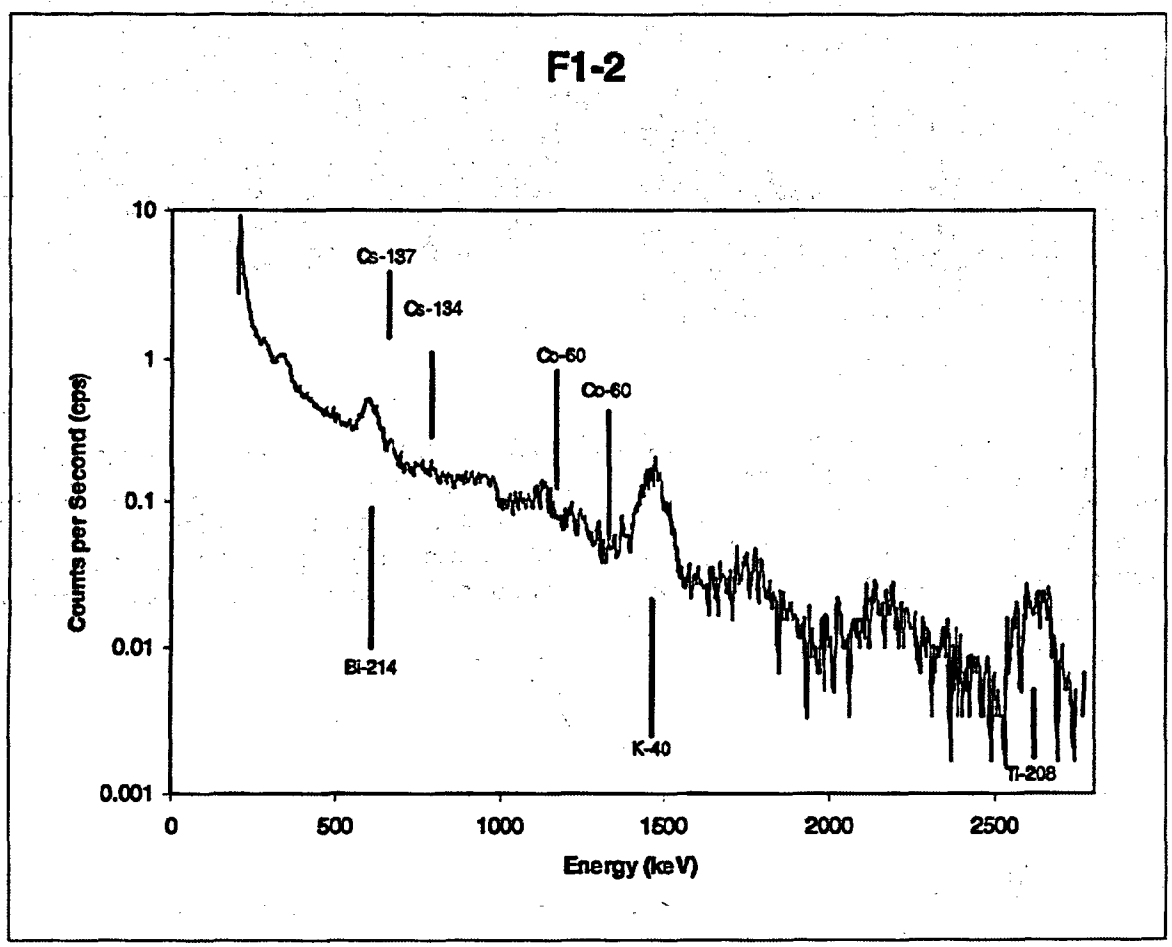


Figure 3 : In situ spectra for SAB F1-2 reported in Counts per Second (cps).

tRadiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): F1-3

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated F1-3. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB F1-3 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB F1-3. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.27	ND	0.35	0.33	(0.05)	0.27	(0.03)
Co-60	ND	0.05	ND	0.27	0.04	N/A	0.04	N/A
Cs-134	ND	0.14	ND	0.21	0.03	N/A	0.03	N/A
K-40	8.25	(0.86)	5.10	(0.76)	7.77	(0.62)	5.73	(0.49)

ND = None Detected N/A = Not Applicable

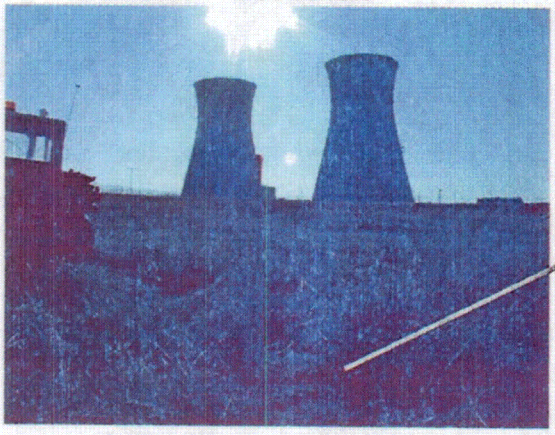
1.3. SAB Orientation and Location

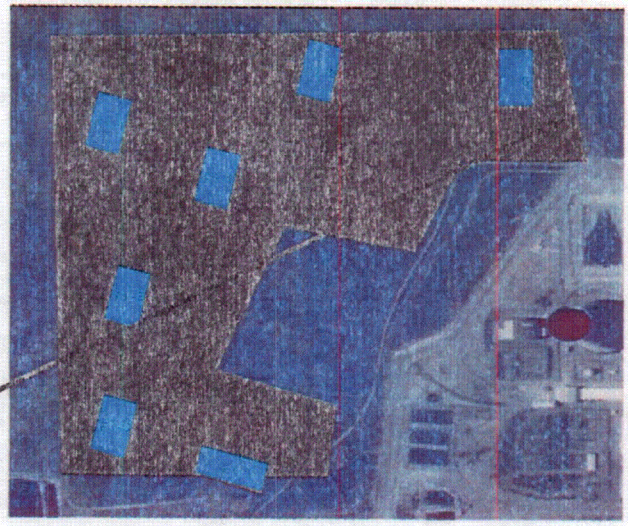
SAB F1-3 is located in the northeast corner of the F1000 Survey Area. An iron pin was placed at the southwest corner of SAB F1-3. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB F1-3 Location Information

SAB F1-3

Latitude: 38° 20.977'
Longitude: 121° 7.473'
Bearing: 322°
Distance: 608 meters





1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/11/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB F1-3 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

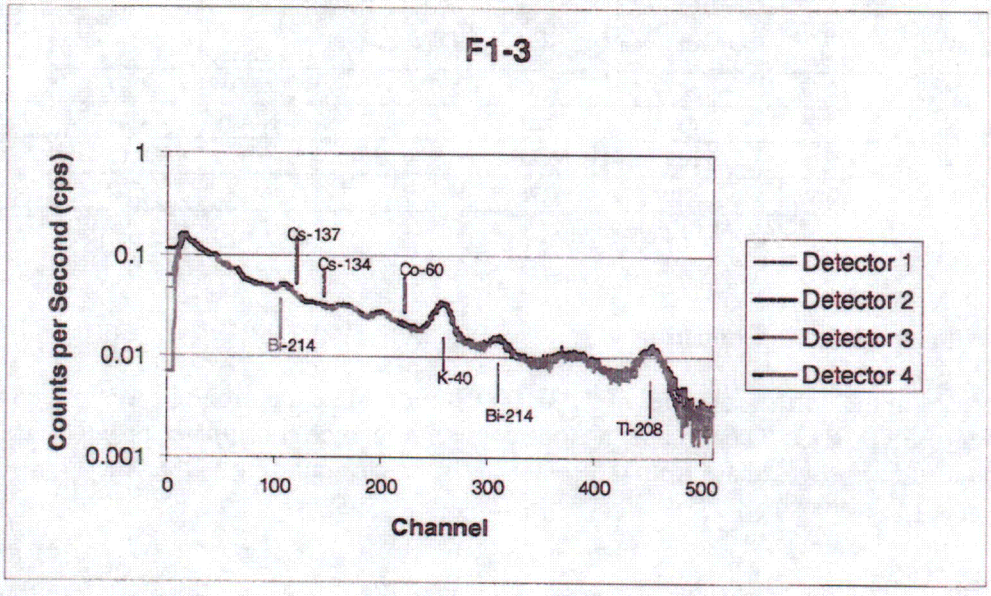


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C39

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Weismann took the soil sample at the pin location on 12/04/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 12/07/00 and again on 12/14/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB F1-3, complete with peak energy locations for nuclides of interest.

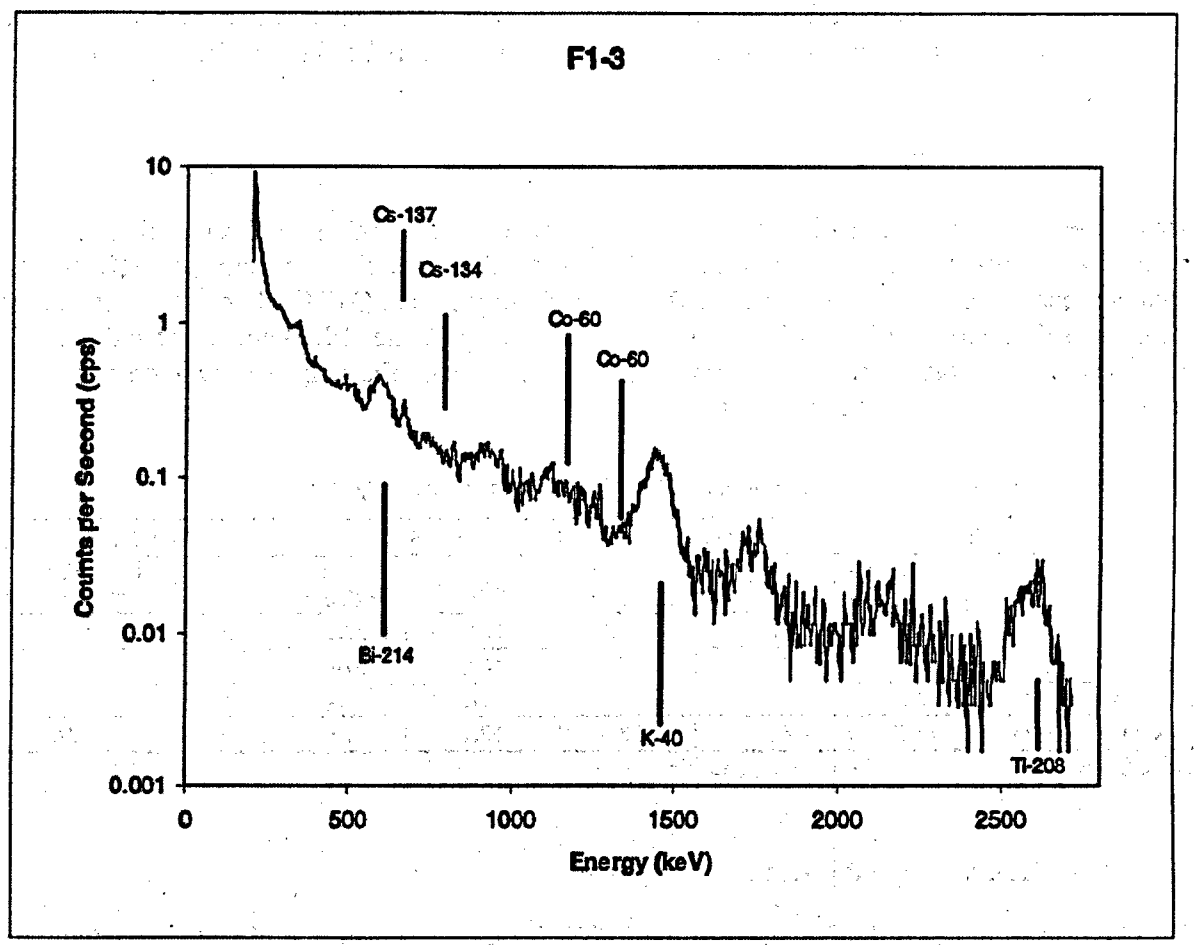


Figure 3 : In situ spectra for SAB F1-3 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): F1-4

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated F1-4. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB F1-4 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB F1-4. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.29	ND	0.41	N/A	N/A	N/A	N/A
Co-60	ND	0.06	ND	0.30	N/A	N/A	N/A	N/A
Cs-134	ND	0.16	ND	0.25	N/A	N/A	N/A	N/A
K-40	6.76	(0.51)	6.33	(0.81)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

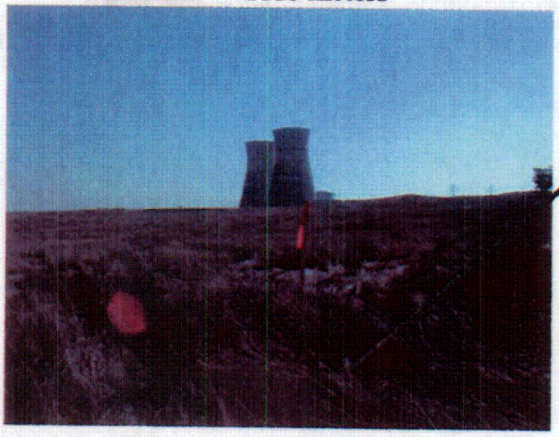
1.3. SAB Orientation and Location

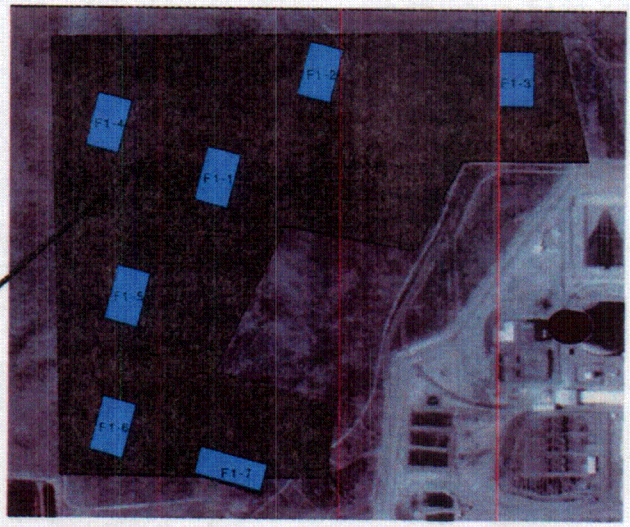
SAB F1-4 is located in the northwest corner of the F1000 Survey Area. An iron pin was placed at the southwest corner of SAB F1-4. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the F1-4 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB F1-4 Location Information

SAB F1-4

Latitude: 38° 20.944'
Longitude: 121° 7.870'
Bearing: 293°
Distance: 1110 meters





1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/04/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB F1-4 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

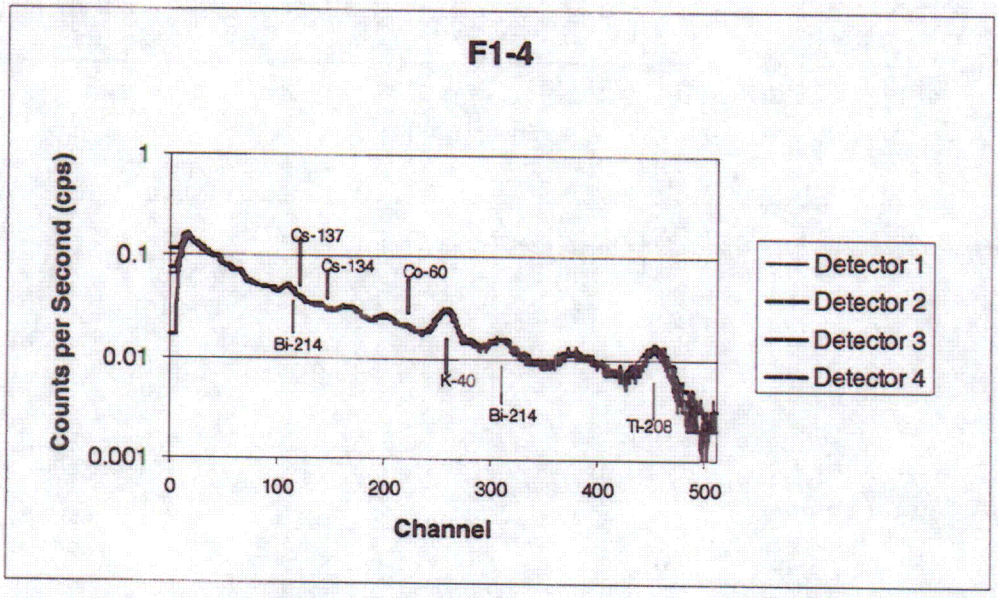


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB F1-4, complete with peak energy locations for nuclides of interest.

