

LMS/PIQ/42087

Addendum Characterization Survey Report for the Piqua, Ohio, Decommissioned Reactor Site Room B-7

August 2022

Work performed under DOE contract number 89303020DLM000001 for the U.S. Department of Energy Office of Legacy Management.

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Appendixes

Appendix A

Piqua Room B-7 Radiological Survey Maps Piqua Room B-7 Radiological Survey Instrument Information Appendix B

Abbreviations

ACS addendum characterization survey

CFR Code of Federal Regulations

cm² square centimeters cpm counts per minute

CS characterization survey

CSP Characterization Survey Plan

CSPA Characterization Survey Plan Addendum

CSR characterization survey report
DOE U.S. Department of Energy
dpm disintegrations per minute

DQO data quality objective

LM Office of Legacy ManagementLMS Legacy Management Support

MARSSIM Multi-Agency Radiological Survey and Site Investigation Manual (MARSSIM)

MDA minimum detectable activity
NaI(Tl) thallium-doped sodium iodide

NV5 NV5 Global, Inc.

RCT radiological control technician

Forms Referenced in This Manual

LMS forms are accessible on the **Document Management** homepage > LMS Forms.

After-Calibration Source Response Checks Data Sheet	LMS 1974
Daily Instrument Response	LMS 1974a
Radiological Survey Map	LMS 1553
Scaler Chi-Squared (x2) Test Data Sheet	LMS 2020

1.0 Introduction

During summer 2020, NV5 Global, Inc. (NV5), which was a subcontracted firm to Woolpert as a subcontractor to the U.S. Army Corps of Engineers, performed a radiological characterization survey (CS) of the U.S. Department of Energy (DOE) Office of Legacy Management (LM) Piqua, Ohio, Decommissioned Reactor Site. The CS was conducted in accordance with the reviewed and approved *Characterization Survey Plan, Piqua Nuclear Power Facility* (NV5 2020), also called the original CSP. The original CSP was developed and written to provide appropriate and confident radiological survey data from which to establish the radiological status of the Piqua site and be able to make confident radiological release decisions.

After completion of the 2020 CS, a characterization survey report (CSR) was written, reviewed, and approved in June 2021 (*Piqua Nuclear Power Facility Characterization Survey Final Report* June 2021, 100552-RPT-20200709, NV5). The CSR concluded that if the facility structures were left as is, then the CS data would be sufficient and appropriate to support an unrestricted release decision of the facilities or an unrestricted release decision of demolished materials from the facilities (if demolished). The unrestricted release decision made by the NV5 health physicist was supported by: (1) the CS data being collected using the *Multi-Agency Radiological Survey and Site Investigation Manual (MARSSIM)* (NRC et al. 2000) survey and sampling methodology and guidance, (2) the final status survey-level data quality objectives (DQOs), and (3) the actual CS results and analysis. The CSR also identified exceptions to the unrestricted release decision for the current Piqua site entombment in the bottom of the Reactor Building, for the inside of Room B-7 in the Auxiliary Building, and for the tank in Room B-7.

The *Piqua, Ohio, Decommissioned Reactor Site Characterization Survey Plan Addendum* (DOE 2022), also called the CSPA, was written as an addendum to the original 2020 CSP. The CSPA provided radiological survey guidance and direction necessary to complete the addendum characterization survey (ACS) of Room B-7 and the tank in Room B-7. Survey guidance and direction in the CSPA came from the original 2020 CSP.

This Addendum Characterization Survey Report for the Piqua, Ohio, Decommissioned Reactor Site Room B-7 presents the survey information and survey results necessary to demonstrate the successful completion of the original CS for the Piqua site.

2.0 Performing the ACS

Room B-7 ACS measurements were performed in August 2022 by a DOE-qualified Legacy Management Support (LMS) radiological control technician (RCT) in accordance with CSPA, LMS *Radiation Protection Program Plan* (LMS/POL/S04373), LMS *Radiological Control Manual* (LMS/POL/S04322), and LMS Radiological Control organization implementing procedures.

2.1 Instrument Minimum Detectable Activity (MDA) Determination

The LMS Radiological Control organization instruments used to perform the ACS met the MDA limits described in the CSPA. Because the radiological survey instruments used by the LMS RCT performing this ACS were similar or identical to those used by the NV5 survey team,

the LMS radiological instruments were considered acceptable and in compliance with the various MDA and functional requirements. The LMS Radiological Control organization instruments used to perform the ACS also met the critical values required by the LMS *Radiation Protection Program Plan* and the LMS *Radiological Control Manual*. The critical values are identified on each completed *Radiological Survey Map* form (LMS 1553) in Appendix A, "Piqua Room B-7 Radiological Survey Maps."

2.2 Building- and Material-Specific Radiological Background Determination

Building- and material-specific background information was collected for the LMS radiological instrumentation used during the ACS. Figure 1 shows a concrete utility vault with a metal manhole cover that is close to and south of the Piqua site Auxiliary Building. Handheld instrument and probe background determinations were performed there, specifically for the following instruments:

- Ludlum Model 2221 and 44-10 thallium-doped sodium iodide NaI(Tl) crystal probe for area gamma scan measurements: A single 10-minute background count was performed with the probe held at the same distance as the survey requirement (i.e., 6 inches above the concrete surface).
- Ludlum Model 2221 and 43-90 probe for alpha direct and scan measurements: A single 10-minute background was performed with the probe at the same distance as the survey requirement (i.e., 0.125 inch above the concrete surface).
- Ludlum Model 26 for beta direct and scan measurements: Ten 1-minute counts were performed with the probe at the same distance as the survey requirement (i.e., 0.25 inch above the surface). The established background value for the instrument was an average of the 10 1-minute count values.

This background location represents nonradiologically impacted concrete and metal, similar to the items surveyed during the ACS (e.g., the walls, floor, and metal tank).

Background determinations for the Ludlum Model 2929/44-10-1 smear counter (for alpha and beta removable surface contamination surveys) were performed at the LM Fernald Preserve, Ohio, Site. A 20-minute background count was performed on the instrument before counting the smears collected during the Room B-7 surveys.

Radiological instrument background values are identified on the *Radiological Survey Map* form for each individual instrument used (Appendix A).



Figure 1. Instrument and Probe Background Determination Location

2.3 Radionuclides of Concern and Action Levels

The radionuclides of concern, action levels, and guidance for deviations from the sample plan remained unchanged during this ACS.

2.4 Measurement Locations

Radiological measurements were collected in accordance with the March 2022 CSPA (DOE 2022). Three wall measurement locations were moved from the physical wall to the rubblized concrete that represents the wall areas that were removed to access and remove the tank from the room. In accordance with the CSPA:

If Room B-7 presents surveyors with physical access limitations (with regard to an RCT being able to enter the room to perform the ACS), then sections or portions of the room (e.g., walls, removable facility supports or structures, the tank) can be mechanically deconstructed as necessary using appropriate construction equipment and techniques (as permitted by approved project demolition plans) before performing

the ACS. Deconstructed room material shall be made available to the RCT to survey immediately after deconstruction. Deconstructed room material shall remain in close proximity to Room B-7 if physically possible. If not physically possible, then the RCT shall perform the ACS of the relocated deconstructed material once the material is placed in a safe and appropriate survey area.

Figure 2 shows the wall measurement locations as presented in the CSPA, Figure 3 shows the areas of the walls that were deconstructed (shaded portions) in order to remove the tank from the room, Figure 4 shows the rubblized concrete that represents the wall areas that were removed, and Figure 5 shows Survey Location No. 1 on the floor of Room B-7 (as an example).

Three measurement locations (one from the B-7 north wall and two from the B-7 east wall) were displaced from the physical walls and transferred to the rubblized concrete. The radiological survey maps in Appendix A show that measurement locations 11, 12, and 13 were moved from the walls to the rubblized concrete.

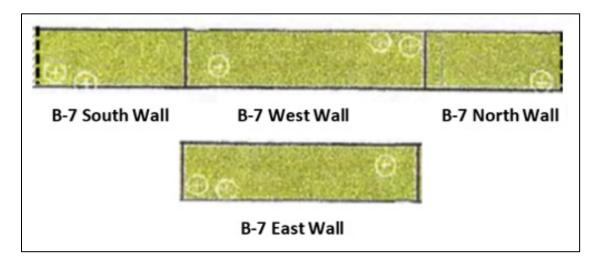


Figure 2. Identified CSPA Room B-7 Wall Measurement Locations

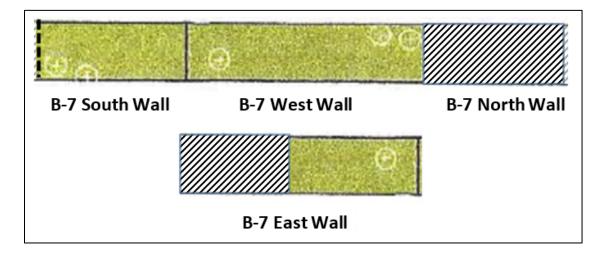


Figure 3. Room B-7 Walls Removed, Shaded Areas



Figure 4. Rubblized Wall Concrete



Figure 5. Survey Location No. 1, Room B-7 Floor

2.5 Survey Instrumentation

This ACS involved radiological instruments that were identical or similar to the radiological instruments used in the original CS. Instruments used in this ACS included the following:

- A Ludlum Model 2221 instrument with a 43-90 probe that was used for alpha direct and scan measurements on Room B-7 walls and floor and on the B-7 tank
- A Ludlum Model 26 that was used for beta direct and scan measurements on (1) Room B-7 walls and floor and (2) the B-7 tank
- A Ludlum 2221 instrument with a 44-10 probe that was used to perform gamma area scans on (1) Room B-7 walls and floor and (2) the B-7 tank
- A Ludlum Model 2929 with a 43-10-1 probe that was used to analyze wipe or smear samples for alpha and beta removable residual radioactivity

The above radiological instruments and detectors came from the LMS Radiological Control instrument inventory. No radiological instruments used during the ACS were rented from an outside vendor or agency.

2.6 Survey Instrument Operational Checks

LMS radiological instrument performance prerequisites (operational checks) were performed in accordance with LMS Radiological Control implementing procedures and as generally outlined below:

- Verify that the instrument is within the calibration due date.
- Visually verify that the instrument is not damaged and, if it is battery operated, that the battery has an acceptable charge or level.
- Verify that the high voltage is set correctly for the instrument, if that is required for the instrument.
- Perform a source check on the instrument using the correct radiation check source.
- Perform a background level determination for the instrument, if necessary.

Instrument verification and operational checks were recorded on the appropriate LMS Radiological Control instrument forms (e.g., LMS 1974, 1974a and 2020,) and are included in Appendix B, "Piqua Room B-7 Radiological Survey Instrument Information."

3.0 ACS Results

3.1 Alpha and Beta Scans

Alpha and beta scans were performed using the Ludlum Model 2221 with a 43-90 probe for alpha radiation and the Ludlum Model 26 for beta radiation. Scans were performed at a rate of 4 inches per second with the probe held 0.25 inch from the surface for beta and 0.125 inch for alpha. No alpha or beta scans identified elevated radioactivity (i.e., approximately twice background), so no additional direct (or static) measurements were necessary or performed.

Alpha and beta scan measurement results were recorded on *Radiological Survey Map* forms in Appendix A. The highest alpha scan measurement on the walls, floor, or tank was 2 counts per minute (cpm) with a background instrument value of 2 cpm. The highest beta scan measurement on the walls, floor, or tank was 70 cpm with a background instrument value of 40 cpm.

3.2 Gamma Area Scans

Gamma area scans were performed using the Ludlum 2221 instrument with a 44-10 probe. Gamma area scans were performed at each identified survey point, covering approximately 1 square meter of area within the identified survey location. The 44-10 probe was held approximately 6 inches from the surface and was moved over the surface in a serpentine pattern to survey each 1 square meter area. No gamma area scans identified elevated radioactivity (i.e., approximately twice background), so no additional investigations were necessary or performed. Gamma area scan measurement results were recorded on the *Radiological Survey Map* forms in Appendix A. The highest gamma area scan measurement on the walls and floors was 6700 cpm with a background instrument value of 4495 cpm. The highest gamma area scan measurement on the tank was 2100 cpm with a background instrument value of 1747 cpm.

3.3 Alpha and Beta Direct Surveys

Alpha and beta direct measurements were performed using the Ludlum Model 2221 with a 43-90 probe for alpha radiation and the Ludlum Model 26 for beta radiation. Direct measurements were performed by collecting a 1 minute (or greater) static measurement at the required distance from the surface being measured (e.g., 0.25 inch for beta and 0.125 inch for alpha) for each identified survey location. No alpha or beta direct measurements identified elevated radioactivity (e.g., greater than the action level), so no additional direct measurements were necessary or performed. Alpha and beta direct measurement results were recorded on the *Radiological Survey Map* forms in Appendix A. The highest alpha direct measurement on the walls, floor, or tank was -1 disintegration per minute (dpm)/100 square centimeters (cm²) (i.e., less than the critical value of the instrument) with a background instrument value of 2 dpm/100 cm². The highest beta direct measurement on the walls, floor, or tank was 290 dpm/100 cm² with a background instrument value of 40 dpm/100 cm².

3.4 Wipe (Smear) Surveys

Wipe (smear) surveys were performed by the RCT in accordance with CSPA, LMS *Radiation Protection Program Plan*, LMS *Radiological Control Manual*, and LMS Radiological Control organization implementing procedures. Smear surveys were performed using industry standard smears (i.e., Wipe Test Smears), applying moderate pressure while sampling a surface area of approximately 100 cm². Once collected, the smears were counted on a Ludlum Model 2929 instrument with a 43-10-1 detector counting system. Smear counting results were recorded on the *Radiological Survey Map* forms in Appendix A. The highest alpha smear result on the walls, floor, or tank was 0.7 cpm net (i.e., less than the critical value of the counting instrument) with an alpha background instrument value of 0.3 cpm. The highest beta smear result on the walls, floor, or tank was 11 cpm net (28 dpm/100 cm²) with a background instrument value of 39 cpm. With an action level of 25% of the Title 10 *Code of Federal Regulations* Part 835 (10 CFR 835) release limit (1000 dpm/100 cm²), no smear result was greater than 250 dpm/100 cm² CSPA action level.

