

R. M. WESTER *and ASSOCIATES, INC.*
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January 13, 2006

Mr. Mike McCann, Senior Health Physicist
USNRC Region III, Division of Nuclear Materials Safety
2443 Warrenville Road
Suite 210
Lisle, IL 60532

RE: TELCON, Environmental Safety SLU, Jan 06 06 07:08p

Dear Mr. McCann:

Please find the comments to your telephone conversation record, cited above. Responses to questions are itemized according to TELCON paragraph number.

Paragraph 1:

a. The grid identification alpha numeric system used was ALPHA-XXX, where ALPHA refers to an alphabetical reference (e.g. A, AA, Soil...) and XXX refers to a number in the range of 1 through 100. Note regarding the grid references follows. Some surveyors varied placement of their sequence, as compared to other surveyors. Also, sometimes it was not necessary to use all of the 100 wipes in an ALPHA series to cover the applicable areas.

b. One of the L38s on page 22 of the report was a typo. A reprint of this page is attached reflecting L39 in sequence. Also, none of the sketches were drawn to exact scale, as indicated on Page 6 of the report, nor would the inclusion of data maintain that uniformity. However, all grid sections were at or below one square meter, and were evaluated equally.

c. A reprint of page 28 is attached.

d. Page 24 refers to the Clean Storage area.

e. The grid reference system was defined using an ALPHA-XXX system, described above. A corner of a floor or wall surface was selected as a starting grid and the grid ID's sequenced horizontally in the row, then vertically. Some of the surveyors elected to vary from this general system, and was a judgement call of the individual health physicist.

f. Tape measures, landmarks, and chalk markings were used to locate grid identifications, post survey.

g. Regarding a master floor plan, we utilized the information provided by the licensee.

Paragraph 2:

a. The phrase "designated area" should be interchangeable with "affected area." And likewise, "ancillary area" is meant to be the same as "unaffected area."

Paragraph 3:

a. Values given in Appendix D were corrected for detector efficiency against suitable standards. Radiation level detector efficiencies are now referenced in the reprint of Appendix B. Counter efficiencies are given in the applicable wipe data appendices.

b. The efficiency of each detector was checked against a known standard. Detector efficiencies are also referenced in the reprint of Appendix B.

c. Wipe test results are reported in dpm per 100 centimeters squared.

Paragraph 4:

a. The purpose of soil samples were to test for the potential spread of contamination around key points of regress from the designated area. The locations of soil samples collected are referenced in Figure C56 and Figure H1.

b. Soil sample activities, in picocuries per gram, are attached to this letter.

Paragraph 5:

a. Wipes were taken of at least 100 square centimeters in each one square meter grid.

b. The phrase "Comprehensive surface wipes were performed on all applicable surfaces to test for removable contamination over the grid elements" was used to refer to paragraph 5a, above.

c. Appendix F references only to those wipes which had measured activities greater than background. As stated in Appendix F, all other wipes from the grid elements, the grid elements were defined in the radiation level data, had measured activities comparable to background, or less.

Paragraph 6:

a. Survey scanning sensitivity (MDCs) were not included in the report. References to MDC were not found in our copy of NUREG 5849. MDA's are listed in Appendix B, however.

b. Survey meters used provided exposure rates in both counts per minute and mR/hr. Equivalencies between the two were used when calibration data was available. Otherwise, the equivalencies were measured based upon known standards. Appendix B now reflects background measurements in mR/hr, cpm, and dpm.

c. Regarding your comments on Page 137, the reported MDA alpha of 152 dpm per 100 square centimeters was based upon guidance from NUREG 5849. Review of our calculations raised by your questions has found that the MDA equation used in the NUREG does not apply to our scintillation counters. This important information was reported by manufacturer technical representatives regarding the scintillation counters (Perkin-Elmer). Please see the attached calculations regarding your request.

d. Regarding each material surveyed for background, the lowest background measured for each detector outside of the affected area was applied uniformly throughout the survey areas as the background rates.