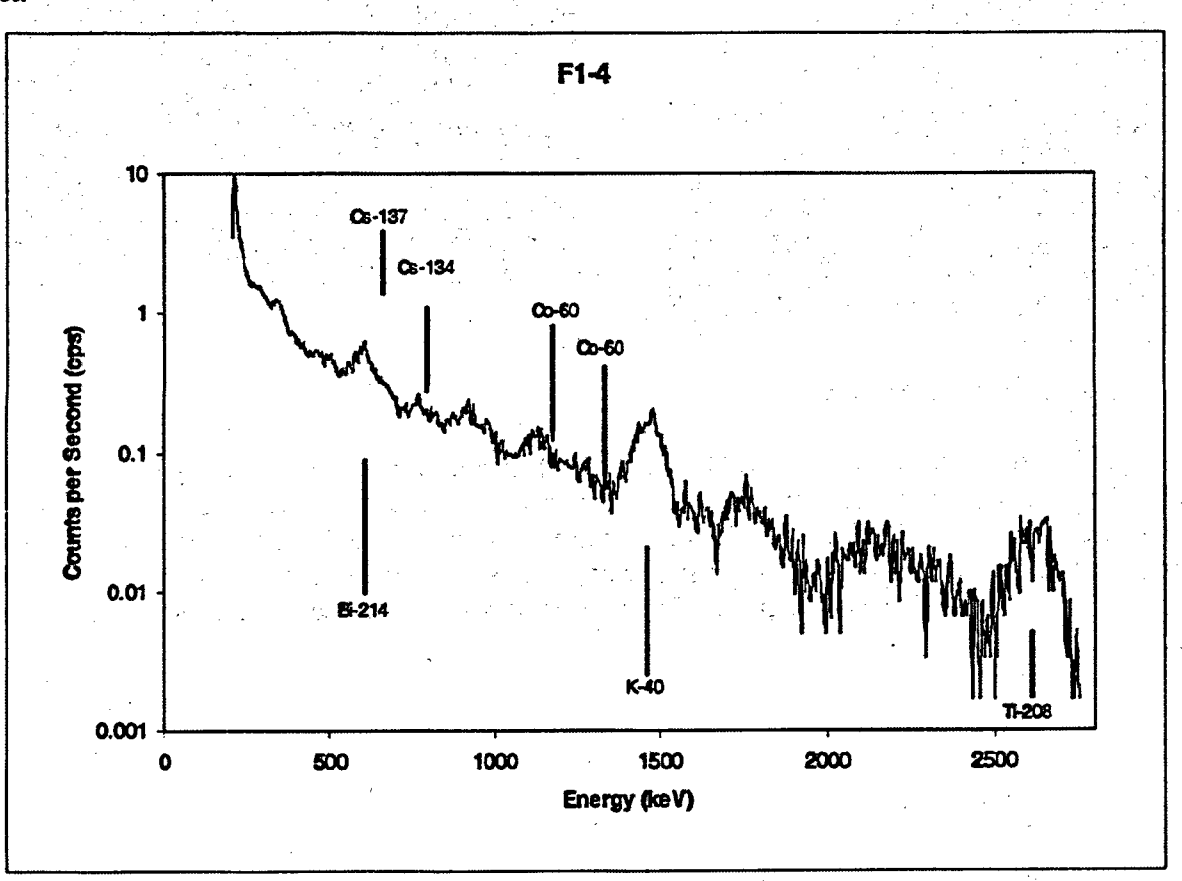


Figure 3 : In situ spectra for SAB F1-4 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): F1-5

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated F1-5. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB F1-5 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB F1-5. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.33	ND	0.39	N/A	N/A	N/A	N/A
Co-60	ND	0.07	ND	0.29	N/A	N/A	N/A	N/A
Cs-134	ND	0.16	ND	0.24	N/A	N/A	N/A	N/A
K-40	6.42	(0.89)	4.81	(0.81)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

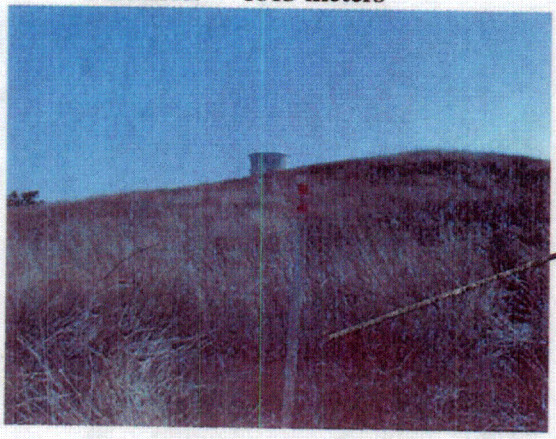
1.3. SAB Orientation and Location

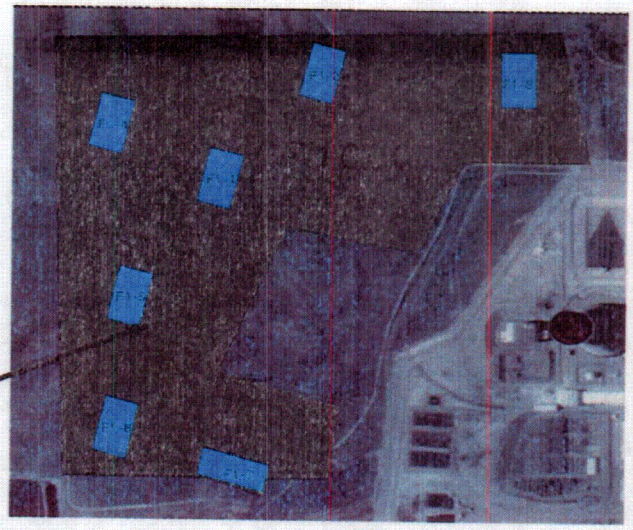
SAB F1-5 is located on the western edge of the F1000 Survey Area. An iron pin was placed at the southwest corner of SAB F1-5. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the F1-5 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB F1-5 Location Information

SAB F1-5

Latitude: 38° 20.783'
Longitude: 121° 7.855'
Bearing: 279°
Distance: 1013 meters





1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/04/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB F1-5 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

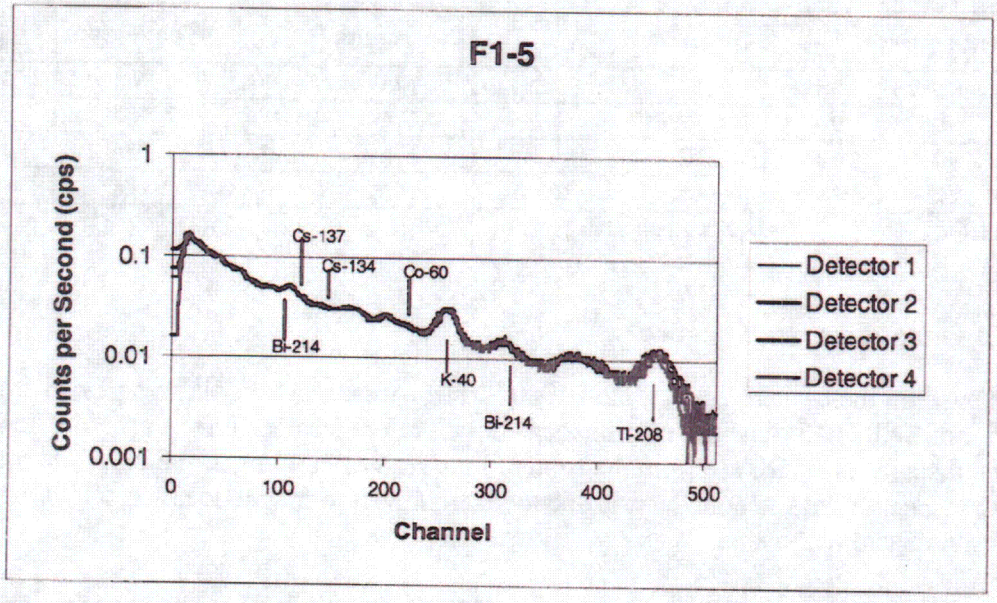


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB F1-5, complete with peak energy locations for nuclides of interest.

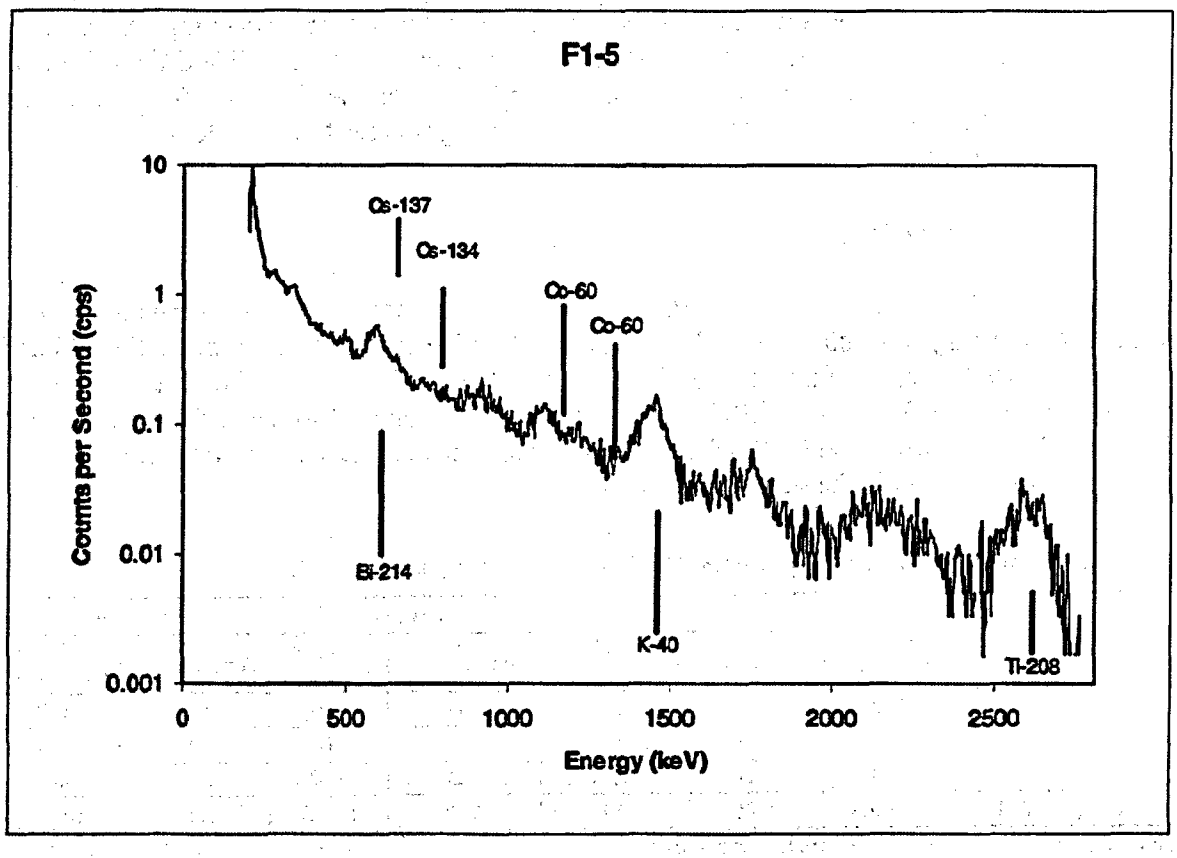


Figure 3 : In situ spectra for SAB F1-5 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): F1-6

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated F1-6. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB F1-6 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB F1-6. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.33	ND	0.38	0.18	(0.03)	0.18	(0.02)
Co-60	ND	0.07	ND	0.30	ND	0.04	ND	0.04
Cs-134	ND	0.14	ND	0.24	ND	0.03	ND	0.03
K-40	7.51	(1.06)	5.85	(0.74)	6.60	(0.50)	5.19	(0.42)

ND = None Detected N/A = Not Applicable

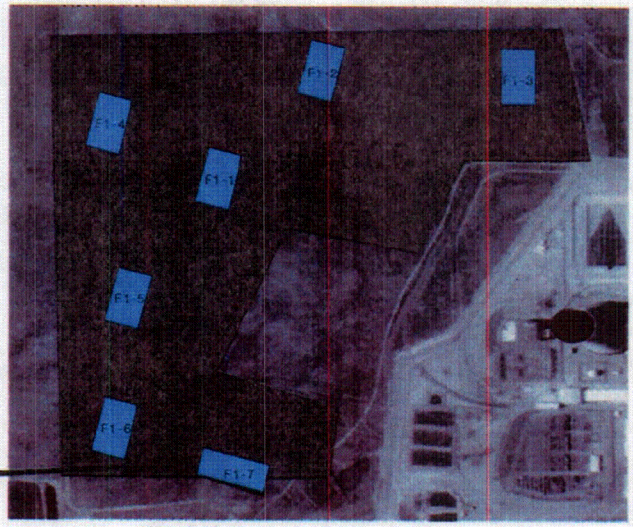
1.3. SAB Orientation and Location

SAB F1-6 is located in the southwest corner of the F1000 Survey Area. An iron pin was placed at the southwest corner of SAB F1-6. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the F1-6 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB F1-6 Location Information

SAB F1-6

Latitude: 38° 20.662'
Longitude: 121° 7.871'
Bearing: 268°
Distance: 1027 meters



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/04/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB F1-6 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

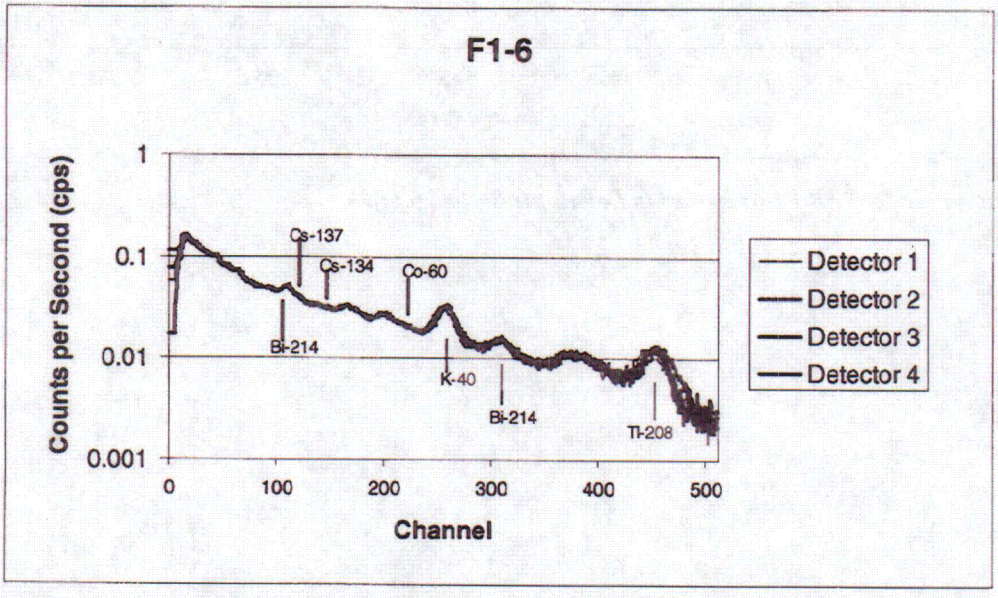


Figure 2 – SMCM scan spectra reported in counts per second (cps).

CFZ

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. J. Shonka took the soil sample at the pin location on 11/15/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 11/28/00 and again on 12/06/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB F1-6, complete with peak energy locations for nuclides of interest.

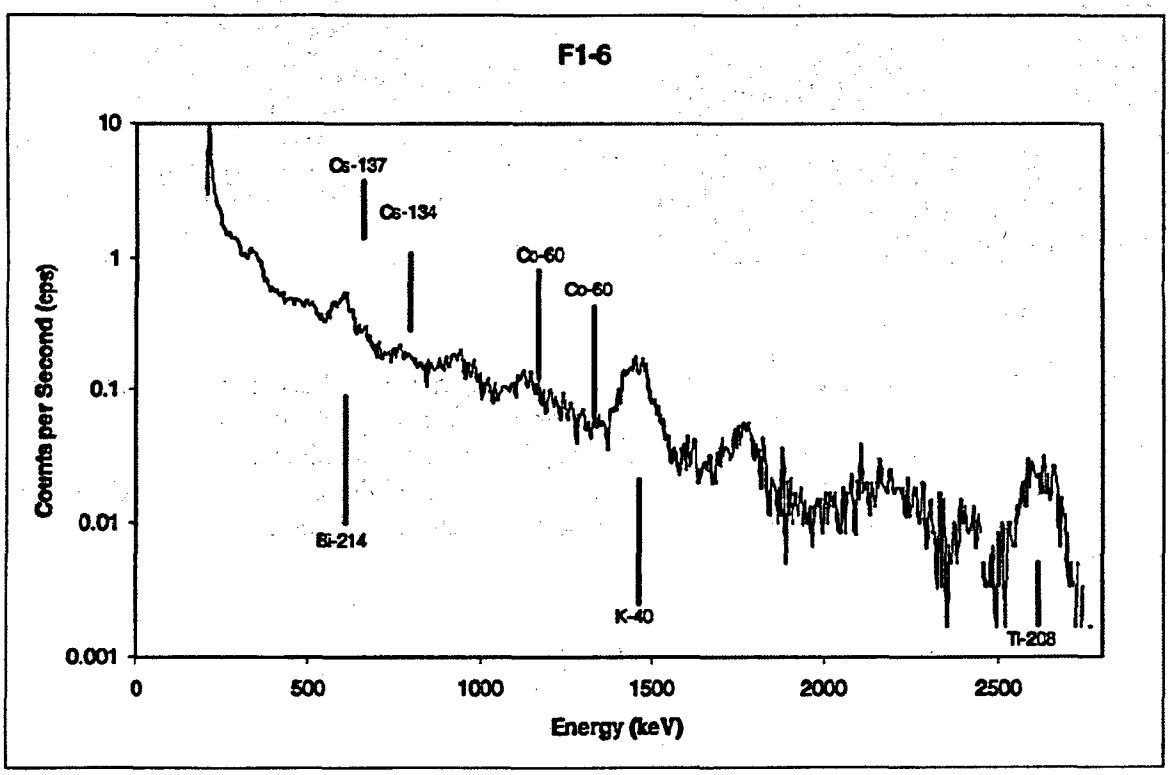


Figure 3 : In situ spectra for SAB F1-6 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): F1-7

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated F1-7. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB F1-7 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The SMCM Scan MDC values is based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB F1-7. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.32	ND	0.37	0.18	(0.03)	0.14	(0.02)
Co-60	ND	0.06	ND	0.29	ND	0.04	ND	0.04
Cs-134	ND	0.17	ND	0.23	ND	0.03	ND	0.03
K-40	7.04	(1.12)	4.62	(0.86)	6.65	(0.52)	5.27	(0.45)

