LANL MLU Incoming TRUPACT Trailer Document

Date: 10/14/2021

To: Kelly Wohlwend, LANL MLU Team Lead

From: Amber Allardice, SNL RP Project Lead (TA-5)

Subject: Incoming TRUPACT Surveys

The following SNL document contains requested radiological survey information, as part of the documentation for the MLU shipment being performed by the LANL MLU team. The survey was performed in TA-5, on October 6th, 2021. This survey was of 2 WIPP trailers carrying 3 empty TRUPACTs each.

- WIPP MLU incoming TRU-Pact Trailer Survey: I-20211006-12

All information contained was completed, reviewed, and approved by SNL RP personnel, and is released for receipt and use by the LANL MLU Team at their discretion.

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Radiological Survey Report

Survey I-20211006-12

General Information

Title: WIPP MLU Incoming Tru-Pact Trailer Survey

Survey Date/Time: 10/6/2021 14:30

Lead Surveyor: Rollins, Andrew

Location: 6593 / OUTSIDE

Work Order/Task #: N/A

TWD or RTWD #: TAV-RTWD-023 rev-0

Purpose: Characterization

Requestor Org: 01381

Status: Approved by: Bowman, Brian, 10/13/2021

Ready for Review by: Rollins, Andrew, 10/11/2021

Additional Surveyors

Surveyor
Kegeler, Stephen
Molina, Vanessa
Tafoya, David

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Probe Model	Probe Serial #	Probe Type	Calibration Date	Efficiency β/γ	Efficiency α
1	RO20	12350	D	N/A	N/A	D	1/10/2022		
2	RADYEYESX	11127	C	SHP380AB	760	C	11/10/2021	0.14	0.15
3	3030	278104	C	43-10-1	105184	C	2/10/2022	0.21	0.31

Instruments Used - Notes

#	Notes
1	BKGD = <0.1 mR/hr
2	BKGD CPM (a/B) = 0/290 See comments for MDA calculation
3	BKGD CPM (a/B) = 0/53

Comments:

Survey for characterization of the incoming WIPP Tru-Pact trailers.
This survey was done to assess the arrival conditions of the 2 trailers, and exterior of the 6 Tru-pacts, after entry in to TA-V.
Trailer #370 loaded with empty Tru-Pacts #208, #207, & #134
Trailer #329 loaded with empty Tru-Pacts #193, #184 & #171
At time of survey, Tru-pacts were labeled Empty.

No posting required for survey.

Radionuclides of concern
Activation Products: Co-60 principal
Fission Products: Cs-137, Sr-90 principal
Actinides: U-234, U-235, U-238 principal
Transuranics: Pu-239, Np-237, Am-241 principal

Contamination limits
Removable: 20dpm/100cm2 (alpha); 1,000dpm/100cm2 (beta/gamma)
Total: 100dpm/100cm2 (alpha); 5,000dpm/100cm2 (beta/gamma)

Swipes taken on the vehicles were counted on a Ludlum 3030 counter.
All swipes were less than removable contamination limits.
3030 MDA sheet attached

Direct scans on the trailers and tru-pact surfaces were done with a RadeyeSX w/SHP-380AB probe.
BKG: 0 cpm (alpha), 290 cpm (beta-gamma)
MDA: 18 dpm (alpha), 585 dpm (beta-gamma)
All scans were less than total contamination limits.

Itemized Details - Items

#	Item Location/Description	Comments
1	Trailer 370- Back Left Tire	
2	Trailer 370- Front Left Tire	
3	Trailer 370-Front Right Tire	
4	Trailer 370- Back Right Tire	
5	Trailer 370- Under Tru-Pact 208	
6	Trailer 370- Under Tru-Pact 207	
7	Trailer 370- Under Tru-Pact 134	
8	Trailer 370- Under Tru-Pact 208	
9	Trailer 370- Under Tru-Pact 207	
10	Trailer 370- Under Tru-Pact 134	
11	Trailer 329- Back Left Tire	
12	Trailer 329- Front Left Tire	
13	Trailer 329-Front Right Tire	
14	Trailer 329- Back Right Tire	
15	Trailer 329- Under Tru-Pact 193	
16	Trailer 329- Under Tru-Pact 184	
17	Trailer 329- Under Tru-Pact 171	
18	Trailer 329- Under Tru-Pact 171	
19	Trailer 329- Under Tru-Pact 184	
20	Trailer 329- Under Tru-Pact 193	

Alpha Activity

Counting Data Attached: ☐ Yes ☑ No
Eff. for Removable: **Inst:** 3 **Eff:** 0.31
Eff. for Total: **Inst:** N/A **Eff:**

Radionuclide: Pu-239
Default Bkg Value: 0
Default Bkg Units: cpm/100 cm2

#	Data	Data Units	Bkg.	Bkg. Units	T/R	Activity	Activity Units
1	2	cpm/100 cm2	0	cpm/100 cm2	R	***6.5***	dpm/100 cm2
2	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
3	2	cpm/100 cm2	0	cpm/100 cm2	R	***6.5***	dpm/100 cm2
4	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
5	2	cpm/100 cm2	0	cpm/100 cm2	R	***6.5***	dpm/100 cm2
6	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
7	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
8	1	cpm/100 cm2	0	cpm/100 cm2	R	***3.2***	dpm/100 cm2
9	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
10	2	cpm/100 cm2	0	cpm/100 cm2	R	***6.5***	dpm/100 cm2
11	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
12	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
13	1	cpm/100 cm2	0	cpm/100 cm2	R	***3.2***	dpm/100 cm2
14	2	cpm/100 cm2	0	cpm/100 cm2	R	***6.5***	dpm/100 cm2
15	1	cpm/100 cm2	0	cpm/100 cm2	R	***3.2***	dpm/100 cm2
16	0	cpm/100 cm2	0	cpm/100 cm2	R	***ND***	dpm/100 cm2
17	2	cpm/100 cm2	0	cpm/100 cm2	R	***6.5***	dpm/100 cm2
18	1	cpm/100 cm2	0	cpm/100 cm2	R	***3.2***	dpm/100 cm2
19	2	cpm/100 cm2	0	cpm/100 cm2	R	***6.5***	dpm/100 cm2
20	1	cpm/100 cm2	0	cpm/100 cm2	R	***3.2***	dpm/100 cm2

