

WIPP MLU Incoming Vehicle Survey Document

Date: 7/20/2020

To: Ronnie York, LANL MLU Team Lead

From: Amber Allardice, SNL RP Project Lead (TA-5)
Edward Walton, SNL RP Sr. RCT (TA-5)

Subject: Incoming Vehicles Surveys

The following SNL document contains requested radiological survey information, as part of the documentation for the TRU-waste shipment being performed by the LANL MLU team. The surveys were performed in TA-5, on July 20th, 2020.

- Incoming WIPP TRU-Pact trailers survey: I-20200720-4
- Incoming MLU trailer and mobile crane survey: I-20200720-8

The first survey was of 2 WIPP trailers carrying 2 empty TRU Half-Pacts each. The second survey was for a trailer with the MLU team's equipment, and for the contracted mobile crane that be used for loading Half-Pacts.

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



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Radiological Survey Report

Survey I-20200720-4

General Information

Title: WIPP MLU Incoming Tru-Pact Trailers Survey
Survey Date/Time: 7/20/2020 08:00
Location: 6585 / OUTSIDE
TWD or RTWD #: SPRF-RTWD-018 rev-2
Purpose: Characterization
Requestor Org: 01387
Status: Approved by: Allardice, Amber, 7/20/2020
Ready for Review by: Walton, Edward, 7/20/2020

Lead Surveyor: Rollins, Andrew
Work Order/Task #: N/A

Additional Surveyors

Surveyor
Brasure, Ryan
Kegeler, Stephen
Walton, Edward

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Probe Model	Probe Serial #	Probe Type	Calibration Date	Efficiency	
								β/γ	α
1	3030	278129	C	43-10-1	171941	C	11/10/2020	0.21	0.31
2	RADEYE SX	11150	C	SHP380AB	681	C	9/10/2020	0.14	0.15
3	RO20		D			D	12/10/2020		

Instruments Used - Notes

#	Notes
1	BKG= 0-alpha/ 47-beta/gamma cpm
2	BKG= 1-alpha/ 207-beta/gamma cpm
3	BKG= <0.1mR/hr

Radiological Survey Report

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 4 half-pacts, prior to entry in to TA-V.

Trailer #306 loaded with empty Half-Pacts #505 & #510

Trailer #302 loaded with empty Half-Pacts #501 & #504

At time of survey, no parts of the trailers or half-pacts were labeled as being or containing rad material.

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); 200dpm/100cm² (beta/gamma)

Total: 100dpm/100cm² (alpha); 1000dpm/100cm² (beta/gamma)

Swipes taken on the vehicles were counted on a Ludlum 3030 counter.

Trailer #306: right-side 1-8/ left-side 9-16; Half-Pacts 17-20

Trailer #302: right-side 21-28/ left-side 29-36; Half-Pacts 37-40

All swipes were less than removable contamination limits.

Direct scans on the trailers and half-pact surfaces were done with a RadeyeSX w/SHP-280AB probe.

All scans were less than total contamination limits.

An RO-20 was used for all dose rates.

Attachment-1: Survey maps of WIPP Trailers #306 and #302

Attachment-2: 3030 MDA calculation sheet

No radiological concerns were identified.

Radiological Survey Report

Itemized Details - Items

#	Item Location/Description	Comments
1	Trailer-306 - front-right	
2	Trailer-306 - structure under Pact-505	
3	Trailer-306 - underside of Pact-505	
4	Trailer-306 - structure between Pacts	
5	Trailer-306 - underside of Pact-510	
6	Trailer-306 - structure under Pact-510	
7	Trailer-306 - back right tire	
8	Trailer-306 - structure top-back right	
9	Trailer-306 - front-left	
10	Trailer-306 - structure under Pact-505	
11	Trailer-306 - underside of Pact-505	
12	Trailer-306 - structure between Pacts	
13	Trailer-306 - underside of Pact-510	
14	Trailer-306 - structure under Pact-510	
15	Trailer-306 - back left tire	
16	Trailer-306 - structure top-back left	
17	Half-Pact-510 right side	
18	Half-Pact-505 right side	
19	Half-Pact-505 left side	
20	Half-Pact-510 left side	
21	Trailer-302 - front-right	
22	Trailer-302 - structure under Pact-501	
23	Trailer-302 - underside of Pact-501	
24	Trailer-302 - structure between Pacts	
25	Trailer-302 - underside of Pact-504	
26	Trailer-302 - structure under Pact-504	
27	Trailer-302 - back right tire	
28	Trailer-302 - structure top-back right	
29	Trailer-302 - front-left	
30	Trailer-302 - structure under Pact-501	
31	Trailer-302 - underside of Pact-501	
32	Trailer-302 - structure between Pacts	
33	Trailer-302 - underside of Pact-504	
34	Trailer-302 - structure under Pact-504	
35	Trailer-302 - back left tire	
36	Trailer-302 - structure top-back left	
37	Half-Pact-504 right side	
38	Half-Pact-501 right side	
39	Half-Pact-501 left side	
40	Half-Pact-504 left side	