3.5 Room B-7 Internal Tank Survey

Radiological surveys and measurements were performed by the RCT on the Room B-7 empty tank (tank) once the tank was removed from the room. Alpha and beta scans, alpha and beta direct measurements, gamma area scans, and smear surveys were performed on the tank. The tank had seven separate openings, which were all on the top of the tank, and most of the radiological surveys performed on the tank were performed in and around the tank's openings (Figure 6). The seven *Radiological Survey Map* forms related to the tank (in Appendix A) describe which radiological surveys and measurements were performed and where they were performed. No radiological measurements were performed deep inside the tank because access into the tank was not available and was not permitted by the CSPA. A visual inspection of the internals of the tank (Figure 7) revealed a clean-looking internal tank surface. A gamma area scan performed on the bottom of the tank (see Radiological Survey Map ID 220723-006 and Figure 8) revealed only background radioactivity levels (i.e., 3600–4200 gross cpm over the tank bottom with an instrument background of 3956 cpm). Had elevated fission product radioactive material been present at the bottom of the tank, the sensitive NaI(Tl) Ludlum 44-10 probe would have likely detected it. During the initial CS performed by the NV5 survey team, they did insert a Ludlum 44-10 probe into the one of the tank openings and did not detect elevated gamma radiation.



Figure 6. Room B-7 Tank, Top Openings



Figure 7. Room B-7 Tank, Internals

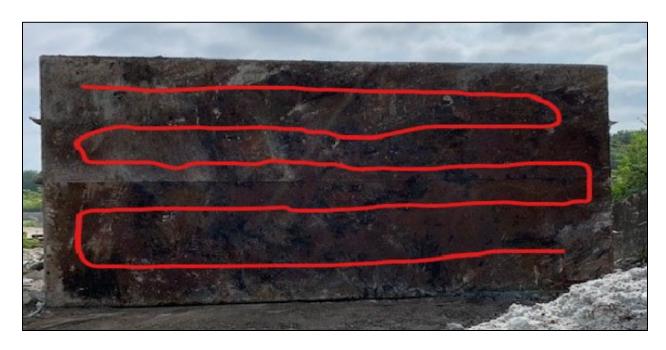


Figure 8. Room B-7 Tank, Bottom

Survey results for this report included the following:

- The highest alpha scan measurement of the tank was 2 cpm gross with a background instrument value of 2 cpm
- The highest beta scan measurement on the tank was 55 cpm gross with a background instrument value of 40 cpm
- The highest alpha direct measurement on the tank was 1 cpm gross with a background instrument value of 2 cpm
- The highest beta direct measurement on the tank was 41 cpm gross with a background instrument value of 40 cpm
- The highest gamma area scan measurement on the tank was 2100 cpm gross with a background instrument value of 1747 cpm
- The highest alpha smear result on the tank was 1 cpm gross with an alpha background instrument value of 0.3 cpm
- The highest beta smear result on the tank was 45 cpm gross with a background instrument value of 39 cpm

Radiological measurement results (from both direct and smear measurements) were all below the instrument's critical values and did not have an activity (in dpm/100 cm²) listed on the *Radiological Survey Map* forms (Appendix A).

4.0 Review of ACS Results

Upon completion of the ACS, the project health physicist gathered the completed and reviewed survey results and evaluated them, ensuring that required surveys were collected and performed in accordance with this CSPA and the original CSP. During the evaluation, it was determined that a DOE-qualified RCT performed the surveys, that correct and appropriate instrumentation was used by the RCT, that established DQOs were met, and that identified survey locations, or their alternative locations, were surveyed by the RCT.

5.0 Room B-7 and Tank CS Conclusion

Upon completion of the ACS, radiological survey results were evaluated and identified to be less than the original CSP action levels (i.e., 250 dpm/100 cm² removable, 1250 dpm/100 cm² total, and 3750 dpm/100 cm² for elevated areas of 1 square meter) and less than the established regulatory release limits (i.e., removable contamination 1000 dpm/100 cm², average total contamination 5000 dpm/100 cm², and maximum total activity of 15,000 dpm/100 cm² on any 1 square meter area).

As identified in the original CSP, these criteria are generally acceptable for unrestricted release for DOE Order 458.1 Chg 4 (LtdChg), *Radiation Protection of the Public and the Environment*, facilities or sites, as described in 10 CFR 835 Appendix D, and as presented in the MARSSIM (NRC et al. 2000) for the U.S. Nuclear Regulatory Commission and the State of Ohio.

Given the above information, it is concluded that Room B-7 and the tank that resided in Room B-7 are not radiologically impacted and are acceptable for unrestricted release.

6.0 References

10 CFR 835. "Occupational Radiation Protection," Code of Federal Regulations.

DOE (U.S. Department of Energy), 2022. *Piqua, Ohio, Decommissioned Reactor Site Characterization Survey Plan Addendum*, LMS/S38287, Office of Legacy Management, March.

DOE Order 458.1 Chg 4 (LtdChg), *Radiation Protection of the Public and the Environment*, U.S. Department of Energy, September 15, 2020.

NRC (U.S. Nuclear Regulatory Commission), EPA (U.S. Environmental Protection Agency), and DOE (U.S. Department of Energy), 2000. *Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM)*, Revision 1, NUREG-1575, EPA 402-R-97-016, DOE/EH-0624, August.

NV5 (NV5 Global, Inc.), 2020. Characterization Survey Plan, Piqua Nuclear Power Facility, DMA-TR-107, Richland, Washington.

Radiation Protection Program Plan, LMS/POL/S04373, continually updated, prepared by the LMS contractor for the U.S. Department of Energy Office of Legacy Management.

Radiological Control Manual, LMS/POL/S04322, continually updated, prepared by the LMS contractor for the U.S. Department of Energy Office of Legacy Management.

Appendix A

Piqua Room B-7 Radiological Survey Maps



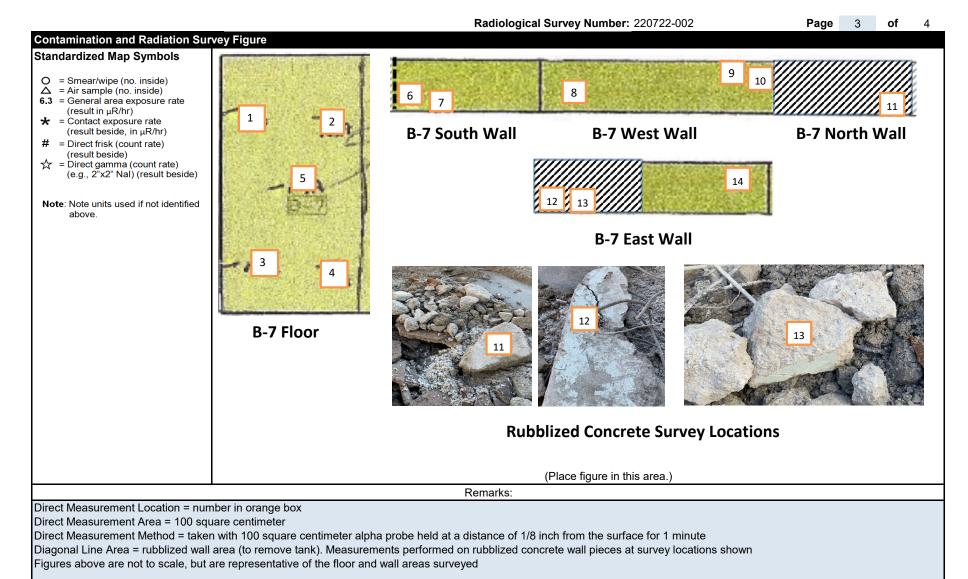
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Floor #5	3							0			- 2.0		< Sc		
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							Remarks:								
10 minute backg	ground perfo	rmed on	Ludlum 2221	(SN#7548	30) and 43-90	Probe (SN#	107237) Alp	ha Backg	round = 2 CPM						



Radiological Survey Number: 220720-005 of Page Contamination and Radiation Survey Figure Standardized Map Symbols O = Smear/wipe (no. inside) \triangle = Air sample (no. inside) 8 **6.3** = General area exposure rate (result in µR/hr) ★ = Contact exposure rate **B-7 North Wall** (result beside, in μR/hr) **B-7 South Wall B-7 West Wall** # = Direct frisk (count rate) (result beside) ☆ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside) Note: Note units used if not identified above. **B-7 East Wall B-7 Floor Rubblized Concrete Survey Locations** (Place figure in this area.) Remarks: Scan Location = number in orange box Scan Area = 1 square meter (represented by the orange box, not to scale) Scan Method = surface area was scanned at 4 inches per second with the alpha probe held at a distance of 1/8 inch from the surface Diagonal Line Area = rubblized wall area (to remove tank). Scans performed on rubblized concrete wall pieces at survey locations shown Figures above are not to scale, but are representative of the floor and wall areas surveyed



	Radiological Survey Number: 220720-005	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				
Floor Location #1 = 0-2 Gross CPM over 1 meter scan area					
Floor Location #2 = 0-2 Gross CPM over 1 meter scan area					
Floor Location #3 = 0 Gross CPM over 1 meter scan area					
Floor Location #4 = 0 Gross CPM over 1 meter scan area					
Floor Location #5 = 0 Gross CPM over 1 meter scan area					
Wall Location #6 = 0 Gross CPM over 1 meter scan area					
Wall Location #7 = 0 Gross CPM over 1 meter scan area					
Wall Location #8 = 0 Gross CPM over 1 meter scan area					
Wall Location #9 = 0-2 Gross CPM over 1 meter scan area					
Wall Location #10 = 0-2 Gross CPM over 1 meter scan area					
Wall Location #11 = 0 Gross CPM over 1 meter scan area					
Wall Location #12 = 0 Gross CPM over 1 meter scan area					
Wall Location #13 = 0 Gross CPM over 1 meter scan area					
Wall Location #14 = 0 Gross CPM over 1 meter scan area					

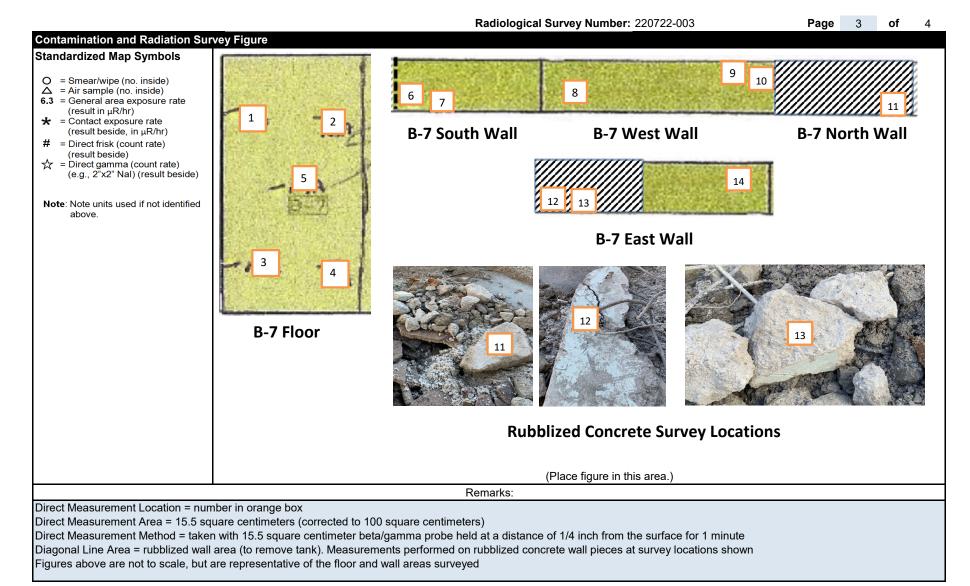


							Radio	logical Surv	vey Number:	220722-003			age <u>1</u>	of 4
	racterization S	Survey of	Room B-7 (B	eta-Gamn	na Direct)						Truck #:	N/A	Trailer #:	N/A
RWP number:						Time: 10:	:00 AM		_	7/20/2022				
	Piqua							_	Room B-7					
RCT (printed):								wer signatur		,			Date:	
	Instruments:		Instrun	nent 1		Instrument	2		ument 3		tion Instrum		Instrui	ment 4
Instrument/prob	e model:							Ludl	lum 26	Instrument/	probe model	:		
Instrument seria	I number:							PF0	08880	Instrument	serial numbe	er:		
Probe serial nur	nber:							1	N/A	Probe seria	ıl number:			
Calibration due:								1/20	1/20/2023 Calibration due:					
Efficiency:		α	β		α	β		α	β 0.38	Background	d (dose rate)	:		
Background (cp	m):	The state of the s									r info (as ne	eded):		
S_C (dpm/100cm ²	·):	α	β		α	β		α	β 276					
Area probe corre	ection factor:								6.5					
Surface Contar	nination and	Radiatio	on Survey Re	sults										
Item Surveyed	Counting		Smea	r Survey	(Instrument	1 or 2)			Di	rect Survey	(Instrument	t 3)		Exposure
	Inst. No.	Gros	s Counts	Net (Counts	Act	ivity	Gros	s Counts	Net C	ounts	Ac	tivity	Rate
-	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamm dpm/100cm		Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
Floor #1	3								42		2.0		< Sc	
Floor #2	3								38		- 2.0		< Sc	
Floor #3	3								36		-4.0		< Sc	
Floor #4	3								47		7.0		< Sc	
Floor #5	3								45		5.0		< Sc	
Wall #6	3								48		8.0		< Sc	
Wall #7	3								56		16.0		< Sc	
Wall #8	3								52		12.0		< Sc	
Wall #9	3								55		15.0		< Sc	
Wall #10	3								50		10.0		< Sc	
Wall #11	3								54		14.0		< Sc	
Wall #12	3								57		17.0		290	
Wall #13	3								45		5.0		< Sc	
Wall #14	3								50		10.0		< Sc	
RCT signa	ature:				-		-			_	•	-	•	