ND = None Detected N/A = Not Applicable

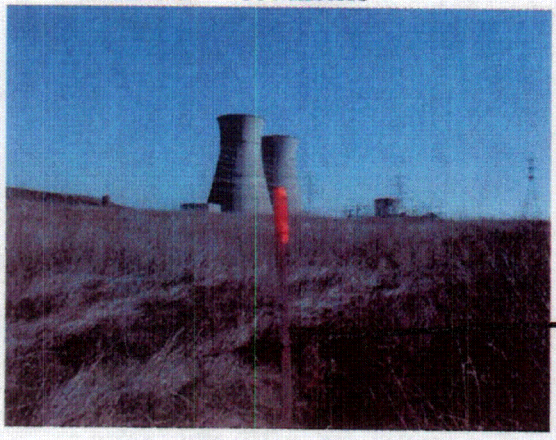
1.3. SAB Orientation and Location

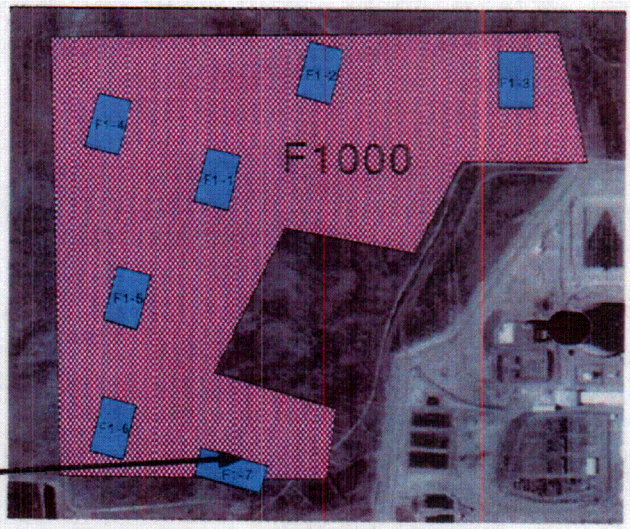
SAB F1-7 is located on the southern edge of the F1000 Survey Area. An iron pin was placed at the southwest corner of SAB F1-7. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the F1-7 SAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB F1-7 Location Information

SAB F1-7

Latitude: 38° 20.639'
Longitude: 121° 7.771'
Bearing: 265°
Distance: 864 meters





1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/04/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB F1-7 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

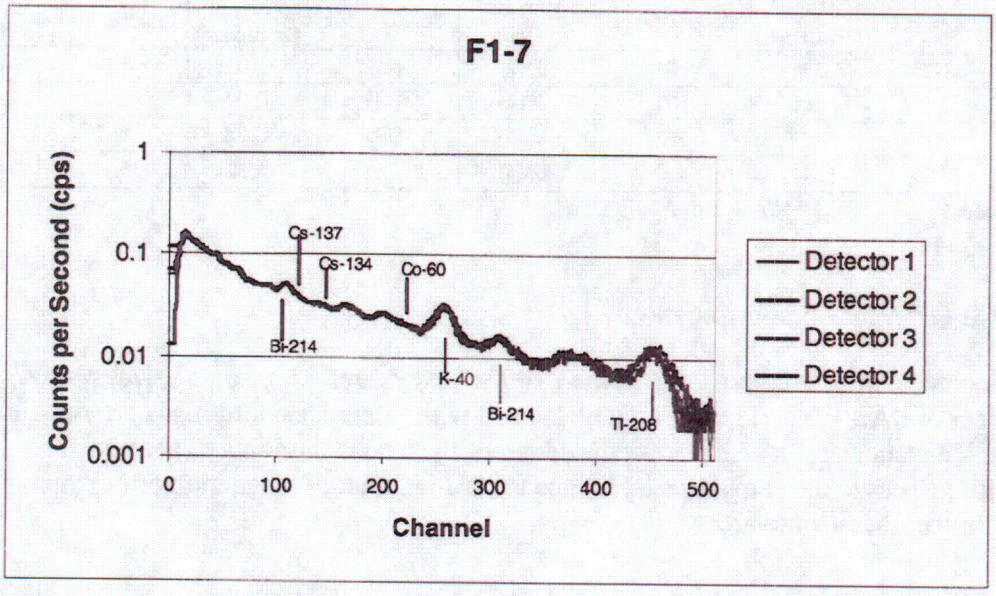


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/04/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. J. Shonka took the soil sample at the pin location on 11/17/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 11/28/00 and again on 12/06/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB F1-7, complete with peak energy locations for nuclides of interest.

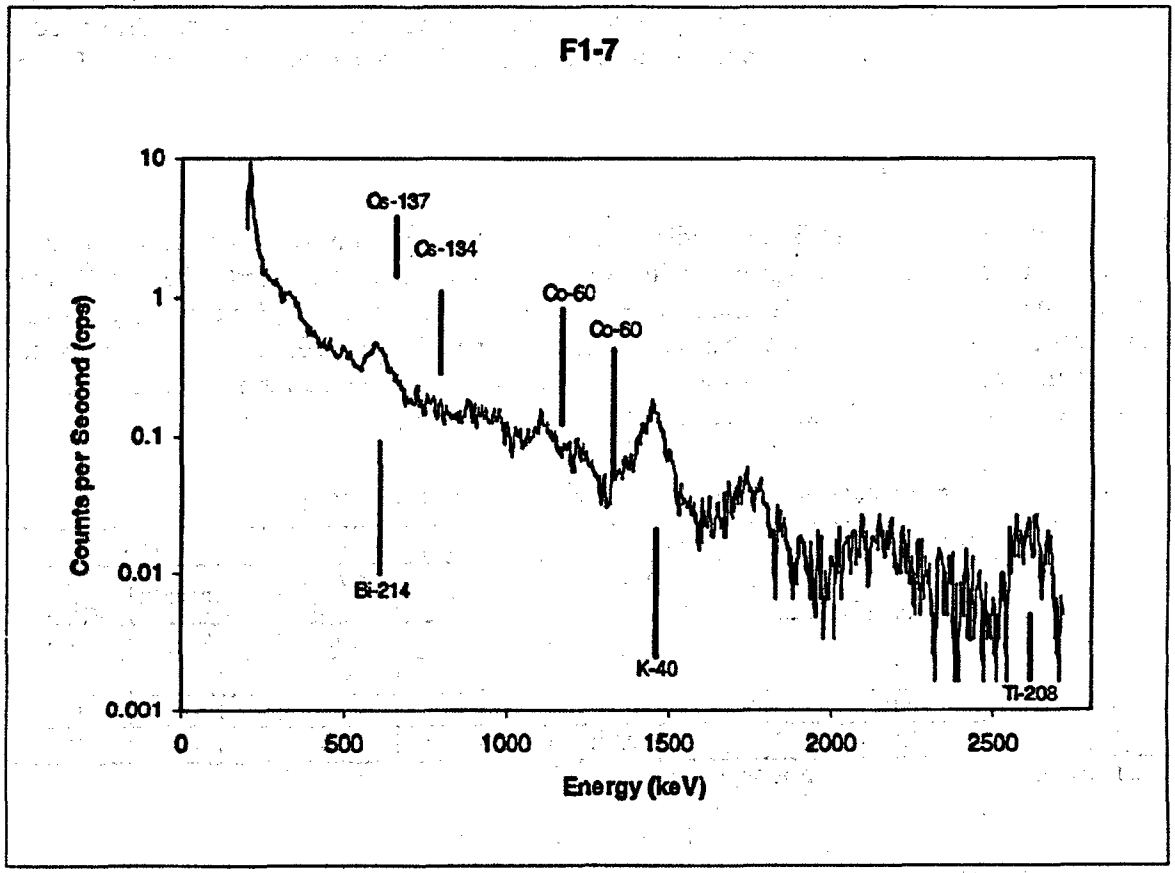


Figure 3 : In situ spectra for SAB F1-7 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): G2-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated G2-1. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB G2-1 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB G2-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.23	ND	0.40	N/A	N/A	N/A	N/A
Co-60	ND	0.06	ND	0.31	N/A	N/A	N/A	N/A
Cs-134	ND	0.12	ND	0.24	N/A	N/A	N/A	N/A
K-40	6.08	(0.67)	5.73	(0.94)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

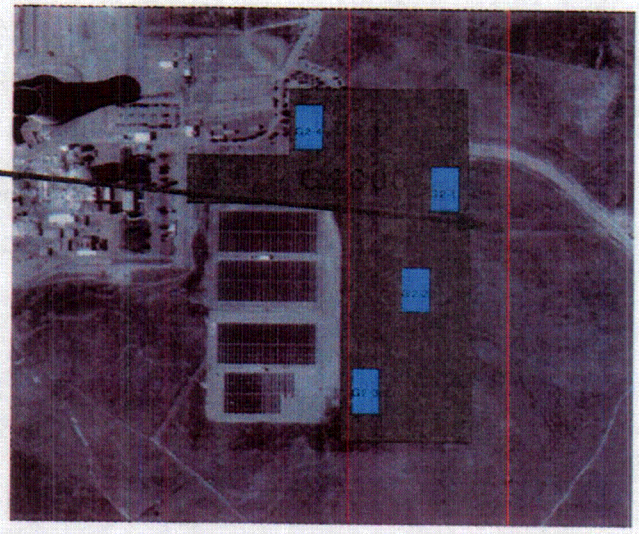
SAB G2-1 is located in the northeast corner of the G2000 Survey Area. An iron pin was placed at the southwest corner of SAB G2-1. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB G2-1 Location Information

SAB G2-1

Latitude: 38° 20.642'
Longitude: 121° 6.828'
Bearing: 96°
Distance: 692 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/09/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB G2-1 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

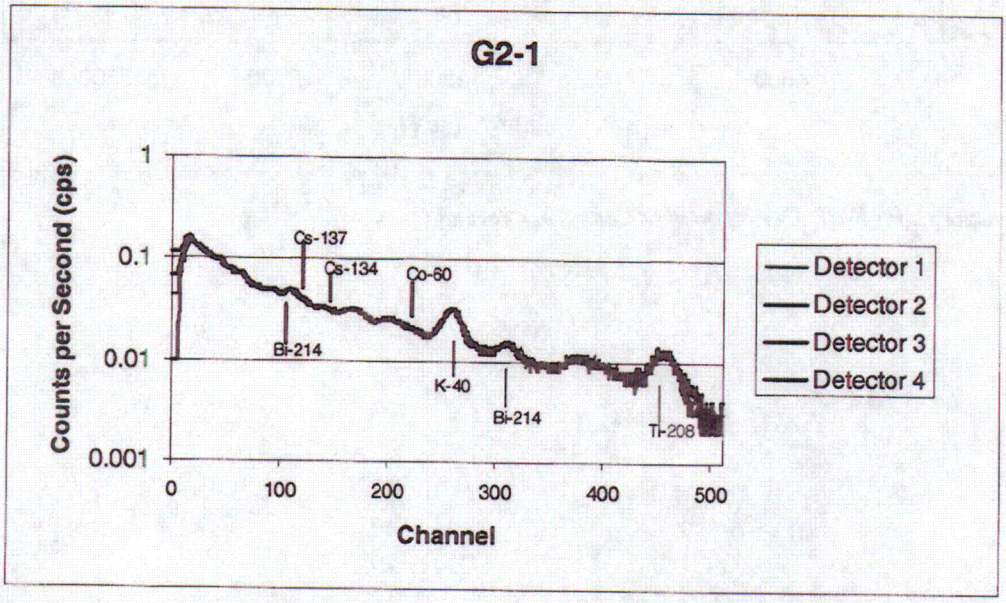


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB G2-1, complete with peak energy locations for nuclides of interest.

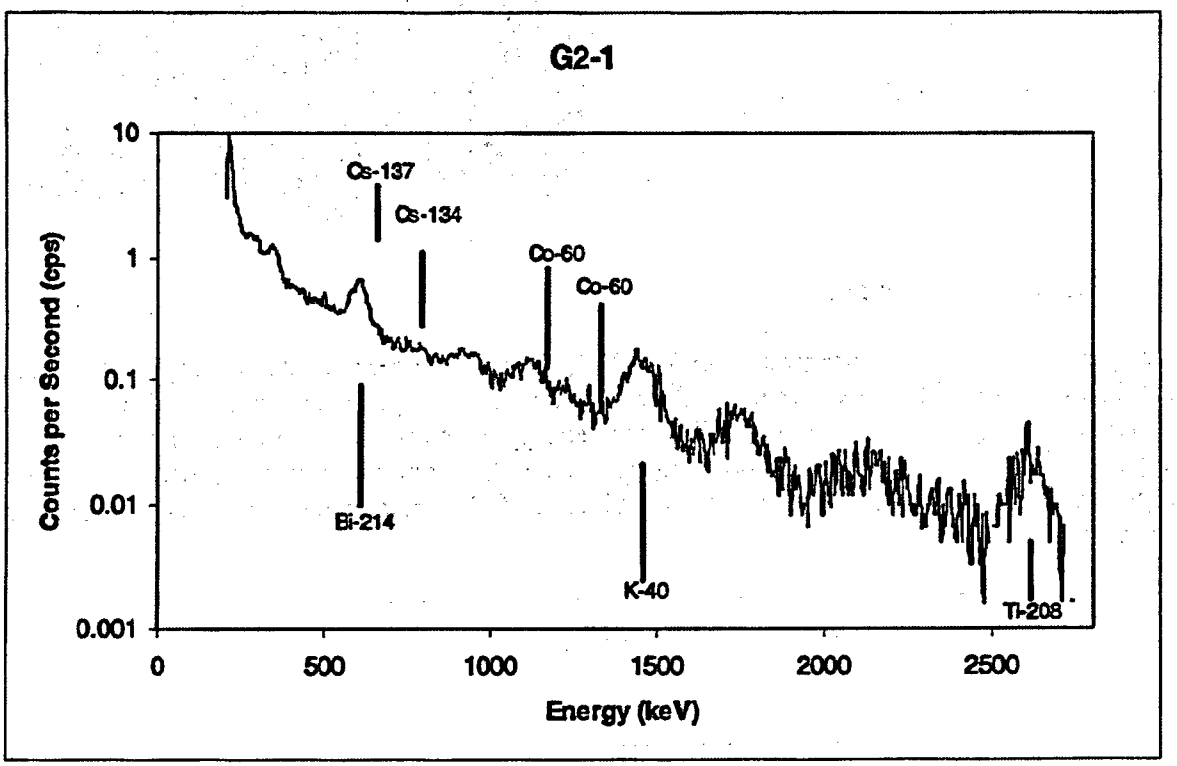


Figure 3 : In situ spectra for SAB G2-1 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): G2-2

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated G2-2. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB G2-2 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB G2-2. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.27	ND	0.38	0.22	(0.03)	0.22	(0.04)
Co-60	ND	0.08	ND	0.30	ND	0.04	ND	0.04
Cs-134	ND	0.19	ND	0.23	ND	0.03	ND	0.03
K-40	5.05	(0.47)	5.09	(0.97)	5.90	(0.54)	5.93	(0.47)

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

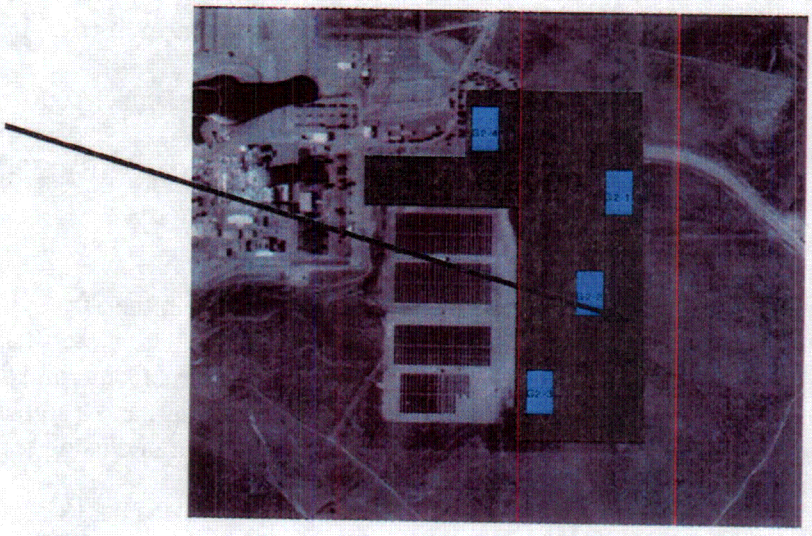
SAB G2-2 is located in the middle of the G2000 Survey Area. An iron pin was placed at the southwest corner of SAB G2-2. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB G2-2 Location Information

SAB G2-2

Latitude: 38° 20.525'
Longitude: 121° 6.865'
Bearing: 113°
Distance: 680 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/08/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB G2-2 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

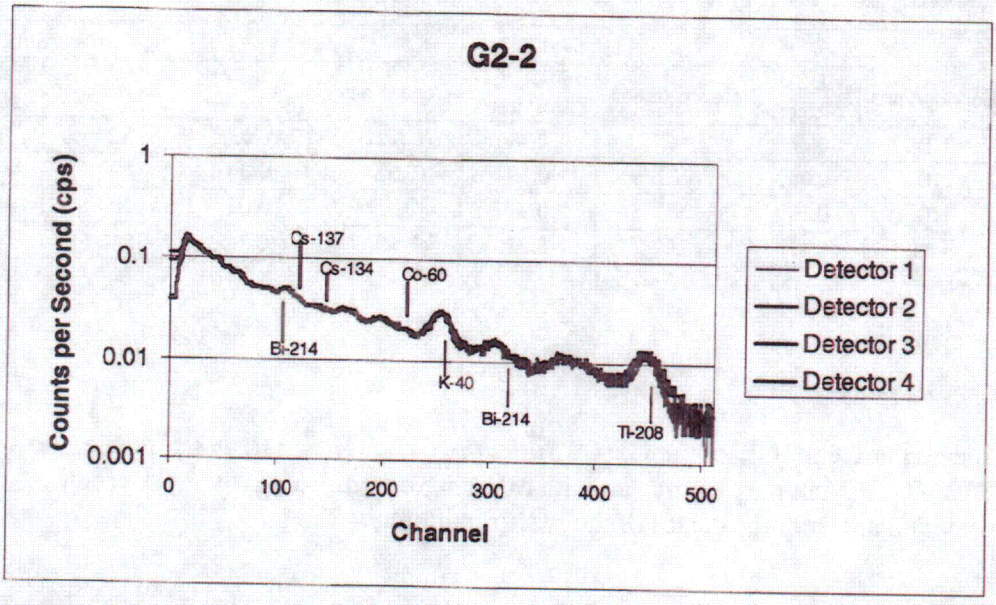


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Weismann took the soil sample at the pin location on 12/06/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 12/11/00 and again on 12/19/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the in-situ count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB G2-2. Nuclide identifiers are included here as well.