Radiological Survey Report

Radiological Survey Report

Alpha Activity

Counting Data Attached: ☐ Yes ☒ No

Radionuclide: Pu-239

Eff. for Removable: Inst:1 Eff: 0.31

Default Bkg Value: 0

Eff. for Total: Inst:N/A Eff:

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	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
3	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	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	3	cpm/100 cm2	0	cpm/100 cm2	R	9.7	dpm/100 cm2
8	2	cpm/100 cm2	0	cpm/100 cm2	R	6.5	dpm/100 cm2
9	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
10	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
11	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
12	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
13	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
14	3	cpm/100 cm2	0	cpm/100 cm2	R	9.7	dpm/100 cm2
15	2	cpm/100 cm2	0	cpm/100 cm2	R	6.5	dpm/100 cm2
16	2	cpm/100 cm2	0	cpm/100 cm2	R	6.5	dpm/100 cm2
17	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
18	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	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
21	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
22	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
23	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
24	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
25	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
26	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
27	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
28	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
29	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
30	2	cpm/100 cm2	0	cpm/100 cm2	R	6.5	dpm/100 cm2
31	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
32	2	cpm/100 cm2	0	cpm/100 cm2	R	6.5	dpm/100 cm2
33	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
34	3	cpm/100 cm2	0	cpm/100 cm2	R	9.7	dpm/100 cm2
35	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
36	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
37	0	cpm/100 cm2	0	cpm/100 cm2	R	ND	dpm/100 cm2
38	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2
39	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2

Radiological Survey Report

Alpha Activity

Counting Data Attached: ☐ Yes ☒ No

Radionuclide: Pu-239

Eff. for Removable: Inst:1 Eff: 0.31

Default Bkg Value: 0

Eff. for Total: Inst:N/A Eff:

Default Bkg Units: cpm/100 cm2

#	Data	Data Units	Bkg.	Bkg. Units	T/R	Activity	Activity Units
40	1	cpm/100 cm2	0	cpm/100 cm2	R	3.2	dpm/100 cm2

Radiological Survey Report

Beta-Gamma Activity

Counting Data Attached: ☐ Yes ☒ No

Radionuclide: Cs-137

Eff. for Removable: Inst:1 Eff: 0.21

Default Bkg Value: 47

Eff. for Total: Inst:N/A Eff:

Default Bkg Units: cpm/100 cm2

#	Data	Data Units	Bkg.	Bkg. Units	T/R	Activity	Activity Units
1	43	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
2	48	cpm/100 cm2	47	cpm/100 cm2	R	4.8	dpm/100 cm2
3	42	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
4	47	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
5	59	cpm/100 cm2	47	cpm/100 cm2	R	57.1	dpm/100 cm2
6	47	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
7	38	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
8	41	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
9	62	cpm/100 cm2	47	cpm/100 cm2	R	71.4	dpm/100 cm2
10	38	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
11	40	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
12	51	cpm/100 cm2	47	cpm/100 cm2	R	19	dpm/100 cm2
13	56	cpm/100 cm2	47	cpm/100 cm2	R	42.9	dpm/100 cm2
14	37	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
15	42	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
16	41	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
17	35	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
18	45	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
19	52	cpm/100 cm2	47	cpm/100 cm2	R	23.8	dpm/100 cm2
20	42	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
21	48	cpm/100 cm2	47	cpm/100 cm2	R	4.8	dpm/100 cm2
22	41	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
23	45	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
24	49	cpm/100 cm2	47	cpm/100 cm2	R	9.5	dpm/100 cm2
25	50	cpm/100 cm2	47	cpm/100 cm2	R	14.3	dpm/100 cm2
26	42	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
27	46	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
28	42	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
29	48	cpm/100 cm2	47	cpm/100 cm2	R	4.8	dpm/100 cm2
30	46	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
31	46	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
32	36	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
33	41	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
34	39	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
35	45	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
36	38	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
37	45	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
38	42	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2
39	44	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2