Surface Contam	ination and F	Radiation	Survey Resul	ts				_	vey Number: 2				age 2		
Item Surveyed	Counting		Smea	r Survey	(Instrument	1 or 2)			Dir	ect Survey	(Instrumen	t 3)		Exposure	
	Inst. No.	Gros	s Counts	Net	Counts	Act	ivity	Gros	ss Counts	Net C	Counts	Ac	tivity	Rate	
	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey	
						•				•					
					1										
Applicable Surf	ace Contam	ination I	imits				Activity Eq	uation					APCE		
Check one for a									KGD count = N	et count			44-9 = 6.5		
Alpha (removabl			000/5000	☐ 200/ ²	1000	20/500	Net count/E						FHZ 732 (G	M) = 6.5	
Beta (removable				☐ 200/ ²			Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-1 = 1								
	,				Remarks:										
Ten one-minute	background	counts w	ere performe	d on Ludl	um Model 26	6. Averaged	background	= 40 CPN	Л						
	ŭ		•			J	ŭ								







	Radiological Survey Number: 220722-003	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				

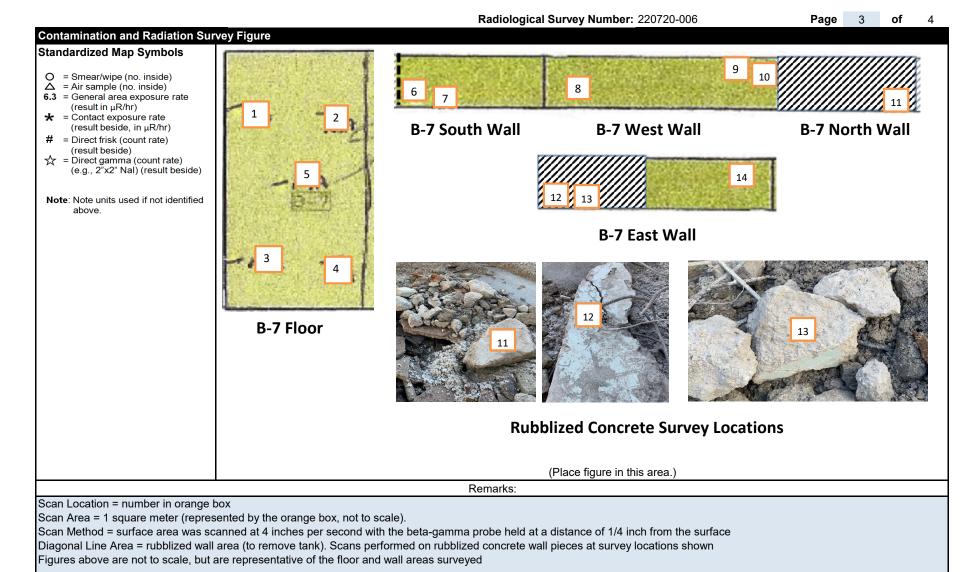


							Radiol	ogical Surv	vey Number:	220720-006		P	age 1	of 4
	racterization S	Survey of	Room B-7 (B	eta-Gamn	na Scan)						Truck #:	N/A	Trailer #:	N/A
RWP number:	N/A					Time: 9:0	00 AM		Date	7/20/2022				
Site name:	Piqua							Location:	Room B-7					
RCT (printed):	Tom Maveal						Revie	ver signatur	re:				Date:	
Counting	Instruments:		Instrun	nent 1		Instrument	2	Instru	ument 3	Radia	tion Instrum	ents:	Instru	ment 4
Instrument/prob	e model:							Ludl	lum 26	Instrument/	probe model	:		
Instrument seria	al number:							PF0	08880	Instrument	serial numbe	er:		
Probe serial nui	mber:							١	N/A	Probe serial number:				
Calibration due:								1/20	0/2023	Calibration	due:			
Efficiency:		α	β		α	β	C	a	β	Background	d (dose rate)	:		
Background (cp	m):	α	β		α	β	C	a e	β 40		Othe	r info (as n	eeded):	
S _C (dpm/100cm	²):	α	β		α	β	C	a c	β					
Area probe corr	ection factor:					<u>. </u>								
Surface Conta		Radiatio	on Survey Re	sults										
Itam Cumravad	Counting		Smea	r Survey	(Instrument	: 1 or 2)			Di	rect Survey	(Instrument	t 3)		Exposure
Item Surveyed / Map	Inst. No.	Smear Survey (Instrument 1 or 2) Gross Counts Net Counts Activity Gross Counts Net Counts								Ac	tivity	Rate		
Location	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm		Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
See Page 3	3													
RCT sign:	ature:			-	-		-			-	-	•	-	



Surface Contam	ination and F	Radiation	Survey Resul	ts			rtaaroro	jioui oui	vey Number: 2	20120 000			age 2	of 4		
Item Surveyed	Counting	Smear Survey (Instrument 1 or 2)							Dir	ect Survey	(Instrument	t 3)		Exposure		
	Inst. No.	Gros	s Counts	Net	Counts	Act	Activity		Gross Counts		Net Counts		Activity			
	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Rate Survey		
Applicable Surf			_imits					ctivity Equation APCE								
Check one for al		beta.					Gross count minus BKGD count = Net count 44-9 = 6.5									
Alpha (removabl				200/		20/500	Net count/Eff = dpm FHZ 732 (GM) = 6.5									
Beta (removable/total)							Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-1 = 1									
							Remarks:									
Ten one-minute	background	counts w	ere performe	d on Ludl	um Model 20	6. Averaged	background	= 40 CPN	1							







	Radiological Survey Number: 220720-006	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				
Floor Location #1 = 30-50 Gross CPM over 1 meter scan area					
Floor Location #2 = 30-50 Gross CPM over 1 meter scan area					
Floor Location #3 = 25-45 Gross CPM over 1 meter scan area					
Floor Location #4 = 25-50 Gross CPM over 1 meter scan area					
Floor Location #5 = 30-55 Gross CPM over 1 meter scan area					
Wall Location #6 = 35-65 Gross CPM over 1 meter scan area					
Wall Location #7 = 40-65 Gross CPM over 1 meter scan area					
Wall Location #8 = 35-70 Gross CPM over 1 meter scan area					
Wall Location #9 = 25-60 Gross CPM over 1 meter scan area					
Wall Location #10 = 40-70 Gross CPM over 1 meter scan area					
Wall Location #11 = 45-65 Gross CPM over 1 meter scan area					
Wall Location #12 = 40-70 Gross CPM over 1 meter scan area					
Wall Location #13 = 25-60 Gross CPM over 1 meter scan area					
Wall Location #14 = 35-60 Gross CPM over 1 meter scan area					

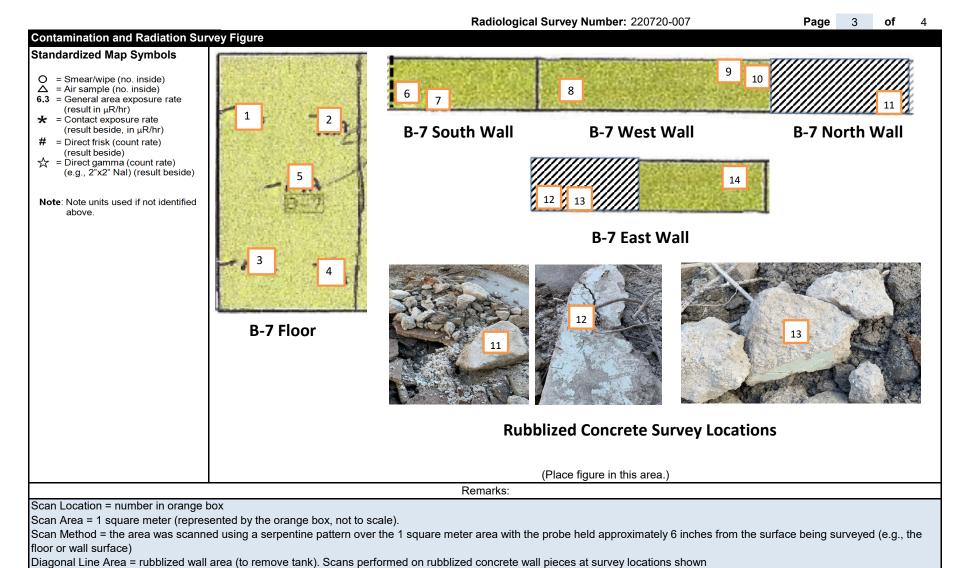


							Radiol	ogical Surv	/ey Number:	220720-007		P	age 1	of 4	
Purpose: Characterization Survey of Room B-7 (Nal Gamma Scan)											Truck #:	N/A	Trailer #:	N/A	
RWP number:	N/A					Time: 8:0	00 AM		Date	7/20/2022					
Site name:	Piqua							Location:	Room B-7						
RCT (printed): Tom Maveal							Revie	ver signatur	e:				Date:		
Counting Instruments: Instrument 1						Instrument	2	Instru	ıment 3	Radia	tion Instrum	ents:	Instru	ment 4	
Instrument/probe model:							Ludlum 2	2221/44-10	Instrument/probe model:						
Instrument serial number:						31	3959	Instrument serial number:							
Probe serial nui	mber:							PR3	57774	Probe seria	al number:				
Calibration due:								11/2	8/2022	Calibration	due:				
Efficiency:		α	β		α	β	C	r c	β	Background	d (dose rate)	:			
Background (cp	m):	α	β		α	β	C	r r	β 4495		Othe	r info (as n	eeded):		
S _C (dpm/100cm	²):	α	β		α	β	(α	β						
Area probe corr	ection factor:		•			U*									
Surface Conta		Radiatio	on Survey Re	sults											
Itam Cumravad	Counting		Smea	r Survey	(Instrument	: 1 or 2)			Di	Direct Survey (Instrument 3)					
Item Surveyed / Map	Inst. No.	Cross Counts					ctivity	Gross Counts		Net Counts		Ac	tivity	Exposure Rate	
Location	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm		Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey	
See Page 3	3														
RCT signs	ature:											•			



Surface Contam	ination and F	Padiation.	Survey Resul	te			Radiolog	gical Sur	vey Number: 2	20720-007		Pa	age 2	of 4				
Item Surveyed Counting Smear Survey (Instrument 1 or 2)								Direct Survey (Instrument 3)										
	Counting Inst. No.	Gros	ss Counts	Net Counts			Activity		Gross Counts		Net Counts		tivity	Exposure Rate				
	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey				
					-													
					1													
Applicable Sur	face Contain	ination I	imits				Activity Eq	uation					APCE					
Check one for a							Gross count minus BKGD count = Net count 44-9 = 6.5											
Alpha (removab	le/total)	□ 1	000/5000	<u> </u>	1000	20/500	Net count/Eff = dpm FHZ 732 (GM) = 6.											
Beta (removable/total) ☐ 1000/5000 ☐ 200/1000							Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-1 = 1											
										, ,								
10 minute backę	ground perfo	rmed on	Ludlum 2221	(SN#3139	959) and 44-1	.0 Probe (SN	I#PR357774)	Gamma	Background = 4	495 CPM								





Figures above are not to scale, but are representative of the floor and wall areas surveyed



	Radiological Survey Number: 220720-007	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				
Floor Location #1 = 5100-5500 Gross CPM over 1 meter scan area					
Floor Location #2 = 5200-5500 Gross CPM over 1 meter scan area					
Floor Location #3 = 5200-5500 Gross CPM over 1 meter scan area					
Floor Location #4 = 4700-5000 Gross CPM over 1 meter scan area					
Floor Location #5 = 5200-5500 Gross CPM over 1 meter scan area					
Wall Location #6 = 5300-5800 Gross CPM over 1 meter scan area					
Wall Location #7 = 5200-5600 Gross CPM over 1 meter scan area					
Wall Location #8 = 6300-6700 Gross CPM over 1 meter scan area					
Wall Location #9 = 5700-5900 Gross CPM over 1 meter scan area					
Wall Location #10 = 5400-5600 Gross CPM over 1 meter scan area					
Wall Location #11 = 4600-4900 Gross CPM over 1 meter scan area					
Wall Location #12 = 4800-5100 Gross CPM over 1 meter scan area					
Wall Location #13 = 4500-4800 Gross CPM over 1 meter scan area					
Wall Location #14 = 4900-5500 Gross CPM over 1 meter scan area					