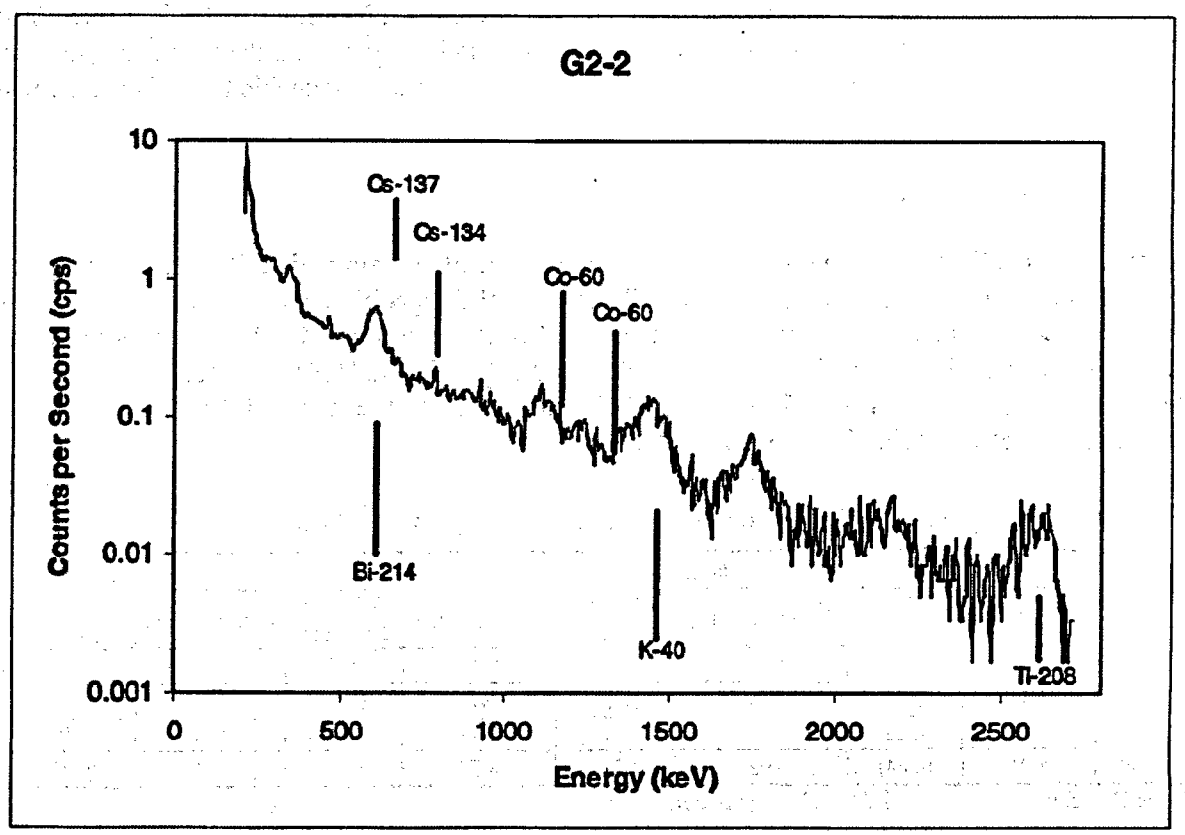


Figure 3 : In situ spectra for SAB G2-2 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): G2-3

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated G2-3. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB G2-3 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB G2-3. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.41	ND	0.40	0.46	(0.05)	0.39	(0.04)
Co-60	ND	0.08	ND	0.32	ND	0.04	ND	0.04
Cs-134	ND	0.23	ND	0.25	ND	0.03	ND	0.03
K-40	6.24	(0.84)	6.92	(0.85)	8.52	(0.65)	7.30	(0.55)

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

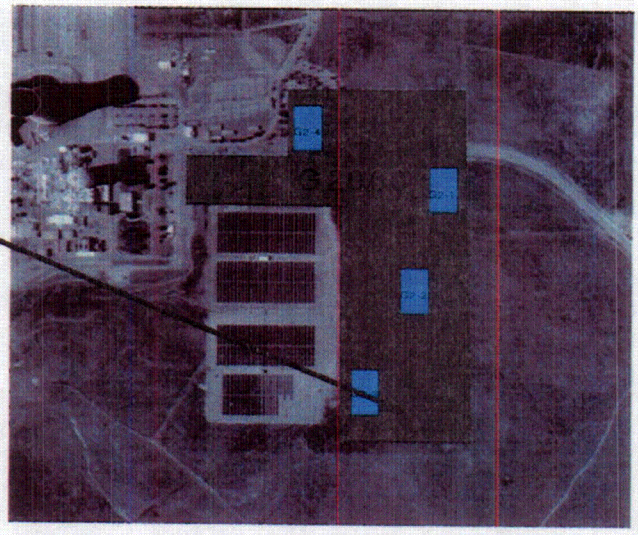
SAB G2-3 is located in the southwest corner of the G2000 Survey Area. An iron pin was placed at the southwest corner of SAB G2-3. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB G2-3 Location Information

SAB G2-3

Latitude: 38° 20.410'
Longitude: 121° 6.926'
Bearing: 131°
Distance: 694 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/08/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB G2-3 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

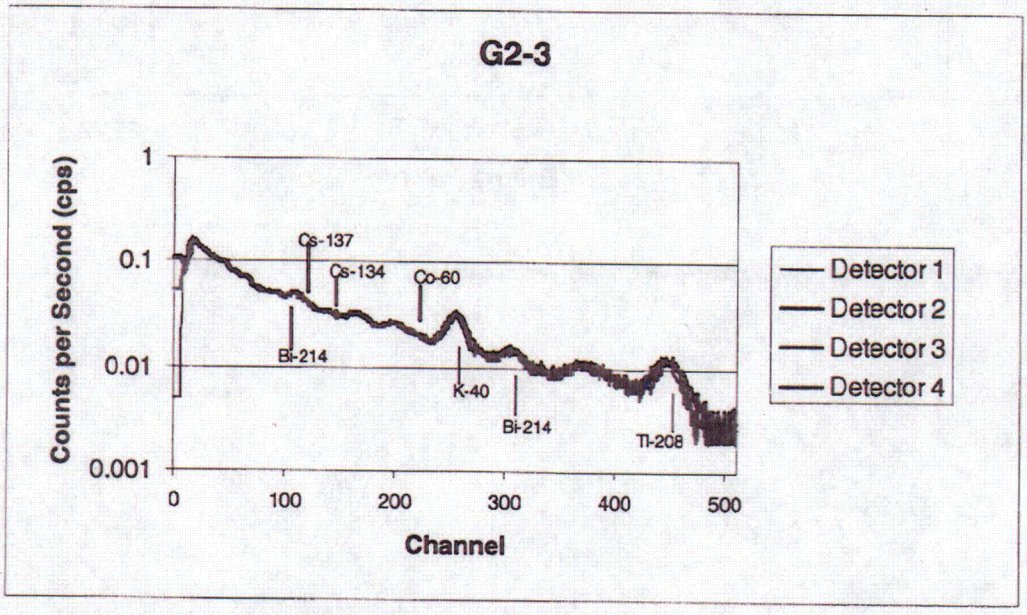


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Weismann took the soil sample at the pin location on 12/05/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 12/11/00 and again on 12/18/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB G2-3, complete with peak energy locations for nuclides of interest.

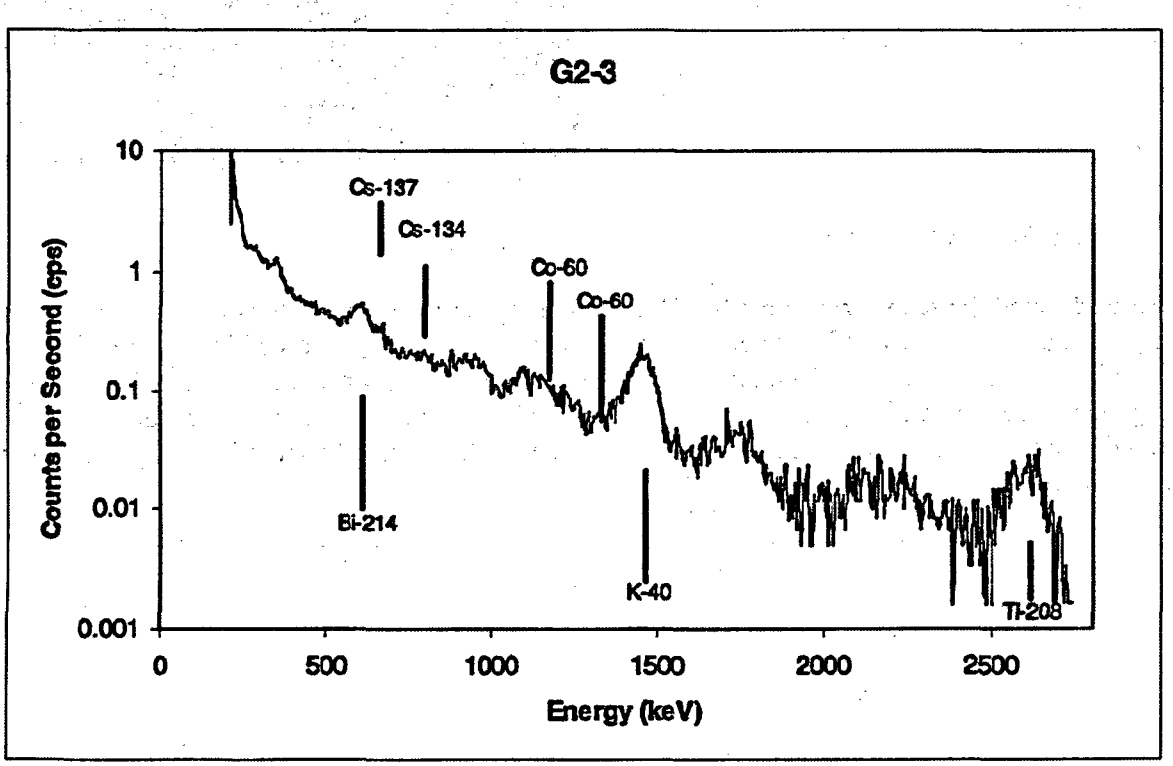


Figure 3 : In situ spectra for SAB G2-3 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): G2-4

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated G2-4. The survey consisted of a surface area scan of 4704 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB G2-4 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB G2-4. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.58	ND	0.44	N/A	N/A	N/A	N/A
Co-60	ND	0.11	ND	0.36	N/A	N/A	N/A	N/A
Cs-134	ND	0.31	ND	0.28	N/A	N/A	N/A	N/A
K-40	10.96	(4.36)	10.85	(0.97)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

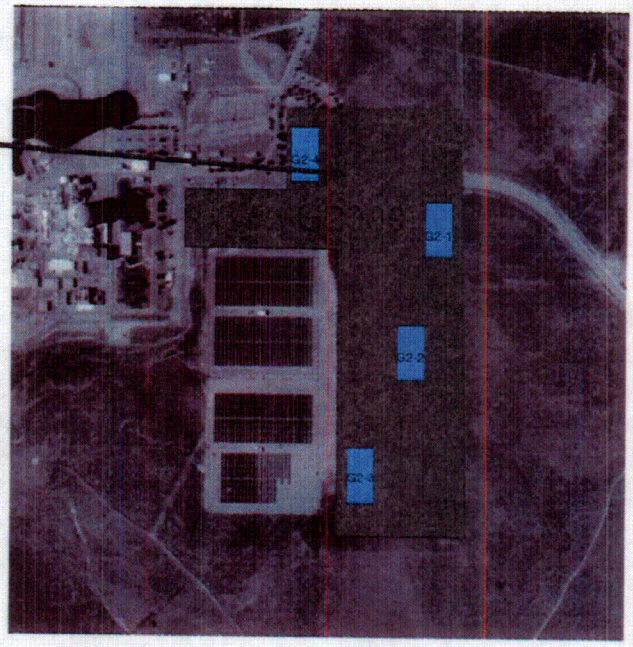
SAB G2-4 is located on the northern edge of the G2000 Survey Area, adjacent to the vacant Technical Center. An iron pin was placed at the southwest corner of SAB G2-4. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB G2-4 Location Information

SAB G2-4

Latitude: 38° 20.715'
Longitude: 121° 6.987'
Bearing: 83°
Distance: 430 meters

No photo available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/09/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB G2-4 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

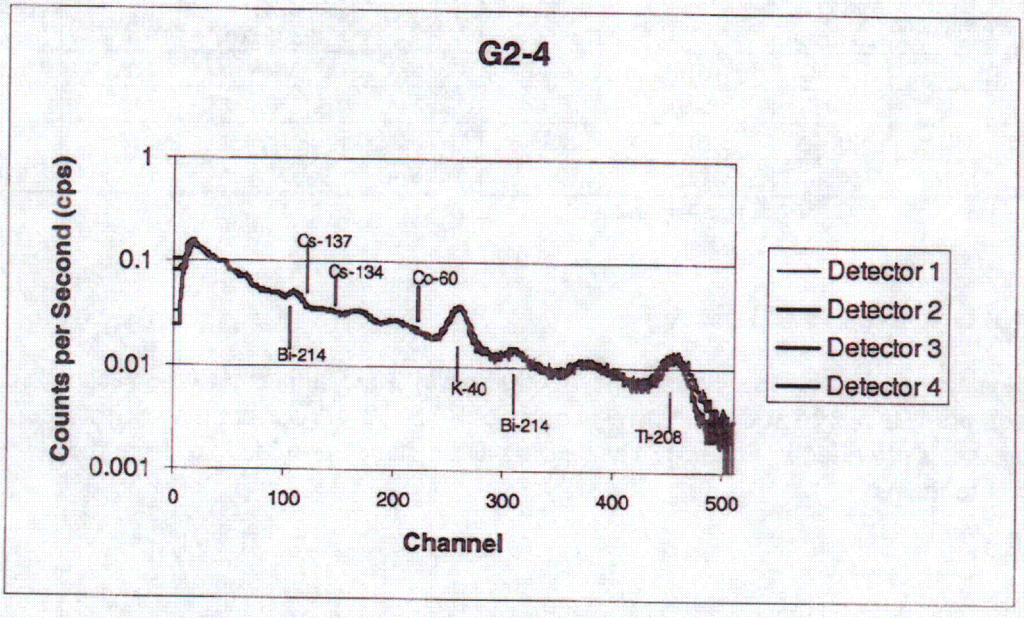


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB G2-4, complete with peak energy locations for nuclides of interest.

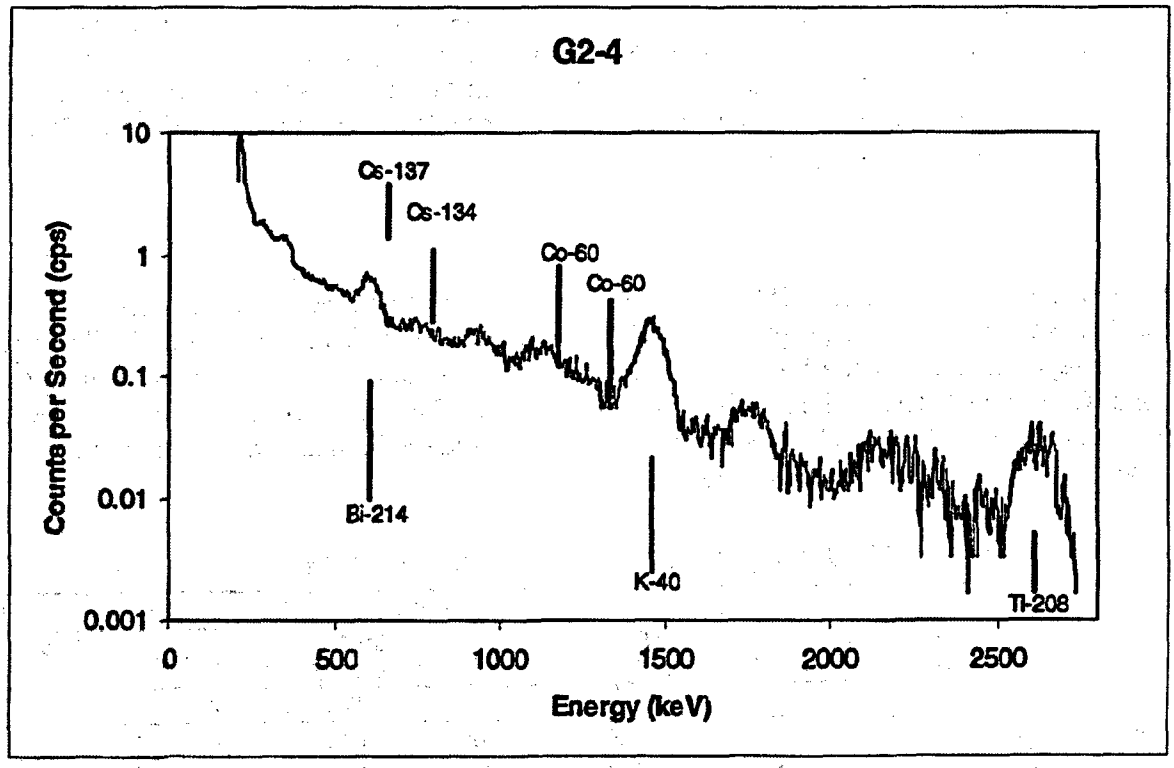


Figure 3 : In situ spectra for SAB G2-4 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): H4-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated H4-1. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB H4-1 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB H4-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.31	ND	0.38	N/A	N/A	N/A	N/A
Co-60	ND	0.05	ND	0.29	N/A	N/A	N/A	N/A
Cs-134	ND	0.17	ND	0.23	N/A	N/A	N/A	N/A
K-40	7.19	(0.82)	4.69	(0.74)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

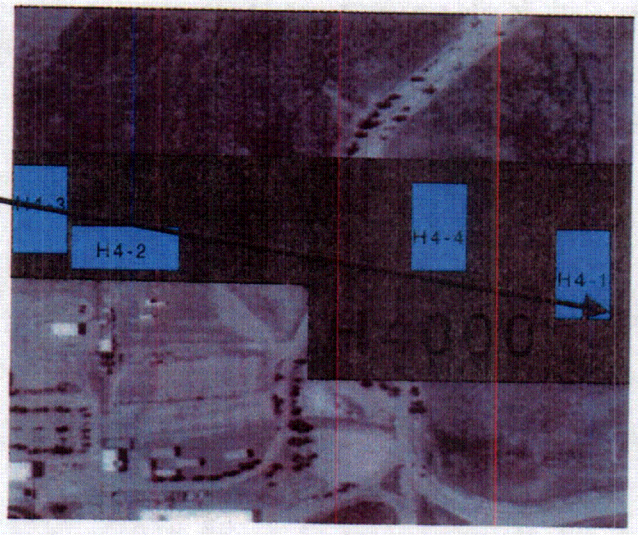
SAB H4-1 is located in the fenced pasture to the east of the main Rancho Seco entrance road. An iron pin was placed at the southwest corner of SAB H4-1. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB H4-1 Location Information

SAB H4-1

Latitude: 38° 20.820'
Longitude: 121° 6.843'
Bearing: 71°
Distance: 701 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/09/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB H4-1 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

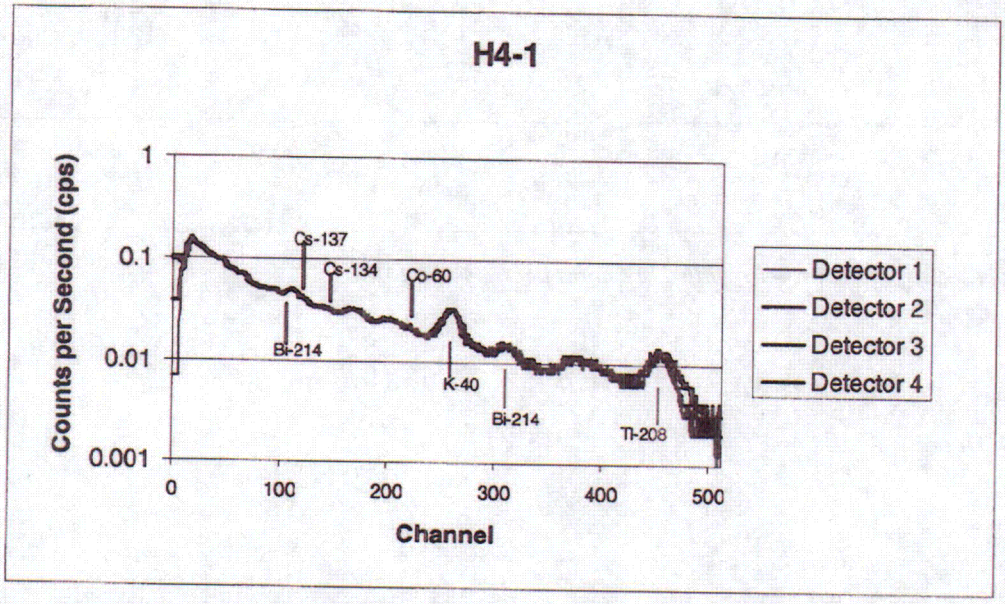


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB H4-4, complete with peak energy locations for nuclides of interest.