Paragraph 7:

a. As per NUREG 1757, Vol. 1, Revision 1, Table B.1, the lowest acceptable surface screening level for unrestricted release (dpm/100 cm²) was chosen as the Cobalt-60 nuclide having the activity of 7.1E+03 dpm/100 cm². All of the survey table entries regarding the radiation level and contamination level survey data were considerably below this most restrictive, unrestricted release standard. Moreover, measured activity comparison to screening levels for Hydrogen-3 (1.2E+08) and Carbon-14 (3.7E+06), listed on the license, are even lower. Other nuclides used by the license were not in the table.


b. As per NUREG 1757, Vol. 1, Revision 1, Table B.2, all soil and sewer samples were less than the most restrictive nuclide reported as actually used by the licensee in the survey report, except for samples designated as Sewer 3, Sewer 14 and Sewer 18. These activity levels exceed the screening release criteria by a factor of approximately two, however no adjustments have been made to account for the greater area contacted by these wipes.

Additional Question:

a. The maximum exposure rate obtained by sweeping the probe at contact over the entire grid element, was the value reported for the grid element. Elevated areas were included in the wipe taken within that grid element.

Thank you for your questions and comments regarding the Saint Louis University Decommissioning Survey Report, dated October 27, 2005. I hope the above information answers your questions.

Sincerely,
R. M. Wester & Associates, Inc.


Kenneth Bachmann
M.S., Health Physicist

Soil/Sewer Sample, Net Wipe Activity Densities

Note: Only those net activities given in the sample wipe test results which exceeded background are contained below. This means that all other bulk samples designated as Soil-XX, Sewer-XX were measured at or below zero net activity.

Sample No.	Protocol	Net Activity (dpm)	Quantity (pCi)	Mass (g)	Quantity (pCi/g)	Screening Values Appendix B NUREG 1757 vol/rev. 1
Soil 9	γ Ch 1	35.11	15.8	1.9	8.32	P-33: Not Present
Soil 8	γ Ch 1	7.02	3.16	0.6	5.27	S-35: 2.7E+02
Sewer 2	γ Ch 1	4.68	2.11	2.5	0.84	H-3: 1.1E+02
Soil 2	β	21.48	9.68	0.8	12.10	Ca-45: 5.7E+01
Soil 4	β	16.12	7.26	0.9	8.07	Cr-51: Not Present
Soil 6	β	8.07	3.64	1.1	3.31	I-125/I-131: Not Present
Soil 7	β	4.85	2.19	1.4	1.56	P-32: Not Present
Soil 8	β	8.07	3.64	0.6	6.07	U-234: 1.3E+01
Soil 9	β	14.78	6.66	1.3	5.12	
Soil 10	β	2.44	1.10	0.1	11.00	
Sewer 12	β	23.60	10.6	2.1	5.05	
Soil 1	α	17.98	8.10	1.6	5.06	
Soil 2	α	14.26	6.42	0.9	7.13	
Soil 5	α	11.93	5.37	0.6	8.95	
Soil 7	α	15.66	7.05	1.4	5.04	
Sewer 3	α	34.48	15.5	0.9	17.22	
Sewer 8	α	52.42	23.6	6.7	3.52	
Sewer 10	α	37.74	17.0	1.6	10.63	
Sewer 11	α	17.01	7.66	4.6	1.67	
Sewer 12	α	34.48	15.5	1.7	9.12	
Sewer 14	α	46.13	20.8	1.2	17.33	
Sewer 17	α	13.51	6.09	9.0	0.68	
Sewer 18	α	171.69	77.3	2.7	28.63	
Sewer 23	α	19.34	8.71	1.8	4.84	

From: "Taupier, Raymond" <Raymond.Taupier@perkinelmer.com>  Add to Address Book  Add Mobile Alert
To: "oldcedar@sbcglobal.net" <oldcedar@sbcglobal.net>
Subject: MDA formula - PE Tech Support
Date: Thu, 12 Jan 2006 13:59:17 -0500

Kenneth,

Here's the formula for LLD (Lower Level of Detection) or MDA (Minimum Detectable Activity).

$LLD / MDA = 4.66 * ((\text{square root of total counts of the background}) / \text{count time in minutes})$.

Example: background sample counted for 100 minutes, 16 cpm.

$4.66 * (\text{sq.rt. of } 16 * 100) / 100$

$4.66 * (40 / 100)$

$4.66 * .4$

1.864

The LLD / MDA is 1.864 counts above background

Have a great day!