							Radio	logical Sur	vey Number: 2	220720-003		P	age 1	of 4
	racterization S	Survey of	Room B-7 (Smears)							Truck #:	N/A	Trailer #:	N/A
RWP number:						Time: 7:4	10 AM		_	7/20/2022				
Site name:	Piqua							Location:	Room B-7					
RCT (printed):	Tom Maveal						Revie	wer signatu	re:				Date:	
	Instruments:		Instru			Instrument	2	Instr	ument 3	Radia	tion Instrum	ents:	Instrui	ment 4
Instrument/prob	e model:		Lud-2929	9/43-10-1						Instrument/	probe mode	l:		
Instrument seria	al number:		329	909						Instrument	serial numbe	er:		
Probe serial nur	mber:		PR36							Probe seria	ıl number:			
Calibration due:			7/6/2	2023						Calibration	due:			
Efficiency:		α	0.32 β	0.39	α	β		α	β	Background	d (dose rate)	:		
Background (cp	m):	α	0.30 β	39	α	β		α	β		Othe	r info (as n	∍eded):	
S_C (dpm/100cm ²	²):	α	3 β	27	α	β		α	β					
Area probe corr	ection factor:		1	.0										
Surface Contain	mination and	Radiatio	on Survey R	esults										
Item Surveyed	Counting		Sme	ar Survey	(Instrument	t 1 or 2)			Di	rect Survey	(Instrumen	t 3)		Exposure
/ Map	Inst. No.	Gros	s Counts	Net	Counts	Act	ivity	Gros	ss Counts	Net C	ounts	Ac	tivity	Rate
Location	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamm dpm/100cm		Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
Floor #1	1	0	38	-0.3	-1.0	< Sc	< Sc							
Floor #2	1	0	41	-0.3	2.0	< Sc	< Sc							
Floor #3	1	0	34	-0.3	-5.0	< Sc	< Sc							
Floor #4	1	0	36	-0.3	-3.0	< Sc	< Sc							
Floor #5	1	1	33	0.7	-6.0	< Sc	< Sc							
Wall #6	1	1	39	0.7	0.0	< Sc	< Sc							
Wall #7	1	0	23	-0.3	-16.0	< Sc	< Sc							
Wall #8	1	0	29	-0.3	-10.0	< Sc	< Sc							
Wall #9	1	0	34	-0.3	- 5.0	< Sc	< Sc							
Wall #10	1	0	33	-0.3	-6.0	< Sc	< Sc							
Wall #11	1	1	38	0.7	-1.0	< Sc	< Sc							
Wall #12	1	1	50	0.7	11.0	< Sc	28							
Wall #13	1	1	45	0.7	6.0	< Sc	< Sc							
Wall #14	1	0	37	-0.3	- 2.0	< Sc	< Sc							

RCT signature:



Surface Contam	nination and F	Radiation	Survev Resu	lts			Radiolog	gical Surv	Pa	age 2	of 4					
Item Surveyed					(Instrument	1 or 2)			Dir	ect Survey	(Instrumen	t 3)		Exposure		
/ Map	Inst. No.	Gros	s Counts		Counts		ivity	Gros	s Counts		ounts		tivity	Rate		
Location	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey		
Applicable Sur	face Contam	ination I	imits				Activity Eq	uation					APCE			
Check one for a									KGD count = N	et count			44-9 = 6.5			
Alpha (removab			000/5000	200/1	000		Net count/E						FHZ 732 (G	M) = 6.5		
Beta (removable			000/5000	200/1	·		Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-1 = 1									
`	· /						Remarks:									
Smears counted	l for 1 minute	. Backgro	ound count ti	me = 20 m	inutes.											



of

Page

Contamination and Radiation Survey Figure Standardized Map Symbols O = Smear/wipe (no. inside) \triangle = Air sample (no. inside) 8 **6.3** = General area exposure rate (result in µR/hr) ★ = Contact exposure rate **B-7 North Wall** (result beside, in μR/hr) **B-7 South Wall B-7 West Wall** # = Direct frisk (count rate) (result beside) ☆ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside) Note: Note units used if not identified above. **B-7 East Wall B-7 Floor Rubblized Concrete Survey Locations** (Place figure in this area.) Remarks: Smear Location = number in orange box Smear Area = 100 square centimeters (represented by the orange box, not to scale) Smear Method = taken using industry standard smears (Wipe Test Smears) using moderate pressure Diagonal Line Area = Rubblized wall area (to remove tank). Smears taken on rubblized concrete wall pieces at survey locations shown Figures above are not to scale, but are representative of the floor and wall areas surveyed

Radiological Survey Number: 220720-003



	Radiological Survey Number: 220720-003	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				



							Radiol	ogical Surv	ey Number: 2	220723-006		P	age 1	of 4
Purpose: Cha	racterization S	Survey of	Room B-7, T	ank Exteri	or (Nal Gam	ma Scan)			_		Truck #:	N/A	Trailer #:	N/A
RWP number:	N/A					Time: 11	:15 AM		Date:	7/20/2022	_		-	
Site name:	Piqua							Location:	Tank					
RCT (printed):	Tom Maveal						Revie	ver signatur	e:				Date:	
Counting	Instruments:		Instrun	nent 1		Instrument	2	Instru	ıment 3	Radia	tion Instrum	ents:	Instrur	nent 4
Instrument/prob	e model:							Ludlum 2	2221/44-10	Instrument/	probe model	:		
Instrument seria	al number:							31	3959	Instrument	serial numbe	er:		
Probe serial nur	mber:							PR3	57774	Probe seria	ıl number:	Ī		
Calibration due:	• •							11/2	8/2022	Calibration	due:	Ī		
Efficiency:		α	β		α	β	(X .	β	Background	d (dose rate)	: [
Background (cp	om):	α	β		α	β	(X .	β 3956		Othe	r info (as ne	eeded):	
S_C (dpm/100cm ²	²):	α	β		α	β	C	χ	β					
Area probe corr	ection factor:													
Surface Conta	mination and	Radiatio	on Survey Re	sults										
Item Surveyed	Counting		Smear Survey (Instrument 1 or 2)						Di	rect Survey	(Instrument	t 3)		Exposure
	Inst. No.	Gros	s Counts	Net (Counts	Act	ivity	Gros	s Counts	Net C	ounts	Ac	tivity	Rate
	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm		Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
See Page 3	3													
	Ŭ													



Surface Contam	ination and F	Radiation														
Item Surveyed	Counting			r Survey	(Instrument	1 or 2)			Dir	ect Survey	(Instrumen			Exposure		
-	Inst. No.		s Counts		Counts		ivity		s Counts		Counts		tivity	Rate		
Location	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²			
						арии госон	арии госоні			- ομ	op	ария госон	upinii roooni			
Applicable Sur			_imits				Activity Eq		KOD				APCE			
Check one for a	•		000/5000		000 -	100/500			KGD count = N	et count			44-9 = 6.5	DM) = C F		
Alpha (removab	•			200/1 200/1		20/500	Net count/Eff = dpm FHZ 732 (GM) = 6									
Beta (removable	riolai)		000/5000	200/1	000		Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-1 = 1 Remarks:									
10 minute backs	round norfo	rmad nas	r tank an Lud	lum 2221	/CN#2120E0	N and 11 10		DD2E7774	\ Camma Back	around - 20	DEC CDM					
TO HILIUTE DACKE	ground perio	illea nea	ar talik oli Lud	iuiii ZZZI	(21/4212325	i) aliu 44-10	FIODE (SN#I	rn33///4) Gaiiiiia Back	ground = 35	JOU CPIVI					



Radiological Survey Number: 220723-006

Page

of

Contamination and Radiation Survey Figure

Standardized Map Symbols

O = Smear/wipe (no. inside)
△ = Air sample (no. inside)

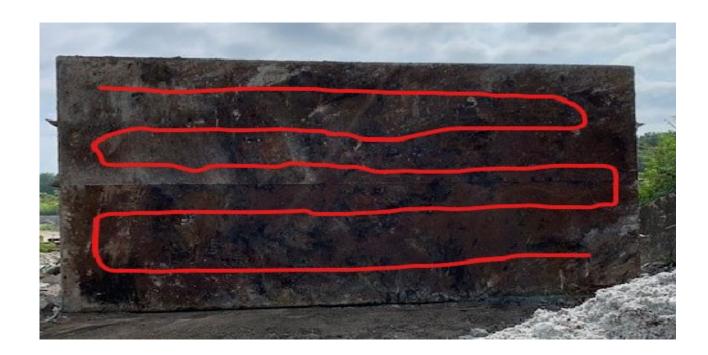
6.3 = General area exposure rate (result in µR/hr)

★ = Contact exposure rate (result beside, in μR/hr)

= Direct frisk (count rate) (result beside)

☆ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside)

Note: Note units used if not identified above.



(Place figure in this area.)

Remarks:

Scan Location = bottom of tank, external

Scan Area = complete bottom of tank

Scan Method = the tank bottom was scanned using a serpentine pattern with the probe held approximately 6 inches from the tank bottom

Figure above is not to scale, but is representative of the tank bottom



	Radiological Survey Number: 220723-006	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition to	o Page 1 of the form)				
Tank Bottom = 3600-4200 Gross CPM over the tank bottom					



							Radio	ologi	ical Surv	vey Number: 2	220723-002			age 1	of 4
	racterization S	Survey of	Room B-7, T	ank Interio	or (Alpha Dire							Truck #:	N/A	Trailer #:	N/A
RWP number:						Time: 10:	:30 AM			_	7/20/2022				
	Piqua									Tank Interior					
RCT (printed):	Tom Maveal						Revie	ewer	signatur	re:				Date:	
	Instruments:		Instrun	nent 1		Instrument	2			ument 3		tion Instrum	_	Instru	ment 4
Instrument/prob										2221/43-90	Instrument	probe model	:		
Instrument seria	al number:									5480	Instrument	serial numbe	er:		
Probe serial nur	mber:									7237	Probe seria	al number:	_		
Calibration due:										0/2023	Calibration	due:			
Efficiency:		α	β		α	β		α	0.18	β	Backgroun	d (dose rate)	: [
Background (cp	m):	α β α β α 2 β Other info (as								r info (as ne	eded):				
S_C (dpm/100cm ²	²):	α	β		α	β		α	27	β					
Area probe corr	ection factor:								•	1.0					
Surface Conta	mination and	Radiatio	on Survey Re	esults											
Item Surveyed	Counting		Smea	ar Survey	(Instrument	1 or 2)				Di	rect Survey	(Instrumen	t 3)		Exposure
/ Map	Inst. No.	Gros	s Counts	Net (Counts	Act	ivity		Gros	s Counts	Net C	ounts	Ac	tivity	Rate
Location	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gami dpm/100c	-	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
Tank #1	3								0		-2.0		< Sc		
Tank #2	3								1		-1.0		< Sc		
Tank #3	3								0		-2.0		< Sc		
Tank #4	3								0		-2.0		< Sc		
Tank #5	3								0		-2.0		< Sc		
Tank #6	3								1		-1.0		< Sc		
Tank #7	3								0		-2.0		< Sc		
RCT signa	ature:					_					_				



Same Survey Counting Inst. No. Used Same Survey (Instrument 1 or 2) Same Survey (Instrument 3) Same	Surface Contan	nination and R	adiation				4 0			2.			(0)			
Alpha Beta/gamma Alpha Cpm Cpm			Gros					ivity	Gros					tivity	Exposure	
Cpm Cpm								•								
Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Alpha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Beta (removable/total) 1000/5000 200/1000 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1	Location	USEU	cpm	срт	срт	срт	dpm/100cm ²	dpm/100cm ²	срт	Beta/gamma cpm	срт	cpm	dpm/100cm ²	dpm/100cm ²	Survey	
Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Alpha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Beta (removable/total) 1000/5000 200/1000 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
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Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Alpha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Alpha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Ipha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Ipha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Alpha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Beta (removable/total) 1000/5000 200/1000 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Alpha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
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Check one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 Ilpha (removable/total) 1000/5000 200/1000 200/1000 Net count/Eff = dpm FHZ 732 (GM) = 6.5 Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1																
heck one for alpha, one for beta. Gross count minus BKGD count = Net count 44-9 = 6.5 lpha (removable/total) ☑ 1000/5000 ☑ 200/1000 ☑ 200/1000 ☐ Dpm x Area Probe Correction Factor (APCF) = dpm/100cm² 43-10-1 = 1	pplicable Sur	face Contam	ination L	imits				Activity Eq	uation					APCE		
eta (removable/total)	· ·									KGD count = N	et count					
	lpha (removab	le/total)	√ 1	000/5000	200/1	000	20/500	Net count/E	ff = dpm					FHZ 732 (G	M) = 6.5	
Remarks:	eta (removabl	e/total)										43-10-1 = 1				
0 minute background performed on Ludlum 2221 (SN#75480) and 43-90 Probe (SN#107237) Alpha background = 2 CPM								Remarks:								



Radiological Survey Number: 220723-002

Page

of

Contamination and Radiation Survey Figure

Standardized Map Symbols

O = Smear/wipe (no. inside)
△ = Air sample (no. inside)

6.3 = General area exposure rate (result in µR/hr)

★ = Contact exposure rate (result beside, in μR/hr)

= Direct frisk (count rate) (result beside)

☆ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside)

Note: Note units used if not identified above.



(Place figure in this area.)