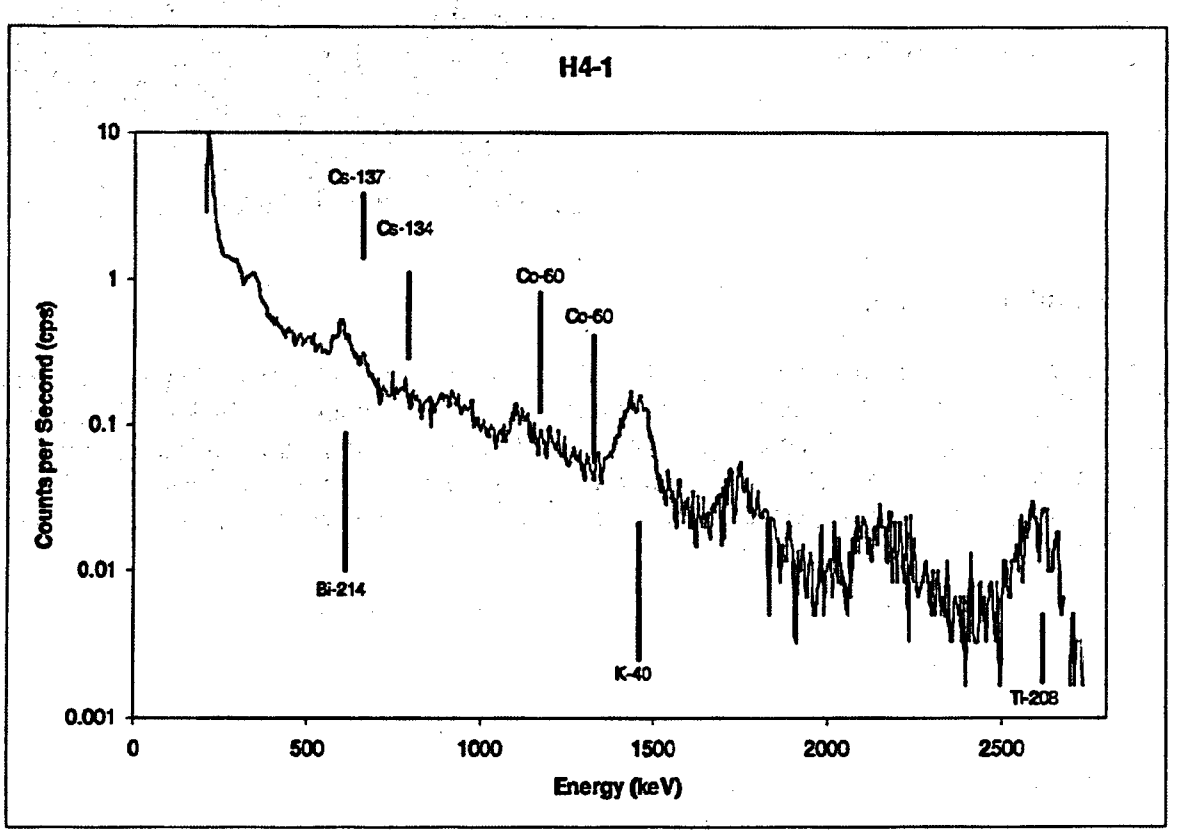


Figure 3 : In situ spectra for SAB H4-1 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): H4-2

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated H4-2. The survey consisted of a surface area scan taken with a gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB H4-2 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB H4-2. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.56	ND	0.37	0.03	(0.02)	ND	0.03
Co-60	ND	0.09	ND	0.31	ND	0.04	ND	0.04
Cs-134	ND	0.25	ND	0.25	ND	0.03	ND	0.03
K-40	6.91	(0.89)	7.10	(0.88)	6.73	(0.52)	6.02	(0.46)

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

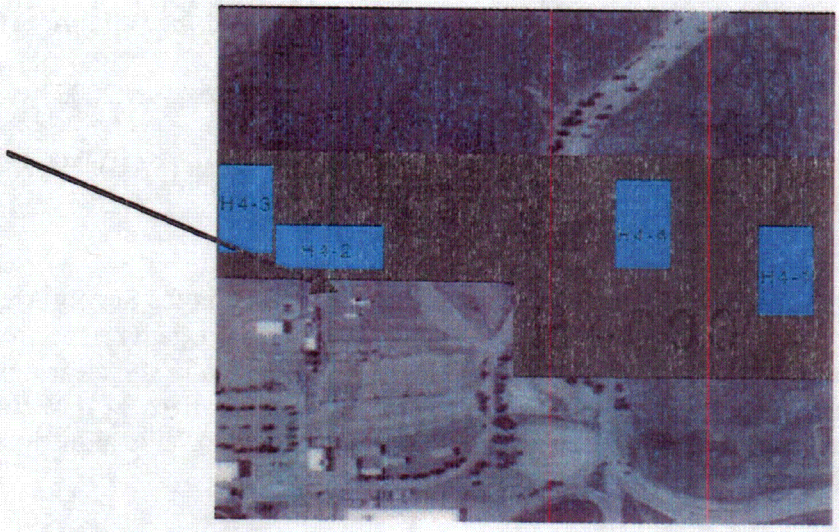
SAB H4-3 is located in the western half of the H4000 Survey Area, in a fenced area just north of the industrial area boundary. An iron pin was placed at the southwest corner of SAB H4-2. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB H4-2 Location Information

SAB H4-2

Latitude: 38° 20.849'
Longitude: 121° 7.135'
Bearing: 34°
Distance: 328 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/09/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB H4-2 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

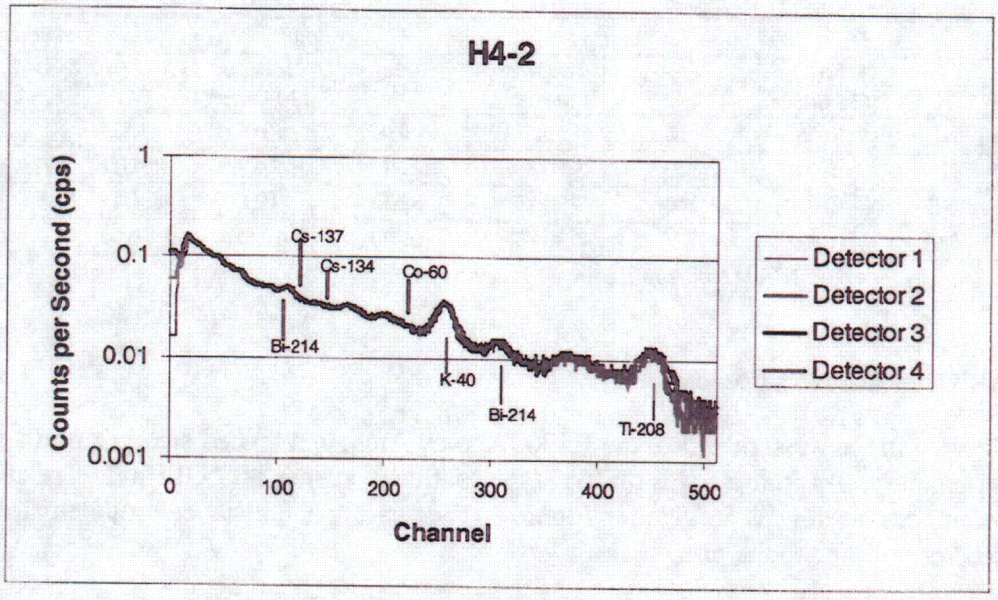


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Shonka took the soil sample at the pin location on 11/15/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 11/28/00 and again on 12/06/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB H4-2, complete with peak energy locations for nuclides of interest.

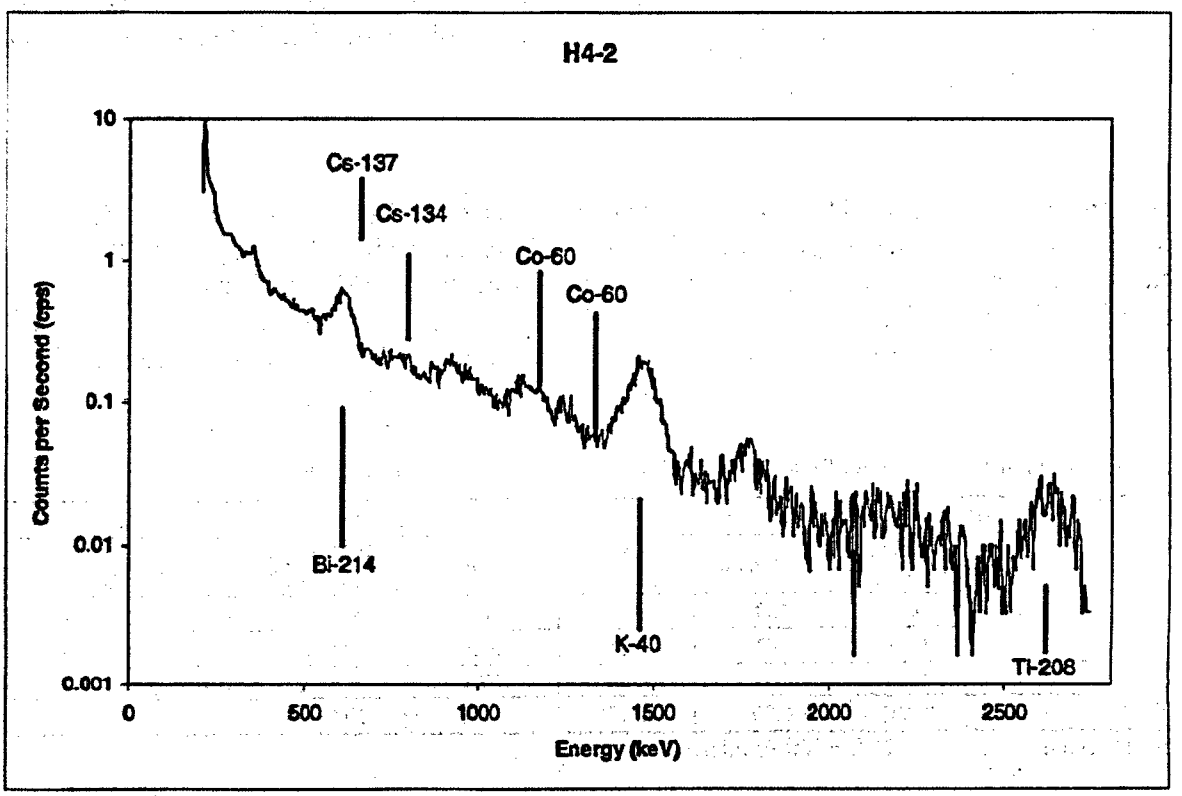


Figure 3 : In situ spectra for SAB H4-2 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): H4-3

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated H4-3. The survey consisted of a surface area scan of 4688 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB H4-3 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB H4-3. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.27	ND	0.37	N/A	N/A	N/A	N/A
Co-60	ND	0.06	ND	0.31	N/A	N/A	N/A	N/A
Cs-134	ND	0.16	ND	0.24	N/A	N/A	N/A	N/A
K-40	7.74	(0.91)	6.20	(0.75)	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

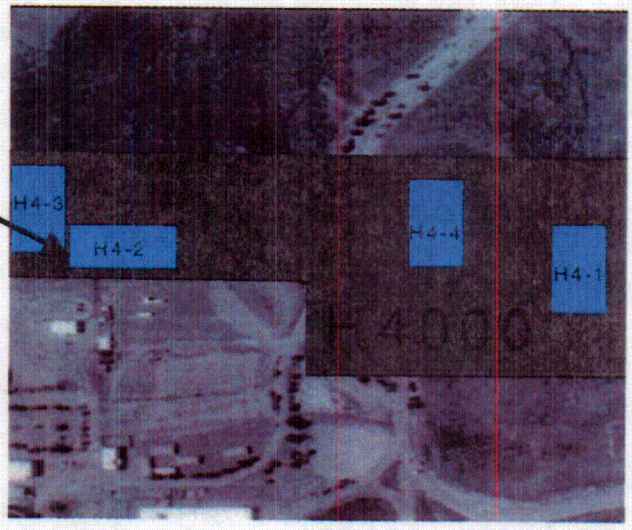
SAB H4-3 is located at the western edge of the H4000 Survey Area, in a fenced area just north of the industrial area boundary. An iron pin was placed at the southwest corner of SAB H4-3. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB H4-3 Location Information

SAB H4-3

Latitude: 38° 20.858'
Longitude: 121° 7.170'
Bearing: 24°
Distance: 313 meters

No photo available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/09/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB H4-3 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

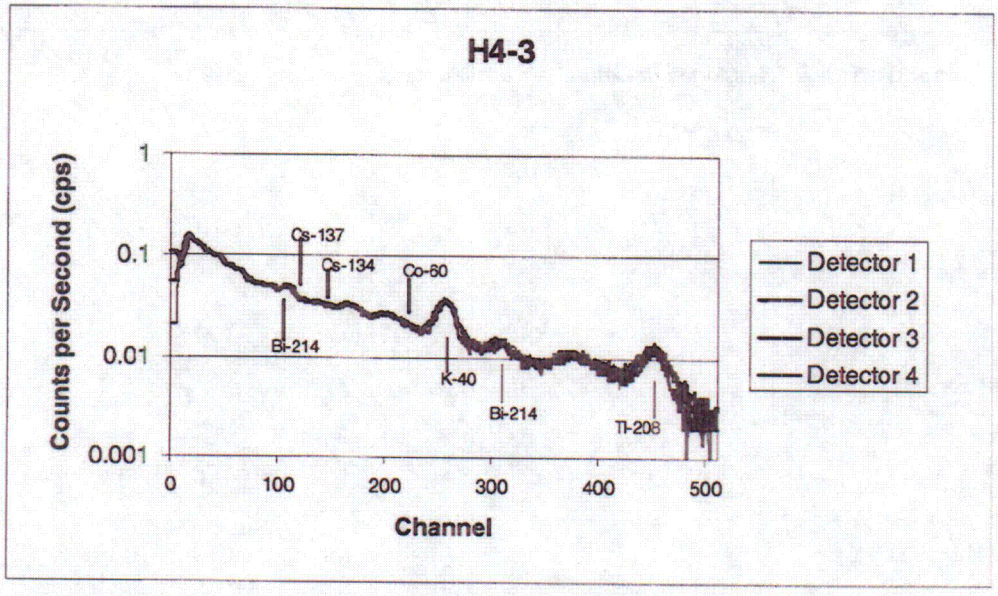


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C50

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB H4-3, complete with peak energy locations for nuclides of interest.