Ray Taupier

Perkin-Elmer MDA's

$$MDA = \frac{4.66\sqrt{B}}{t}$$

where $B = \text{Background_Count_Rate}$

$t = \text{Count_Time_ (min)}$

$$MDA = \frac{4.66\sqrt{4\text{cpm}}}{1\text{min}} = 31.3\text{cpm} \Rightarrow 73.2\text{dpm} / 100\text{cm}^2 \text{ Cs} - 137$$

$$MDA = \frac{4.66\sqrt{12.4\text{cpm}}}{1\text{min}} = 16.4\text{cpm} \Rightarrow 22.0\text{dpm} / 100\text{cm}^2 \text{ C} - 14$$

$$MDA = \frac{4.66\sqrt{13.2\text{cpm}}}{1\text{min}} = 16.9\text{cpm} \Rightarrow 19.7\text{dpm} / 100\text{cm}^2 \text{ Th} - 232$$

Table B.1 Acceptable License Termination Screening Values of Common Radionuclides for Building-Surface Contamination

Radionuclide	Symbol	Acceptable Screening Levels* for Unrestricted Release (dpm/100 cm ²) ^b
Hydrogen-3 (Tritium)	³ H	1.2E+08
Carbon-14	¹⁴ C	3.7E+06
Sodium-22	²² Na	9.5E+03
Sulfur-35	³⁵ S	1.3E+07
Chlorine-36	³⁶ Cl	5.0E+05
Manganese-54	⁵⁴ Mn	3.2E+04
Iron-55	⁵⁵ Fe	4.5E+06
Cobalt-60	⁶⁰ Co	7.1E+03
Nickel-63	⁶³ Ni	1.8E+06
Strontium-90	⁹⁰ Sr	8.7E+03
Technetium-99	⁹⁹ Tc	1.3E+06
Iodine-129	¹²⁹ I	3.5E+04
Cesium-137	¹³⁷ Cs	2.8E+04
Iridium-192	¹⁹² Ir	7.4E+04

Notes:

a Screening levels are based on the assumption that the fraction of removable surface contamination is equal to 0.1. For cases when the fraction of removable contamination is undetermined or higher than 0.1, users may assume, for screening purposes, that 100 percent of surface contamination is removable, and therefore the screening levels should be decreased by a factor of 10. Alternatively, users having site-specific data on the fraction of removable contamination, based on site-specific resuspension factors (e.g., within 10 percent to 100 percent range), may calculate site-specific screening levels using DandD, Version 2.

b Units are disintegrations per minute (dpm) per 100 square centimeters (dpm/100 cm²). One dpm is equivalent to 0.0167 becquerel (Bq). Therefore, to convert to units of Bq/m², multiply each value by 1.67. The screening values represent surface concentrations of individual radionuclides that would be deemed in compliance with the 0.25 mSv/y (25 mrem/y) unrestricted release dose limit in 10 CFR 20.1402. For radionuclides in a mixture, the "sum of fractions" rule applies; see Part 20, Appendix B, Note 4.

**Table B.2 Screening Values (pCi/g) of Common Radionuclides
for Soil Surface Contamination Levels**

Radionuclide	Symbol	Surface Soil Screening Values ^a
Hydrogen-3	³ H	1.1 E+02
Carbon-14	¹⁴ C	1.2 E+01
Sodium-22	²² Na	4.3 E+00
Sulfur-35	³⁵ S	2.7 E+02
Chlorine-36	³⁶ Cl	3.6 E-01
Calcium-45	⁴⁵ Ca	5.7 E+01
Scandium-46	⁴⁶ Sc	1.5 E+01
Manganese-54	⁵⁴ Mn	1.5 E+01
Iron-55	⁵⁵ Fe	1.0 E+04
Cobalt-57	⁵⁷ Co	1.5 E+02
Cobalt-60	⁶⁰ Co	3.8 E+00
Nickel-59	⁵⁹ Ni	5.5 E+03
Nickel-63	⁶³ Ni	2.1 E+03
Strontium-90	⁹⁰ Sr	1.7 E+00
Niobium-94	⁹⁴ Nb	5.8 E+00
Technetium-99	⁹⁹ Tc	1.9 E+01
Iodine-129	¹²⁹ I	5.0 E-01
Cesium-134	¹³⁴ Cs	5.7 E+00
Cesium-137	¹³⁷ Cs	1.1 E+01
Europium-152	¹⁵² Eu	8.7 E+00
Europium-154	¹⁵⁴ Eu	8.0 E+00
Iridium-192	¹⁹² Ir	4.1 E+01
Lead-210	²¹⁰ Pb	9.0 E-01
Radium-226	²²⁶ Ra	7.0 E-01
Radium-226 + C-3	²²⁶ Ra + C	6.0 E-01
Actinium-227	²²⁷ Ac	5.0 E-01
Actinium-227 + C	²²⁷ Ac + C	5.0 E-01