Remarks:

Direct Measurement Location = number in orange circle

Direct Measurement Area = 100 square centimeter, flange area, internal

Direct Measurement Method = taken with 100 square centimeter alpha probe held at a distance of 1/8 inch from the surface for 1 minute

Figure above is not to scale, but is representative of the tank top and openings into the tank



	Radiological Survey Number: 220723-002	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				



							Radiol	ogical Sur	vey Number:		age 1	of 4		
Purpose: Cha	racterization S	Survey of	Room B-7, T	ank Interio	or and Top (A	Alpha Scan)					Truck #:	N/A	Trailer #:	N/A
RWP number:	N/A					Time: 10:	:45 AM		Date:	7/20/2022			<u>-</u>	
Site name:	Piqua							Location:	Tank Interior	and Top Ope	enings	_		
RCT (printed):	Tom Maveal						Revie	- wer signatuı	e:				Date:	
Counting	Instruments:		Instrun	nent 1		Instrument	2	Instru	ument 3	Radia	tion Instrum	ents:	Instrur	nent 4
Instrument/prob	e model:							Ludlum 2	2221/43-90	Instrument	/probe model	1:		
Instrument seria	ıl number:							75	5480	Instrument	serial number	er:		
Probe serial nur	mber:							10	7237	Probe seria	al number:	Ī		
Calibration due:								1/20	0/2023	Calibration	due:			
Efficiency:		α	β		α	β	C	a	β	Backgroun	d (dose rate)	:		
Background (cp	m):	α	β		α	β	(и 2	β		Othe	r info (as ne	eded):	
S _C (dpm/100cm ²	²):	α	β		α	β	C	a c	β					
Area probe corr	ection factor:					<u>. </u>			<u> </u>					
Surface Contai	mination and	Radiatio	on Survey Re	sults										
Itam Cumavad	Counting		Smea	r Survey	(Instrument	1 or 2)			Di	rect Survey	(Instrumen	t 3)		Evpooure
Item Surveyed / Map	Inst. No.	Gros	s Counts	Act	ivity	Gros	s Counts	Net C	Counts	Ac	tivity	Exposure Rate		
Location	Used	Alpha	Beta/gamma cpm	Alpha cpm	Beta/gamma	Alpha dpm/100cm ²	Beta/gamma		Beta/gamma cpm	Alpha	Beta/gamma	Alpha	Beta/gamma dpm/100cm ²	Survey
		cpm	Cpiii	Сріп	cpm	apm/100cm	dpm/100cm	2 cpm		cpm	cpm	dpm/100cm ²	dpm/100cm	
See Page 3	3	Сріп	Сріп	Сріп	Сріп	apm/100cm	apm/100cm	cpm		срт	cpm	dpm/100cm ⁻	dpm/100cm	
See Page 3	3	Сріп	срш	Сріп	Сри	apm/100cm	apm/100cm	- cpm		cpm	срт	dpm/100cm ⁻	dpm/100cm	
See Page 3	3	Сри	срп	Сри	срііі	арт/100ст	apm/100cm	- cpm		срт	срт	dpm/100cm ⁻	dpm/100cm	
See Page 3	3	Сри	Срії	Сри	Сри	арт/тист	apm/100cm	- cpm		срт	срт	dpm/100cm ⁻	dpm/100cm	
See Page 3	3	Сри	Срп	срііі	Срії	артичест	арт/100ст	- cpm		cpm	срм	dpm/100cm*	арт/100ст	
See Page 3	3	Сри	Сріп	срії	Срії	артичест	apm/100cm	cpm		cpm	cpm	dpm/100cm*	apm/100cm	
See Page 3	3	Сри	Сріп	Срії	Сри	артичест	apm/100cm	cpm		cpm	cpm	dpm/100cm*	apm/100cm	
See Page 3	3	Cpin	Сріп	Сри	Сри	артичест	apm/100cm	cpm		cpm	cpm	dpm/100cm*	apm/100cm	
See Page 3	3	Сри	CPIII	Cpin	Cpin	артичест	apm/100cm	cpm		cpm	cpm	dpm/100cm*	dpm/100cm	
See Page 3	3	Cpini	Cpin	Срії	Cpin	артичест	apm/100cm	cpm		cpm	cpm	dpm/100cm*	apm/100cm	
See Page 3	3		Cpin	Cpin	Cpin	артичест	apm/100cm	cpm		cpm	cpm	dpm/100cm*	apm/100cm	
See Page 3	3	Cpiii	Cpin	Срії	Cpin	филост	apm/100cm	cpm		cpm	cpm	dpm/100cm*	dpm/100cm	
See Page 3	3		Cpin	Cpini	Cpin	филост	apm/100cm	cpm		cpm	cpm	dpm/100cm*	dpm/100cm	
See Page 3	3		Cpin	- Cpin	- Cpin	филост	apm/100cm	cpm		cpm	cpm	dpm/100cm	dpm/100cm	
See Page 3	3		Cpin	- Cpini	- Cpin	филост	apm/100cm	cpm		cpm	cpm	dpm/100cm	dpm/100cm	
See Page 3	3		Cpini	- Cpini		филост	apm/100cm	- cpm		cpm	cpm	dpm/100cm	dpm/100cm	



Surface Contam	singtion and F	Padiation	Survey Besul	to		20723-004		Pa	age 2	of 4						
Item Surveyed		aulation			(Instrument	1 or 2)			Dir	ect Survey	(Instrument	t 3)		Exposure		
	Inst. No.	Gros	s Counts	Net	Counts	Acti	ivity	Gros	ss Counts	Net C	ounts	Act	tivity	Rate		
•	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey		
Applicable Sur			_imits				Activity Eq						APCE			
Check one for a	•								KGD count = N	et count			44-9 = 6.5			
Alpha (removab	•	_	☐ 1000/5000 ☐ 200/1000 ☐ 20/500 Net count/Eff = dpm										FHZ 732 (GI	M) = 6.5		
Beta (removable	∍/total)	1	000/5000	200/1	000		Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-1 = 1									
	Remarks:															



Radiological Survey Number: 220723-004

Page

3

of

Contamination and Radiation Survey Figure

Standardized Map Symbols

O = Smear/wipe (no. inside)
△ = Air sample (no. inside)

6.3 = General area exposure rate (result in μR/hr)

★ = Contact exposure rate (result beside, in μR/hr)

= Direct frisk (count rate) (result beside)

⇒ = Direct gamma (count rate) (e.g., 2"x2" NaI) (result beside)

Note: Note units used if not identified above.



(Place figure in this area.)

Remarks:

Scan Location = number in orange circle

Scan Area = localized in and around the tank openings

Scan Method = surface area was scanned at 4 inches per second with the alpha probe held at a distance of 1/8 inch from the surface

Figure above is not to scale, but is representative of the tank top and openings into the tank



	Radiological Survey Number: 220723-004	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				
Tank Opening Area #1 = 0-1 Gross CPM over scan area					
Tank Opening Area #2 = 0 Gross CPM over scan area					
Tank Opening Area #3 = 0-2 Gross CPM over scan area					
Tank Opening Area #4 = 0 Gross CPM over scan area					
Tank Opening Area #5 = 0 Gross CPM over scan area					
Tank Opening Area #6 = 0 Gross CPM over scan area					
Tank Opening Area #7 = 0 Gross CPM over scan area					



							Radiol	ogical Surv	vey Number:	220723-003			age 1	of 4
Purpose: Cha	racterization S	Survey of	Room B-7, T	ank Interio	or (Beta-Gan	nma Direct)					Truck #:	N/A	Trailer #:	N/A
RWP number:	-					Time: 10:	:45 AM		Date	7/20/2022				
Site name:	Piqua							_	Tank Interior					
RCT (printed):	Tom Maveal						Reviev	wer signatur	re:				Date:	
Counting	Instruments:		Instrun	nent 1		Instrument	2	Instru	ument 3	Radia	tion Instrum	ents:	Instru	ment 4
Instrument/prob	e model:							Ludl	lum 26	Instrument/	probe model	:		
Instrument seria	al number:							PF0	08880	Instrument	serial numbe	er:		
Probe serial nur	mber:							1	N/A	Probe seria	al number:			
Calibration due:								1/20	0/2023	Calibration	due:			
Efficiency:		α	β		α	β	C	x	β 0.38	Background	d (dose rate)	:		
Background (cp	m):	α	β		α	β	C	x	β 40		Othe	r info (as ne	eeded):	
S_C (dpm/100cm ²	²):	α	β		α	β	C	a c	β 276					
Area probe corr									6.5					
Surface Contain	Contamination and Radiation Survey Results													
Item Surveyed	Counting		Smea	ar Survey	(Instrument	1 or 2)	Direct Survey (Instrument							Evnosuro
	Inst. No.	Smear Survey (Instrument 1 or 2) Gross Counts Net Counts Activity Gross Counts Net Counts					ounts	Ac	tivity	Exposure Rate				
•	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm		Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
Tank #1	3								35		-5.0		< Sc	
Tank #2	3								38		- 2.0		< Sc	
Tank #3	3								40		0.0		< Sc	
Tank #4	3								32		-8.0		< Sc	
Tank #5	3								41		1.0		< Sc	
Tank #6	3								38		- 2.0		< Sc	
Tank #7	3								37		-3.0		< Sc	
RCT signa	ature:													



0 (0)		- I: I:		1			Radiolog	Radiological Survey Number: 220723-003						of 4	
Surface Contam		Radiation			(Instrument	1 or 2)			Dir	ect Survey	(Instrumen	f.3)			
Item Surveyed	Counting Inst. No.	Gros	ss Counts		Counts		ivity	Gros	ss Counts		ounts		tivity	Exposure Rate	
•	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey	
							apiii room					upiiii receiii	upiii recoiii		
													 		
														-	
					+								 		
					+									-	
Applicable Sur	face Contan	nination I	Limits				Activity Eq	uation					APCE		
Check one for a							Gross coun	t minus B	KGD count = N	et count			44-9 = 6.5		
Alpha (removab		<u> </u>	000/5000	200/	1000	20/500	Net count/E	ff = dpm					FHZ 732 (GI	M) = 6.5	
Beta (removable	e/total)		000/5000	200/	1000		Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-1 = 1								
							Remarks:								
Ten one minute	_	counts w	ere performe	d on Ludl	um Model 26	6. Averaged	background	= 40 CPN	1						
Count Time = 1	Minute														



Radiological Survey Number: 220723-003

Page

of

Contamination and Radiation Survey Figure

Standardized Map Symbols

O = Smear/wipe (no. inside)

 \triangle = Air sample (no. inside)

6.3 = General area exposure rate (result in µR/hr)

★ = Contact exposure rate (result beside, in μR/hr)

= Direct frisk (count rate) (result beside)

☆ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside)

Note: Note units used if not identified above.



(Place figure in this area.)

Remarks:

Direct Measurement Location = number in orange circle

Direct Measurement Area = 15.5 square centimeters (corrected to 100 square centimeters), flange area, internal

Direct Measurement Method = taken with 15.5 square centimeter beta/gamma probe held at a distance of 1/4 inch from the surface for 1 minute

Figure above is not to scale, but is representative of the tank top and openings into the tank



	Radiological Survey Number: 220723-003	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				
			·		



							Radiol	ey Number: 2	220723-005		Pa	age 1	of 4	
Purpose: Cha	racterization S	Survey of	Room B-7, T	ank Interic	or and Top (E	Beta-Gamma	a Scan)		_		Truck #:	N/A	Trailer #: I	N/A
RWP number:	N/A					Time: 11:	:00 AM		Date:	7/20/2022			·	
Site name:	Piqua							Location:	Tank Interior	and Top Ope	enings			
RCT (printed):	Tom Maveal						Revie	ver signatur	e:				Date:	
Counting	Instruments:		Instrun	nent 1		Instrument	2	Instru	ıment 3	Radia	tion Instrum	ents:	Instrur	nent 4
Instrument/prob	e model:							Ludl	um 26	Instrument/	probe model	:		
Instrument seria	al number:							PF0	08880	Instrument	serial numbe	er:		
Probe serial nur	mber:							١	N/A	Probe seria	ıl number:			
Calibration due:								1/20)/2023	Calibration	due:			
Efficiency:		α	β		α	β	(X	β	Background	d (dose rate):	:		
Background (cp	m):	α	β		α	β	(X	β 40		Othe	r info (as ne	eded):	
S_C (dpm/100cm ²							C	X .	β					
Area probe corr	$_{C}$ (dpm/100cm²): α β α													
Surface Conta	mination and	Radiatio	on Survey Re	sults										
Item Surveyed	Counting		Smea	r Survey	(Instrument	: 1 or 2)			Di	rect Survey	(Instrument	t 3)		Exposure
	Inst. No.	Gros	s Counts	Net (Counts	Act	ivity	Gros	s Counts	Net Counts			tivity	Rate
Location	Used	Alpha	Beta/gamma Alpha Beta/gamma Alpha Beta/gamma		Alpha		Alpha	Beta/gamma	Alpha	Beta/gamma				
Location	USEU	Alpha Beta/gamma Alpha Beta/gam cpm cpm cpm cpm			срт	dpm/100cm ²	dpm/100cm		Beta/gamma cpm	cpm	cpm	dpm/100cm ²	dpm/100cm ²	Survey
See Page 3	3	срт	срт		срт	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		срт	срт		срт	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		срт	срт		срт	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		срт	срт		срт	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		срт	срт		срт	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		срт	срт		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		срм	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey
		cpm	cpm		cpm	dpm/100cm ²			Beta/gamma cpm	_	_	-		Survey



Surface Contam	vination and B	Padiation	Survey Beaut	to			Radiolog	ological Survey Number: 220723-005					age 2	of 4
Item Surveyed		aulation			(Instrument	: 1 or 2)			Dir	ect Survey	(Instrument	t 3)		Exposure
	Inst. No.	Gros	s Counts	Net	Counts	Act	ivity	Gros	ss Counts	Net C	ounts	Ac	tivity	Rate
•	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
				-				•						
A sull subtract							A . (1. 14. E .						A D.O.E.	
Applicable Sur			_imits				Activity Eq		KGD count = N	at an unt			APCE 44-9 = 6.5	
Check one for a Alpha (removab	•		000/5000	□ 200/4	000 -	100/500	Net count/E		NGD Count – N	et count			44-9 – 6.5 FHZ 732 (GI	M) = 6 E
Aipria (removable Beta (removable	-	_		 200/1 200/1		20/500			orrection Facto	- (ADOE)	dr. m. /4.00 a.m. ²		43-10-1 = 1	vi) – 0.5
Beta (Terriovable	riolai)		000/3000		000		Remarks:	Probe C		43-10-1 - 1				
							Remarks.							



Radiological Survey Number: 220723-005

Page

of

Contamination and Radiation Survey Figure

Standardized Map Symbols

O = Smear/wipe (no. inside)
△ = Air sample (no. inside)

6.3 = General area exposure rate (result in µR/hr)

★ = Contact exposure rate (result beside, in μR/hr)

= Direct frisk (count rate) (result beside)

☆ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside)

Note: Note units used if not identified above.



(Place figure in this area.)