Beta-Gamma Activity

Counting Data Attached: ☐ Yes ☑ No
Eff. for Removable: **Inst:** 3 **Eff:** 0.21
Eff. for Total: **Inst:** N/A **Eff:**

Radionuclide: Cs-137
Default Bkg Value: 53
Default Bkg Units: cpm/100 cm2

#	Data	Data Units	Bkg.	Bkg. Units	T/R	Activity	Activity Units
1	47	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
2	41	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
3	38	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
4	55	cpm/100 cm2	53	cpm/100 cm2	R	***9.5***	dpm/100 cm2
5	53	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
6	50	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
7	43	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
8	48	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
9	43	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
10	43	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
11	43	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
12	59	cpm/100 cm2	53	cpm/100 cm2	R	***28.6***	dpm/100 cm2
13	37	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
14	39	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
15	53	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
16	50	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
17	41	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2
18	56	cpm/100 cm2	53	cpm/100 cm2	R	***14.3***	dpm/100 cm2
19	58	cpm/100 cm2	53	cpm/100 cm2	R	***23.8***	dpm/100 cm2
20	43	cpm/100 cm2	53	cpm/100 cm2	R	***ND***	dpm/100 cm2

Radiation Survey

Background: <0.1
Background Units: mR/hr
Radiation Type: Gamma

#	Radiation Type	Reading	Units	Distance From Source	Comment
1	Gamma	<0.1	mR/hr	OC	
2	Gamma	<0.1	mR/hr	OC	
3	Gamma	<0.1	mR/hr	OC	
4	Gamma	<0.1	mR/hr	OC	
5	Gamma	<0.1	mR/hr	OC	
6	Gamma	<0.1	mR/hr	OC	
7	Gamma	<0.1	mR/hr	OC	
8	Gamma	<0.1	mR/hr	OC	
9	Gamma	<0.1	mR/hr	OC	
10	Gamma	<0.1	mR/hr	OC	
11	Gamma	<0.1	mR/hr	OC	
12	Gamma	<0.1	mR/hr	OC	
13	Gamma	<0.1	mR/hr	OC	
14	Gamma	<0.1	mR/hr	OC	
15	Gamma	<0.1	mR/hr	OC	
16	Gamma	<0.1	mR/hr	OC	
17	Gamma	<0.1	mR/hr	OC	
18	Gamma	<0.1	mR/hr	OC	
19	Gamma	<0.1	mR/hr	OC	
20	Gamma	<0.1	mR/hr	OC	

Attachments

Order	Filename	Description	Pages
1	S6591-2-KM-21100616020.pdf	3030 MDA sheet	1

LUDLUM 3030 MDA CALCULATION WORKSHEET

Instrument #:	278104	Calibration Expires:	2/10/22	Location:	Bldg. 6591/12D
Probe Type:	43-10-1	Probe #:	105184		
CALCULATION BY:	David Tafoya			**DATE:**	10/6/21

Expected Sample Radionuclide (α):	Pu-239	α Detector Efficiency for expected radionuclide (cpd):	0.31 (Pu-239)
Expected Sample Radionuclide (β):	Cs-137	β Detector Efficiency for expected radionuclide (cpd):	0.21 (Cs-137)
Background Count Time (min):	1	If background and sample count times are the same, use MDA calculation method 4.6.1.	
Sample Count Time (min):	1	If background and sample count times are different then use MDA calculation method 4.6.2.	

Daily check background count rate shall be used for MDA determination.

α 0 cpm β 53 cpm

Method 4.4.2: Use when background and sample count times are the same.	**Method 4.4.3:** Use when background and sample count times are different.
$MDA = \frac{2.71 + 4.65\sqrt{(R_b * t_b)}}{t_b * E}$	$MDA = \frac{2.71 + 3.29\sqrt{(R_b * t_s)\left(1 + \frac{t_s}{t_b}\right)}}{t_s * E}$

Where:

MDA = Minimum Detectable Activity level in dpm

R_b = Background count rate in counts per minute

t_s = Sample count time in minutes

t_b = Background count time in minutes

E = Detector efficiency (α or β) in counts per disintegration (cpd)

Instrument MDA Calculation Results	**Acceptable**	**MDA Acceptance Limits†** (from Table 6-1, RPPM)	
α MDA: 9	Y ☒ N ☐ N/A ☐	**Nuclide**	**dpm**
β MDA: 175	Y ☒ N ☐ N/A ☐		
		Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20
		Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200
		Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90.	1000
		U-natural, U-235, U-238 and associated decay products	1000 (alpha)

†Assumes swipe area is 100 cm^2

List Applicable Survey Number(s): 1-20211006-12

REVIEWED BY: [signature] **DATE:** 10-6-21

Radiation Protection Line Support Project Leader (or Designee)