Radiological Survey Report

Beta-Gamma Activity

Counting Data Attached: ☐ Yes ☒ No

Radionuclide: Cs-137

Eff. for Removable: Inst:1 Eff: 0.21

Default Bkg Value: 47

Eff. for Total: Inst:N/A Eff:

Default Bkg Units: cpm/100 cm2

#	Data	Data Units	Bkg.	Bkg. Units	T/R	Activity	Activity Units
40	43	cpm/100 cm2	47	cpm/100 cm2	R	ND	dpm/100 cm2

Radiological Survey Report

Radiation Survey

Background: <0.1

Background Units: mR/hr

Radiation Type: Beta/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	
21	Gamma	<0.1	mR/hr	OC	
22	Gamma	<0.1	mR/hr	OC	
23	Gamma	<0.1	mR/hr	OC	
24	Gamma	<0.1	mR/hr	OC	
25	Gamma	<0.1	mR/hr	OC	
26	Gamma	<0.1	mR/hr	OC	
27	Gamma	<0.1	mR/hr	OC	
28	Gamma	<0.1	mR/hr	OC	
29	Gamma	<0.1	mR/hr	OC	
30	Gamma	<0.1	mR/hr	OC	
31	Gamma	<0.1	mR/hr	OC	
32	Gamma	<0.1	mR/hr	OC	
33	Gamma	<0.1	mR/hr	OC	
34	Gamma	<0.1	mR/hr	OC	
35	Gamma	<0.1	mR/hr	OC	
36	Gamma	<0.1	mR/hr	OC	
37	Gamma	<0.1	mR/hr	OC	
38	Gamma	<0.1	mR/hr	OC	
39	Gamma	<0.1	mR/hr	OC	

Radiological Survey Report

Radiation Survey

Background: <0.1

Background Units: mR/hr

Radiation Type: Beta/Gamma

#	Radiation Type	Reading	Units	Distance From Source	Comment
40	Gamma	<0.1	mR/hr	OC	

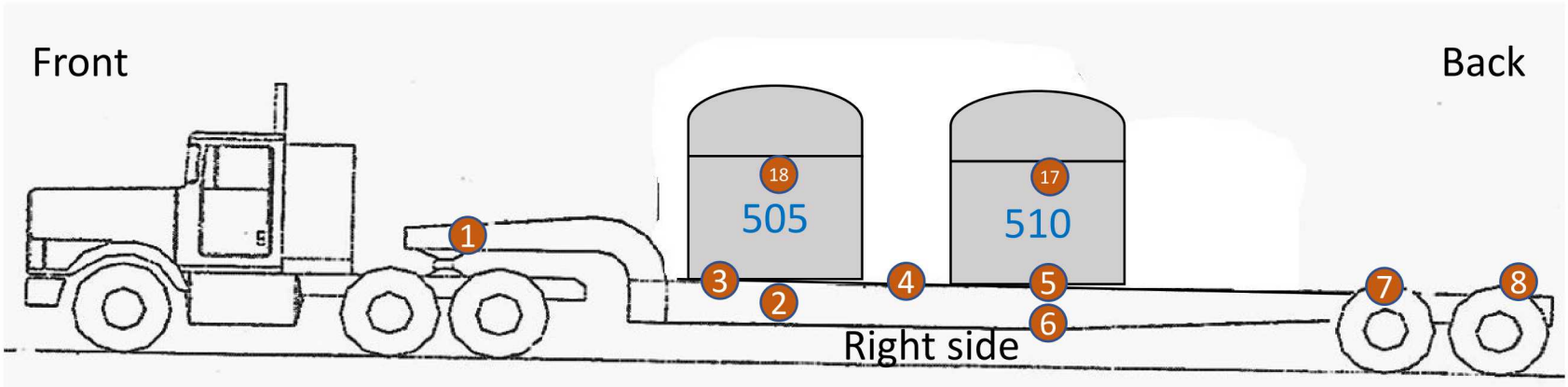
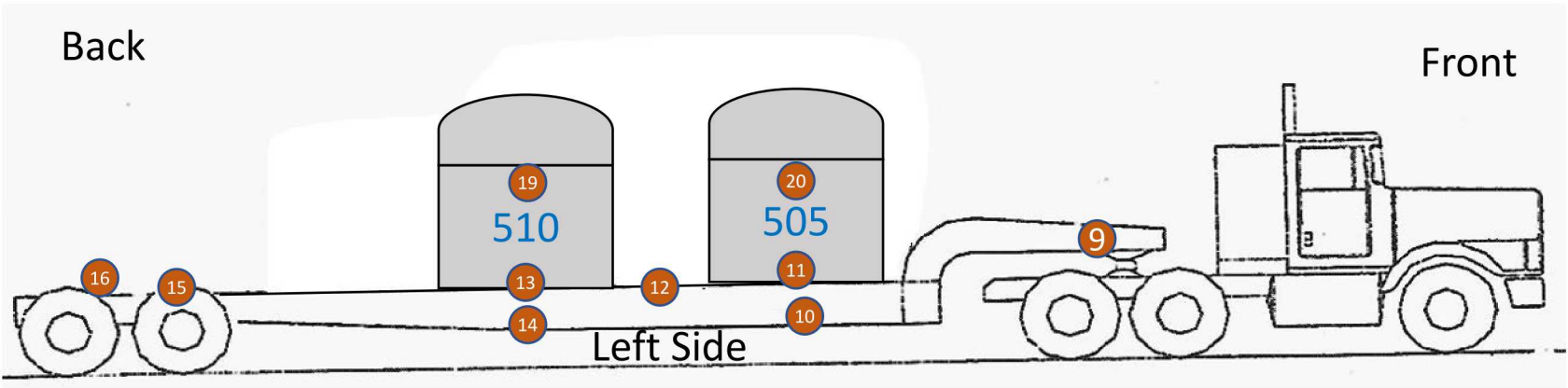
Radiological Survey Report

Attachments

Order	Filename	Description	Pages
1	Completed Incoming WIPP trailer surveys maps.pdf	Trailer survey maps	2
2	MDA sheet for incoming pact trailers.pdf	MDA sheet	1

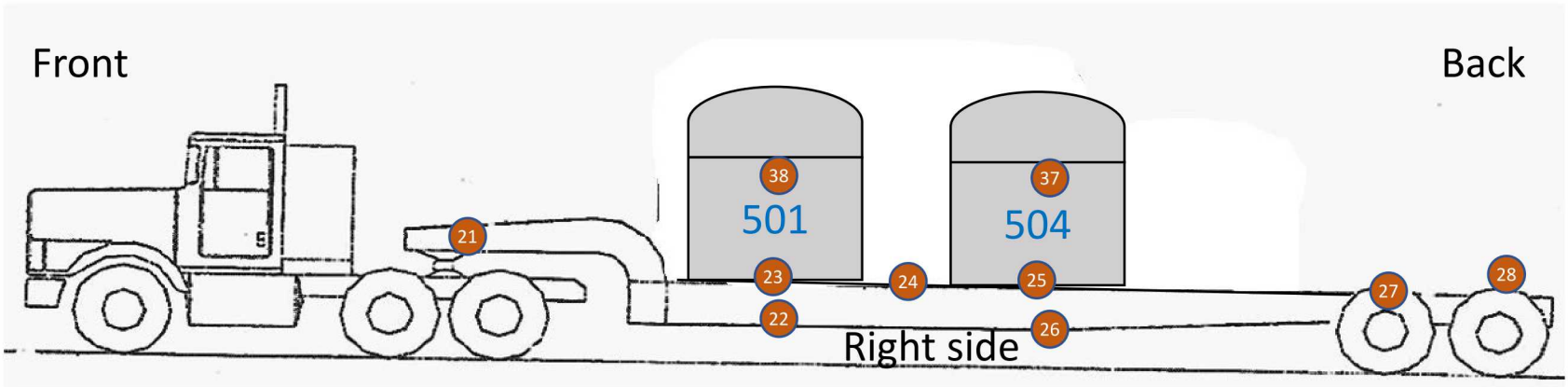
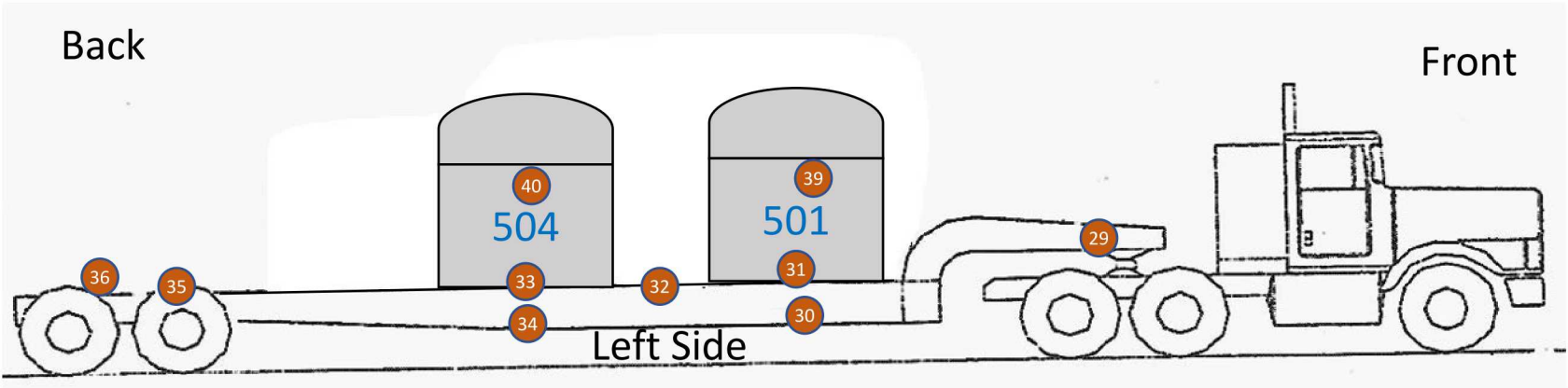
Incoming Tru-Shipment Truck Trailers w/Half-Pacts

Trailer #	306
Front Pact #	505
Back Pact #	510



Incoming Tru-Shipment Truck Trailers w/Half-Pacts

Trailer #	302
Front Pact #	501
Back Pact #	504



LUDLUM 3030 MDA CALCULATION WORKSHEET

Instrument #: <u>278129</u>	Calibration Expires: <u>11/10/2020</u>	Location: Bldg. <u>6585</u> Room <u>Lot</u>
Probe Type: <u>43-10-1</u>	Probe #: <u>171941</u>	
CALCULATION BY: <u>Andrew Collins</u>		DATE: <u>7/20/20</u>

Expected Sample Radionuclide (α): <u>Pu-239</u>	α Detector Efficiency for expected radionuclide (cpd): <u>0.31 (Pu-239)</u>
Expected Sample Radionuclide (β): <u>Cs-137</u>	β Detector Efficiency for expected radionuclide (cpd): <u>0.21 (Cs-137)</u>
Background Count Time (min): <u>1</u>	If background and sample count times are the same, use MDA calculation method 4.6.1.
Sample Count Time (min): <u>1</u>	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 <u>0</u> cpm	β <u>47</u> 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)	
		Nuclide	dpm
α MDA: <u>9</u>	Y ☒ N ☐ N/A ☐		
β MDA: <u>165</u>	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): <u>I-20200720-4</u>			
REVIEWED BY: <u>W. J. W. W. W.</u>		DATE: <u>7/20/2020</u>	
Radiation Protection Line Support Project Leader (or Designee)			

Radiological Survey Report

Survey I-20200720-8

General Information

Title: WIPP MLU Survey for Incoming MLU & Crane
Survey Date/Time: 7/20/2020 09:00
Location: 6585 / Lot, 6593 / Lot
TWD or RTWD #: SPRF-RTWD-018 rev-2
Purpose: Characterization
Requestor Org: 01381
Status: Approved by: Allardice, Amber, 7/20/2020
Ready for Review by: Walton, Edward, 7/20/2020

Lead Surveyor: Rollins, Andrew
Work Order/Task #: N/A

Additional Surveyors

Surveyor
Brasure, Ryan
Kegeler, Stephen
Walton, Edward

Instruments Used

#	Instrument Model	Instrument Serial #	Inst Type	Probe Model	Probe Serial #	Probe Type	Calibration Date	Efficiency	
								β/γ	α
1	3030	276345	C	43-10-1	113586	C	12/10/2020	0.21	0.31
2	3030	276345	C	43-10-1	113586	C	12/10/2020	0.21	0.31
3	RO20	12444	D			D	12/20/2020		
4	RADEYE SX	11150	C	SHP380AB	681	C	9/10/2020	0.14	0.15

Instruments Used - Notes

#	Notes
1	BKG= 0-alpha/ 51-beta/gamma cpm (6585)
2	BKG= 0-alpha/ 48-beta/gamma cpm (6593)
3	BKG= <0.1mR/hr
4	BKG= 1-alpha/ 207-beta/gamma cpm

Radiological Survey Report

Comments:

Survey for characterization of the incoming MLU equipment trailer and a mobile crane. This survey was done to assess the arrival conditions of the vehicles, prior to entry in to TA-V.

The MLU trailer was surveyed on the roadway south of bldg-6585; the crane was surveyed on the lot south of bldg-6593 (SPRF).

At time of survey, no parts of the either vehicle were labeled as being or containing rad material.

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); 200dpm/100cm² (beta/gamma)

Total: 100dpm/100cm² (alpha); 1000dpm/100cm² (beta/gamma)

Swipes taken on the vehicles were counted on a Ludlum 3030 counter.

MLU Trailer: 1-10

Mobile crane: 11-20

All swipes were less than removable contamination limits.

Direct scans on the MLU trailer and crane surfaces were done with a RadeyeSX w/SHP-280AB probe.

All scans were less than total contamination limits.

An RO-20 meter was used for all dose rates.

Attachment-1: 3030 MDA calculation sheet for MLU trailer survey

Attachment-2: 3030 MDA calculation sheet for mobile crane survey

Attachment-3: Pictures of MLU trailer

Attachment-4: Pictures of mobile crane

No radiological concerns were identified.

Radiological Survey Report

Itemized Details - Items

#	Item Location/Description	Comments
1	MLU trailer - front box (left)	
2	MLU trailer - left-front side	
3	MLU trailer - transportainer (left)	
4	MLU trailer - back-left side	
5	MLU trailer - back-left tire	
6	MLU trailer - front box (right)	
7	MLU trailer - front-left side	
8	MLU trailer - transportainer (right)	
9	MLU trailer - back-right side	
10	MLU trailer - back-right tire	
11	Crane large hook left-side	
12	Crane large hook right-side	
13	Crane small hook	
14	Crane front-left tires	
15	Crane back-left tires	
16	Crane front-right tires	
17	Crane back-right tires	
18	Crane ladder rungs	
19	Crane front grill	
20	Crane door handle	

Radiological Survey Report

Alpha Activity

Counting Data Attached: ☐ Yes ☒ No

Radionuclide: Pu-239

Eff. for Removable: Inst:1 Eff: 0.31

Default Bkg Value: 0

Eff. for Total: Inst:N/A Eff:

Default Bkg Units: cpm/100 cm2

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

Radiological Survey Report

Beta-Gamma Activity

Counting Data Attached: ☐ Yes ☒ No

Radionuclide: Cs-137

Eff. for Removable: Inst:1 Eff: 0.21

Default Bkg Value: 51

Eff. for Total: Inst:N/A Eff:

Default Bkg Units: cpm/100 cm2

#	Data	Data Units	Bkg.	Bkg. Units	T/R	Activity	Activity Units
1	50	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
2	35	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
3	36	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
4	44	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
5	32	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
6	40	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
7	32	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
8	48	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
9	42	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
10	48	cpm/100 cm2	51	cpm/100 cm2	R	ND	dpm/100 cm2
11	45	cpm/100 cm2	48	cpm/100 cm2	R	ND	dpm/100 cm2
12	40	cpm/100 cm2	48	cpm/100 cm2	R	ND	dpm/100 cm2
13	48	cpm/100 cm2	48	cpm/100 cm2	R	ND	dpm/100 cm2
14	42	cpm/100 cm2	48	cpm/100 cm2	R	ND	dpm/100 cm2
15	52	cpm/100 cm2	48	cpm/100 cm2	R	19	dpm/100 cm2
16	38	cpm/100 cm2	48	cpm/100 cm2	R	ND	dpm/100 cm2
17	44	cpm/100 cm2	48	cpm/100 cm2	R	ND	dpm/100 cm2
18	50	cpm/100 cm2	48	cpm/100 cm2	R	9.5	dpm/100 cm2
19	40	cpm/100 cm2	48	cpm/100 cm2	R	ND	dpm/100 cm2
20	56	cpm/100 cm2	48	cpm/100 cm2	R	38.1	dpm/100 cm2

Radiological Survey Report

Radiation Survey

Background: <0.1

Background Units: mR/hr

Radiation Type: Beta/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	

Radiological Survey Report

Attachments

Order	Filename	Description	Pages
1	MDA sheet for incoming MLU trailer.pdf	MDA sheet for MLU trailer	1
2	MDA sheet for incoming mobile crane.pdf	MDA sheet for mobile crane	1
3	MLU trailer.pdf	MLU trailer pictures	2
4	Mobile crane.pdf	Mobile crane pictures	3

Instrument #: <u>276345</u>	Calibration Expires: <u>12/10/2020</u>	Location: Bldg. <u>6585</u> Room <u>Lot</u>
Probe Type: <u>43-10-1</u>	Probe #: <u>113586</u>	
CALCULATION BY: <u>Andrew Bollins</u>		DATE: <u>7/20/20</u>

Expected Sample Radionuclide (α): <u>Pu-239</u>	α Detector Efficiency for expected radionuclide (cpd): <u>0.31 (Pu-239)</u>
Expected Sample Radionuclide (β): <u>Cs-137</u>	β Detector Efficiency for expected radionuclide (cpd): <u>0.21 (Cs-137)</u>
Background Count Time (min): <u>1</u>	If background and sample count times are the same, use MDA calculation method 4.6.1.
Sample Count Time (min): <u>1</u>	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 <u>0</u> cpm	β <u>51</u> 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)	
		Nuclide	dpm
α MDA: <u>9</u>	Y ☒ N ☐ N/A ☐	Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20
β MDA: <u>171</u>	Y ☒ N ☐ N/A ☐	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 cm²

List Applicable Survey Number(s): I-20200720-8

REVIEWED BY: Michael E. Weller DATE: 7/20/2020
 Radiation Protection Line Support Project Leader (or Designee)

LUDLUM 3030 MDA CALCULATION WORKSHEET

Instrument #: 276345 Calibration Expires: 12/10/2020 Location: Bldg. 6593 Room Lot

Probe Type: 43-10-1 Probe #: 113586

CALCULATION BY: Andrew Rollins DATE: 7/20/20

Expected Sample Radionuclide (α): Pu-239 α Detector Efficiency for expected radionuclide 0.31 (Pu-239) (cpd):

Expected Sample Radionuclide (β): Cs-137 β Detector Efficiency for expected radionuclide 0.21 (Cs-137) (cpd):

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 48 cpm

Method 4.4.2:

Use when background and sample count times are the same.

$$MDA = \frac{2.71 + 4.65 \sqrt{(R_b * t_b)}}{t_b * E}$$

Method 4.4.3:

Use when background and sample count times are different.

$$MDA = \frac{2.71 + 3.29 \sqrt{(R_b * t_s) \left(1 + \frac{t_s}{t_b}\right)}}{t_s * E}$$

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: <u>9</u>	Y ☒ N ☐ N/A ☐	Nuclide	dpm
β MDA: <u>167</u>	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): <u>I-20200720-8</u>			
REVIEWED BY: <u>Michael E. Watter</u>		DATE: <u>7/20/2020</u>	
Radiation Protection Line Support Project Leader (or Designee)			







CRANE
SERVICE INC.

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5171 CAPACITY 75 TONS

VIN EL028171
USDOT 1677598

CRANE
SERVICE INC.

504

501