Remarks:

Scan Location = number in orange circle

Scan Area = localized in and around the tank openings

Scan Method = surface area was scanned at 4 inches per second with the beta-gamma probe held at a distance of 1/4 inch from the surface

Figure above is not to scale, but is representative of the tank top and openings into the tank



	Radiological Survey Number: 220723-005	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				
Tank Opening Area #1 = 35-45 Gross CPM over 1 meter scan area					
Tank Opening Area #2 = 30-45 Gross CPM over 1 meter scan area					
Tank Opening Area #3 = 30-50 Gross CPM over 1 meter scan area					
Tank Opening Area #4 = 35-50 Gross CPM over 1 meter scan area					
Tank Opening Area #5 = 30-50 Gross CPM over 1 meter scan area					
Tank Opening Area #6 = 35-55 Gross CPM over 1 meter scan area					
Tank Opening Area #7 = 30-55 Gross CPM over 1 meter scan area					



							Radio	ogical Surv	vey Number: 2	220723-001		P	age 1	of 4
Purpose: Cha	racterization S	Survey o	f Room B-7, T	ank Top a	nd Openings	s (Nal Scan))		_		Truck #:	N/A	Trailer #:	N/A
RWP number:	N/A					Time: 10:	:15 AM		Date:	7/20/2022			-	
Site name:	Piqua				_			Location:	Tank Top and	Openings				
RCT (printed):	Tom Maveal						Revie	wer signatur	re:				Date:	
Counting	Instruments:		Instrun	nent 1		Instrument	2	Instru	ument 3	Radia	tion Instrum	ents:	Instrui	ment 4
Instrument/prob	e model:							Ludlum 2	2221/44-10	Instrument	probe model	:		
Instrument seria	al number:							31	3959	Instrument	serial numbe	er:		
Probe serial nur	mber:							PR 3	357774	Probe seria	al number:	Ī		
Calibration due:								11/2	8/2022	Calibration	due:			
Efficiency:		α	β		α	β		α	β	Backgroun	d (dose rate)			
Background (cp	m):	α	β		α	β		α	β 1747		Othe	r info (as ne	eded):	
S _C (dpm/100cm ²	²):	α β α β						α	β					
Area probe corr	ection factor:								•					
Surface Conta	mination and	Radiati	on Survey Re	sults										
Item Surveyed	Counting		Smea	ar Survey	(Instrument	1 or 2)			Di	rect Survey	(Instrument	t 3)		Exposure
	Inst. No.	Gros	ss Counts	Net (Counts	Act	ivity	Gros	ss Counts	Net Counts		Ac	Activity	
	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamm dpm/100cm		Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Rate Survey
See Page 3	3													
RCT signa	-t			•					•		•		-	



Surface Contam	singtion and [Rediction	Survey Beaul	to			Radiolog	Radiological Survey Number: 220723-001						of 4
		Radiation			(Instrument	t 1 or 2)			Dir	ect Survey	(Instrumen	t 3)		_
Item Surveyed / Map	Inst. No.	Gros	ss Counts		Counts		ivity	Gro	ss Counts		counts		tivity	Exposure Rate
•	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
														-
													<u> </u>	
													 	
													<u> </u>	1
					+									
					 									
Applicable Sur	face Contan	nination I	Limits				Activity Eq	uation					APCE	
Check one for a	lpha, one for	beta.					Gross coun	t minus E	KGD count = N	et count			44-9 = 6.5	
Alpha (removab	le/total)	□ 1	000/5000	200/	1000	20/500	Net count/E	ff = dpm					FHZ 732 (GI	M) = 6.5
Beta (removable	e/total)	1	000/5000	200/	1000		Dpm x Area Probe Correction Factor (APCF) = dpm/100cm ² 43-10-							
Remarks:														



Radiological Survey Number: 220723-001

Page

of

Contamination and Radiation Survey Figure

Standardized Map Symbols

O = Smear/wipe (no. inside)
△ = Air sample (no. inside)

6.3 = General area exposure rate (result in µR/hr)

★ = Contact exposure rate (result beside, in μR/hr)

= Direct frisk (count rate) (result beside)

☆ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside)

Note: Note units used if not identified above.



(Place figure in this area.)

Remarks:

Scan Location = number in orange circle

Scan Area = localized in and around the tank openings and the top of the tank

Scan Method = tank top and openings were scanned with the probe held approximately 6 inches from the surface

Figure above is not to scale, but is representative of the tank top and openings into the tank



	Radiological Survey Number: 220723-001	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				
Tank Opening Area #1 = 1800-2100 Gross CPM					
Tank Opening Area #2 = 1600-1900 Gross CPM					
Tank Opening Area #3 = 1600-2000 Gross CPM					
Tank Opening Area #4 = 1500-1800 Gross CPM					
Tank Opening Area #5 = 1500-1800 Gross CPM					
Tank Opening Area #6 = 1500-1800 Gross CPM					
Tank Opening Area #7 = 1600-2000 Gross CPM					



							Radio	logical Su	rvey Number:	220720-004		F	age 1	of 4
Purpose: Cha	racterization S	Survey of	Room B-7, T	ank Open	ings (Smear	s)			-		Truck #:	N/A	Trailer #:	N/A
RWP number:	N/A					Time: 10	:00 AM		Date	7/20/2022	_		-	
Site name:	Piqua							Location	n: Tank Opening	s and Interio	or	_		
RCT (printed):	Tom Maveal						Revie	wer signat	ure:				Date:	
Counting	Instruments:		Instrur	nent 1		Instrument	2	Inst	rument 3	Radia	tion Instrum	ents:	Instru	ment 4
Instrument/prob	e model:		Ludlum 292	29/43-10-1						Instrument/	probe model	l:		
Instrument seria	ıl number:		329	909						Instrument	serial numbe	er:		
Probe serial nur	nber:		PR36	2456						Probe seria	ıl number:			
Calibration due:			7/6/2	2023						Calibration	due:			
Efficiency:		α	0.32 β	0.39	α	β		α	β	Background	d (dose rate)	:		
Background (cp	m):	α	0.30 β	39	α	β		α	β		Othe	r info (as n	eeded):	
S_C (dpm/100cm ²	²):	α	3 β	27	α	β		α	β			•		
	rea probe correction factor: 1.0								·					
Surface Contain	Radiatio	on Survey Re	esults											
					(Instrument	1 or 2)	Direct Survey (Instrument 3)							E
Item Surveyed / Map	Inst. No.	Gros	s Counts		Counts	•	ivity	Gross Counts Net Counts Activity					tivity	Exposure Rate
Location	Used	Alpha	Beta/gamma	Alpha	Beta/gamma	Alpha	Beta/gamn		Beta/gamma cpm	Alpha	Beta/gamma	Alpha	Beta/gamma	Survey
		срт	срт	срт	срт	dpm/100cm ²	dpm/100cr	n ² cpm	Beta/gamma cpm	срт	cpm	dpm/100cm ²	dpm/100cm ²	Currey
Tank #1	1	1	39	0.7	0.0	< Sc	< Sc							
Tank #2	1	0	45	-0.3	6.0	< Sc	< Sc							
Tank #3	1	0	42	-0.3	3.0	< Sc	< Sc							
Tank #4	1	0	31	-0.3	-8.0	< Sc	< Sc							
Tank #5	1	0	45	-0.3	6.0	< Sc	< Sc							
Tank #6	1	1	41	0.7	2.0	< Sc	< Sc							
Tank #7	1	0	36	-0.3	-3.0	< Sc	< Sc							
RCT signa	ature.													



							Radiolog	iological Survey Number: 220720-004					age 2	of 4
Surface Contam	ination and f	Radiation	Survey Resu	ılts										
Item Surveyed	Counting		Sme	ar Survey	(Instrument	1 or 2)			Dir	ect Survey	(Instrumen	t 3)		Exposure
	Inst. No.	Gros	s Counts	Net	Counts	Act	ivity	Gros	s Counts	Net C	Counts	Act	tivity	Rate
•	Used	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Alpha cpm	Beta/gamma cpm	Alpha cpm	Beta/gamma cpm	Alpha dpm/100cm ²	Beta/gamma dpm/100cm ²	Survey
Applicable Surf	face Contan	nination I	imite				Activity Eq	uation					APCE	
Check one for a			-11111165						KGD count = N	et count			44-9 = 6.5	
Alpha (removab			000/5000	<u> </u>	000 -		Net count/E		NOD Count - N	et count			FHZ 732 (G	M) = 6.5
Beta (removable		_	000/5000	200/1		-	Dpm x Area			43-10-1 = 1	WI) - 0.0			
Dota (removable	, total)	<u> </u>	000/0000		000		Remarks:	i Flobe C		40 10 1 1				
Smear count tim	ne = 1 minute	L minute. Background count time = 20 minutes.												
Sincar count tin	ic – I illilati	Dackgre	Julia Coulit ti	1110 - 20 111	mates.									



Radiological Survey Number: 220720-004

Page

3

of

Contamination and Radiation Survey Figure

Standardized Map Symbols

O = Smear/wipe (no. inside)

 \triangle = Air sample (no. inside)

6.3 = General area exposure rate (result in μR/hr)

Contact exposure rate
 (result beside, in μR/hr)

= Direct frisk (count rate) (result beside)

⇒ = Direct gamma (count rate) (e.g., 2"x2" Nal) (result beside)

Note: Note units used if not identified above.



(Place figure in this area.)

Remarks:

Smear Location = number in orange circle, in and around tank openings

Smear Area = 100 square centimeters (represented by the orange circle) localized in and around the tank openings

Smear Method = taken using industry standard smears (Wipe Test Smears) using moderate pressure

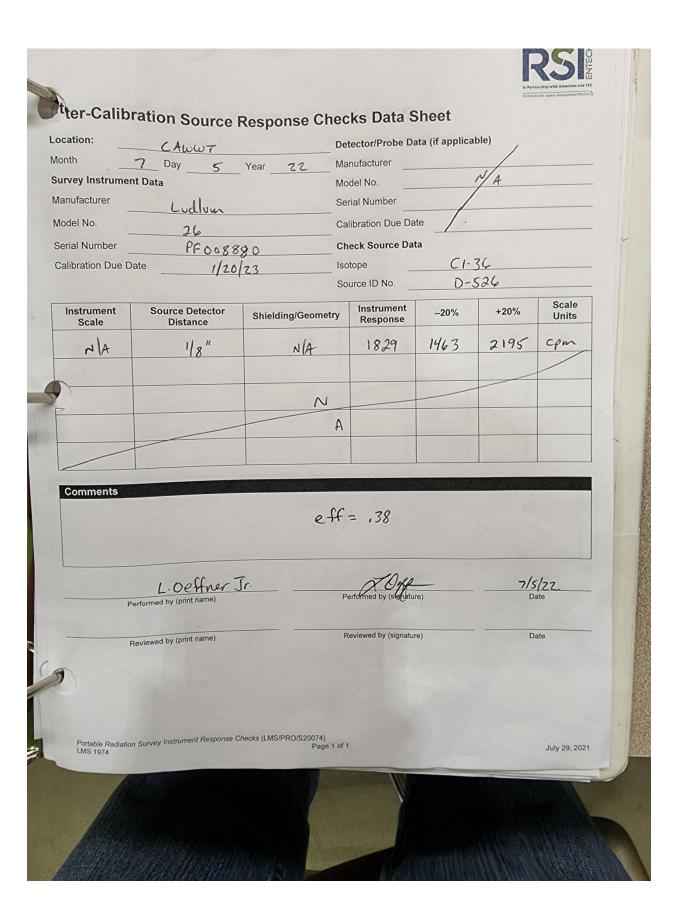
Figure above is not to scale, but is representative of the tank top and openings into the tank



	Radiological Survey Number: 220720-004	Page	4	of	4
Contamination and Radiation Survey Continuation Sheet					
Use this sheet to document or record radiological survey information (in addition	to Page 1 of the form)				

Appendix B **Piqua Room B-7 Radiological Survey Instrument Information**

aily Instrument Response strument model: Lud 43-46 Serial number: 75480 Detector model: 43-46 Serial number: 7816723										
rrce ID number: KR-368 Isotope:					Th - 230 Scale units:				cpm	
	n due date:									
					ptubio ruii	90 (2 2070)		13/00		
nth		Year 20	22							
			Initial if da	ily respon	se check i	s satisfact	ory	Market Control	国际	
Desir	Response (Scale or Decade)					Battery	Physical	High	Initials	
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ment	model: 24	Serial number	er: PF0088	86_Deter	,[0] [[[0]	Casla	mite:		· om
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ration	due date:	110	0/23	Acce	ptable ran	ge (± 20%)	: 146	3-2173	
th	July Y	ear	2022						
	30.9	- ·			hank fi	o catisfact	orv		
			Initial if da		se check is	Battery	Physical	High	Initials
ay			Scale or Decade) Unsatisfactory	2 nd Check	Sat/Failed	Check	Inspection	Voltage	
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				ay	or designed (p	Ann and Sign)			Date



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lanufacturer	, iii Dui	Ludlum		Se	rial Number	PR35	7774	
				— Ca	libration Due Da	ate 11	129/22	
Model No.		313959		— Ch	eck Source Da	ta		
Serial Number	Data		177-		tope		5-137	
Calibration Due Date II 29 22					urce ID No.		R-00(
Instrument Scale	:	Source Detector Distance	Shielding/Geon	netry	Instrument Response	-20%	+20%	Scale Units
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Comments	Perl	L O effuer formed by (print name)	Jr.	€ R	erformed by (signature		7/5/ Date	27
Comments	Perl	formed by (print name)	Jr.	₽. R			Date	27
Comments	Perl	formed by (print name)	Jr.	Gr.			Date	22
	Perf	formed by (print name)					Date	22



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					sponse Checks (LM	1S/PRO/S20074) ge 1 of 1			J	anuary 5, 2022

CERTIFICATE OF CALIBRATION

(SCALER/RATEMETER)