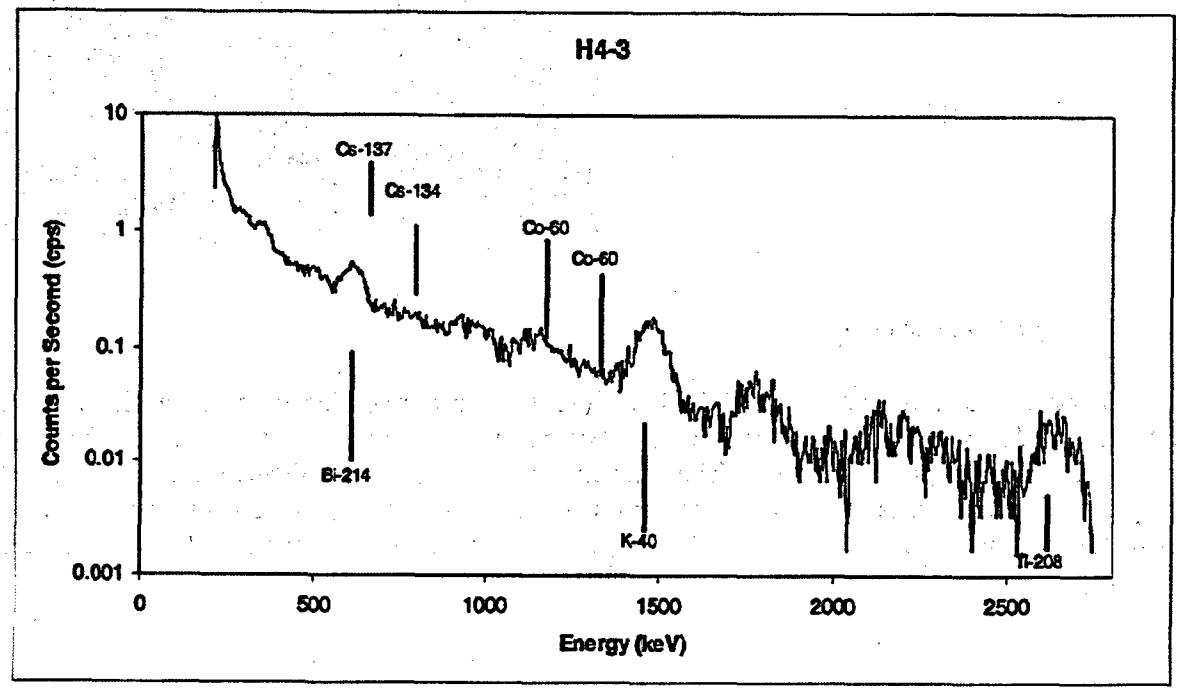


Figure 3 : In situ spectra for SAB H4-3 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): H4-4

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated H4-4. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB H4-4 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB H4-4. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.39	ND	0.38	0.26	(0.04)	0.24	(0.03)
Co-60	ND	0.07	ND	0.29	ND	0.04	ND	0.04
Cs-134	ND	0.16	ND	0.24	ND	0.03	ND	0.03
K-40	6.13	(0.64)	5.20	(0.66)	7.08	(0.58)	6.87	(0.57)

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

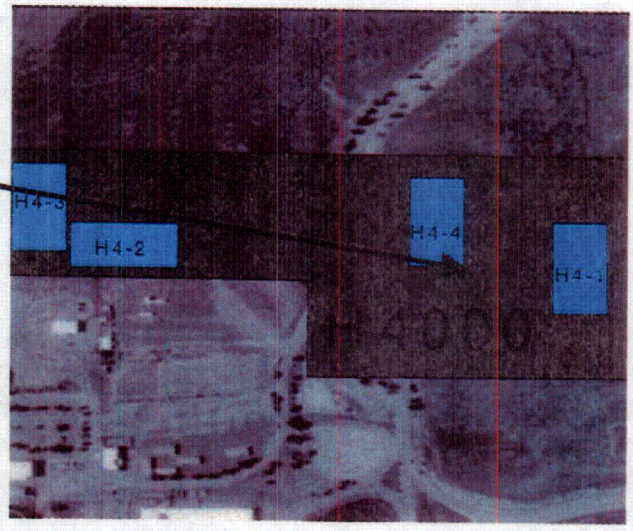
SAB H4-4 is located in the fenced pasture to the east of the main Rancho Seco entrance road. An iron pin was placed at the southwest corner of SAB H4-4, in close proximity to an existing steel fence pole in the center of the pasture. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB H4-4 Location Information

SAB H4-4

Latitude: 38° 20.848'
Longitude: 121° 6.929'
Bearing: 63°
Distance: 588 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/09/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB H4-4 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

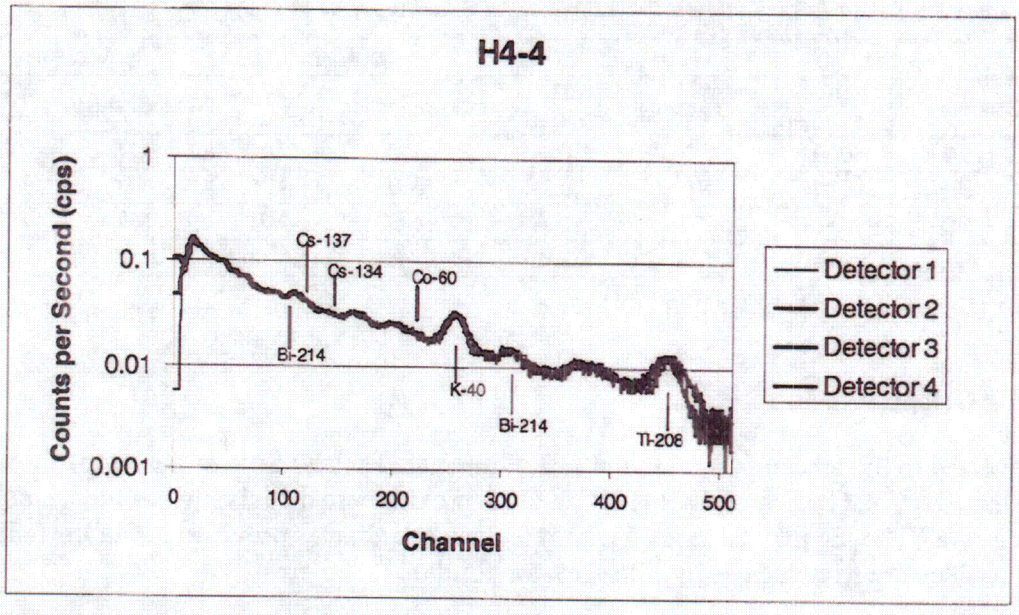


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C51

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/06/00 by J. Weismann. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. J. Weismann took the soil sample at the pin location on 12/05/00 in accordance with Rancho Seco procedures. Rancho Seco Environmental Counting Lab analyzed the "wet" sample on 12/11/00 and again on 12/19/00 after the sample was dried in a laboratory oven.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB H4-4, complete with peak energy locations for nuclides of interest.

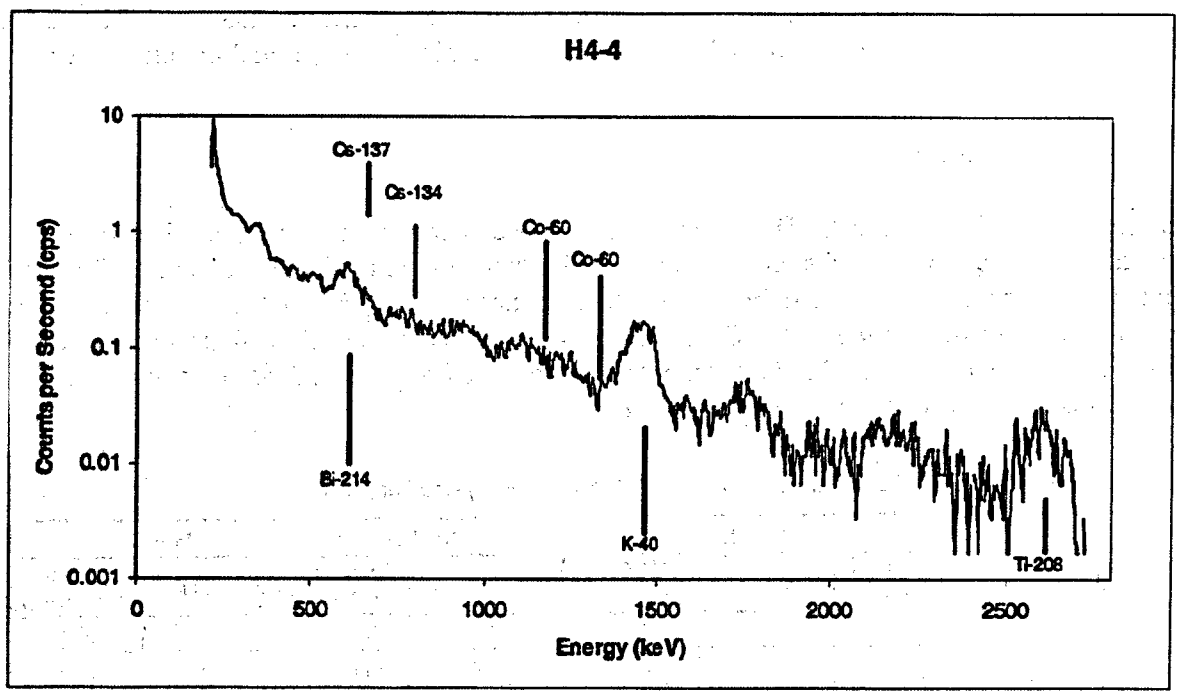


Figure 3 : In situ spectra for SAB H4-4 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): I1-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated I1-1. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB I1-1 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB I1-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.24	ND	0.30	N/A	N/A	N/A	N/A
Co-60	ND	0.05	ND	0.27	N/A	N/A	N/A	N/A
Cs-134	ND	0.16	ND	0.21	N/A	N/A	N/A	N/A
K-40	5.78	(0.46)	8.03	(0.78)	N/A	N/A	N/A	N/A

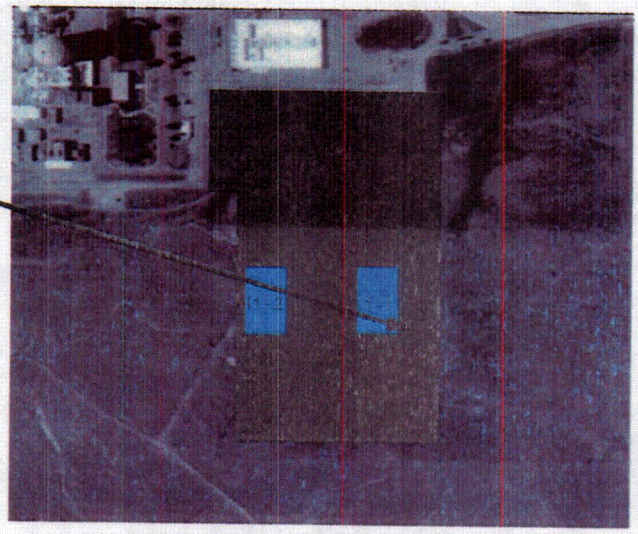
1.3. SAB Orientation and Location

SAB I1-1 is located within Photovoltaic Array area #2 near the eastern fence boundary fence.. An iron pin was placed at the southwest corner of SAB I1-1. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB II-1 Location Information

SAB I1-1

Latitude: 38° 20.465'
Longitude: 121° 7.003'
Bearing: 132°
Distance: 540 meters



No Photo Available

1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/12/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB I1-1 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

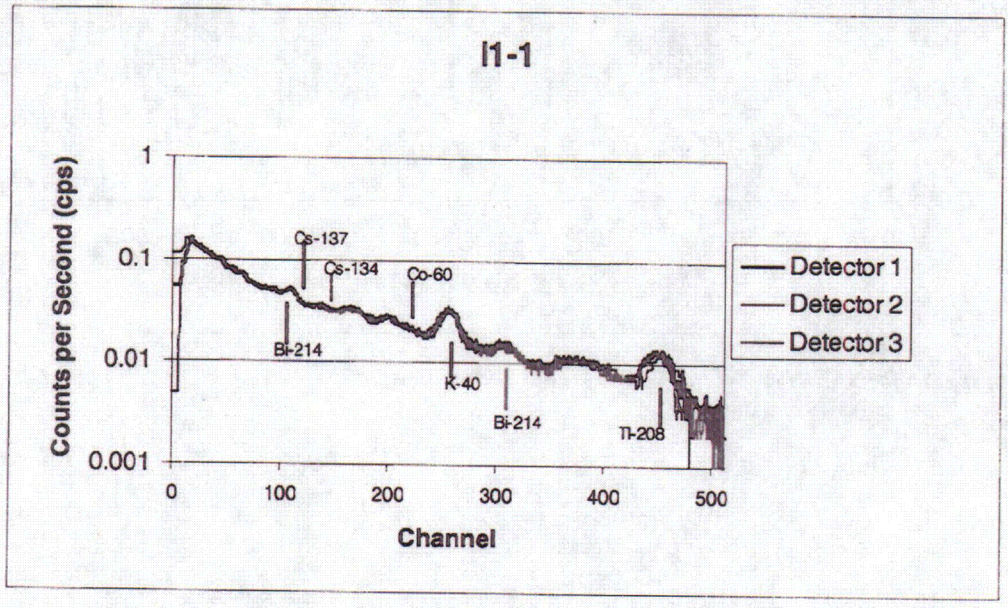


Figure 2 – SMCM scan spectra reported in counts per second (cps).

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/13/00 by D. DeBord. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB I1-1, complete with peak energy locations for nuclides of interest.

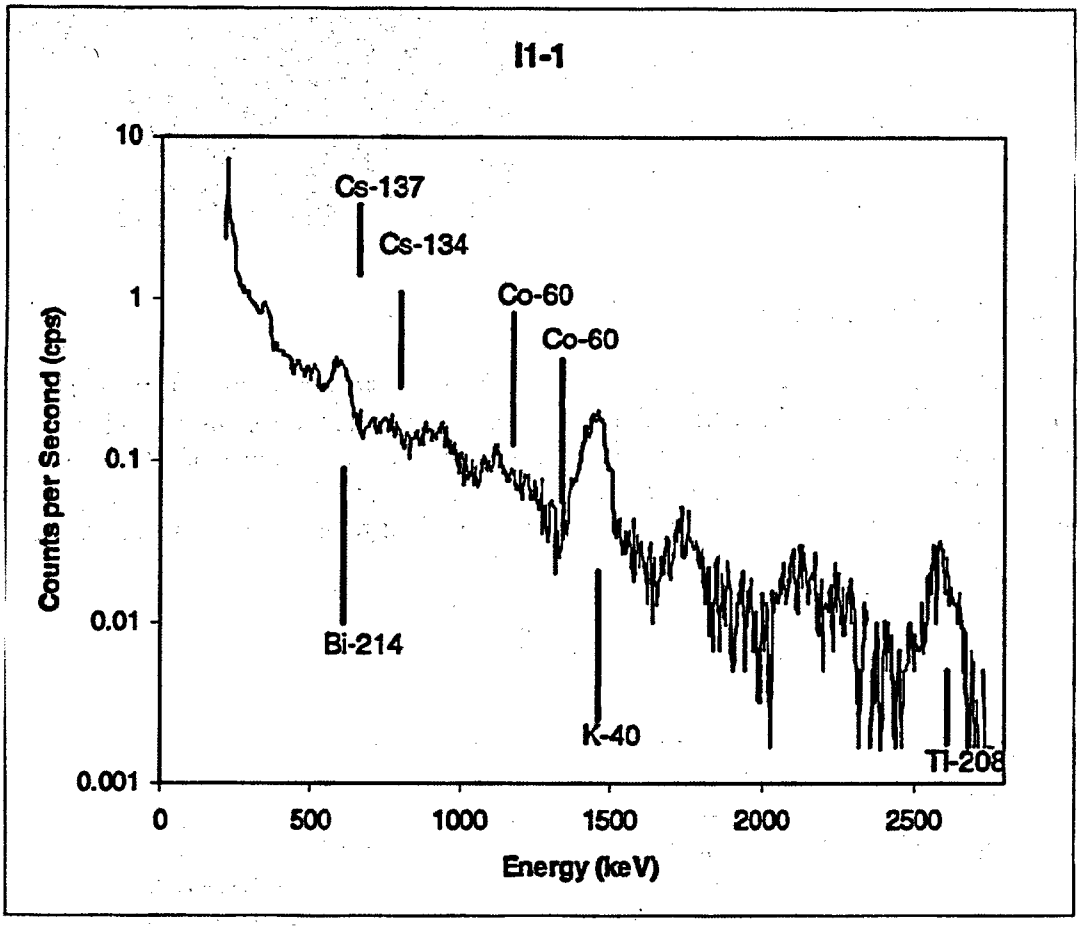


Figure 3 : In situ spectra for SAB I1-1 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): I1-2

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated I1-2. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM) and a fixed *in situ* measurement taken with a portable gamma spectrometer. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB I1-2 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB I1-2. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.25	ND	0.31	N/A	N/A	N/A	N/A
Co-60	ND	0.06	ND	0.28	N/A	N/A	N/A	N/A
Cs-134	ND	0.14	ND	0.21	N/A	N/A	N/A	N/A
K-40	1.65	(0.71)	5.78	(0.81)	N/A	N/A	N/A	N/A

1.3. SAB Orientation and Location

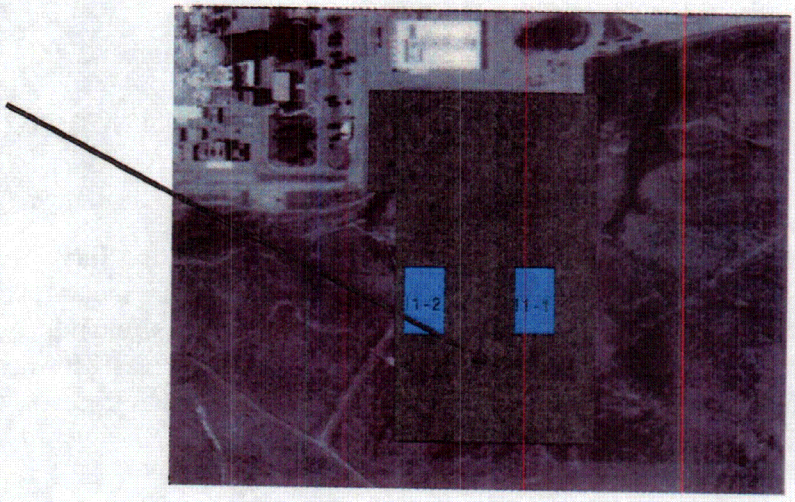
SAB I1-2 is located within Photovoltaic Array area #2 at the far west fence. An iron pin has been driven at the southwest corner of SAB I1-2. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB I1-2 Location Information

SAB I1-2

Latitude: 38° 20.466'
Longitude: 121° 7.091'
Bearing: 145°
Distance: 442 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/12/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB I1-2 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

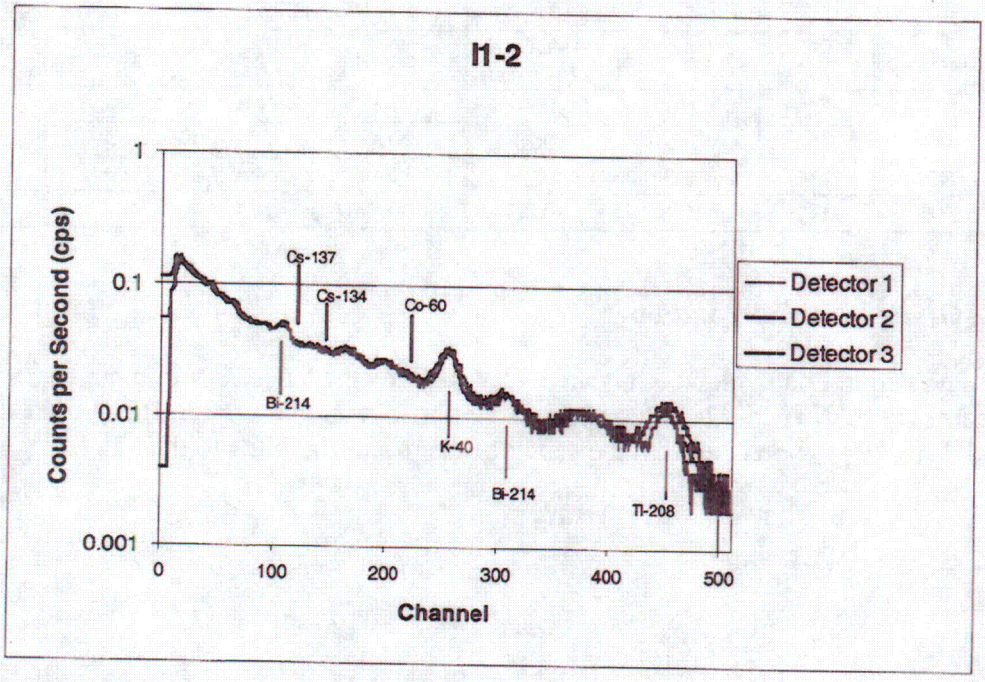


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C53

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/13/00 by D. DeBord. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. No soil sample was taken at this location.