Table B.2 Screening Values (pCi/g) of Common Radionuclides for Soil Surface Contamination Levels (continued)

Radionuclide	Symbol	Surface Soil Screening Values ^a
Thorium-228	²²⁸ Th	4.7 E+00
Thorium-228 + C ^b	²²⁸ Th + C	4.7 E+00
Thorium-230	²³⁰ Th	1.8 E+00
Thorium-230 + C	²³⁰ Th + C	6.0 E-01
Thorium-232	²³² Th	1.1 E+00
Thorium-232 + C	²³² Th + C	1.1 E+00
Protactinium-231	²³¹ Pa	3.0 E-01
Protactinium-231 + C	²³¹ Pa + C	3.0 E-01
Uranium-234	²³⁴ U	1.3 E+01
Uranium-235	²³⁵ U	8.0 E+00
Uranium-235 + C	²³⁵ U + C	2.9 E-01
Uranium-238	²³⁸ U	1.4 E+01
Uranium-238 + C	²³⁸ U + C	5.0 E-01
Plutonium-238	²³⁸ Pu	2.5 E+00
Plutonium-239	²³⁹ Pu	2.3 E+00
Plutonium-241	²⁴¹ Pu	7.2 E+01
Americium-241	²⁴¹ Am	2.1 E+00
Curium-242	²⁴² Cm	1.6 E+02
Curium-243	²⁴³ Cm	3.2 E+00

These values represent surficial surface soil concentrations of individual radionuclides that would be deemed in compliance with the 25 mrem/y (0.25 mSv/y) unrestricted release dose limit in 10 CFR 20.1402. For radionuclides in a mixture, the "sum of fractions" rule applies; see Part 20, Appendix B, Note 4.

Notes:

- a Screening values are in units of (pCi/g) equivalent to 25 mrem/y (0.25 mSv/y). To convert from pCi/g to units of becquerel per kilogram (Bq/kg), divide each value by 0.027. These values were derived using Dandl screening methodology (NUREG/CR-5512, Volume 3). They were derived based on selection of the 90th percentile of the output dose distribution for *each specific radionuclide* (or radionuclide with the specific decay chain). Behavioral parameters were set at the mean of the distribution of the assumed critical group. The metabolic parameters were set at "Standard Man" or at the mean of the distribution for an average man.
- b "Plus Chain (+C)" indicates a value for a radionuclide with its decay progeny present in equilibrium. The values are concentrations of the parent radionuclide, but account for contributions from the complete chain of progeny in equilibrium with the parent radionuclide (NUREG/CR-5512 Volumes 1, 2, and 3).

APPENDIX B

Survey Equipment and Standardization Tables

Table B1: Survey Equipment

Make	Model	Serial Number	Detector S/N	Detector Type	Sensitivity	Cal. Date
Ludlum	Model 3	23550	44-9PR035418	Pancake G-M	α, β, γ	April 1, 2005
Ludlum	Model 3	77734	44-17PR079308	Low Energy Gamma Scintillation.	γ	April 1, 2005
Ludlum	Model 3	52971	43-5PR108634	Alpha Scintillation	α	August 19, 2005
Packard	Tri-Carb 2100TR	416174	Internal	Liquid Scintillation	α, β, γ	Checked Daily
Packard	Auto-Gamma 5230	21651	Internal	Scintillation	γ	Checked Daily

Table B2: Standardization

44-9 Probe: 0.01 mR/hr = 20.6 cpm; Background = 0.01 mR/hr (20.6 cpm, 61.1 dpm) Eff=33.7%
 44-17 Probe: 0.01 mR/hr = 12 cpm; Background = 0.04 – 0.07 mR/hr (84 cpm, 571 dpm) Eff=14.7%
 44-5 Probe: 0.01 mR/hr = 23.5 cpm; Background = 0.01 mR/hr (23.5 cpm, 194 dpm) Eff=12.1%