Calibrated by: Kurt D. Newton



Hebron, Connecticut 06248 (860) 228-0721 Fax (860)228-4402

Customer and Cont Customer Address: Inst. Mfr. & Model Det. Mfr. & Model Calibration Date	2597 l Ludlu Ludlu	EnTech, Attn: Anthor Legacy Way, Grand on Im Model 2221 Im 44-10 Ivember 2021	•	CO 81503 Type Scaler Type Gamn	756 /Ratemeter na Scintillato vember 2022			313959 357774 1 year		
Environmental condition Pre-calibration Checks: X Calibration surv X Mechanical che X Meter zero X Geotropism che	rey ck	Temperature 70° X Battery check X Audio check X Reset check X Fast response chec			ponse check Operation		29.57 Det. Vol		Vdc mV	
X Pulse generator	X Pulse generator s/n 94926 ☐ Oscilloscope s/n 171-04928 ☐ Voltmeter s/n 574100002									
Comments: Efficiencies measured on contact, WIN = OUT.										
Precision check souce s/ Reading #1 Precision:	/n 47 59,334 cpm ±<10%	Isotope A Reading #2 59 □±10-20%	m-241 9,142 cpm ☐ Out of t		59,393			59,290 cpm		
Range Multi	iplier	Reference Calibration	on Point		ent Indication s Found"			ient Indication As Left"	1	
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x 1K		100,000 cpm	1	10),000 cpm		100	0,000 cpm		
x 100		40,000 cpm		40	,000 cpm		40	,000 cpm		
x 100		10,000 cpm		10	,000 cpm		10	,000 cpm		
x 10	*	4,000 cpm		4.	000 срт		4,	,000 cpm		
x 10		1,000 cpm		1	000 срт		1,	,000 cpm		
x 1		400 cpm			100 cpm		4	100 cpm		
x 1		100 cpm		1	00 cpm		1	100 cpm		
1 min. cou	ınt	400,000 cpm			022 counts			,022 counts		
1 min. cou		100,000 cpm	1	100	007 counts		100,	,007 counts		
All ranges calibrated	electronically.				Local backgro	und (cpm) ≈		11,32	9	
Range Multiplier	Cal. S	Source Used (isotope and s	s/n)	Source Acti	vity (dpm)	Instrument Re	ading	4π Instrui Efficiency		
1 min. count		Cs-137 #2886		12,0	002	12,854		12.71		
1 min. count		Cs-137 #2887		88,3	317	23,210		13.45		
1 min. count		Am-241 #47		558,	006	59,290		8.60		
1 min. count		Ra-226 (watch)		10,3	338	15,809		43.34		
unless otherwise specific and Technology, or have	ed. RSA Laborate been derived fro	ibration points unless otherwitories certifies that the above om accepted values of nature	e instrument h	as been calibrate	d with standards	traceable to the	national	Institute of Sta	s 1 cm indards	
RSA Laboratories ID					,	Data 20 N	omb or	2021		
Calibrated by: Kurt I). Newton					Date: 29 Nov	cilinet.	4U41		

CERTIFICATE OF CALIBRATION (COUNT-RATE INSTRUMENT)



RSA Laboratories, Inc.

19 Pendleton Drive, P.O. Box 61 Hebron, Connecticut 06248 (860) 228-0721 Fax (860) 228-4402

Customer and Con Customer Address:				Oeffner (513) 6 on, OH 45030-						
Inst. Mfr. & Model Det. Mfr. & Model	Ludlum Mode		Inst, Type	Survey mete	r	Inst. s/n	PF008880	~ d		
Calibration Date	20 January 20	22	Det. Type Due Date	20 January		Det. s/n Cal Interval	not indicate	eu		
Environmental condition Pre-calibration Checks:	*	ature 70°F	Relative Humid	-		eric Pressure 29.81 inches Hg				
X Contamination survey X Battery check X Mechanical check X Audio check Meter zero Reset check			☐ Slow response c ☐ Window Operat: ☐ Plateau check	□ Det. Vo	olts	Vdc				
Geotropism che	☐ Geotropism check ☐ Fast response check ☐ Alarm set				☐ Input se	ens.	mΥ			
□ Pulse generator s/n 94926 □ Oscilloscope s/n 171-04928 □ Voltmeter s/n 574100002										
Comments: All efficient	Comments: All efficiencies measured at near contact.									
Precision check souce s/ Reading #1 Precision:	9,210 cpm Readin	-		Dedicated Source? Leading #3 Ice	☐ Yes 9,180 cpm	X No Mean	9,033 cpm			
				Local b	ackground	(cpm) ≈	47			
Range Multiplier	Cat. Source Used	d (isotope and s/n		ource Activity (dp		rument Reading (cpm)	4π Instrun Efficiency	- 11		
1 mln. count	C-14	#4456		202,100		10,620	5.23			
1 min. count	Pm-147	#1613-32		1,886		283	12.51			
1 min. count	Тс-99	#D702		23,064		4830	20.74			
1 min. count	Cs-137	7 #2886		11,956		4460	36.91			
1 min. count	Cl-36	# D 700		23,598		9033	38.08			
1 min, count	Sr/Y-90	0 # D711		29,283		12,610	42,90			
1 min. count	Th-230 #91	TH2200210		38,900		4360	11.09			
nstrument indicates within ±10% of calibration points unless otherwise indicated. Source-to-detector entry window distance for efficiency determination is 1 cm nless otherwise specified. RSA Laboratories certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.										
RSA Laboratories ID#	22626	مند								
Calibrated by: Kurt D	. Newton			and the second second second second second second	Date:	20 January 20	22			

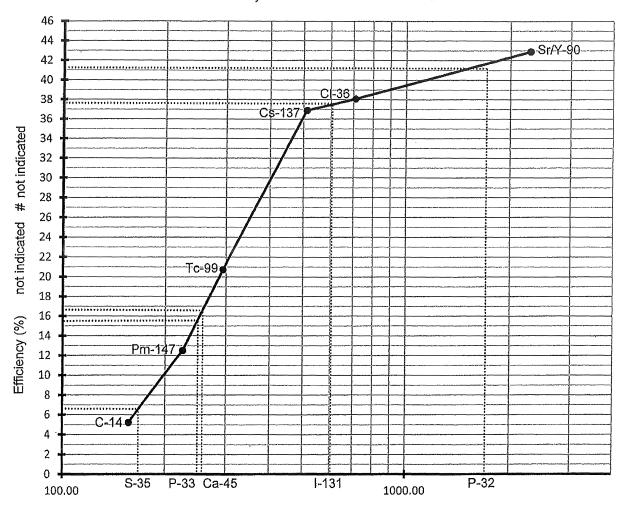
CERTIFICATE OF CALIBRATION (COUNT-RATE INSTRUMENT)

(860) 228-0721 Fax (860) 228-4402

Interpolated Beta Efficiencies

20 January 2022

Ludlum Model 26 # PF008880



Maximum Beta Energy (keV)

Calibrated by: Kurt D. Newton Dafe: 20 January 2022

Page 2 of 2

CERTIFICATE OF CALIBRATION

(SCALER / RATEMETER)



RSA Laboratories, Inc.

19 Pendleton Drive, P.O. Box 61 Hebron, Connecticut 06248 (860) 228-0721 Fax (860) 228-4402

Customer and Con Customer Address		Геат Fernald Reserve 5 Hamilton-Cleves Hig					64				
Inst. Mfr. & Mode		um Model 2221	Inst. Ty		Scaler/Rate			Inst. s/n		75480	
Det. Mfr. & Model		um 43-90	Det, Ty		Alpha Scint		,	Det. s/n		107237	
Calibration Date		nuary 2022	Due Da		20 January			Cal Interv			
Environmental condition Pre-calibration Checks:		Temperature 70°F	Relative Hu	midity	29%	Atmosj	oheric Pi	ressure 29.8			
X Contamination		X Battery check X Slow response check									
X Mechanical che	eck	X Audio check					X Det.	. Vol	ts	600 Vdc	
X Meter zero	_	X Reset check		Plateau check							
X Geotropism che	eck	X Fast response check		Ш	Alarm set			X Inpi	ıt sen	18.	21 mV
X Pulse generator		Oscilloscop	e s/n 171-0492	28		Voltme	ter s/n 5	74100002			
Comments: Efficiencies measured on contact.											
Precision check source					dicated Source?		Yes	X No		11.111111111111111111111111111111111111	
Reading #1	6,028 cpm		966 cpm		ding #3	5,968	cpm	Mean		5,987 срі	n
Precision: X]±<10%	□±10-20%	Out of tol				•				
Range Mult	iplier	Reference Calibration	Point]	Instrument "As	Found'	ı	Inst	rum	ent "As L	eft"
x 1000		400,000 cpm			400,000 ep	1111			400	,000 cpm	
x 1000		100,000 cpm			100,000 cp	m			100	,000 cpm	
x 100		' 40,000 cpm			40,000 cp	nı		40,000 cpm			
x 100		10,000 cpm			10,000 ср			10,000 cpm			
x 10		4,000 cpm		····	4,000 cpn					000 cpm	
x 10		1,000 cpm			1,000 epn	1		1,000 cpm			
x 1		400 cpm			400 cpm			400 cpm			
x 1 All ranges calibrated	electronically	100 cpm			100 cpm				10	00 cpm	
Range Multi		Pulse Rate Indicati		T	nstrument "As	Found		Inet	rmne	ent "As Le	ft"
1 min. cou	<u> </u>	1 min. x 400,000 cg			400,039 cou					39 counts	
1 min, cou		1 min, x 100,000 cp			100,004 cou				····	04 counts	
1 min, cou		1 min. x 40,000 cp			40,009 cour				<u> </u>	09 counts	
1 min. cou		1 min. x 10,000 cp			10,001 cour				<u> </u>)1 counts	
1 min, cou	nt	1 min. x 4,000 cpr			4,001 coun				<u> </u>	1 counts	
1 min. cou	nt	1 min. x 1,000 cpn			1,000 coun					0 counts	
1 min. cou	nt	1 min. x 400 cpm			400 count					counts	
1 min, cou	nt	1 min. x 100 cpm			100 count	s			100	counts	
			L	ocal b	ackground (cr	m)≈		2 (α)			
Range Multiplier	Cal. S	ource Used (isotope and s/n	, [Som	rce Activity (dp	m)	Instru	ment Readin (cpm)	g	4π Insti Efficien	
1 min. count		Th-230 #91TH4700001			33,000			5,987 (α)	十	18,	
nstrument indicates with	nin ±10% of calib	oration points unless otherwis	e indicated. So	ource-t	o-detector entry	window	distance	for efficienc	y det	ermination	is 1 cm

Instrument indicates within $\pm 10\%$ of calibration points unless otherwise indicated. Source-to-detector entry window distance for efficiency determination is 1 cm unless otherwise specified, RSA Laboratories certifies that the above instrument has been calibrated with standards traceable to the National Institute of Standards and Technology, or have been derived from accepted values of natural physical constants, or have been derived by the ratio-type of calibration techniques.

RSA Laboratories ID#

22628

Calibrated by:

Kurt D. Newton

CERTIFICATE OF CALIBRATION

(SCALER INSTRUMENT)



RSA Laboratories, Inc.

19 Pendleton Drive, P.O. Box 61 Hebron, Connecticut 06248 (860) 228-0721 Fax (860) 228-4402

Customer and Contact Customer Address:	RSI Team Fernald Res 10995 Hamilton-Cleves					
Inst. Mfr. & Model	Ludlum Model 2929	Inst. Type	Dual Scaler	,20	Inst. s/n	329909
Det. Mfr. & Model	Ludlum 43-10-1	Det. Type	Alpha/Beta S	Scintillator	Det. s/n	362456
Calibration Date	06 July 2022	Due Date	06 July 2023		Cal Interval	1 year
Environmental conditions: Pre-calibration Checks:	Temperature 72°F	Relative Humidi	ty 51%	Atmospheric P	ressure 29.60	inches Hg
X Contamination surv X Mechanical check X Meter zero	ey Battery check X Audio check X Reset check		Slow response ch Window Operation Plateau check		☑ Det. V	olts 750 Vdc
Geotropism check	Fast response	check [Alarm set		Input s	ens. see comment
X Pulse generator s/n	94926 Oscilli	oscope s/n 171-04928		Voltmeter s/n 5	74100002	
Comments: Alpha channel AC line power, HV potent	threshold = 180 mV, window = 18 cometer set to 310.	0 mV to ∞. Beta chann	el threshold = 4.4	mV, window =	4.4 mV to 50 m	V. Calibrated using
Precision check source s/n Reading #1 9, Precision: X ±<	145 cpm Reading #2		Dedicated Source? eading #3 ce	☐ Yes 9,087 cpm	X No Mean	9,147 cpm
Range Multiplie	r Reference Calib	ration Point	Instrument Indi "As Found			ment Indication 'As Left"
1 minute	800,000	срш	800,029 cour	nts	800	0,015 counts
I minute	200,000	cpm	199,978 com	nts	200	0,003 counts
1 minute	80,000 c	pm	80,002 coun	its	79	,997 counts
1 minute	20,000 c	pm	20,000 coun	its	20	.001 counts
1 minute	8,000 cg		8,000 count		7.	999 counts
1 minute	2,000 cp	pm	2,000 count	ts	2.	000 counts
1 minute	800 cp		800 counts		8	00 counts
1 minute	200 ср	m	200 counts		2	00 counts
1 minute	80 cpr		80 counts			90 counts
1 minute	20 срп		20 counts			20 counts
All ranges calibrated elec	ronically.	Loca	l background (cp	om) ≈	1 (α)	62 (β)
Range Multiplier	Cal. Source Used (isotope a		ource Activity (dp	Instru	ment Reading (cpm)	4π Instrument Efficiency (%)
1 min. count	Th-230 #91TH470000		33,000		9,961 (a)	30.18
1 min. count	C1-36 #D700		23,598		9,147 (B)	38.50
nless otherwise specified. R nd Technology, or have bee	10% of calibration points unless of SA Laboratories certifies that the ab a derived from accepted values of a	sove instrument has been	calibrated with sta	ndards traceabl	le to the National	Institute of Standards
RSA Laboratories ID# Calibrated by: Ku	23066 rt D. Newton			Date:	06 July 2022	