No evidence of plant-related contaminants was found in the *in situ* count. Figure 3 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB I1-2, complete with peak energy locations for nuclides of interest.

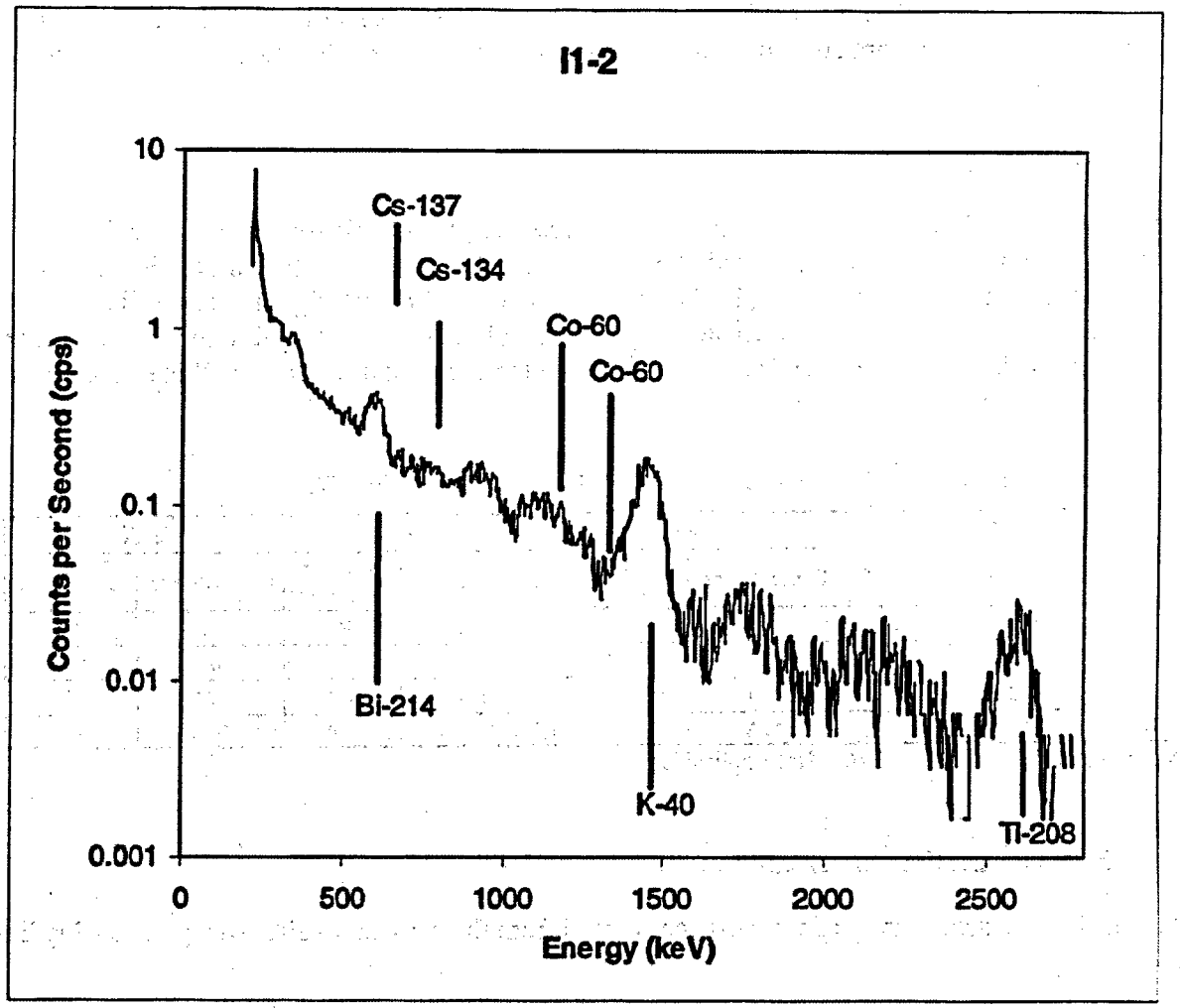


Figure 3 : In situ spectra for SAB I1-2 reported in Counts per Second (cps).

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): J1-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated J1-1. The survey consisted of a surface area scan taken with a gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM). This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB J1-1 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM is reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB J1-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.23	ND	N/A	N/A	N/A	N/A	N/A
Co-60	ND	0.06	ND	N/A	N/A	N/A	N/A	N/A
Cs-134	ND	0.14	ND	N/A	N/A	N/A	N/A	N/A
K-40	12.37	(1.81)	N/A	N/A	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

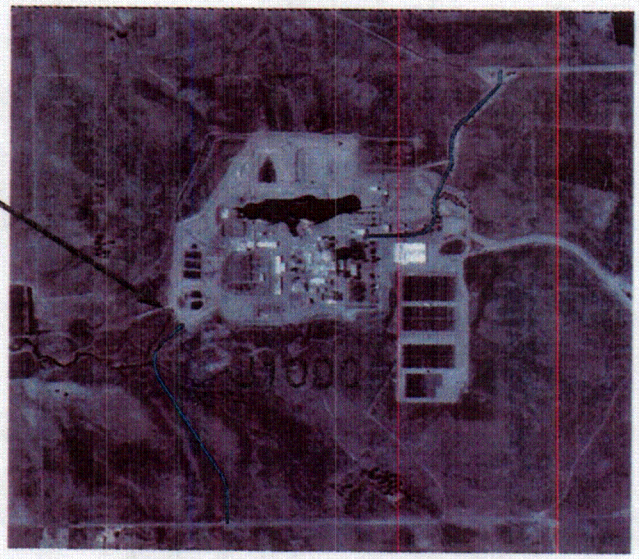
SAB J1-1 included a scan survey of the west access road from the west Industrial Area gate to Clay East Road.

Figure 1 : SAB J1-1 Location Information

SAB J1-1

Latitude: N/A
Longitude: N/A
Bearing: N/A
Distance: N/A

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/11/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB J1-1 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey.

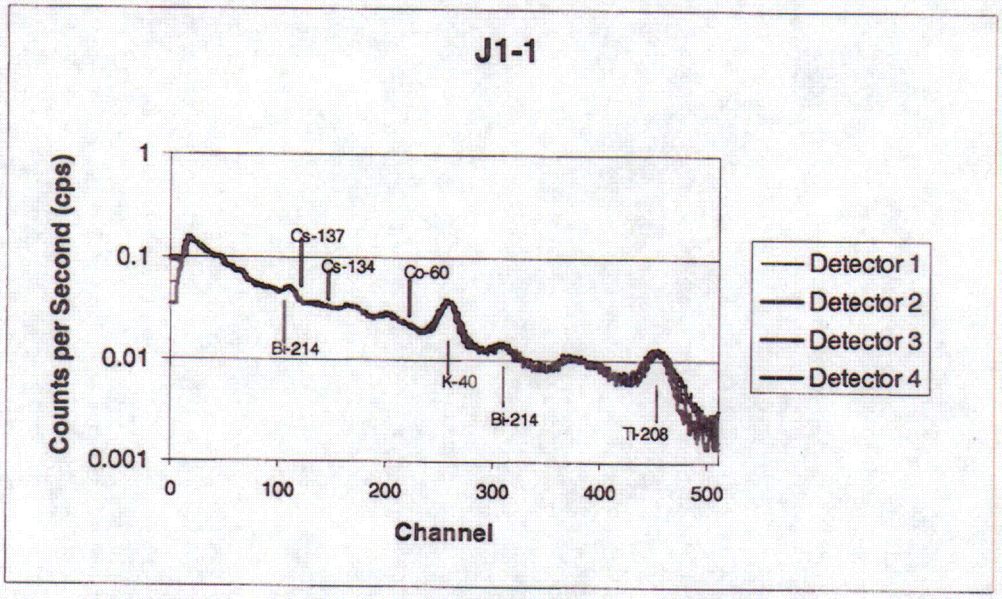


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C54

1.5. *In situ* Measurement and Soil Sample

No *in situ* count or soil sample was taken for this SAB.

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): J1-2

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated J1-2. The survey consisted of a surface area scan of 6112 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM). This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

The measurements collected for SAB J1-2 indicate no presence of contamination discernible from background. A summary of results is provided in Table 1. Nuclide specific data from the SMCM is reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block.

Table 1: Results summary for nuclides of interest in SAB J1-2. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.17	N/A	N/A	N/A	N/A	N/A	N/A
Co-60	ND	0.07	N/A	N/A	N/A	N/A	N/A	N/A
Cs-134	ND	0.14	N/A	N/A	N/A	N/A	N/A	N/A
K-40	9.64	(0.94)	N/A	N/A	N/A	N/A	N/A	N/A

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

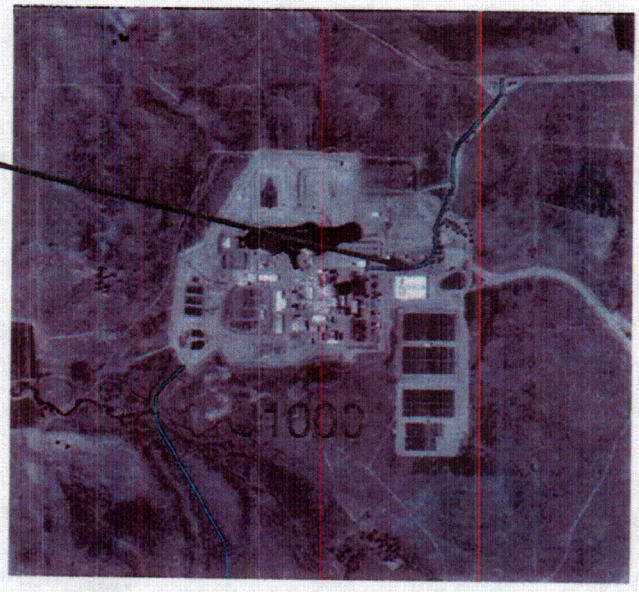
SAB J1-2 included a scan survey of the east access road from the main plant gate to Twin Cities Road.

Figure 1 : SAB J1-2 Location Information

SAB J1-2

Latitude: N/A
Longitude: N/A
Bearing: N/A
Distance: N/A

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the scan survey on 12/11/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. Each detector's average response within SAB J1-2 is shown as a normalized energy spectra in Figure 2. The peak energy locations for nuclides of interest are noted, including plant-related nuclides (noted above spectrum) and those nuclides present as natural gamma background sources (noted below spectrum). No evidence of plant-related contaminants was found during the scan survey .

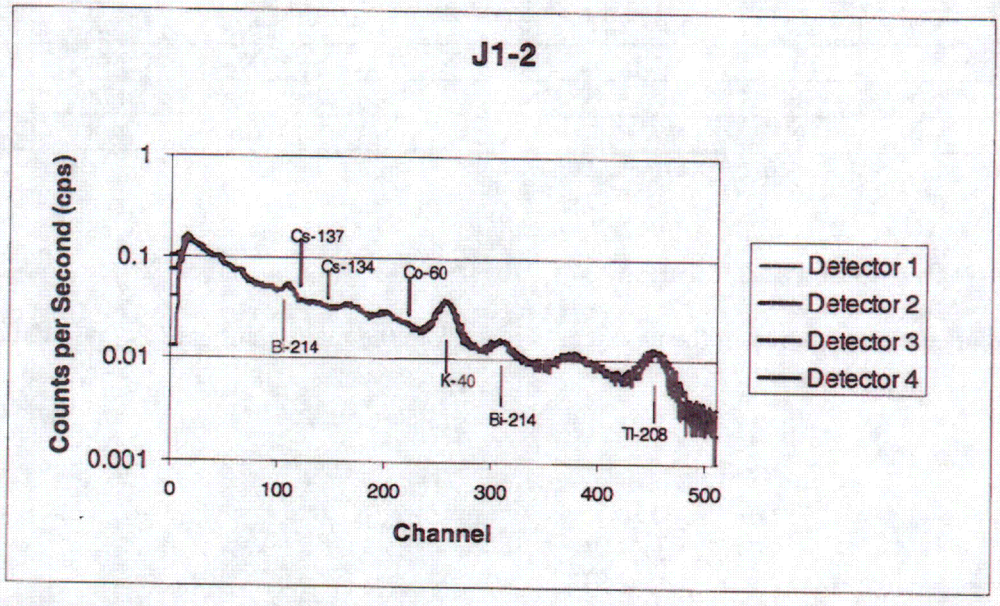


Figure 2 – SMCM scan spectra reported in counts per second (cps).

C55

1.5. In situ Measurement and Soil Sample

No *in situ* count or soil sample was taken for this SAB.

Appendix A

Test SAB Reports

This appendix provides the survey reports for SABs that were taken with known contamination present. SAB B1-3 was intentionally salted with small check sources containing ^{137}Cs and ^{60}Co. SAB B5-1 was located in the effluents area of the plant that is known to be impacted from past plant releases. These reports are provided as a performance test of the SMCM system, and are not indicative of contamination present in the area proposed for partial site release.

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): B1-3T

1.1. Introduction

Shonka Research Associates, Inc. performed two additional performance-based tests in the Survey Area Block (SAB) designated B1-3. The tests both consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM). This document summarizes the data collected from this test. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

Test 1 - B1-3-T1: For the first test, several ^{60}Co and ^{137}Cs button sources were placed in random locations throughout the B1-3 SAB.

Test 2 – B1-3-T2: The second test in B1-3 was identical to the original B1-3 survey except for the time of day when the survey was completed.

1.2. Results Comparison

The results from the two tests performed in SAB B1-3 are summarized in Table 1 (SAB B1-3-T1, with added check sources) and Table 2 (SAB B1-3-T2, no added sources repeat of SAB B1-3). The only significant data reported is for ^{40}K, which can be compared to the results reported in the last section for SAB B1-3. The three mean concentrations are 6.82, 6.69, and 6.71 for the original survey, added source survey and repeated survey. The results indicate a 1.5% shift in apparent ^{40}K concentration from the beginning of the survey when SAB B1-3 was performed to the end of the survey when the two test SABs were measured. This shift is likely due to rainfall that occurred during the course of the survey.

Table 3 later in this report shows side by side comparisons of the three surveys for four of the nuclides of interest: ^{137}Cs, ^{134}Cs, ^{60}Co and ^{40}K. The first three are man-made nuclides of concern. Negative data reflect the subtraction of background for each of the man-made nuclides. The ^{40}K data shows a quite similar 2-dimensional pseudocolor plot and CFD for each of the three surveys. The ^{137}Cs and ^{60}Co data clearly show the presences of the small check sources that were placed on the area, with a pronounced change in the CFD for SAB B1-3-T1.

Table 1: Results summary for nuclides of interest in SAB B1-3-T1.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	2.17	N/A	N/A	N/A	N/A	N/A	N/A
Co-60	ND	0.19	N/A	N/A	N/A	N/A	N/A	N/A
Cs-134	ND	0.21	N/A	N/A	N/A	N/A	N/A	N/A
K-40	6.69	(1.50)	N/A	N/A	N/A	N/A	N/A	N/A

*The values reported for K-40 are measured concentrations, not MDC values.

Table 2: Results summary for nuclides of interest in SAB B1-3-T2.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	ND	0.33	N/A	N/A	N/A	N/A	N/A	N/A
Co-60	ND	0.05	N/A	N/A	N/A	N/A	N/A	N/A
Cs-134	ND	0.13	N/A	N/A	N/A	N/A	N/A	N/A
K-40	6.71	(1.34)	N/A	N/A	N/A	N/A	N/A	N/A

*The values reported for K-40 are measured concentrations, not MDC values.

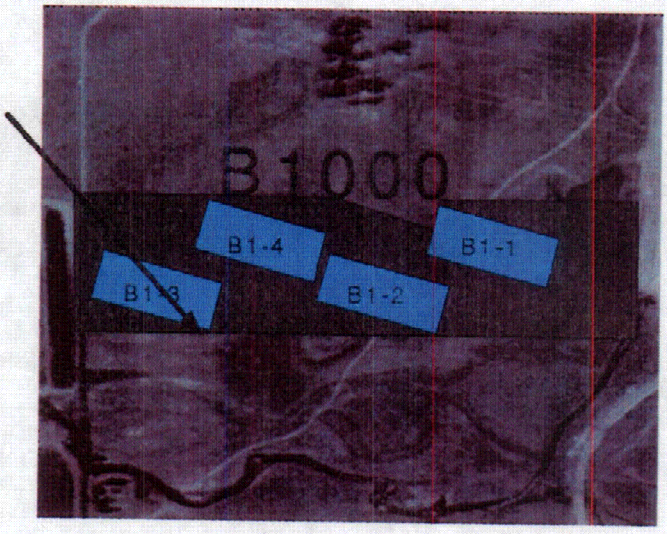
1.3. SAB Orientation and Location

SAB B1-3T is located in the southwest corner of the B1000 Survey Area. An iron pin was placed at the southwest corner of SAB B1-3T. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin. The rotation of the B1-3TSAB, with respect to the site boundary, is due to its alignment to magnetic north, which is 14.5° east of grid north for the Sacramento area.

Figure 1 : SAB B1-3T Location Information

SAB B1-3T

Latitude: 38° 20.585'
Longitude: 121° 7.891'
Bearing: 261°
Distance: 1072 meters

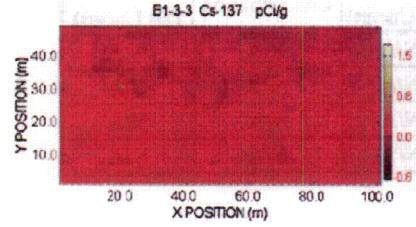
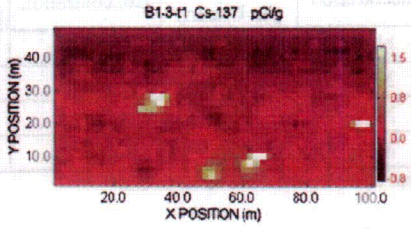
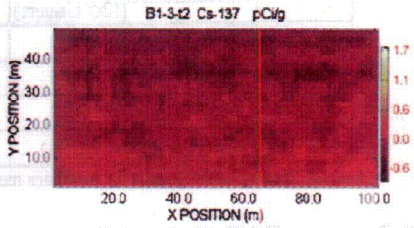
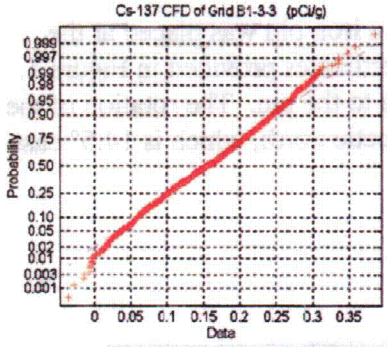
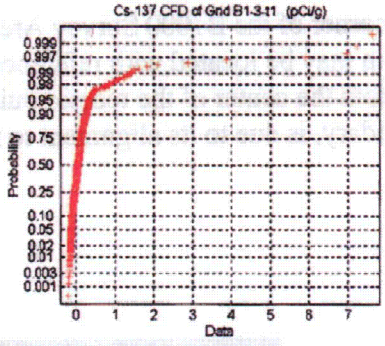
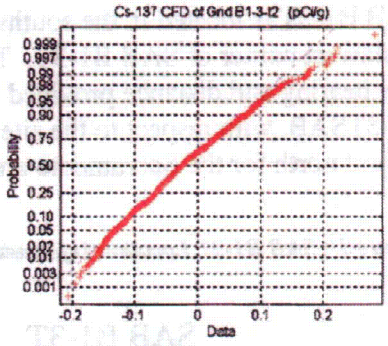
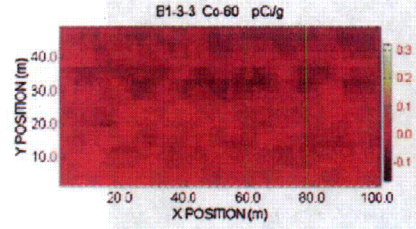
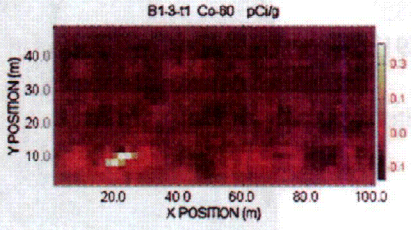
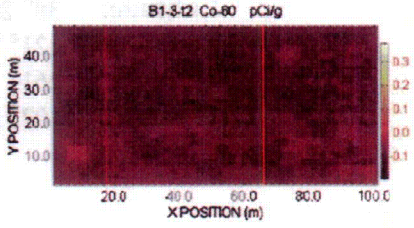
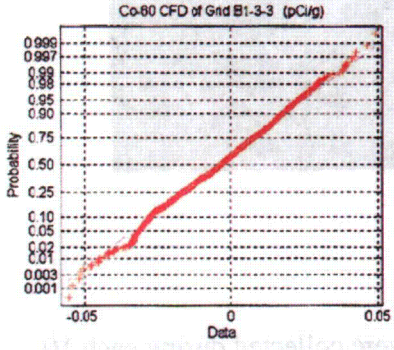
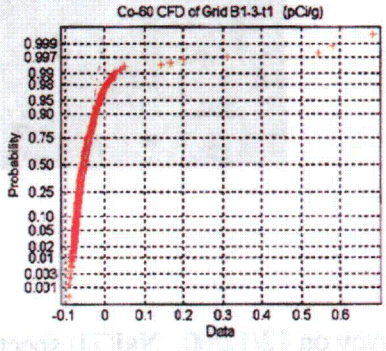
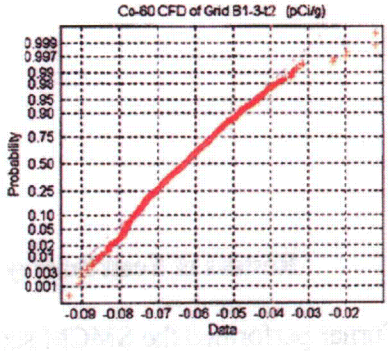


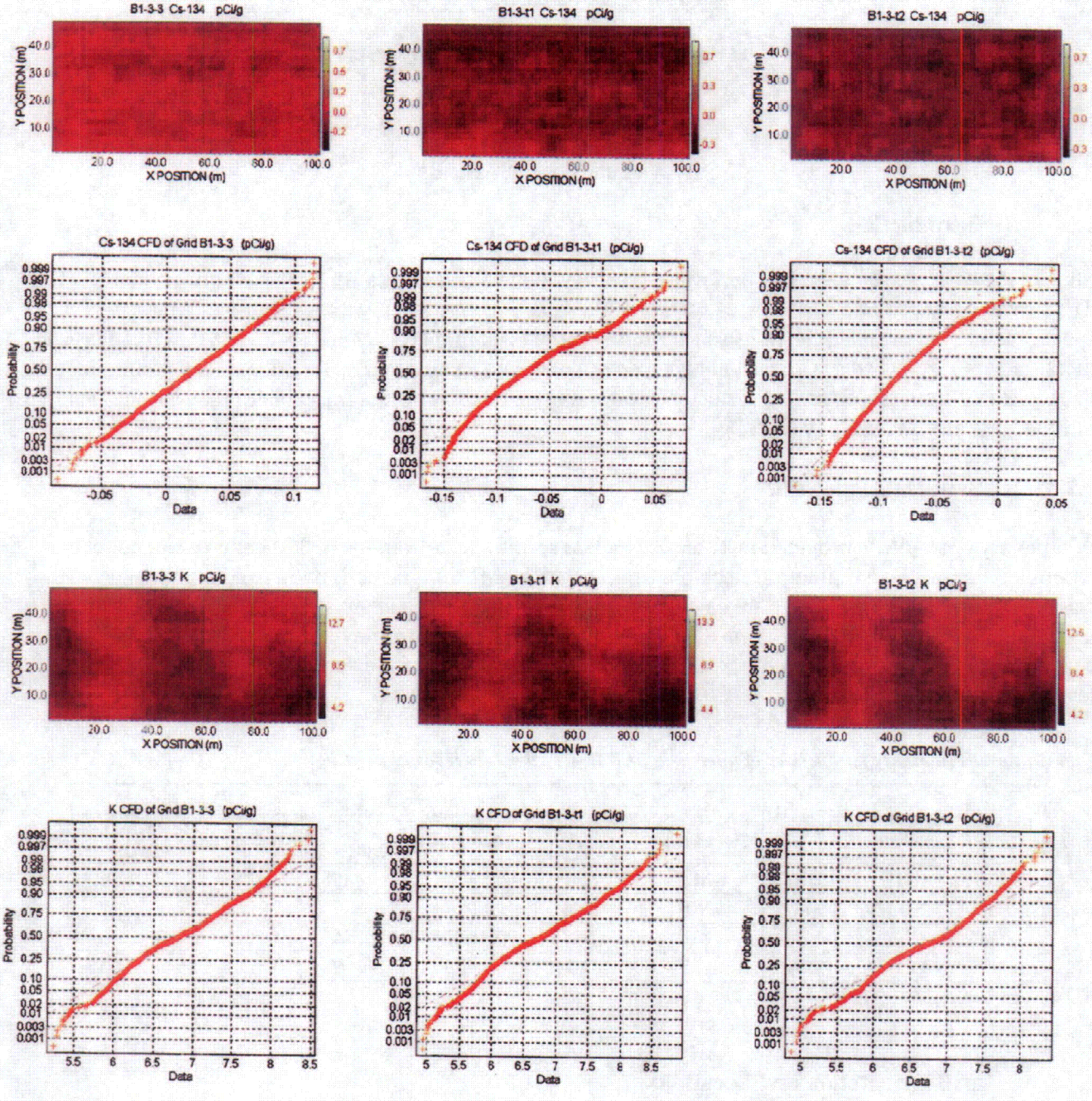
1.4. Results of Scan Survey

R. Turner performed the SMCM scan survey on 12/12/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. This data is then assigned to the center of the 2-meter by 2-meter square under each detector. Twenty-four adjacent strips of 100 meters in length were characterized. Results of the scan survey are presented in Table 3 below. Scan data is presented in the form of a 2-dimensional pseudocolor plot of the SAB along with a cumulative frequency distribution (CFD) for ^{137}Cs, ^{60}Co, ^{134}Cs, and ^{40}K nuclides. The data for B1-3 and B1-3-T2 show no point sources. The data for B1-3-T1 indicate the presence of the ^{137}Cs and ^{60}Co check sources.

C56

Table 3: Results from the original B1-3 survey and the two tests.

B1-3	Test 1 – B1-3-T1	Test 2 – B1-3-T2
		
		
		
		



1.5. *In situ* Measurement and Soil Sample

No *in situ* or soil sample was taken for this test survey.

Radiological Survey Report

SMUD Rancho Seco Non-Industrial Area Survey

November/December 2000

Survey Area Block (SAB): B5-1

1.1. Introduction

Shonka Research Associates, Inc. performed a survey in the Survey Area Block (SAB) designated B5-1. The survey consisted of a surface area scan of 4800 square meters taken with a scanning gamma spectrometer system called the Subsurface Multispectral Contamination Monitor (SMCM), a fixed *in situ* measurement taken with a portable gamma spectrometer, and a soil sample. This document summarizes the data collected from this SAB. All detectors were calibrated using sources traceable to the National Institute of Standards and Technology (NIST).

1.2. Results Comparison

A summary of results is provided in Table 1. Nuclide specific data from the SMCM and *in situ* count are reported in terms of a Minimum Detectable Concentration (MDC) if no activity in excess of background was detected. The *in situ* MDCs are calculated as per Currie (1968) and are stated to the 95% confidence level. The *a posteriori* MDCs for the SMCM are based on the standard deviation of all measurements collected within the survey area block. See Appendix I of Volume I for an additional discussion of the results of this survey.

Table 1: Results summary for nuclides of interest in SAB B5-1. All values reported in pCi/g.

Isotope	SMCM		In situ		Dry Soil		Wet Soil	
	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)	Concentration	MDC or (2σ Uncert)
Cs-137	1.34	(3.64)	ND	0.31	4.51	(0.15)	2.93	(0.10)
Co-60	ND	0.14	ND	0.24	0.04	N/A	0.04	N/A
Cs-134	ND	0.14	ND	0.18	0.03	N/A	0.03	N/A
K-40	4.84	(1.38)	4.65	(0.79)	6.19	(0.67)	3.78	(0.45)

ND = None Detected N/A = Not Applicable

1.3. SAB Orientation and Location

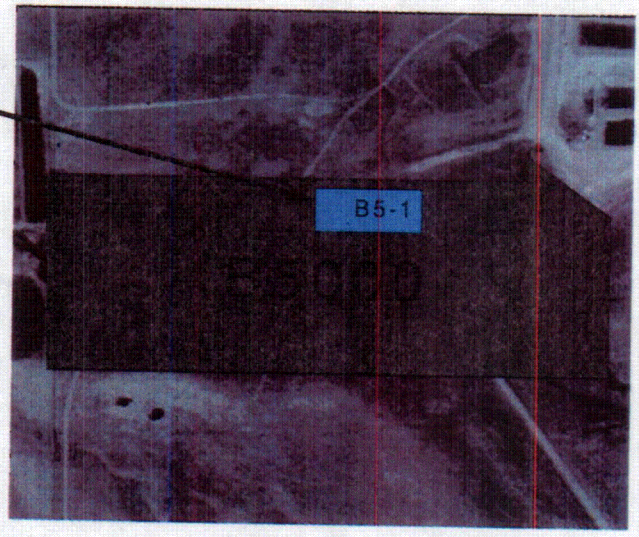
SAB B5-1 is located on the northern edge of the B5000 Survey Area. An iron pin was placed at the southwest corner of SAB B5-1. The pin may be located with reference coordinates provided in Figure 1. The bearing and distance provided are from the center of the reactor building to the pin.

Figure 1 : SAB B5-1 Location Information

SAB B5-1

Latitude: 38°20.3529'
Longitude: 121° 7.711'
Bearing: 246°
Distance: 720 meters

No Photo Available



1.4. Results of Scan Survey

R. Turner performed the SMCM scan survey on 12/12/00. NaI(Tl) spectra were collected during each 10 second interval while the SMCM traveled 2 meters. This data is then assigned to the center of the 2-meter by 2-meter square under each detector. Twenty-four adjacent strips of 100 meters in length were characterized. Results of the scan survey are presented in Figure 2 below. Scan data is presented in the form of a 2-dimensional pseudocolor plot of the SAB along with a cumulative frequency distribution (CFD) for ^{137}Cs, ^{60}Co, ^{134}Cs, and ^{40}K nuclides.

1.5. *In situ* Measurement and Soil Sample

The static *in situ* measurement was taken at the pin location 12/13/00 by D. DeBord. The *in situ* measurement used a tripod mounted, nominal three-inch diameter, 3-inch long (3X3) NaI(Tl) spectrometer with the front face of the detector placed one meter above the ground. The *in situ* count time was 10 minutes. D. DeBord took the soil sample in the middle of the "Y" on 12/13/00 in accordance with Rancho Seco procedures.

Figure 2 shows the NaI(Tl) spectrum for the *in situ* count performed at SAB B5-1Y. The peak energy locations for nuclides of interest have been noted on the *in situ* spectrum, including plant-related nuclides (noted above spectrum) as well as those nuclides present as natural gamma background sources (noted below spectrum).

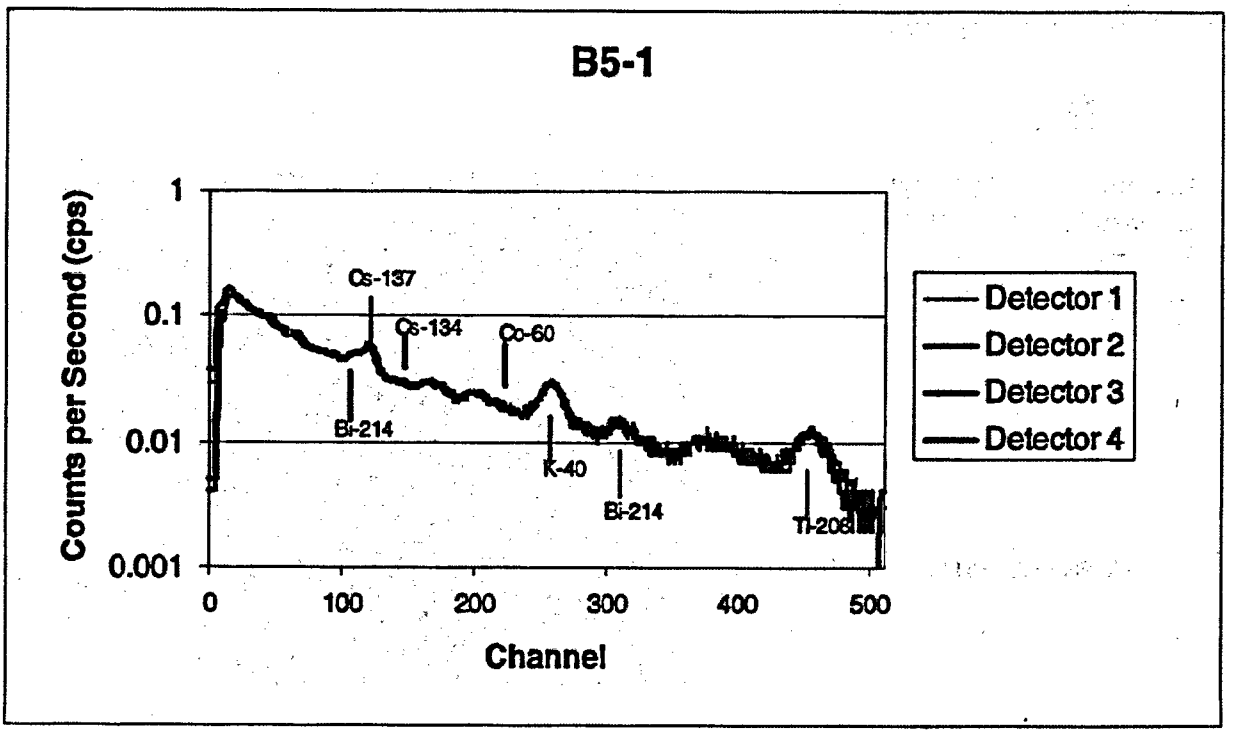


Figure 2 : In situ spectra for SAB B5-1 reported in Counts per Second (cps).

The *in situ* spectra clearly shows the ^{137}Cs peak due to the contamination present.