Standard gamma activity, Cs-137: 9960696 dpm Energy discrimination:
 Standard gamma activity, Co-60: 14123879 dpm Gamma Ch1: 20–1000 keV; Ch2: 1000–2000 keV
 Standard LSA activity, C-14: 129786 dpm Beta/Alpha ChA: 10.0–18.6 keV; ChB: 18.6–156 keV
 Standard LSA activity, H-3: 183894 dpm ChC: 156–2000 keV
 Standard LSA activity, Th-230: 25929 dpm

Protocol	Ch A/1 cpm	Ch B/2 cpm	Ch C cpm	eff %
Standard Cs-137	4255319	51078	N/A	42.72
Standard Co-60	11111111	2725027	N/A	19.29
Standard C-14	13854	96710	528	74.5
Standard H-3	14031	637	2.8	7.63
Standard, Th-230	5555	22261	14115	85.85
Standard background, γ	N/A	N/A	N/A	N/A
Similar background, γ	344	45	N/A	N/A
Standard background, LSA β	2.82	6.88	12.4	N/A
Similar background, LSA β	0.00	4.92	0.00	N/A
Standard background, LSA α	4.22	7.98	13.2	N/A
Similar background, LSA α	1.78	9.02	0.00	N/A
MDA (GSA): 73.2 dpm/100 cm ² [3.30 Exp-05 μ Ci]				
MDA (LSA β): 22.0 dpm/100 cm ² [9.91 Exp-06 μ Ci]				
MDA (LSA α): 19.7 dpm/100 cm ² [8.87 Exp-06 μ Ci]				

Table C3: Work Room Equipment

Item	Grid Identification
Sink	D29 Trap ext.; D22, D24
Disposer	D60 Trap ext.; D50; D48 Bottom; D70
Faucets	D49, D72, D73
Sprayer	D57, D58
Rack	D45
Dry erase board	D90
Shelves	C82, C86, C96, C92
Cabinets	E30-E40; E21-E24

Figure C22: Clean Storage Floor Grid and Layout

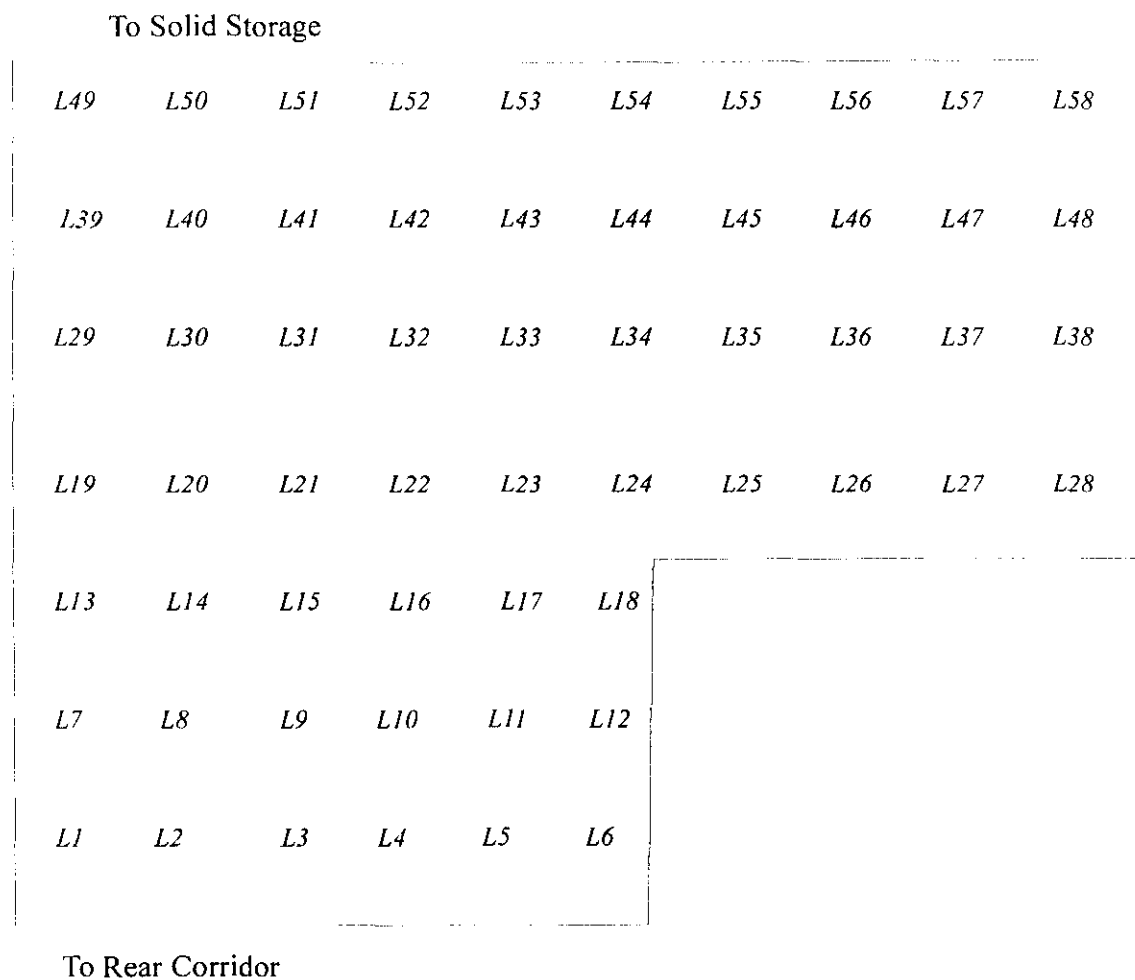


Table C4: Office Equipment

Item	Grid Identification
File cabinet	C12
File cabinet	C13
Desk	C59, C2
Book case	C44

Figure C33: Bathroom Floor Grid and Layout

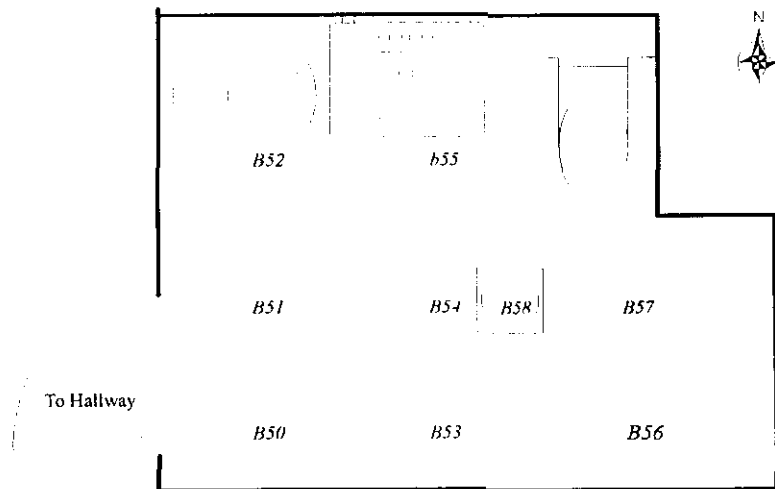
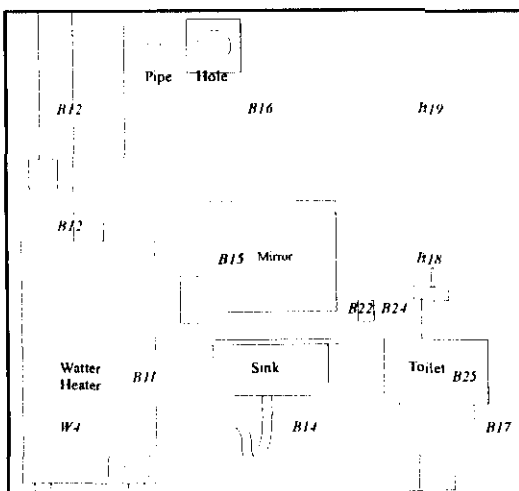


Figure C34: Bathroom North Wall



C-23

APPENDIX E

Sample Wipe Test Results– Net Gamma– Channel 1

1. Statistics regarding channel 1 gross gamma counting protocol are contained below:

Standard gamma activity, Cs-137: 9960696 dpm	Energy discrimination:
Standard gamma activity, Co-60: 14123879 dpm	Gamma ChA1: 20–1000 keV; Ch2: 1000–2000 keV
Standard LSA activity, C-14: 129786 dpm	Beta/Alpha ChA: 10.0–18.6 keV; ChB: 18.6–156 keV
Standard LSA activity, H-3: 183894 dpm	ChC: 156–2000 keV
Standard LSA activity, Th-230: 25929 dpm	

Protocol	Ch A/1 cpm	Ch B/2 cpm	Ch C cpm	eff %
Standard Cs-137	4255319	51078	N/A	42.72
Standard Co-60	11111111	2725027	N/A	19.29
Standard C-14	13854	96710	528	74.57
Standard H-3	14031	637	2.8	7.63
Standard, Th-230	5555	22261	14115	85.85
Standard background, γ	N/A	N/A	N/A	N/A
Similar background, γ	344	45	N/A	N/A
Standard background, LSA β	2.82	6.88	12.4	N/A
Similar background, LSA β	0.00	4.92	0.00	N/A
Standard background, LSA α	4.22	7.98	13.2	N/A
Similar background, LSA α	1.78	9.02	0.00	N/A
MDA (GSA): 73.2 dpm/100 cm ² [3.30 E-05 μ Ci]				
MDA (LSA β): 22.0 dpm/100 cm ² [9.91 E-06 μ Ci]				
MDA (LSA α): 19.7 dpm/100 cm ² [8.87 E-06 μ Ci]				

2. A background count rate of 344 cpm was deducted from the channel 1 gross gamma sample population count rates to obtain net gamma sample activities. After background deduction, any activities of less than zero defaulted to zero. Only the following samples from the entire sample population exceeded the background rate. All other sample activities were consistent with the background count rate. All table activities are given in net values.

APPENDIX E

Sample Wipe Test Results-- Net Gamma-- Channel 2

1. Statistics regarding channel 2 gross gamma counting protocol are contained below:

Standard gamma activity, Cs-137: 9960696 dpm	Energy discrimination:
Standard gamma activity, Co-60: 14123879 dpm	Gamma Cha1: 20–1000 keV; Ch2: 1000–2000 keV
Standard LSA activity, C-14: 129786 dpm	Beta/Alpha ChA: 10.0–18.6 keV; ChB: 18.6–156 keV
Standard LSA activity, H-3: 183894 dpm	ChC: 156–2000 keV
Standard LSA activity, Th-230: 25929 dpm	

Protocol	Ch A/1 cpm	Ch B/2 cpm	Ch C cpm	eff %
Standard Cs-137	4255319	51078	N/A	42.72
Standard Co-60	11111111	2725027	N/A	19.29
Standard C-14	13854	96710	528	74.57
Standard H-3	14031	637	2.8	7.63
Standard, Th-230	5555	22261	14115	85.85
Standard background, γ	N/A	N/A	N/A	N/A
Similar background, γ	344	45	N/A	N/A
Standard background, LSA β	2.82	6.88	12.4	N/A
Similar background, LSA β	0.00	4.92	0.00	N/A
Standard background, LSA α	4.22	7.98	13.2	N/A
Similar background, LSA α	1.78	9.02	0.00	N/A
MDA (GSA): 73.2 dpm/100 cm ² [3.30 E-05 μ Ci]				
MDA (LSA β): 22.0 dpm/100 cm ² [9.91 E-06 μ Ci]				
MDA (LSA α): 19.7 dpm/100 cm ² [8.87 E-06 μ Ci]				

2. A background count rate of 45 cpm was deducted from the channel 2 gross gamma sample population count rates to obtain net gamma sample activities. After background deduction, any activities of less than zero defaulted to zero. Only the following samples from the entire sample population exceeded the background rate. All other sample activities were consistent with the background count rate. All table activities are given in net values.

APPENDIX F

Sample Wipe Test Results– Net Beta

1. Statistics regarding gross beta counting protocol are contained below:

Standard gamma activity, Cs-137: 9960696 dpm	Energy discrimination:
Standard gamma activity, Co-60: 14123879 dpm	Gamma ChA1: 20–1000 keV; Ch2: 1000–2000 keV
Standard LSA activity, C-14: 129786 dpm	Beta/Alpha ChA: 10.0–18.6 keV; ChB: 18.6–156 keV
Standard LSA activity, H-3: 183894 dpm	ChC: 156–2000 keV
Standard LSA activity, Th-230: 25929 dpm	

Protocol	Ch A/1 cpm	Ch B/2 cpm	Ch C cpm	eff %
Standard Cs-137	4255319	51078	N/A	42.72
Standard Co-60	11111111	2725027	N/A	19.29
Standard C-14	13854	96710	528	74.57
Standard H-3	14031	637	2.8	7.63
Standard, Th-230	5555	22261	14115	85.85
Standard background, γ	N/A	N/A	N/A	N/A
Similar background, γ	344	45	N/A	N/A
Standard background, LSA β	2.82	6.88	12.4	N/A
Similar background, LSA β	0.00	4.92	0.00	N/A
Standard background, LSA α	4.22	7.98	13.2	N/A
Similar background, LSA α	1.78	9.02	0.00	N/A
MDA (GSA): 73.2 dpm/100 cm ² [3.30 E-05 μ Ci]				
MDA (LSA β): 22.0 dpm/100 cm ² [9.91 E-06 μ Ci]				
MDA (LSA α): 19.7 dpm/100 cm ² [8.87 E-06 μ Ci]				

2. The sample population was chosen as the maximum count rate over three channels. A background count rate of 12.4 cpm was deducted from the gross beta sample population count rates to obtain net beta sample activities. After background deduction, any activities of less than zero defaulted to zero. Only the following samples from the entire sample population exceeded the background rate. All other sample activities were consistent with the background count rate. All table activities are given in net values.

APPENDIX G

Sample Wipe Test Results-- Net Alpha

1. Statistics regarding gross alpha counting protocol are contained below:

Standard gamma activity, Cs-137: 9960696 dpm	Energy discrimination:
Standard gamma activity, Co-60: 14123879 dpm	Gamma ChA1: 20–1000 keV; Ch2: 1000–2000 keV
Standard LSA activity, C-14: 129786 dpm	Beta/Alpha ChA: 10.0–18.6 keV; ChB: 18.6–156 keV
Standard LSA activity, H-3: 183894 dpm	ChC: 156–2000 keV
Standard LSA activity, Th-230: 25929 dpm	

Protocol	Ch A/1 cpm	Ch B/2 cpm	Ch C cpm	eff %
Standard Cs-137	4255319	51078	N/A	42.72
Standard Co-60	11111111	2725027	N/A	19.29
Standard C-14	13854	96710	528	74.57
Standard H-3	14031	637	2.8	7.63
Standard, Th-230	5555	22261	14115	85.85
Standard background, γ	N/A	N/A	N/A	N/A
Similar background, γ	344	45	N/A	N/A
Standard background, LSA β	2.82	6.88	12.4	N/A
Similar background, LSA β	0.00	4.92	0.00	N/A
Standard background, LSA α	4.22	7.98	13.2	N/A
Similar background, LSA α	1.78	9.02	0.00	N/A
MDA (GSA): 73.2 dpm/100 cm ² [3.30 E-05 μ Ci]				
MDA (LSA β): 22.0 dpm/100 cm ² [9.91 E-06 μ Ci]				
MDA (LSA α): 19.7 dpm/100 cm ² [8.87 E-06 μ Ci]				

2. The sample population was chosen as the maximum count rate over three channels. A background count rate of 13.2 cpm was deducted from the gross alpha sample population count rates to obtain net alpha sample activities. After background deduction, any activities of less than zero defaulted to zero. Only the following samples from the entire sample population exceeded the background rate. All other sample activities were consistent with the background count rate. All table activities are given in net values.

EXPRESS

Waybill

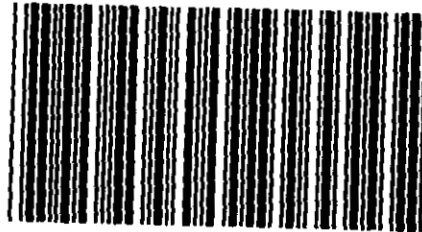
Page 1 of 1

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Destination:

DPAF



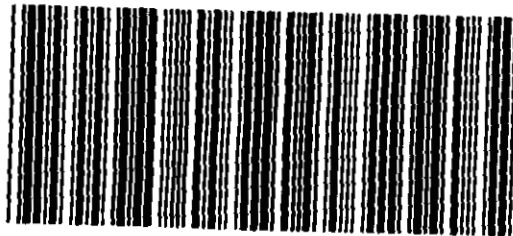
Acct: 852255197

Date: 01/16/2006

Ref:

Waybill:

8834758785



Routing:

3T/

Weight: XD

Origin: SFL

Pcs: 1

FR: R M WESTER & ASSOCIATES

Barbara Nacke

215 INDACOM DR

ST PETERS, MO

63376 United States Of America

Ph: (636) 928-9628 Fax:

TO: US NRC Region III

Mr Mike McCann

Senior Health Physicist

2443 Warrenville Road

Lisle, IL

60532 United States Of America

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