Scaler Chi-Squared (x2) Test Data Sheet

Scaler model	Lud-2929		Serial No.	329909	Calibra	tion due date
Detector model	43-10-1		Serial No.	PR362456		7/6/2023
α Source ID no.	Kr-368		βγ	Source ID no.	D-526	
α Source isotope	Th-230		βγ S	ource isotope	CI-36	
α Source activity	77400	dpm	βγ S	Source activity	5000	dpm
α Source diameter	47	mm	βγ So	urce diameter	47	mm
α Source assay date	5/23/2002		βγ Sour	ce assay date	12/11/1995	
Date performed	7/11/2022		Location	performed at	CAWWT	
				•		•

Chi-Square										
	Alp	ha								
n	x_i	(x_i) - (\overline{x})	$[(x_i)-(\overline{x})]^2$							
1	24687	6.55	42.9							
2	24899	218.55	47764.1							
3	24533	-147.45	21741.5							
4	24747	66.55	4428.9							
5	24644	-36.45	1328.6							
6	24783	102.55	10516.5							
7	24836	155.55	24195.8							
8	24553	-127.45	16243.5							
9	24780	99.55	9910.2							
10	24587	-93.45	8732.9							
11	24436	-244.45	59755.8							
12	24740	59.55	3546.2							
13	24543	-137.45	18892.5							
14	24630	-50.45	2545.2							
15	25051	370.55	137307.3							
16	24572	-108.45	11761.4							
17	24806	125.55	15762.8							
18	24385	-295.45	87290.7							
19	24704	23.55	554.6							
20	24693	12.55	157.5							
Totals	493609	na	482479.0							
x =	24680.5	σ=	159.4							
2σ =	318.7	3σ =	478.1							

$\bar{x} =$	$\frac{\sum x_i}{20}$	$\sigma = \sqrt{\frac{\sum (x_i - \overline{x})^2}{(n-1)}}$		
	Alpha	Values		
mean $+2\sigma =$	24999.2	mean $-2\sigma =$	24361.7	
mean $+3\sigma =$	25158.5	mean $-3\sigma = 24202.4$		
Cł	ni-squared ran	ge: 8.91 to 32.8	85	
$x^2 =$	19.5	Test result	Pass	

(χ^2) Test										
	Be	ta								
n	x_{i}	(x_i) - (\overline{x})	$[(x_i)-(\overline{x})]^2$							
1	1860	-107.1	11470.4							
2	1940	-27.1	734.4							
3	1938	-29.1	846.8							
4	2031	63.9	4083.2							
5	1995	27.9	778.4							
6	2025	57.9	3352.4							
7	1990	22.9	524.4							
8	2034	66.9	4475.6							
9	1942	-25.1	630.0							
10	1949	-18.1	327.6							
11	1849	-118.1	13947.6							
12	2018	50.9	2590.8							
13	1962	-5.1	26.0							
14	1994	26.9	723.6							
15	1969	1.9	3.6							
16	1999	31.9	1017.6							
17	1961	-6.1	37.2							
18	1996	28.9	835.2							
19	1927	-40.1	1608.0							
20	1963	-4.1	16.8							
Totals	39342	na	48029.8							
=	1967.1	σ=	50.3							
2σ =	100.6	3σ =	150.8							

X									
Beta Values									
mean $+2\sigma =$	2067.7	mean $-2\sigma =$	1866.5						
mean $+3\sigma =$	2117.9	mean $-3\sigma =$	1816.3						
Chi-squared range: 8.91 to 32.85									
$x^2 =$	24.4	Test result	Pass						

Performed:		Date:
	Printed Name and Signature	
Reviewed:		Date:
	Printed Name and Signature	



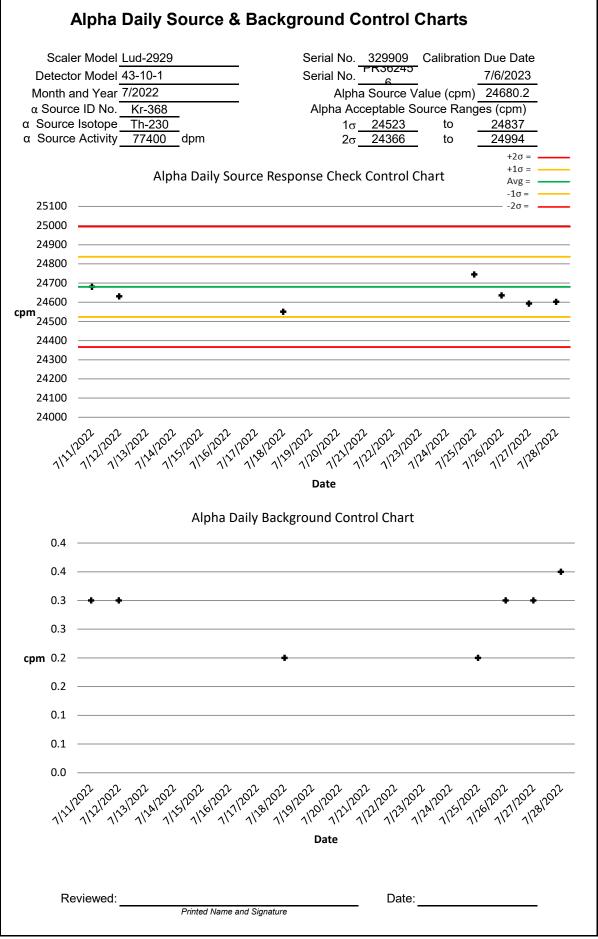
Scaler Post-Calibration Test Data Sheet					
	dpm mm	Serial No. 329909 Serial No. PR362456 β-γ Source ID no. β-γ Source isotope β-γ Source activity β-γ Source diameter β-γ Source assay date Location performed at	Calibration due da 7/6/2023 D-526 Cl-36 5000 47 mm 12/11/1995 CAWWT		
	Backgrour cts (20 min)	β-γ Background counts	757 cts (20 mir	ו)	
α Background 0.30	cpm	β-γ Background _	37.9 cpm		
Almho	Scaler Effi	iciency Beta			
Gross count rate 24680.5 Net count rate 24680.2 Source activity 77400	cts cpm cpm dpm cpm/dpm	20 minute source count	39342 cts 1967.1 cpm 1929.3 cpm 5000 dpm 0.39 cpm/dpm		
Acceptable Source Range					
Gross count rate 24680.5	cts cpm cpm	20 minute count _ Gross count rate _ Net count rate _	39342 cts 1967.1 cpm 1929.3 cpm		
$\sigma = \sqrt{\frac{Rg}{1} + \frac{Rb}{20}}$	where:	σ = standard deviation of th Rg = Gross count rate (cpm) Rb = background count rate (
Alpha σ 157.10	cpm	Beta-Gamma σ	44.37 cpm		
Alpha Acceptable Source Ranges	(cpm)	Beta Acceptable Sou	rce Ranges (cpm)		
1σ <u>24523</u> to 2σ <u>24366</u> to	24837 24994	1σ <u>1885</u> 2σ <u>1841</u>	to 1974 to 2018		
Performed:	gnature	Date: _			
Reviewed:	gnature	Date: _			



	Scaler model	Lud-2929		Serial no	329909	Calibrat	ion due date
	Scaler model Lud-2929 Detector model 43-10-1				PR362456	Calibrat	7/6/2023
							1/0/2023
Month/y	ear performed	7/2022		Locatio	n performed at		
						e value (cpm)	24680.2
	Source ID no.				Acceptable So		
	Source isotope		dom		24523		24837
u -	Source activity	77400	dpm	20	24366	. 10	24994
	Alpha	Alpha	Alpha	Alpha	Critical	Daily	
Date		Background	Source	Source	Value	Check	Initials
	Counts	срт	Counts	cpm	(dpm/100cm ²)	Sat/Unsat	
7/11/2022	6	0.30	24681	24681	2.9	Sat	LO
7/12/2022	6	0.30	24631	24631	2.9	Sat	LO
7/18/2022	4	0.20	24551	24551	2.4	Sat	LO
7/25/2022	4	0.20	24745	24745	2.4	Sat	LO
7/26/2022	6	0.30	24636	24636	2.9	Sat	LO
7/27/2022	6	0.30	24594	24594	2.9	Sat	LO
7/28/2022	7	0.35	24603	24603	3.1	Sat	LO
				-			
					1		
		<u> </u>		1	<u> </u>		



aler model ctor model performed urce ID no. ce isotope rce activity Beta ckground Counts 757 773 734 690 787 770 738	43-10-1 7/2022 D-526 Cl-36	Beta Source Counts 1967 1981 1983 1952 1915 1935 1954	Location Beta A	PR362456 n performed at Beta source Acceptable So 1885 1841 Critical Value (dpm/100cm²) 27 27 26 26 26 27 27	CAWWT e value (cpm)	1929.3 (cpm) 1974 2018 Initials LO LO LO LO LO
performed urce ID no. rce isotope rce activity Beta ckground Counts 757 773 734 690 787 770	D-526 Cl-36 5000 Beta Background cpm 38 39 37 35 39 39	Beta Source Counts 1967 1981 1983 1952 1915 1935	Beta A	r performed at Beta source Acceptable So 1885 1841 Critical Value (dpm/100cm²) 27 27 26 26 27 27 27	value (cpm) urce Ranges to to Daily Check Sat/Unsat Sat Sat Sat Sat Sat Sat Sat	1929.3 (cpm) 1974 2018 Initials LO LO LO
Beta ckground Counts 757 773 734 690 787 770	D-526 Cl-36 5000 Beta Background cpm 38 39 37 35 39 39	Beta Source Counts 1967 1981 1983 1952 1915 1935	Beta A 25 Beta Source cpm 1929 1942 1946 1918 1876 1897	Beta source Acceptable So	value (cpm) urce Ranges to to Daily Check Sat/Unsat Sat Sat Sat Sat Sat Sat Sat	1974 2018 Initials LO
Beta ckground Counts 757 773 734 690 787 770	CI-36 5000 Beta Background cpm 38 39 37 35 39 39	Beta Source Counts 1967 1981 1983 1952 1915 1935	Beta Source cpm 1929 1942 1946 1918 1876	Critical Value (dpm/100cm²) 27 26 26 27 27 27	to to Daily Check Sat/Unsat Sat Sat Sat Sat Sat Sat Sat	1974 2018 Initials LO
Beta ckground Counts 757 773 734 690 787 770	CI-36 5000 Beta Background cpm 38 39 37 35 39 39	Beta Source Counts 1967 1981 1983 1952 1915 1935	Beta Source cpm 1929 1942 1946 1918 1876	1885 1841 Critical Value (dpm/100cm²) 27 27 26 26 26 27 27	Daily Check Sat/Unsat Sat Sat Sat Sat Sat Sat Sat	lnitials LO LO LO LO
Beta ckground Counts 757 773 734 690 787 770	5000 Beta Background cpm 38 39 37 35 39 39	Beta Source Counts 1967 1981 1983 1952 1915 1935	Beta Source cpm 1929 1942 1946 1918 1876 1897	Critical Value (dpm/100cm²) 27 27 26 26 26 27 27	Daily Check Sat/Unsat Sat Sat Sat Sat Sat Sat Sat	2018 Initials LO LO LO LO
Beta ckground Counts 757 773 734 690 787	Beta Background cpm 38 39 37 35 39 39	Beta Source Counts 1967 1981 1983 1952 1915 1935	Beta Source cpm 1929 1942 1946 1918 1876 1897	Critical Value (dpm/100cm²) 27 27 26 26 27 27	Daily Check Sat/Unsat Sat Sat Sat Sat Sat	Initials LO LO LO LO
ckground Counts 757 773 734 690 787 770	38 39 37 35 39 39	Source Counts 1967 1981 1983 1952 1915 1935	Source cpm 1929 1942 1946 1918 1876	Value (dpm/100cm²) 27 27 26 26 27 27 27	Check Sat/Unsat Sat Sat Sat Sat Sat Sat Sat Sat	LO LO LO
757 773 734 690 787 770	38 39 37 35 39 39	Counts 1967 1981 1983 1952 1915 1935	1929 1942 1946 1918 1876 1897	(dpm/100cm²) 27 27 26 26 27 27 27	Check Sat/Unsat Sat Sat Sat Sat Sat Sat Sat Sat	LO LO LO
757 773 734 690 787 770	38 39 37 35 39 39	1967 1981 1983 1952 1915 1935	1929 1942 1946 1918 1876 1897	27 27 26 26 27 27	Sat Sat Sat Sat Sat	LO LO
773 734 690 787 770	39 37 35 39 39	1981 1983 1952 1915 1935	1942 1946 1918 1876 1897	27 26 26 27 27	Sat Sat Sat Sat	LO LO
734 690 787 770	37 35 39 39	1983 1952 1915 1935	1946 1918 1876 1897	26 26 27 27	Sat Sat Sat	LO LO
690 787 770	35 39 39	1952 1915 1935	1918 1876 1897	26 27 27	Sat Sat	LO
787 770	39 39	1915 1935	1876 1897	27 27	Sat	
770	39	1935	1897	27		10
					Sot	
738	37	1954	1917		ડ તા	LO
				27	Sat	LO
					Date:	



	Beta Daily Source & Backo	ground Control Charts
Detector Month a β-γ Source β-γ Source	tor Model Lud-2929 tor Model 43-10-1 and Year 7/2022 ce ID No. D-526 e Isotope CI-36 e Activity 5000 dpm	Serial No. 329909 Calibration Due Date Serial No. $\frac{7/6/2023}{6}$ Beta Source Value (cpm) 1929.3 Beta Acceptable Source Ranges (cpm) 1σ 1885 to 1974 2σ 1841 to 2018
2050	Beta Daily Source Resp	ponse Check Control Chart $Avg = $ $-1\sigma =$ $-2\sigma =$
2000		
1950	• •	
cpm 1900		* *
1850		
1800		
1750 1121		Date ground Control Chart
40		ground control chart
39	•	+
38	+	
37 cpm 36	•	
cpm 30		
34		+
33		
32 71 ² 21		59/2012 1/21/2012 1/23/2012 1/25/2012 1/26/2012 1/28/2012 Date
Re	eviewed:	Date: