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2021 Annual External Radiation Monitoring Report Paducah Gaseous Diffusion Plant, Paducah, Kentucky

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

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David Hayden
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2021 Annual External Radiation Monitoring Report Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract DE-EM0004895

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CONTENTS

TABLES

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ACRONYMS

ANSI	American National Standards Institute
ASER	annual site environmental report
CY	calendar year
DOE	U.S. Department of Energy
E	effective dose
EMP	environmental monitoring plan
FY	fiscal year
LA	Limited Area
MEI	maximally exposed individual
O	order
OSL	optically stimulated luminescence
PPA	Property Protection Area
TLD	thermoluminescent dosimeter
WKWMA	West Kentucky Wildlife Management Area

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EXECUTIVE SUMMARY

U.S. Department of Energy (DOE) Order (O) 458.1, *Radiation Protection of the Public and the Environment*, has requirements in place to protect the public and environment from radiation exposure. Energy absorbed from radioactive materials outside the body results in an external dose. At the Paducah Site, external doses come from direct ionizing radiation that includes natural radioactivity from cosmic and terrestrial sources and man-made radioactive sources. Results for external gamma and neutron radiation monitoring conducted in 2021 are summarized in this report.

In 2021, the deactivation and remediation contractor conducted routine surveillance of external gamma and neutron radiation exposure to monitor any effects due to past releases of radionuclides and to monitor current operations that involve radioactive sources [e.g., depleted uranium hexafluoride (UF_6) cylinder management].

The primary sources for radiation exposure to areas outside the Limited Area (LA) are the UF_6 cylinder storage yards, which are located within the secured area and are in close proximity to the perimeter fence. Studies conducted within the cylinder storage yards have shown that the cylinders are sources of both gamma and neutron radiation. The neutrons are produced at moderate energy levels by the alpha-fluorine reaction that occurs within the residual UF_6 material. Further studies have indicated that the range of the neutrons is such that the neutron dose rate falls off rapidly with distance.

A surveillance network of thermoluminescent dosimeters (TLDs) and optically stimulated luminescence (OSL) dosimeters monitored areas, which included locations inside LA, Paducah Site perimeter, outfalls, ditches and background locations. Dosimeters were also placed in areas that, historically, received the highest radiation exposure. The objectives and design of the network are described in CP2-ES-0006, *Environmental Monitoring Plan Fiscal Year 2022 Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (EMP) (FRNP 2021a). The EMP is approved by DOE on a fiscal year (FY) basis; accordingly, the EMPs for FY 2021 and FY 2022 apply to calendar year (CY) 2021 TLD and OSL monitoring locations.

In 2021, 15 out of 53 locations showed results statistically above background with 99.7% confidence. Fourteen of these 15 locations were, historically, the areas with the highest measured results throughout the monitoring period. All of these locations were adjacent to or in close proximity of the UF_6 cylinder storage yards and are either in the LA boundary or between the LA boundary and the Property Protection Area boundary, which is not regularly accessible to the public. This means the potential external radiation dose calculated from these locations is not representative of the actual public external radiation dose. The fifteenth location, TLD-40, was located outside the DOE boundary and within the West Kentucky Wildlife Management Area (WKWMA) off Dyke Road.

The Paducah Site licensed a portion of the DOE Reservation to the Kentucky Department of Fish and Wildlife Resources for recreational uses. These areas were open to the public for use; however, there are no residences within the Paducah Site boundary. Public traffic was allowed on the main reservation roads outside of the active plant area as a courtesy to the public, and some members of the public visited the DOE Reservation for recreational purposes. Recreational purposes and durations of time spent in the area by the public were less than full-time.

In 2021, the potential effective dose (E) for the residential exposure scenario at the nearest local residence was found to be equivalent to naturally occurring background or 0.0E+00 millirem (mrem).

In 2021, the potential E for the member of the public at the DOE boundary exposure scenario was 2.0E+00 mrem.

In 2021, three TLD locations inside the DOE boundary were accessible to members of the public. These locations were TLD-14, TLD-96, and TLD-97.

- TLD-14 is near Harmony Cemetery and is located north of the LA and south of Ogden Landing Road. In CY 2009, security restrictions were eased to allow regular public access to Harmony Cemetery. In 2021, the monitoring results for TLD-14 were statistically equivalent to the average mean background; however, they were below the calculated average background for the site. The estimated external radiation dose to a member of the public at this location was 0.0E+00 mrem.

- TLD-96, Food Vendor 1, was located in the C-810 parking lot. In 2021, the monitoring results for TLD-96 were statistically equivalent to the average mean background; however, they were below the calculated average background for the site. The estimated external radiation dose for Food Vendor 1 was 7.6E-01 mrem.

- TLD-97, Food Vendor 2, was located on the east side of the C-100 building. In 2021, the monitoring results for TLD-97 were statistically equivalent to the average mean background; however, they were below the calculated average background for the site. The estimated external radiation dose for Food Vendor 2 was 1.0E-02 mrem.

For 2021, the maximally exposed individual scenario was applied to a potential external radiation E to a member of the public passing through accessible portions of the DOE Reservation where areas of highest exposure were visited 80 hours per year. This scenario showed a member of the public would potentially receive 3.4E+00 mrem/year. This result is consistent with previous results cited in annual site environmental reports (ASERs).

For 2021, an estimated external radiation effective collective dose was calculated by multiplying the scenario dose by a total estimated number of visitors hiking within the WKWMA annually (i.e., 150 persons), which resulted in an estimated external radiation collective E of 5.2E-01 person-rem/year. This result is consistent with previous results cited in ASERs.

Based on the results of measurements in areas accessible to the public or near the closest local residence, the estimated E from external radiation levels received by a member of the public from DOE operations is below the applicable DOE limit of 100 mrem within a year, in accordance with DOE O 458.1.

1. INTRODUCTION

U.S. Department of Energy (DOE) Order (O) 458.1, *Radiation Protection of the Public and the Environment*, has requirements in place to protect the public and environment from radiation exposure. Energy absorbed from radioactive materials outside the body results in an external dose. At the Paducah Site, external doses come from direct ionizing radiation that includes natural radioactivity from cosmic and terrestrial sources and man-made radioactive sources. Results for external gamma and neutron radiation monitoring conducted in 2021 are summarized in this report.

In 2021, the deactivation and remediation (D&R) contractor conducted routine surveillance of external gamma and neutron radiation exposure to monitor any effects due to past releases of radionuclides and current operations involving radioactive sources [e.g., depleted uranium hexafluoride (UF_6) cylinder management].

The primary sources for radiation exposure to areas outside the Limited Area (LA) are the UF_6 cylinder storage yards, which are located within the secured area and are in close proximity to the perimeter fence. Studies conducted within the cylinder storage yards have shown that the cylinders are sources of both gamma and neutron radiation. The neutrons are produced at moderate energy levels by the alpha-fluorine reaction that occurs within the residual UF_6 material. Further studies have indicated that the range of the neutrons is such that the neutron dose rate falls off rapidly with distance.

A surveillance network of thermoluminescent dosimeters (TLDs) and optically stimulated luminescence (OSL) dosimeters monitored areas that included locations inside the LA, Paducah Site perimeter, outfalls, ditches, and background locations. Dosimeters were also placed in areas that, historically, received the highest radiation exposure. The objectives and design of the network are described in CP2-ES-0006, *Environmental Monitoring Plan Fiscal Year 2022 Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (EMP) (FRNP 2021a). The EMP is approved by DOE on a fiscal year (FY) basis; accordingly, the EMPs for FY 2021 and FY 2022 apply to calendar year (CY) 2021 TLD and OSL monitoring locations.

2. METHODOLOGY

2.1 MEASUREMENT OF DIRECT RADIATION

The D&R Contractor used the Global Dosimetry Solutions Environmental TLD 110 Dosimeter received from Mirion Technologies, Inc. of Oak Ridge, Tennessee, to measure external gamma radiation. This TLD is manufactured by ThermoRMP and meets American National Standards Institute (ANSI) N545-1975 standards. This type of TLD measures low-level gamma radiation and is designed for outdoor applications. This four-chip Harshaw TLD includes two calcium fluoride 200 chips and two lithium fluoride 100 chips.

The literature that supports the use of this dosimeter indicates the following:

- Energy response range is 40 keV to 6 MeV; and
- Lower level of detection is 5 milliroentgen (mR)/month and 10 mR/quarter.

Mirion Technologies, Inc. processed the dosimeters received from the D&R Contractor following their internal processes, protocols, and quality control routines; Mirion Technologies, Inc. provided reports of these results to the D&R Contractor.

The D&R Contractor used the InLight-LDR Model 2T OSL Dosimeter received from Landauer of Glenwood, Illinois, to measure external neutron radiation. This environmental dosimeter is designed to meet ANSI N545 Standard and ANSI/Health Physics Society Standard N13.37. This type of dosimeter uses a carbon four-chip, aluminum oxide dosimeter that exhibits OSL when exposed to a light-emitting diode array. The OSL dosimeter is combined with an integrated CR-39 neutron chip. This chip is an allyl diglycol carbonate-based, solid-state nuclear track detector that is not sensitive to X-ray, beta, or gamma radiation. The CR-39 neutron chip is intended for fast, intermediate, and thermal neutrons. The left area of the chip uses a polyethylene radiator for fast neutrons, while the right area uses a boron loaded Teflon™ radiator for fast, intermediate, and thermal neutrons that record alpha particles that result from neutron interactions in the dosimeter. The literature supporting this dosimeter indicates the following:

- Thermal neutron energy range is 0.25 electron volt (eV) to 40 eV;
- Thermal neutron detection range is 10 mrem to 5 rem;
- Fast neutron energy range is 40 keV to 40 MeV; and
- Fast neutron detection range is 20 mrem to 25 mrem.

Landauer processed the dosimeters received from the D&R Contractor by following their internal processes, protocols, and quality control routines. Landauer provided reports of these results to the D&R Contractor.

2.2 SURVEILLANCE NETWORK

The D&R Contractor used a total of 66 TLD locations and 7 OSL locations, along with one control location in 2021 (see Appendix A, Figure A.1, and Table A.1).

Coordinates for monitoring locations were determined using a differential global positioning system and data were entered into the Paducah Site geographic information system. No dosimeters were placed in radiologically contaminated areas.

The network of TLD and OSL locations, along with analysis of their data, served to monitor changes in external radiation measures over time and any accidental releases of radioactive material related to D&R Contractor operational activities conducted for DOE.

The network of TLD and OSL locations was divided into the following groups for data analysis.

- Background—There were 13 TLD locations used for background data analysis because they were unaffected by Paducah Site operations or other site-specific radiation sources. These locations were TLD-22, TLD-54, TLD-85, TLD-86, TLD-87, TLD-88, TLD-89, TLD-90, TLD-91, TLD-92, TLD-93, TLD-94, and TLD-95.

- LA—There were 13 TLD locations and 4 OSL locations inside or on the perimeter of the LA. Due to Paducah Site security protocols, the public did not have access to the Paducah Site LA boundary fence; therefore, the external radiation measured at the LA boundary fence was not applicable to members of the public. TLD locations were TLD-3, TLD-4, TLD-5, TLD-6, TLD-50, TLD-52, TLD-59, TLD-60, TLD-61, TLD-62, TLD-63, TLD-65, and TLD-68. OSL locations were TLD-3, TLD-50, TLD-65, and TLD-68.

- Outside the LA boundary and inside the Property Protection Area (PPA) boundary—There were 22 TLD locations and 3 OSL locations outside the LA and inside the PPA boundary. TLD locations were TLD-1, TLD-2, TLD-7, TLD-13, TLD-15, TLD-25, TLD-35, TLD-37, TLD-46, TLD-53, TLD-

58, TLD-64, TLD-69, TLD-70, TLD-71, TLD-72, TLD-78, TLD-81, TLD-82, TLD-83, TLD-96, and TLD-97. OSL locations were TLD-2, TLD-81, and TLD-83.

- Outside the PPA and inside the DOE boundary—There were 11 TLD locations outside the PPA and inside the DOE boundary that were not background locations. TLD locations were TLD-9, TLD-12, TLD-14, TLD-19, TLD-38, TLD-66, TLD-67, TLD-76, TLD-77, TLD-79, and TLD-84.

- Outside the DOE boundary—There were 7 TLD locations outside the DOE boundary that were not background TLD locations. TLD locations were TLD-16, TLD-30, TLD-40, TLD-73, TLD-74, TLD-75, and TLD-80.

- Control—Trip blank and field blank TLDs stored inside a "Lead Box" that is stored in the C-101 dosimetry office.

Results of the TLD and OSL data analysis are presented in Section 3.

2.3 DATA COLLECTION

TLDs and OSLs were placed at monitoring locations and then collected and analyzed quarterly. When TLDs and OSLs were collected, the following quarter's TLDs and OSLs were placed at the same locations when possible. Appendix B lists the TLD and OSL collection dates.

One TLD per quarterly sampling event was designated as a field blank and was carried to all monitoring locations during placement and collection of the TLDs. One control TLD (i.e., trip blank TLD) was retained in the C-101 dosimetry office and then used as a transit blank that accompanied the TLDs when they were shipped off-site for analysis. TLDs and OSLs that included background and trip blank locations were placed as described in Table A.1.

The TLDs were kept in the original flexible protective packaging and then placed in a wide-mouth, plastic sample bottle when deployed to the monitoring location. A lid was screwed on the bottle and a nylon wire tie was wrapped around each bottle (i.e., under the lid) to secure it to a fence or other fixed structure, usually at a height of approximately 3 to 4 ft aboveground. The plastic packaging and sample bottle provided a sturdy weather-resistant package that did not significantly attenuate gamma radiation (i.e., induce a negative bias on the measurement).

The OSLs were kept in the original flexible protective packaging and then placed in a wide-mouth, plastic sample bottle when deployed to the monitoring location. A lid was screwed on the bottle and a nylon wire tie was wrapped around each bottle (i.e., under the lid) to secure to a Lucite block (to simulate the albedo effect) that was attached to a fence or other fixed structure, usually at a height approximately 3 to 4 ft aboveground.

Based on process knowledge from historical surveys, the siting of dosimeters outside the bounds of radiological contamination areas, and the class 3 radiological surveys performed by Radiation Protection to release the dosimeters prior to shipment to the vendor, the dosimeters were noncontaminated and nonregulated for the purposes of handling and shipping (i.e., contamination levels are below DOE release criteria and U.S. Department of Transportation levels for regulated materials).

2.4 TLD AND OSL LOCATION CHANGES

On March 2, 2021, an additional TLD location (i.e., TLD-97) was installed on the east side of the C-100 building (on light pole T-13-A) to represent food vendor occupancy. This raised the total TLD locations used to measure external gamma radiation from 65 to 66 locations.

Additionally, there were LA and PPA boundary fencing changes during 2021, which resulted in TLD-46 moving from the LA group to the outside the LA and inside the PPA boundary group.

2.5 DATA REPORTING

2.5.1 Direct Gamma Radiation

Direct gamma radiation exposure is reported in mR, which is a measure of exposure in terms of ionizations in the air.

All the direct gamma radiation data presented in this report has been converted to mrem using a 1:1 ratio.

2.5.2 Direct Neutron Radiation

Direct neutron radiation exposure is reported in mrem.

3. TLD AND OSL RESULTS

Design analysis and calculation DAC-ENV-FA5810-0006, *2021 Annual External Radiation Monitoring Report*, documents the equations, assumptions, and results that were summarized in this report.

TLD analytical data can be found in Appendix C.

OSL analytical data can be found in Appendix D.

3.1 FIRST QUARTER TLD AND OSL RESULTS

3.1.1 TLD Results

There were 66 TLD locations monitored for external gamma radiation for an average of 95 days. Results ranged from 14 to 504 mrem.

The background results ranged from 20 to 25 mrem. The mean background result was 22 mrem.

The field blank result was 6 mrem, and the trip blank result was 12 mrem. These results were indistinguishable from background, likely due to storage inside lead shielding where they were kept.

Tables 1 through 5 show the results for the first quarter.

Table 1. First Quarter Results for Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	1/6/2021	4/12/2021	96	22	0.23
650	54	1/6/2021	4/12/2021	96	22	0.23
678	85	1/6/2021	4/12/2021	97	21	0.22
679	86	1/6/2021	4/12/2021	96	22	0.23
680	87	1/6/2021	4/12/2021	96	22	0.23
681	88	1/6/2021	4/12/2021	96	22	0.23
682	89	1/6/2021	4/12/2021	96	23	0.24
683	90	1/6/2021	4/12/2021	96	21	0.22
684	91	1/6/2021	4/12/2021	96	23	0.24
685	92	1/6/2021	4/12/2021	96	20	0.21
686	93	1/6/2021	4/12/2021	96	20	0.21
687	94	1/6/2021	4/12/2021	96	22	0.23
688	95	1/6/2021	4/12/2021	96	25	0.26

Table 2. First Quarter Results for the LA TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
627	3	1/7/2021	4/12/2021	95	22	0.23
628	4	1/7/2021	4/12/2021	95	20	0.21
629	5	1/7/2021	4/12/2021	95	22	0.23
630	6	1/7/2021	4/12/2021	95	19	0.20
647	50	1/7/2021	4/12/2021	95	47	0.49
648	52	1/7/2021	4/12/2021	95	18	0.19
652	59	1/5/2021	4/12/2021	97	17	0.18
653	60	1/7/2021	4/12/2021	95	386	4.06
654	61	1/7/2021	4/12/2021	95	504	5.31
655	62	1/5/2021	4/12/2021	97	18	0.19
656	63	1/7/2021	4/13/2021	96	15	0.16
658	65	1/7/2021	4/12/2021	95	17	0.18
661	68	1/7/2021	4/12/2021	95	22	0.23

Table 3. First Quarter Results for TLD Locations Outside the LA and Inside the PPA Boundary

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
625	1	1/7/2021	4/12/2021	95	220	2.32
626	2	1/6/2021	4/12/2021	96	282	2.94
631	7	1/6/2021	4/12/2021	96	25	0.26
634	13	1/6/2021	4/12/2021	96	24	0.25
636	15	1/7/2021	4/12/2021	95	17	0.18
640	25	1/6/2021	4/12/2021	96	28	0.29
642	35	1/6/2021	4/12/2021	96	23	0.24
643	37	1/7/2021	4/12/2021	95	20	0.21
646	46	16/2021	4/12/2021	96	20	0.21

Table 3. First Quarter Results for TLD Locations Outside the LA and Inside the PPA Boundary (Continued)

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
649	53	1/6/2021	4/12/2021	96	115	1.20
651	58	1/7/2021	4/12/2021	95	14	0.15
657	64	1/7/2021	4/12/2021	95	16	0.17
662	69	1/7/2021	4/12/2021	95	17	0.18
663	70	1/7/2021	4/12/2021	95	41	0.43
664	71	1/7/2021	4/12/2021	95	25	0.26
665	72	1/6/2021	4/12/2021	96	23	0.24
671	78	1/6/2021	4/12/2021	96	24	0.25
674	81	1/7/2021	4/12/2021	95	101	1.06
675	82	1/6/2021	4/12/2021	96	30	0.31
676	83	1/6/2021	4/12/2021	96	72	0.75
689	96	1/7/2021	4/12/2021	95	22	0.23
692	97	3/2/2021	4/13/2021	42	15	0.36

Table 4. First Quarter Results for TLD Locations Outside the PPA and Inside the DOE Boundary*

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
632	9	1/6/2021	4/12/2021	96	18	0.19
633	12	1/6/2021	4/12/2021	96	19	0.20
635	14	1/7/2021	4/12/2021	95	18	0.19
638	19	1/6/2021	4/12/2021	96	20	0.21
644	38	1/6/2021	4/12/2021	96	22	0.23
659	66	1/7/2021	4/12/2021	95	18	0.19
660	67	1/7/2021	4/12/2021	95	22	0.23
669	76	1/6/2021	4/12/2021	96	19	0.20
670	77	1/6/2021	4/12/2021	96	22	0.23
672	79	1/7/2021	4/12/2021	95	20	0.21
677	84	1/7/2021	4/12/2021	95	18	0.19

*TLD-86 is located outside the PPA and inside the DOE boundary. It is not listed in this table because it is a background TLD and is listed in Table 1.

Table 5. First Quarter Results for the TLD Locations Outside the DOE Boundary[a,b]

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
637	16	1/6/2021	4/12/2021	96	23	0.24
641	30	1/6/2021	4/12/2021	96	23	0.24
645	40	1/6/2021	4/12/2021	96	26	0.27
666	73	1/6/2021	4/12/2021	96	15	0.16
667	74	1/6/2021	4/12/2021	96	25	0.26
668	75	1/6/2021	4/12/2021	96	21	0.22
673	80	1/6/2021	4/12/2021	96	23	0.24

[a] Background TLDs located outside the DOE Boundary are not listed in this table because they are listed in Table 1.
[b] The result for TLD-73 was estimated for this quarter because the TLD was found missing. Equation used for the estimate for TLD-73 can be found in Section 5.6.1 of DAC-ENV-FA5810-0006, *2021 Annual External Radiation Monitoring Report*.

3.1.2 OSL Results

In the first quarter, 7 locations were monitored for external neutron radiation for an average of 95 days (see Table 6).

All results collected in the first quarter were reported as "M" (i.e., dose equivalents below the minimum measureable quantity); therefore, analysis of annual neutron dose was not required and no dose equations were used.

Table 6. First Quarter Results for OSL Locations

Landauer Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Total Neutron	Fast Neutron	Thermal Neutron
2882	2	1/6/2021	4/12/2021	96	M	M	M
2883	3	1/7/2021	4/12/2021	95	M	M	M
2884	50	1/7/2021	4/12/2021	95	M	M	M
2885	65	1/7/2021	4/12/2021	95	M	M	M
2886	68	1/7/2021	4/12/2021	95	M	M	M
2887	81	1/7/2021	4/12/2021	95	M	M	M
2888	83	1/6/2021	4/12/2021	96	M	M	M

3.2 SECOND QUARTER TLD AND OSL RESULTS

3.2.1 TLD Results

There were 66 TLD locations monitored for external gamma radiation for an average of 85 days. Results ranged from 12 to 496 mrem.

The background results ranged from 15 to 19 mrem. The mean background was 17 mrem.

The field blank result was 12 mrem, and trip blank result was 12 mrem. These results were indistinguishable from background, likely due to storage inside lead shielding where they were kept.

Tables 7 through 11 show the results for the second quarter.

Table 7. Second Quarter Results for Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	4/12/2021	7/6/2021	85	17	0.20
650	54	4/12/2021	7/6/2021	85	19	0.22
678	85	4/12/2021	7/6/2021	85	16	0.19
679	86	4/12/2021	7/6/2021	85	16	0.19
680	87*	4/12/2021	7/6/2021	85	16	0.19
681	88	4/12/2021	7/6/2021	85	16	0.19
682	89	4/12/2021	7/6/2021	85	19	0.22
683	90	4/12/2021	7/6/2021	85	16	0.19
684	91	4/12/2021	7/6/2021	85	17	0.20
685	92*	4/12/2021	7/6/2021	85	15	0.18
686	93	4/12/2021	7/6/2021	85	16	0.19
687	94	4/12/2021	7/6/2021	85	18	0.21
688	95	4/12/2021	7/6/2021	85	19	0.22

*The result for TLD-92 was estimated for this quarter because the TLD was missing. Equation used for the estimate can be found in Section 5.6.3 of DAC-ENV-FA5810-0006, *2021 Annual External Radiation Monitoring Report*.

Table 8. Second Quarter Results for the LA TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
627	3	4/12/2021	7/6/2021	85	17	0.20
628	4	4/12/2021	7/6/2021	85	17	0.20
629	5	4/12/2021	7/6/2021	85	18	0.21
630	6	4/12/2021	7/6/2021	85	14	0.16
647	50	4/12/2021	7/6/2021	85	40	0.47
648	52	4/12/2021	7/6/2021	85	14	0.16
652	59	4/12/2021	7/6/2021	85	16	0.19
653	60	4/12/2021	7/6/2021	85	290	3.41
654	61	4/12/2021	7/6/2021	85	496	5.84
655	62	4/12/2021	7/6/2021	85	14	0.16
656	63	4/12/2021	7/6/2021	84	15	0.18
658	65	4/12/2021	7/6/2021	85	14	0.16
661	68	4/12/2021	7/6/2021	85	18	0.21

Table 9. Second Quarter Results for TLD Locations Outside the LA and Inside the PPA Boundary

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
625	1	4/12/2021	7/6/2021	85	173	2.04
626	2	4/12/2021	7/6/2021	85	210	2.47
631	7	4/12/2021	7/6/2021	85	21	0.25
634	13	4/12/2021	7/6/2021	85	18	0.21
636	15	4/12/2021	7/6/2021	85	14	0.16
640	25	4/12/2021	7/6/2021	85	22	0.26
642	35	4/12/2021	7/6/2021	85	21	0.25
643	37	4/12/2021	7/6/2021	85	18	0.21
646	46	4/12/2021	7/6/2021	85	14	0.16
649	53	4/12/2021	7/6/2021	85	94	1.11
651	58	4/12/2021	7/6/2021	85	12	0.14
657	64	4/12/2021	7/6/2021	85	15	0.18
662	69	4/12/2021	7/6/2021	85	14	0.16
663	70	4/12/2021	7/6/2021	85	34	0.40
664	71	4/12/2021	7/6/2021	85	19	0.22
665	72	4/12/2021	7/6/2021	85	19	0.22
671	78	4/12/2021	7/6/2021	85	19	0.22
674	81	4/12/2021	7/6/2021	85	68	0.80
675	82	4/12/2021	7/6/2021	85	24	0.28
676	83	4/12/2021	7/6/2021	85	50	0.59
689	96	4/12/2021	7/6/2021	85	16	0.19
692	97	4/12/2021	7/6/2021	84	14	0.17

Table 10. Second Quarter Results for TLD Locations Outside the PPA and Inside the DOE Boundary[a,b]

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
632	9	4/12/2021	7/6/2021	85	17	0.20
633	12	4/12/2021	7/6/2021	85	15	0.18
635	14	4/12/2021	7/6/2021	85	15	0.18
638	19	4/12/2021	7/6/2021	85	17	0.20
644	38	4/12/2021	7/6/2021	85	18	0.21
659	66	4/12/2021	7/6/2021	85	17	0.20
660	67	4/12/2021	7/6/2021	85	18	0.21
669	76	4/12/2021	7/6/2021	85	16	0.19
670	77	4/12/2021	7/6/2021	85	16	0.19
672	79	4/12/2021	7/6/2021	85	15	0.18
677	84	4/12/2021	7/6/2021	85	16	0.19

[a] TLD-86 is located outside the PPA and inside the DOE boundary. It is not listed in this table because it is a background TLD and is listed in Table 7.
[b] The result for TLD-84 was estimated for this quarter because the TLD was missing. The equation used for the estimate can be found in Section 5.6.2 DAC-ENV-FA5810-0006 *2021 Annual External Radiation Monitoring Report*.

Table 11. Second Quarter Results for TLD Locations Outside the DOE Boundary*

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
637	16	4/12/2021	7/6/2021	85	18	0.21
641	30	4/12/2021	7/6/2021	85	18	0.21
645	40	4/12/2021	7/6/2021	85	21	0.25
666	73	4/12/2021	7/6/2021	85	15	0.18
667	74	4/12/2021	7/6/2021	85	18	0.21
668	75	4/12/2021	7/6/2021	85	19	0.22
673	80	4/12/2021	7/6/2021	85	16	0.19

*Background TLDs located outside the DOE boundary are not listed in this table because they are listed in Table 7.

3.2.2 OSL Results

In the second quarter, 7 locations were monitored for external neutron radiation for an average of 85 days (see Table 12).

All neutron results collected in the second quarter were reported as "M" (i.e., dose equivalents below the minimum measureable quantity); therefore, analysis of annual neutron dose was not required and no dose equations were used.

Table 12. Second Quarter Results for OSL Locations

Landauer Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Total Neutron	Fast Neutron	Thermal Neutron
2882	2	4/12/2021	7/6/2021	85	M	M	M
2883	3	4/12/2021	7/6/2021	85	M	M	M
2884	50	4/12/2021	7/6/2021	85	M	M	M
2885	65	4/12/2021	7/6/2021	85	M	M	M
2886	68	4/12/2021	7/6/2021	85	M	M	M
2887	81	4/12/2021	7/6/2021	85	M	M	M
2888	83	4/12/2021	7/6/2021	85	M	M	M

3.3 THIRD QUARTER TLD AND OSL RESULTS

3.3.1 TLD Results

There were 66 TLD locations monitored for external gamma radiation for an average of 86 days. Results ranged from 12 to 558 mrem.

The background results ranged from 16 to 19 mrem. The mean background result was 17 mrem.

The field blank result was 11 mrem, and the trip blank result was 11 mrem. These results were indistinguishable from background, likely due to storage inside lead shielding where they were kept.

Tables 13 through Table 17 show the results for the third quarter.

Table 13. Third Quarter Results for Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	7/6/2021	9/30/2021	86	19	0.22
650	54	7/6/2021	9/30/2021	86	17	0.20
678	85	7/6/2021	9/30/2021	86	18	0.21
679	86	7/6/2021	9/30/2021	86	17	0.20
680	87	7/6/2021	9/30/2021	86	16	0.19
681	88	7/6/2021	9/30/2021	86	17	0.20
682	89	7/6/2021	9/30/2021	86	18	0.21
683	90	7/6/2021	9/30/2021	86	17	0.20
684	91	7/6/2021	9/30/2021	86	17	0.20
685	92	7/6/2021	9/30/2021	86	17	0.20
686	93	7/6/2021	9/30/2021	86	17	0.20
687	94	7/6/2021	9/30/2021	86	17	0.20
688	95	7/6/2021	9/30/2021	86	18	0.21

Table 14. Third Quarter Results for the LA TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
627	3	7/6/2021	9/30/2021	86	18	0.21
628	4	7/6/2021	9/30/2021	86	16	0.19
629	5	7/6/2021	9/30/2021	86	18	0.21
630	6	7/6/2021	9/30/2021	86	16	0.19
647	50	7/6/2021	9/30/2021	86	42	0.49
648	52	7/6/2021	9/30/2021	86	15	0.17
652	59	7/6/2021	9/30/2021	86	15	0.17
653	60	7/6/2021	9/30/2021	86	348	4.05
654	61	7/6/2021	9/30/2021	86	558	6.49
655	62	7/6/2021	9/30/2021	86	14	0.16
656	63	7/6/2021	9/30/2021	86	15	0.17
658	65	7/6/2021	9/30/2021	86	15	0.17
661	68	7/6/2021	9/30/2021	86	19	0.22

Table 15. Third Quarter Results for TLD Locations Outside the LA and Inside the PPA Boundary

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
625	1	7/6/2021	9/30/2021	86	198	2.30
626	2	7/6/2021	9/30/2021	86	211	2.45
631	7	7/6/2021	9/30/2021	86	24	0.28
634	13	7/6/2021	9/30/2021	86	17	0.20
636	15	7/6/2021	9/30/2021	86	14	0.16
640	25	7/6/2021	9/30/2021	86	26	0.30
642	35	7/6/2021	9/30/2021	86	22	0.26
643	37	7/6/2021	9/30/2021	86	18	0.21
646	46	7/6/2021	9/30/2021	86	16	0.19
649	53	7/6/2021	9/30/2021	86	94	1.09
651	58	7/6/2021	9/30/2021	86	12	0.14
657	64	7/6/2021	9/30/2021	86	15	0.17
662	69	7/6/2021	9/30/2021	86	14	0.16
663	70	7/6/2021	9/30/2021	86	37	0.43
664	71	7/6/2021	9/30/2021	86	23	0.27
665	72	7/6/2021	9/30/2021	86	20	0.23
671	78	7/6/2021	9/30/2021	86	20	0.23
674	81	7/6/2021	9/30/2021	86	138	1.60
675	82	7/6/2021	9/30/2021	86	25	0.29
676	83	7/6/2021	9/30/2021	86	61	0.71
689	96	7/6/2021	9/30/2021	86	18	0.21
692	97	7/6/2021	9/30/2021	86	15	0.17

Table 16. Third Quarter Results for the TLD Locations Outside the PPA and Inside the DOE Boundary*

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
632	9	7/6/2021	9/30/2021	86	15	0.17
633	12	7/6/2021	9/30/2021	86	15	0.17
635	14	7/6/2021	9/30/2021	86	15	0.17
638	19	7/6/2021	9/30/2021	86	18	0.21
644	38	7/6/2021	9/30/2021	86	19	0.22
659	66	7/6/2021	9/30/2021	86	19	0.22
660	67	7/6/2021	9/30/2021	86	18	0.21
669	76	7/6/2021	9/30/2021	86	17	0.20
670	77	7/6/2021	9/30/2021	86	17	0.20
672	79	7/6/2021	9/30/2021	86	16	0.19
677	84	7/6/2021	9/30/2021	86	19	0.22

*TLD-86 is located outside the PPA and inside the DOE boundary. It is not listed in this table because it is a background TLD and is listed in Table 13.

Table 17. Third Quarter Results for TLD Locations Outside the DOE Boundary*

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
637	16	7/6/2021	9/30/2021	86	18	0.21
641	30	7/6/2021	9/30/2021	86	20	0.23
645	40	7/6/2021	9/30/2021	86	23	0.27
666	73	7/6/2021	9/30/2021	86	15	0.17
667	74	7/6/2021	9/30/2021	86	20	0.23
668	75	7/6/2021	9/30/2021	86	18	0.21
673	80	7/6/2021	9/30/2021	86	18	0.21

*Background TLDs located outside the DOE boundary are not listed in this table because theyare listed in Table 13.

3.3.2 OSL Results

In the third quarter, 7 locations were monitored for external neutron radiation for an average of 86 days (see Table 18).

All neutron results collected in the third quarter were reported as “M” (i.e., dose equivalents below the minimum measureable quantity); therefore, analysis of annual neutron dose was not required and no dose equations were used.

Table 18. Third Quarter Results for OSL Locations

Landauer Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Total Neutron	Fast Neutron	Thermal Neutron
2882	2	7/6/2021	9/30/2021	86	M	M	M
2883	3	7/6/2021	9/30/2021	86	M	M	M
2884	50	7/6/2021	9/30/2021	86	M	M	M
2885	65	7/6/2021	9/30/2021	86	M	M	M
2886	68	7/6/2021	9/30/2021	86	M	M	M
2887	81	7/6/2021	9/30/2021	86	M	M	M
2888	83	7/6/2021	9/30/2021	86	M	M	M

3.4 FOURTH QUARTER TLD AND OSL RESULTS

3.4.1 TLD Results

There were 66 TLD locations monitored for external gamma radiation for an average of 111 days. Results ranged from 11 to 467 mrem.

The background results ranged from 14 to 18 mrem. The mean background result was 16 mrem.

The field blank result was 8 mrem, and the trip blank result was 9 mrem. These results were indistinguishable from background, likely due to storage inside lead shielding where they were kept.

Tables 19 through 23 show the results for the fourth quarter.

Table 19. Fourth Quarter Results for Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	9/30/2021	1/19/2022	111	18	0.16
650	54	9/30/2021	1/20/2022	112	16	0.14
678	85	9/30/2021	1/19/2022	111	16	0.14
679	86	9/30/2021	1/19/2022	111	17	0.15
680	87	9/30/2021	1/19/2022	111	15	0.14
681	88	9/30/2021	1/19/2022	111	15	0.14
682	89	9/30/2021	1/19/2022	111	16	0.14
683	90	9/30/2021	1/19/2022	111	17	0.15
684	91	9/30/2021	1/19/2022	111	14	0.13
685	92	9/30/2021	1/19/2022	111	14	0.13
686	93	9/30/2021	1/19/2022	111	14	0.13
687	94	9/30/2021	1/19/2022	111	17	0.15
688	95	9/30/2021	1/19/2022	111	16	0.14

Table 20. Fourth Quarter Results for the LA TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
627	3	9/30/2021	1/19/2022	111	15	0.14
628	4	9/30/2021	1/19/2022	111	15	0.14
629	5	9/30/2021	1/19/2022	111	17	0.15
630	6	9/30/2021	1/19/2022	111	13	0.12
647	50	9/30/2021	1/19/2022	111	36	0.32
648	52	9/30/2021	1/19/2022	111	14	0.13
652	59	9/30/2021	1/19/2022	111	12	0.11
653	60	9/30/2021	1/19/2022	111	279	2.51
654	61	9/30/2021	1/19/2022	111	467	4.21
655	62	9/30/2021	1/19/2022	111	13	0.12
656	63	9/30/2021	1/19/2022	111	11	0.10
658	65	9/30/2021	1/19/2022	111	12	0.11
661	68	9/30/2021	1/19/2022	111	16	0.14

Table 21. Fourth Quarter Results for TLD Locations Outside the LA and Inside the PPA Boundary

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
625	1	9/30/2021	1/19/2022	111	167	1.50
626	2	9/30/2021	1/19/2022	111	253	2.28
631	7	9/30/2021	1/19/2022	111	20	0.18
634	13	9/30/2021	1/19/2022	111	16	0.14
636	15	9/30/2021	1/19/2022	111	13	0.12
640	25	9/30/2021	1/19/2022	111	21	0.19
642	35	9/30/2021	1/19/2022	111	19	0.17
643	37	9/30/2021	1/19/2022	111	15	0.14
646	46	9/30/2021	1/19/2022	111	15	0.14
649	53	9/30/2021	1/19/2022	111	89	0.80
651	58	9/30/2021	1/19/2022	111	12	0.11
657	64	9/30/2021	1/19/2022	111	11	0.10
662	69	9/30/2021	1/19/2022	111	12	0.11

Table 21. Fourth Quarter Results for TLD Locations Outside the LA and Inside the PPA Boundary (Continued)

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
663	70	9/30/2021	1/19/2022	111	29	0.26
664	71	9/30/2021	1/19/2022	111	22	0.20
665	72	9/30/2021	1/19/2022	111	16	0.14
671	78	9/30/2021	1/19/2022	111	19	0.17
674	81	9/30/2021	1/19/2022	111	74	0.67
675	82	9/30/2021	1/19/2022	111	23	0.21
676	83	9/30/2021	1/19/2022	111	51	0.46
689	96	9/30/2021	1/19/2022	111	14	0.13
692	97	9/30/2021	1/19/2022	111	13	0.12

Table 22. Fourth Quarter Results for the TLD Locations Outside the PPA and Inside the DOE Boundary*

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
632	9	9/30	1/19/2022	111	13	0.12
633	12	9/30	1/19/2022	111	14	0.13
635	14	9/30	1/19/2022	111	14	0.13
638	19	9/30	1/19/2022	111	14	0.13
644	38	9/30	1/19/2022	111	16	0.14
659	66	9/30	1/19/2022	111	15	0.14
660	67	9/30	1/19/2022	111	17	0.15
669	76	9/30	1/19/2022	111	16	0.14
670	77	9/30	1/19/2022	111	15	0.14
672	79	9/30	1/19/2022	111	14	0.13
677	84	9/30	1/19/2022	111	17	0.15

*TLD-86 is located outside the PPA and inside the DOE boundary. It is not listed in this table because it is a background TLD and is listed in Table 19.

Table 23. Fourth Quarter Results for TLD Locations Outside the DOE Boundary*

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
637	16	9/30/2021	1/19/2022	111	17	0.15
641	30	9/30/2021	1/19/2022	111	16	0.14
645	40	9/30/2021	1/19/2022	111	19	0.17
666	73	9/30/2021	1/19/2022	111	13	0.12
667	74	9/30/2021	1/19/2022	111	19	0.17
668	75	9/30/2021	1/19/2022	111	15	0.14
673	80	9/30/2021	1/19/2022	111	14	0.13

*Background TLDs located outside the DOE boundary are not listed in this table because they are listed in Table 19.

3.4.2 OSL Results

In the fourth quarter, 7 locations were monitored for external neutron radiation for an average of 111 days (see Table 24).

All neutron results collected in the fourth quarter were reported as “M” (i.e., dose equivalents below the minimum measureable quantity); therefore, analysis of annual neutron dose was not required and no dose equations were used.

Table 24. Fourth Quarter Results for OSL Locations

Landauer Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Total Neutron	Fast Neutron	Thermal Neutron
2882	2	9/30/2021	1/19/2022	111	M	M	M
2883	3	9/30/2021	1/19/2022	111	M	M	M
2884	50	9/30/2021	1/19/2022	111	M	M	M
2885	65	9/30/2021	1/19/2022	111	M	M	M
2886	68	9/30/2021	1/19/2022	111	M	M	M
2887	81	9/30/2021	1/19/2022	111	M	M	M
2888	83	9/30/2021	1/19/2022	111	M	M	M

3.5 ANNUAL TLD AND OSL RESULTS

3.5.1 Annualized TLD Results Summary

There were 66 TLD locations monitored for external gamma radiation for an average of 377 days. Annualized results ranged from 48 to 1,961 mrem.

The annualized background results ranged from 64 to 75 mrem. The annualized mean background result was 69 mrem.

Tables 25 through 31 show the annualized results.

Table 25. Annualized Results for Background TLD Locations

TLD Location Number	Total Monitored Effective Dose (mrem)	Total Exposure Days	Annualized Effective Dose (mrem)	Mean Background (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
22	76	378	73	69	4	0.012	0.001
54	74	379	71	69	2	0.006	0.000
85	71	379	68	69	-1	-0.002	0.000
86	72	378	70	69	1	0.001	0.000
87	69	378	67	69	-2	-0.007	0.000
88	70	378	68	69	-1	-0.004	0.000
89	76	378	73	69	4	0.012	0.001
90	71	378	69	69	0	-0.001	0.000
91	71	378	69	69	0	-0.001	0.000
92	66	378	64	69	-5	-0.014	-0.001
93	67	378	65	69	-4	-0.012	0.000
94	74	378	71	69	2	0.007	0.000
95	78	378	75	69	6	0.017	0.001

Table 26. Annualized Results for the LA TLD Locations

TLD Location Number	Total Monitored Effective Dose (mrem)	Total Exposure Days	Annualized Effective Dose (mrem)	Mean Background (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
3	72	377	70	69	1	0.002	0.000
4	68	377	66	69	-3	-0.009	0.000
5	75	377	73	69	4	0.010	0.000
6	62	377	60	69	-9	-0.025	-0.001
50	165	377	160	69	91	0.249	0.010
52	61	377	59	69	-10	-0.027	-0.001
59	60	379	58	69	-11	-0.031	-0.001
60	1,303	377	1,262	69	1,193	3.267	0.136
61	2,025	377	1,961	69	1,892	5.182	0.216
62	59	379	57	69	-12	-0.033	-0.001
63	56	377	54	69	-15	-0.040	-0.002
65	58	377	56	69	-13	-0.035	-0.001
68	75	377	73	69	4	0.010	0.000

Table 27. Annualized Results for TLD Locations Outside the LA and Inside the PPA Boundary

TLD Location Number	Total Monitored Effective Dose (mrem)	Total Exposure Days	Annualized Effective Dose (mrem)	Mean Background (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
1	758	377	734	69	665	1.822	0.076
2	956	378	923	69	854	2.340	0.098
7	90	378	87	69	18	0.049	0.002
13	75	378	72	69	3	0.009	0.000
15	58	377	56	69	-13	-0.035	-0.001
25	97	378	94	69	25	0.068	0.003
35	85	378	82	69	13	0.036	0.001
37	71	377	69	69	0	-0.001	0.000
46	65	378	63	69	-6	-0.017	-0.001
53	392	378	379	69	310	0.848	0.035
58	50	377	48	69	-21	-0.056	-0.002
64	57	377	55	69	-14	-0.038	-0.002
69	57	377	55	69	-14	-0.038	-0.002
70	141	377	137	69	68	0.185	0.008
71	89	377	86	69	17	0.047	0.002
72	78	378	75	69	6	0.017	0.001
78	82	378	79	69	10	0.028	0.001
81	381	377	369	69	300	0.822	0.034
82	102	378	98	69	29	0.081	0.003
83	234	378	226	69	157	0.430	0.018
96	70	377	68	69	-1	-0.003	0.000
97	57	323	64	69	-5	-0.013	-0.001

Table 28. Annualized Results for TLD Locations Outside the PPA and Inside the DOE Boundary*

TLD Location Number	Total Monitored Effective Dose (mrem)	Total Exposure Days	Annualized Effective Dose (mrem)	Annualized Mean Background (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
9	63	378	61	69	-8	-0.022	-0.001
12	63	378	61	69	-8	-0.022	-0.001
14	62	377	60	69	-9	-0.025	-0.001
19	69	378	67	69	-2	-0.007	0.000
38	75	378	72	69	3	0.009	0.000
66	69	377	67	69	-2	-0.006	0.000
67	75	377	73	69	4	0.010	0.000
76	68	378	66	69	-3	-0.009	0.000
77	70	378	68	69	-1	-0.004	0.000
79	65	377	63	69	-6	-0.017	-0.001
84	70	377	68	69	-1	-0.003	0.000

*TLD-86 is located outside the PPA and inside the DOE boundary. It is not listed in this table because it is a background TLD and is listed in Table 25.

Table 29. Annualized Results for the TLD Locations Outside the DOE Boundary*

TLD Location Number	Total Monitored Effective Dose (mrem)	Total Exposure Days	Annualized Effective Dose (mrem)	Mean Background (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
16	76	378	73	69	4	0.012	0.001
30	77	378	74	69	5	0.015	0.001
40	89	378	86	69	17	0.046	0.002
73	58	378	56	69	-13	-0.036	-0.001
74	82	378	79	69	10	0.028	0.001
75	73	378	70	69	1	0.004	0.000
80	71	378	69	69	0	-0.001	0.000

* Background TLDs located outside the DOE boundary are not listed in this table because they are listed in Table 25.

Table 30. Annualized Results for Food Vendor 1

Potential Estimated Dose for Food Vendor 1	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
E mrem/day at Location TLD-96	0.23	N/A	N/A	0.13
# of Days Food Vendor On-Site at TLD-96	36	N/A	N/A	5
E mrem/day at Location TLD-97	0.36	0.17	0.17	0.12
# of Days Food Vendor On-Site at TLD-97	18	44	45	42
# hours/day	24	24	24	24
# of Hours/day Food Vendor on-site	4	4	4	4
Food Vendor mrem/hour	0.62	0.31	0.33	0.23
Annualized mean background	69	69	69	69
Background mrem/day	0.19	0.19	0.19	0.19
Background mrem/hour	0.43	0.35	0.35	0.37
Food vendor mrem	2.46	1.22	1.31	0.92
Food Vendor background mrem	1.70	1.39	1.42	1.48
Net Estimated Effective Dose (E) (mrem)	0.76	-0.16	-0.11	-0.56
Estimated E for Food Vendor 1*(mrem)	**-0.07**			

*Because the calculated estimated E is a negative value, the quarter with the positive result (0.76 mrem) was assigned as the Food Vendor 1 E.

Table 31. Annualized Results for Food Vendor 2

Potential Estimated Dose for Food Vendor 2	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
E mrem/day at Location TLD-96	0.23	N/A	N/A	N/A
# of Days Food Vendor On-Site at TLD-96	2	N/A	N/A	N/A
# hours/day	24	N/A	N/A	N/A
# of Hours/day Food Vendor on-site	3	N/A	N/A	N/A
Food Vendor mrem/hour	0.02	N/A	N/A	N/A
Annualized mean background	69	N/A	N/A	N/A
Background mrem/day	0.19	N/A	N/A	N/A
Background mrem/hour	0.02	N/A	N/A	N/A
Food vendor mrem	0.06	N/A	N/A	N/A
Food Vendor background mrem	0.05	N/A	N/A	N/A
Net Estimated E (mrem)	0.01	N/A	N/A	N/A
Estimated E for Food Vendor 2 (mrem)	**0.01**			

3.5.2 Determination of TLD Results Statistically Above Background at 99.7% Confidence

To determine the TLD results that were statistically above background, the standard deviation of the background measurements was calculated using a normal distribution. The result was a standard deviation of 3.43 mrem.

In order to ensure dose from D&R Contractor activities are reported accurately and to reduce the potential of reporting false positives, results greater than three standard deviations from the annual mean background measurement are considered to be above background with 99.7% confidence. The result for three standard deviations was 10.3 mrem (3.43 × 3 = 10.29).

The annual mean background was 69.43 mrem. The result for the annual mean background, plus three standard deviations, provides an upper range result of 80 mrem (69.43 + 10.29 = 79.72).

One TLD location outside the DOE boundary (i.e., TLD-40) exceeded 80 mrem. This TLD location is accessible to the public and is discussed further in Section 3.5.7 of this report.

The remaining TLD locations where the annualized E equaled or exceeded 80 mrem are listed in Tables 32 and 33.

Table 32. LA TLD Locations with Results Statistically Above Background*

TLD Location Number	Annualized Effective Dose (mrem)	Annualized Mean Background (mrem)	Annualized Mean Background Plus Three Standard Deviations (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
50	160	69	80	91	0.249	0.010
60	1,262	69	80	1,193	3.267	0.136
61	1,961	69	80	1,892	5.182	0.216

*These TLD locations are not accessible to the public. The dose measurements in these locations resulted from DOE operations.

Table 33. TLD Locations Outside the LA and Inside the PPA Boundary with Results Statistically Above Background*

TLD Location Number	Annualized Effective Dose (mrem)	Annualized Mean Background (mrem)	Annualized Mean Background Plus Three Standard Deviations (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
1	734	69	80	665	1.822	0.076
2	923	69	80	854	2.340	0.098
7	87	69	80	18	0.049	0.002
25	94	69	80	25	0.068	0.003
35	82	69	80	13	0.036	0.001
53	379	69	80	310	0.848	0.035
70	137	69	80	68	0.185	0.008
71	86	69	80	17	0.047	0.002
81	369	69	80	300	0.822	0.034
82	98	69	80	29	0.081	0.003

*These TLD locations are not regularly accessible to the public. The dose measurements in these locations resulted from DOE operations.

3.5.3 Annualized OSL Results Summary

The OSL locations were monitored for external neutron radiation for an average of 377 days. All neutron results collected were reported as "M" (i.e., dose equivalents below the minimum measureable quantity); therefore, analysis of annual neutron dose was not required and no dose equations were used.

3.5.4 Analysis of the Annual TLD and OSL Results

Since fall 2001, security controls have been in place to restrict public access to areas adjacent to the LA. In 2019, a PPA boundary fence was added to restrict public access to areas between the LA boundary and the PPA boundary.

In 2021, 15 out of 53 locations showed results statistically above background with 99.7% confidence. Fourteen of these 15 locations were historically the areas with the highest measured results throughout the monitoring period. All of these locations were adjacent to or in close proximity of the UF_6 cylinder storage yards and are either in the LA boundary or between the LA boundary and the PPA boundary, which is not regularly accessible to the public. This means the potential external radiation dose calculated from these locations is not representative of the actual public external radiation dose. The fifteenth location, TLD-40, was located outside the DOE boundary and within the West Kentucky Wildlife Management Area (WKWMA) off Dyke Road.

3.5.5 Potential Effective Dose for the Residential Scenario

The potential E for the residential exposure scenario at the nearest local residence (a TLD is located at this residence) was found to be equivalent to naturally-occurring background or 0.0E+00 mrem.

3.5.6 Potential Effective Dose Scenario for a Member of the Public in Areas Freely Accessible to Members of the Public

The Paducah Site licenses a portion of the DOE Reservation to the Kentucky Department of Fish and Wildlife Resources for recreational uses. These areas are open to the public for use but do not have any

residences within the Paducah site boundary. Public traffic is allowed on the main reservation roads outside of the active plant area as a courtesy to the public, and some members of the public visit the DOE Reservation for various reasons, which includes hunting. It is anticipated that any use would be limited to recreational purposes and durations of time spent in the area by the public would be less than full-time.

In 2021, three TLD locations inside the DOE boundary and the PPA boundary that were accessible to members of the public. These locations were TLD-14, TLD-96, and TLD-97.

- TLD-14 is near Harmony Cemetery and is located north of the LA and south of Ogden Landing Road. In CY 2009, security restrictions were eased to allow regular public access to Harmony Cemetery. In 2021, the monitoring results for TLD-14 were statistically equivalent to the average mean background; however, they were below the calculated average background for the site. The estimated external radiation dose to a member of the public at this location was 0.0E+00 mrem.

- TLD-96, Food Vendor 1, was located in the C-810 parking lot. In 2021, the monitoring results for TLD-96 were statistically equivalent to the average mean background; however, they were below the calculated average background for the site. The estimated external radiation dose for Food Vendor 1 was 7.6E-01 mrem (see Table 30).

- TLD-97, Food Vendor 2, was located on the east side of the C-100 building. In 2021, the monitoring results for TLD-97 were statistically equivalent to the average mean background; however, they were below the calculated average background for the site. The estimated external radiation dose for Food Vendor 2 was 1.0E-02 mrem (see Table 31).

3.5.7 Potential Effective Dose Scenario for Member of the Public at the DOE Boundary

The TLD location along the DOE boundary with the highest net annualized dose rate was TLD-40, which was located outside the DOE boundary and within the WKWMA off Dyke Road.

The calculation of a reasonable maximum exposure at this location was determined by using the assumptions listed in Section 4.6.13 of DAC-ENV-FA5810-0006, *2021 Annual External Radiation Monitoring Report,* and the following equation.

(17 mrem × 104 days per year × 10 hours per day) ÷ (365 days per year × 24 hours/day) = 2.01 mrem

A member of the public would receive an estimated external radiation E of 2.0E+00 mrem at the DOE boundary.

3.5.8 Potential Effective Dose for the Maximally Exposed Individual Scenario

The maximally exposed individual (MEI) scenario was applied to a potential external radiation E to a member of the public passing through accessible portions of the DOE Reservation where areas of highest exposure were visited 80 hours per year. This applies to visitors accessing the Paducah Site in the area closed for public access, but outside DOE-controlled areas, as defined by DOE O 458.1.

The estimated scenario for potential external radiation dose received by the MEI is determined by using the assumptions in Section 4.2 of DAC-ENV-FA5810-0006, *2021 Annual External Radiation Monitoring Report*, and the following equation.

Table 32, Table 33, and TLD-40 Average of the Net Annualized mrem/hour × 80 hours

0.043 mrem/hour × 80 hours per year = 3.44 mrem

The estimated potential external radiation E received by the MEI was 3.4E+00 mrem.

An estimated potential external radiation collective dose has been calculated by multiplying the dose to the MEI from the preceding paragraph by a total estimated number of visitors hiking within the WKWMA annually (i.e., 150 persons), which resulted in a representative collective dose of 5.2E-01 person-rem.

3.44 mrem × 1 rem/1000 mrem × 150 persons = 0.516 person-rem

3.5.9 Establish the Potential Radiation Dose from Direct Exposure to DOE Operations at the Boundary of the DOE Perimeter Fence

Based on the results of measurements in areas accessible to the public or near the closest local residence, the estimated E received from external radiation levels received by a member of the public from DOE operations is below the applicable DOE limit of 100 mrem within a year, in accordance with DOE O 458.1.

4. ANNUALIZED RESULTS COMPARISON

This section presents the results of a comparison between previous TLD and OSL annualized results and current year TLD and OSL annualized results.

4.1 COMPARISON OF OSL ANNUALIZED RESULTS

All neutron results collected from 2016 through 2020 were reported as "M" (i.e., dose equivalents below the minimum measureable quantity). In 2021, all neutron results were also reported as "M."

4.2 COMPARISON OF TLD ANNUALIZED RESULTS

Tables 34 through 39 present comparison of average results from 2015 through 2020 with results from 2021 (FRNP 2021b).

A new TLD location, TLD-97, was added in 2021 to monitor the food vendor location, so no comparison data was available.

4.2.1 Comparison of Annualized Results for Background TLD Locations

Table 34 shows the annual results of background minimums, maximums, means, standard deviations, three sigma values, and lower and upper ranges for 2015 through 2020, and compares the results of the averages of 2015 through 2020 with the results from 2021 (FRNP 2021b).

Table 34. Comparison of Annual Background Information*

Annual Background Information	2015 to 2020 Average	2021	Increase or Decrease from Average to 2021	% Change
Background Minimum (mrem)	77	64	-13.4	-20.9
Background Maximum (mrem)	100	75	-24.2	-32.1
Annualized Mean Background (mrem)	86	69	-16.1	-23.2
Standard Deviation	6	3.43	-2.6	-75.3
3 sigma	18	10.30	-7.8	-75.3
Lower Range	67	59.13	-8.3	-14.1
Upper Range	104	79.72	-23.8	-29.9

*Includes decimal places not shown when rounding.

Table 35 presents the results of comparison between average results from 2015 through 2020 with 2021 results for individual Background TLD locations.

Table 35. Comparison of Annualized Results for Background TLD Locations*

TLD Location Number	2015 to 2020 Average Annualized Effective Dose (mrem)	2021 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2021	% Change
22	84	73	-10.6	-14.5
54	97	71	-25.7	-36.1
85	81	68	-12.1	-17.7
86	85	70	-15.1	-21.8
87	82	67	-15.7	-23.6
88	84	68	-15.9	-23.5
89	86	73	-12.6	-17.2
90	88	69	-18.9	-27.6
91	85	69	-16.6	-24.2
92	83	64	-19.5	-30.6
93	84	65	-18.8	-29.1
94	88	71	-16.4	-22.9
95	88	75	-12.5	-16.6

*Includes decimal places not shown when rounding.

4.2.2 Comparison of Annualized Results for the LA TLD Locations

Table 36 presents the results of comparison between average results from 2015 through 2020 with 2021 results.

TLD locations where the text is in **bold** indicate where the 2021 annualized results were above the maximum background with 99.7% confidence. The highlighted cells are the TLD locations closest to the perimeter of the DUF_6 facility or operations. Radiation dose rates at these highlighted areas are subject to change as a result of DUF_6 plant operations (e.g., UF_6 cylinder relocation), which may explain the dose increases and decreases shown in this table.

Table 36. Comparison of Annualized Results for the LA TLD Locations*

TLD Location Number	2015 to 2020 Average Annualized Effective Dose (mrem)	2021 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2021	% Change
3	83	70	-13.0	-18.6
4	81	66	-15.3	-23.3
5	90	73	-16.9	-23.3
6	75	60	-15.0	-24.9
50	174	160	-14.1	-8.8
52	76	59	-16.4	-27.8
59	68	58	-10.2	-17.7
60	1265	1262	-3.5	-0.3
61	2301	1961	-340.6	-17.4
62	71	57	-14.0	-24.7
63	67	54	-12.4	-23.0
65	70	56	-14.2	-25.3
68	83	73	-10.2	-14.1

*Includes decimal places not shown when rounding.

4.2.3 Comparison of Annualized Results for TLD Locations Outside the LA and Inside the PPA Boundary

Table 37 presents the results of comparison between average results from 2015 through 2020 with 2021 results.

TLD locations where the text is in **bold** indicate where the 2021 annualized results were above the maximum background with 99.7% confidence. The highlighted cells are the TLD locations closest to the perimeter of the DUF_6 facility or operations. Radiation dose rates at these highlighted areas are subject to change as a result of DUF_6 plant operations (e.g., UF_6 cylinder relocation), which may explain the dose increases and decreases shown in this table.

Table 37. Comparison of Annualized Results for TLD Locations Outside the LA and Inside the PPA Boundary[a,b]

TLD Location Number	2015 to 2020 Average Annualized Effective Dose (mrem)	2021 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2021	% Change
1	790	734	-55.8	-7.6
2	1039	923	-116.2	-12.6
7	112	87	-24.8	-28.5
13	91	72	-18.9	-26.1
15	69	56	-12.7	-22.6
25	117	94	-23.2	-24.7
35	103	82	-21.3	-25.9
37	82	69	-12.9	-18.8
46	76	63	-13.6	-21.6
53	401	379	-22.0	-5.8
58	66	48	-17.6	-36.3
64	69	55	-13.8	-25.0
69	71	55	-15.3	-27.8
70	179	137	-42.2	-30.9

Table 37. Comparison of Annualized Results for TLD Locations Outside the LA and Inside the PPA Boundary (Continued)[a,b]

TLD Location Number	2015 to 2020 Average Annualized Effective Dose (mrem)	2021 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2021	% Change
71	143	86	-56.8	-66.0
72	83	75	-7.7	-10.2
78	94	79	-14.3	-18.1
81	383	369	-14.1	-3.8
82	110	98	-11.7	-11.9
83	226	226	0.1	0.1
96	25	68	42.8	63.1
97	N/A	64	N/A	N/A

[a] Includes decimal places not shown when rounding.
[b] TLD-97 is a new location installed on March 2, 2021. No comparison data is available.

4.2.4 Comparison of Annualized Results for TLD Locations Outside the PPA and Inside the DOE Boundary

Table 38 presents the results of comparison between average results from 2015 through 2020, with 2021 results.

Table 38. Comparison of Annualized Results for the TLD Locations Outside the PPA and Inside the DOE Boundary[a,b]

TLD Location Number	2015 to 2020 Average Annualized Effective Dose (mrem)	2021 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2021	% Change
9	74	61	-13.3	-21.9
12	75	61	-13.8	-22.7
14	75	60	-14.5	-24.1
19	81	67	-13.9	-20.8
38	85	72	-12.4	-17.1
66	83	67	-16.2	-24.2
67	88	73	-14.9	-20.5
76	85	66	-19.5	-29.7
77	81	68	-12.9	-19.1
79	77	63	-14.1	-22.4
84	74	68	-5.8	-8.5

[a] TLD-86 is located outside the PPA and inside the DOE boundary. It is not listed in this table because it is a background location and is listed in Table 35.
[b] Includes decimal places not shown when rounding.

4.2.5 Comparison of Annualized Results for TLD Locations Outside the DOE Boundary

Table 39 presents the results of comparison between average results from 2015 through 2020 with 2021 results.

Table 39. Comparison of Annualized Results for the TLD Locations Outside the DOE Boundary[a,b]

TLD Location Number	Average Annualized Effective Dose (mrem)	2021 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2021	% Change
16	95	73	-21.3	-29.0
30	85	74	-10.3	-13.9
40	102	86	-16.1	-18.7
73	76	56	-19.7	-35.2
74	93	79	-13.5	-17.0
75	88	70	-17.0	-24.1
80	82	69	-13.8	-20.1

[a] All background TLD locations located outside the DOE boundary are not listed in this table because they are listed in Table 35.
[b] Includes decimal places not shown when rounding.

4.2.6 Comparison of ASERs Direct Radiation Pathway

A review of previous Annual Site Environmental Reports indicate the direct radiation pathway for 2021 is consistent with previous years.

Table 40 presents the results of the direct radiation pathway from 2015 through 2021 (FRNP 2021c).

Table 40. Comparison of Potential Radiological Dose to the MEI for the Direct Radiation Pathway

Direct Radiation Pathway	2015	2016	2017	2018	2019	2020	2021
Dose to MEI (mrem/year)	5.1E+00	4.2E+00	3.8E+00	5.0E+00	3.0E+00	4.1E+00	3.4E+00
Percent of DOE 100 mrem/year Limit	5.1%	4.2%	3.8%	5.0%	3.0%	4.1%	3.4%
Estimated Collective (Population Dose) (person-rem/year)	7.7E-01	6.4E-01	5.6E-01	7.5E-01	4.5E-01	6.1E-01	5.2E-01
Population within 50 miles*	150	150	150	150	150	150	150

*Population dose for direct radiation is based on a representative assumption using the estimated visitors hiking in the WKWMA only.

5. REFERENCES

FRNP 2021a. *Environmental Monitoring Plan Fiscal Year 2022 Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, CP2-ES-0006/FR7, Four Rivers Nuclear Partnership, LLC, Paducah, KY, October.

FRNP 2021b. *Annual Report on External Radiation Monitoring for Calendar Year 2020 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0178, Four Rivers Nuclear Partnership, LLC, Paducah, KY, March.

FRNP 2021c. *Paducah Site Annual Site Environmental Report for Calendar Year 2020*, FRNP-RPT-0198, Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Four Rivers Nuclear Partnership, LLC, Paducah, KY, September.

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APPENDIX A

MONITORING LOCATIONS AND DESCRIPTIONS

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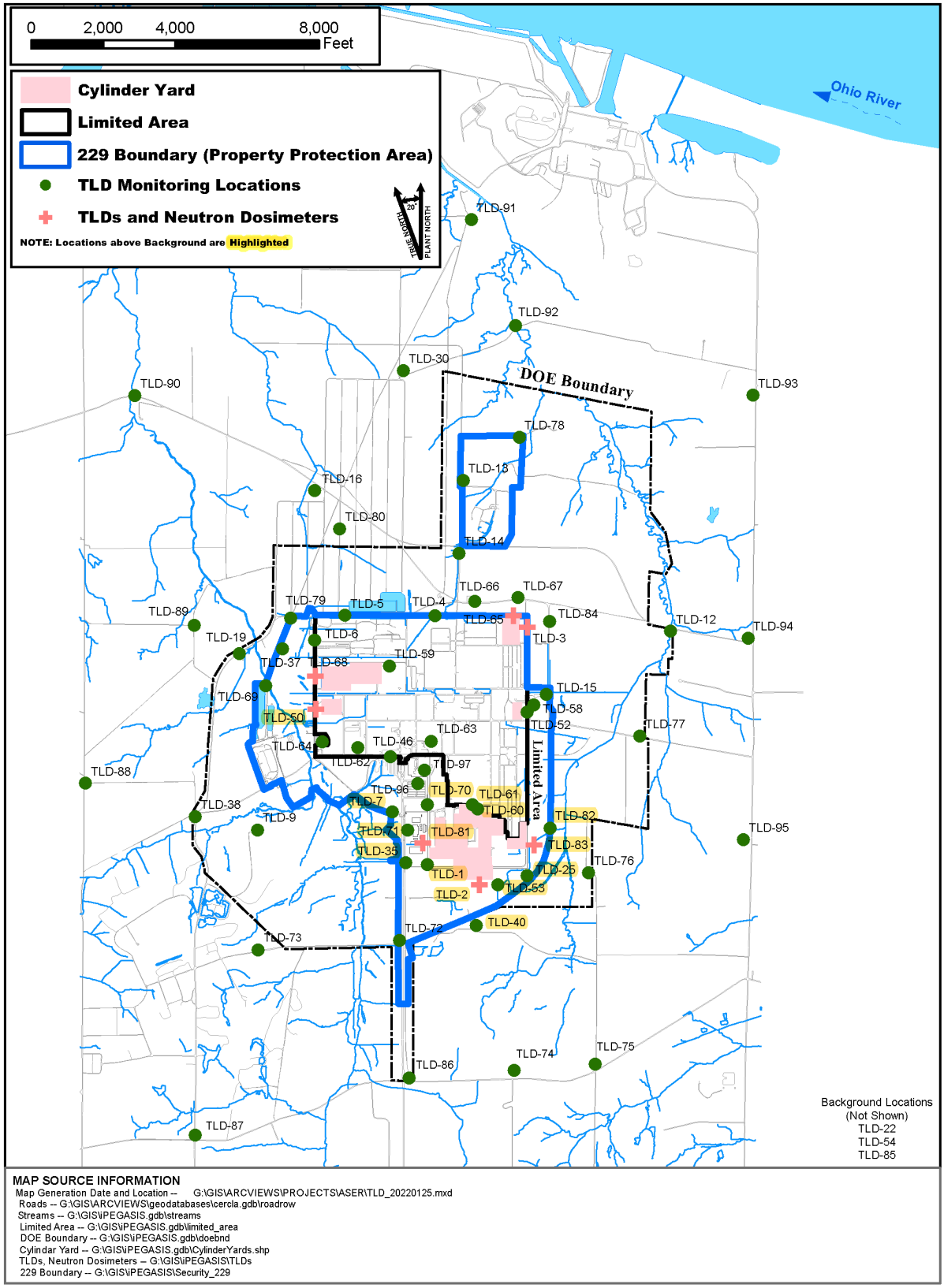

Figure A.1. Dosimeter Locations in the Vicinity of the Paducah Site

Table A.1. TLC Location Name, Description, and Coordinates

Location Name	Location Description	North Latitude (DMS)	West or East Longitude (DMS)	X coordinate	Y coordinate
TLD-1	Paducah Gaseous Diffusion Plant (PGDP) security fence west of C-745-M near intersection of Patrol Road and Alabama Avenue near pole 21-20. Outside fence behind DUF_6 dirt pile.	N 37 06 16.66	W 088 48 55.18	-4172	-5856
TLD-2	PGDP security fence south of C-745-T near pole T20-6J. South Cylinder Yard perimeter fence.	N 37 06 02.15	W 088 48 43.07	-2740	-6427
TLD-3	PGDP security fence east of C-745-H near pole 23-31. Perimeter fence northeast corner.	N 37 07 04.17	W 088 47 57.21	-1399	739
TLD-4	North PGDP security fence near North-South Diversion Ditch (NSDD).	N 37 07 15.74	W 088 48 25.56	-3957	1052
TLD-5	North PGDP security fence north of C-747-A near pole T53A1P26G. North perimeter fence between lagoon.	N 37 07 24.38	W 088 48 54.58	-6464	1068
TLD-6	West PGDP security fence west of C-746-P1 near pole 22-4. 612 perimeter fence.	N 37 07 20.85	W 088 49 07.22	-7303	382
TLD-7	PGDP perimeter fence adjacent to Curlee Road near entrance to U.S. Department of Energy (DOE) building (C-103). Perimeter fence across from entrance to DOE building.	N 37 06 29.15	W 088 49 02.49	-5153	-4400
TLD-9	Northeast corner of fence of old Kentucky Ordnance Works (KOW) water treatment plant, near MW309. Gate to MW305.	N 37 06 37.12	W 088 49 48.11	-8901	-4907
TLD-12	Institutional controls fence near MW191 where Little Bayou Creek crosses U.S. Highway 358. MW191, Little Bayou, and Ogden Landing Road.	N 37 06 49.62	W 088 47 11.44	2588	626
TLD-13	West fence of C-746-U landfill near entrance gate.	N 37 07 48.17	W 088 48 00.61	-3182	4825
TLD-14	Institutional controls fence along the NSDD on west side of 14th street extension near Highway 358 (K003). Fence at North-South ditch, north of MW353.	N 37 07 29.75	W 088 48 10.58	-3302	2798

Table A.1. TLD Location Name, Description, and Coordinates (Continued)

Location Name	Location Description	North Latitude (DMS)	West or East Longitude (DMS)	X coordinate	Y coordinate
TLD-15	Northeast corner of C-755 fence behind C-755-D.	N 37 06 45.01	W 088 47 58.91	-864	-1129
TLD-16	West Kentucky Wildlife Management Area (WKWMA) Clubhouse on northwest corner porch post. On porch WKWMA Headquarters.	N 37 07 59.44	W 088 48 49.76	-7311	4533
TLD-19	Past pond on right "A" sign next to MW426.	N 37 07 24.43	W 088 49 33.11	-9398	2
TLD-22	Outside of the fence of the locked air sampling station at the rear corner of the Bethel Cumberland Presbyterian Church Cemetery.	N 37 00 05.36	W 088 52 36.29	-8159	-46801
TLD-25	On power line tower nearest Dyke Road southeast of C-745-T.	N 37 06 00.02	W 088 48 26.49	-1401	-6172
TLD-30	Take the road by the PGDP landfills, drive past MW98 and MW235. At intersection, the TLD is hung on the inside of the Warning Fiber Optic sign at Boldry School Road, west of MW381.	N 37 08 21.060	W 088 45 09.060	-4836	7876
TLD-35	Outfall 017 off the Plant Access Road. Outfall 017 DUF_6 laydown yard.	N 37 06 21.480	W 088 49 03.960	-4773	-5806
TLD-37	KPDES Outfall 001 behind Vortec facility. K001.	N 37 07 18.600	W 088 49 15.660	-8202	138
TLD-38	Five-Points Creek with concrete bridge, on tree behind 2A sign.	N 37 06 43.320	W 088 50 09.000	-10630	-4528
TLD-40	Turn north on Kelly Road off Woodville Road, go about 1/2 mile on Kelly Road and then turn left, go about 1/2 mile. TLD is placed with in trees on left. Orange sign on blocked road, east of 57 off Dyke Road.	N 37 05 52.200	W 088 48 52.20	-2818	-7551
TLD-46	Truck entrance at receiving C-720.	N 37 06 44.700	W 088 49 00.120	-5198	-2865
TLD-50	West Patrol Road fence across from C-745-A.	N 37 07 02.88	W 088 49.15.18	-7287	-1547
TLD-52	East Patrol Road fence across from C-745-E.	N 37 06 42.18	W 088 48.07.20	-1397	-1628
TLD-53	Security fence at southeast corner of C-745-T Yard. Down fence line away from TLD-2.	N 37 06 00.42	W 088 48.37.02	-2220	-6423

Table A.1. TLD Location Name, Description, and Coordinates (Continued)

Location Name	Location Description	North Latitude (DMS)	West or East Longitude (DMS)	X coordinate	Y coordinate
TLD-54	Residence; Jalusian Trail.	N 57 87 72.16	E 23 93 13.48	45296	-25254
TLD-58	West Central C-755 Complex.	N 59 07 98.00	E 22 88 70.74	-1209	-1422
TLD-59	C-752-A Break Area.	N 59 15 61.62	E 22 78 55.79	-5234	-339
TLD-60	C-333-A Light Pole on Fence Pole #16.	N 59 02 07.10	E 22 80 71.62	-2919	-4199
TLD-61	West of C-746-Q Light Pole #14.	N 59 01 58.14	E 22 80 98.35	-2778	-4315
TLD-62	C-743 Trailer Complex Light Pole #336, behind Trailer #3.	N 59 10 20.18	E 22 73 49.81	-6111	-2607
TLD-63	C-412 HP Break Trailer.	N 59 08 36.46	E 22 79 46.95	-4069	-2435
TLD-64	C-764 T-6 Trailer.	N 59 11 77.55	E 22 70 88.88	-7098	-2447
TLD-65	Located outside of North Security fence North of C-745-H Cylinder Yard; South of C-762 Laydown Yard.	N 37 07 08.54386	W 088 48 00.45376	-1795	1062
TLD-66	Located on tree at southeast corner of New Harmony Cemetery; adjacent to last concrete barrier and large metal post.	N 37 07 15.80859	W 088 48 11.08836	-2856	1457
TLD-67	Located on “No Trespassing” sign north side of Dyke Road next to Security Fence North of C-762 Laydown yard.	N 37 07 12.70502	W 088 47 56.75697	-1658	1560
TLD-68	West Security Fence west of C-745-B Cylinder Yard and southeast of Vortec Site.	N 37 07 11.60797	W 088 49 11.43416	-7302	-617
TLD-69	Wooden utility pole (T12-15 H) next to gravel road at Northeast corner of pond North of C-611.	N 37 07 13.70394	W 088 49 28.37928	-8664	-888
TLD-70	Outside of west Security Fence southeast of C-333, midway between C-810 parking area and north DUF_6 Security Fence.	N 37 06 27.82855	W 088 48 50.25203	-4173	-4189
TLD-71	Outside of west Security Fence of DUF_6 under security light, northeast of wooden utility pole (11056 KU 78487).	N 37 06 23.05971	W 088 48 59.65074	-4723	-4903
TLD-72	North side of Air Monitoring Station AMD57, northwest of Post 57.	N 37 05 55.32798	W 088 49 15.28582	-4952	-7972
TLD-73	Eastern “Railroad Crossing” sign at train tracks on Acid Road.	N 37 06 06.14205	W 088 50 02.01070	-8883	-8241
TLD-74	Located on “Warning Siren” sign at turnoff north of Magruder Road and Woodville Road intersection.	N 37 05 10.96196	W 088 48 53.61411	-1765	-11586

Table A.1. TLD Location Name, Description, and Coordinates (Continued)

Location Name	Location Description	North Latitude (DMS)	West or East Longitude (DMS)	X coordinate	Y coordinate
TLD-75	Located on "Warning Siren" sign at north of Kelley Road. and Woodville Road intersection.	N 37 05 04.94525	W 088 48 26.65157	496	-11409
TLD-76	Located on "Tract A" sign below power lines south side of Kelley Road in sharp curve between Woodville Road and McCaw Road.	N 37 05 55.05466	W 088 48 06.27328	310	-6082
TLD-77	Located on "Warning Siren" sign north side of McCaw Road east of Kelley Road intersection.	N 37 06 25.46598	W 088 47 33.66599	1737	-2287
TLD-78	Northeast Corner of C-746-U Landfill Security Fence.	N 37 07 54.00752	W 088 47 37.45924	-1622	6020
TLD-79	Located on left post of the "Wildlife Management" gate on New Waterline Road southwest of Plant gate 41A west of C-612.	N 37 07 28.86304	W 88 49 12.50003	-7981	993
TLD-80	Located on "Cattle" gate west of MW453 and MW454 on gravel road east of New Waterline Road.	N 37 07 47.29850	W 088 48 46.10944	-6612	3477
TLD-81	Southeast corner of DUF_6 security fence next to gate V1 east of New Waterline East of C-1100.	N 37 06 18.33947	W 088 48 56.42591	-4314	-5262
TLD-82	Short pole east of Dyke Road north of Outfall 13.	N 37 06 10.13175	W 088 48 13.53048	-765	-4851
TLD-83	Large metal power pole west of Dyke Road South of Outfall 13.	N 37 06 07.30640	W 088 48 20.71726	-1214	-5319
TLD-84	Located at MW496 on the east side of Dyke Road.	N 37 07 03.50589	W 088 47 49.26485	-769	894
TLD-85	Residence; corner of Springwell and Buckner Lane.	N 37 03 27.9036	W 088 40 43.9638	39082	-7750
TLD-86	Plant entrance, Gravel Construction Road. Right side on orange warning signal sign.	N 37 5 18.8622	W 088 49 28.2282	-4676	-11794
TLD-87	KOW entrance north of Woodville Road north of Kevil Eagles. Right side on orange warning signal sign.	N 37 05 24.2802	W 088 50 43.9548	-10629	-13381
TLD-88	Bethel Church Road KOW entrance. North of Massey Road, right side on yellow post.	N 37 07 05.4876	W 088 50 37.9608	-13677	-3597

Table A.1. TLD Location Name, Description, and Coordinates (Continued)

Location Name	Location Description	North Latitude (DMS)	West or East Longitude (DMS)	X coordinate	Y coordinate
TLD-89	Bobo Road, off Bethel Church Road. Continue east 200 yards past end of asphalt. At intersection on orange warning signal sign.	N 37 07 35.9976	W 088 49 44.3922	-10657	788
TLD-90	Bridge on Ogden Landing Road east of Lamb's garage. On northeast corner of bridge on contaminated creek sign.	N 37 08 54.6714	W 088 47 27.2472	-12310	7182
TLD-91	Boldry School Road on KOW at Shawnee plant entrance. On cattle gate road on hill, right side.	N 37 08 40.9884	W 088 49 36.5232	-2952	12069
TLD-92	First left road past C-746-U Landfill, cross Iron Bridge, on ICM-01. Notice sign across from MW133.	N 37 08 23.18	W 088 47 25.41	-1717	9125
TLD-93	MW100, north on Metropolis Lake Road past railroad tracks on left side on well bollard.	N 37 08 09.0744	W 088 46 50.9304	4874	7186
TLD-94	Residence; corner of Ogden Landing Road and Metropolis Lake Road.	N 37 05 48.9294	W 088 47 12.4332	4740	436
TLD-95	West McCracken Health Clinic, Metropolis Lake Road. On Light Pole in southwest corner of parking lot.	N 37 06 40.5468	W 088 46 47.2872	4617	-5167
TLD-96	C-810 Parking Lot on Swift and Staley Inc. Operations and Maintenance Parking Only sign. Fourth sign—TLD facing south toward DUF_6 facility.	N 37 06 34.11	W 88 48 50.9616	-4447	-3610
TLD-97	C-100 Building, Light pole T13-A.	N 37 06 36.9649	W 88 48 47.1533	-4256	-3233
TLD-FB	Taken along while placing and collecting all other samples—stored in "lead box" at C-101 dosimetry office.	N/A	N/A	N/A	N/A
TLD-TB	Stored in "lead box" at C-101 dosimetry office.	N/A	N/A	N/A	N/A

APPENDIX B

TLD AND OSL ISSUE AND COLLECTION DATES

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TABLES

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Table B.1. First Quarter TLD and OSL Issue and Collection Dates

Date/Time Issued Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
1/7/2021 9:20 0362-625	AW	4/12/2021 8:55	AW	TLD-1	N/A
1/6/2021 12:15 0365-626 2882	AW	4/12/2021 8:43	AW	TLD-2	N/A
1/7/2021 15:23 0366-627 2883	AW	4/12/2021 7:55	AW	TLD-3	N/A
1/7/2021 13:39 0367-628	AW	4/12/2021 10:35	AW	TLD-4	N/A
1/7/2021 13:31 0368-629	AW	4/12/2021 10:30	AW	TLD-5	N/A
1/7/2021 13:17 0369-630	AW	4/12/2021 10:18	AW	TLD-6	N/A
1/6/2021 10:51 0370-631	AW	4/12/2021 9:38	AW	TLD-7	N/A
1/6/2021 9:25 0371-632	AW	4/12/2021 13:57	AW	TLD-9	N/A
1/6/2021 8:08 0372-633	AW	4/12/2021 12:45	AW	TLD-12	N/A
1/6/2021 8:22 0373-634	AW	4/12/2021 12:50	AW	TLD-13	N/A
1/7/2021 15:11 0374-635	AW	4/12/2021 7:45	AW	TLD-14	N/A
1/7/2021 14:56 0375-636	AW	4/12/2021 7:34	AW	TLD-15	N/A
1/6/2021 8:53 0376-637	AW	4/12/2021 13:20	AW	TLD-16	N/A
1/6/2021 9:17 0377-638	AW	4/12/2021 14:48	AW	TLD-19	N/A
1/6/2021 9:56 0378-639	AW	4/12/2021 14:25	AW	TLD-22	N/A
1/6/2021 12:04 0379-640	AW	4/12/2021 8:19	AW	TLD-25	N/A
1/6/2021 08:46 0380-641	AW	4/12/2021 13:13	AW	TLD-30	N/A
1/6/2021 10:48 0381-642	AW	4/12/2021 9:35	AW	TLD-35	N/A
1/7/2021 13:13 0382-643	AW	4/12/2021 10:15	AW	TLD-37	N/A
1/6/2021 9:22 0383-644	AW	4/12/2021 13:53	AW	TLD-38	N/A
1/6/2021 12:06 0384-645	AW	4/12/2021 8:22	AW	TLD-40	N/A
1/6/2021 10:55 0385-646	AW	4/12/2021 9:42	AW	TLD-46	N/A
1/7/2021 13:00 0386-647 2884	AW	4/12/2021 10:07	AW	TLD-50	N/A
1/7/2021 14:49 0387-648	AW	4/12/2021 7:27	AW	TLD-52	N/A

Table B.1. First Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
1/6/2021 12:25 0388-649	AW	4/12/2021 8:40	AW	TLD-53	N/A
1/6/2021 10:18 0389-650	AW	4/12/2021 14:53	AW	TLD-54	N/A
1/7/2021 14:55 0390-651	AW	4/12/2021 7:31	AW	TLD-58	N/A
1/5/2021 13:30 0391-652	AW	4/12/2021 15:54	AW	TLD-59	N/A
1/7/2021 08:55 0392-653	AW	4/12/2021 16:09	AW	TLD-60	N/A
1/7/2021 8:37 0393-654	AW	4/12/2021 16:10	AW	TLD-61	N/A
1/5/2021 15:45 0394-655	AW	4/12/2021 16:00	AW	TLD-62	N/A
1/7/2021 09:07 0395-656	AW	4/13/2021 12:25	AW	TLD-63	N/A
1/7/2021 14:30 0396-657	AW	4/12/2021 10:45	AW	TLD-64	N/A
1/7/2021 15:20 0397-658 2885	AW	4/12/2021 7:56	AW	TLD-65	N/A
1/7/2021 15:08 0398-659	AW	4/12/2021 7:43	AW	TLD-66	N/A
1/7/2021 15:05 0399-660	AW	4/12/2021 7:41	AW	TLD-67	N/A
1/7/2021 13:08 0400-661 2886	AW	4/12/2021 10:13	AW	TLD-68	N/A
1/7/2021 12:53 0401-662	AW	4/12/2021 9:59	AW	TLD-69	N/A
1/7/2021 10:36 0402-663	AW	4/12/2021 9:10	AW	TLD-70	N/A
1/7/2021 9:54 0403-664	AW	4/12/2021 9:06	AW	TLD-71	N/A
1/6/2021 10:46 0404-665	AW	4/12/2021 8:52	AW	TLD-72	N/A
1/6/2021 09:31 0405-666	AW	Missing	AW	TLD-73	Estimate will be performed based on results of other quarters.
1/6/2021 7:50 0406-667	AW	4/12/2021 12:16	AW	TLD-74	N/A
1/6/2021 7:52 0407-668	AW	4/12/2021 12:18	AW	TLD-75	N/A
1/6/2021 7:57 0408-669	AW	4/12/2021 12:23	AW	TLD-76	N/A
1/6/2021 08:02 0409-670	AW	4/12/2021 12:29	AW	TLD-77	N/A
1/6/2021 08:25 0410-671	AW	4/12/2021 12:54	AW	TLD-78	N/A
1/7/2021 13:24 0411-672	AW	4/12/2021 10:24	AW	TLD-79	N/A

Table B.1. First Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
1/6/2021 8:50 0412-673	AW	4/12/2021 13:18	AW	TLD-80	N/A
1/7/2021 10:34 0413-674 2887	AW	4/12/2021 9:04	AW	TLD-81	N/A
1/6/2021 11:51 0414-675	AW	4/12/2021 8:12	AW	TLD-82	N/A
1/6/2021 12:01 0415-676 2888	AW	4/12/2021 8:15	AW	TLD-83	N/A
01/07/2021 15:00 0416-677	AW	4/12/2021 7:39	AW	TLD-84	N/A
1/5/2021 17:00 0417-678	AW	4/12/2021 9:45	SO	TLD-85	N/A
1/6/2021 7:44 0418-679	AW	4/12/2021 12:13	AW	TLD-86	N/A
1/6/2021 9:37 0419-680	AW	4/12/2021 14:12	AW	TLD-87	N/A
1/6/2021 9:11 0420-681	AW	4/12/2021 15:39	AW	TLD-88	N/A
1/6/2021 9:06 0421-682	AW	4/12/2021 15:34	AW	TLD-89	N/A
1/6/2021 13:50 0422-683	AW	4/12/2021 15:30	AW	TLD-90	N/A
1/6/2021 8:41 0423-684	AW	4/12/2021 13:07	AW	TLD-91	N/A
1/6/2021 8:32 0424-685	AW	4/12/2021 13:00	AW	TLD-92	N/A
1/6/2021 8:12 0425-686	AW	4/12/2021 12:37	AW	TLD-93	N/A
1/6/2021 8:16 0426-687	AW	4/12/2021 12:42	AW	TLD-94	N/A
1/6/2021 8:06 0427-688	AW	4/12/2021 12:32	AW	TLD-95	N/A
1/7/2021 10:48 0428-689	AW	4/12/2021 9:14	AW	TLD-96	N/A
3/2/2021 7:15 0431-692	AW	4/13/2021 12:00	AW	TLD-97	N/A
1/7/2021 16:10 0429-690	AW	1/8/2021 13:00	AW	TLD-FB	N/A
1/6/2021 8:00 0430-691	AW	4/12/2021 7:00	AW	TLD-TB	N/A

Table B.2. Second Quarter TLD and OSL Issue and Collection Dates

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
4/12/2021 8:55 2101-625	AW	7/6/2021 9:19	AW	TLD-1	N/A
4/12/2021 8:43 2104-626 2882	AW	7/6/2021 8:56	AW	TLD-2	N/A
4/12/2021 7:55 2105-627 2883	AW	7/6/2021 8:22	AW	TLD-3	N/A
4/12/2021 10:35 2106-628	AW	7/6/2021 10:36	AW	TLD-4	N/A
4/12/2021 10:30 2107-629	AW	7/6/2021 10:32	AW	TLD-5	N/A
4/12/2021 10:18 2108-630	AW	7/6/2021 10:23	AW	TLD-6	N/A
4/12/2021 9:38 2109-631	AW	7/6/2021 9:46	AW	TLD-7	N/A
4/12/2021 13:57 2110-632	AW	7/6/2021 15:02	AW	TLD-9	N/A
4/12/2021 12:45 2111-633	AW	7/6/2021 13:45	AW	TLD-12	N/A
4/12/2021 12:50 2112-634	AW	7/6/2021 13:52	AW	TLD-13	N/A
4/12/2021 7:45 2113-635	AW	7/6/2021 8:15	AW	TLD-14	N/A
4/12/2021 7:34 2114-636	AW	7/6/2021 7:53	AW	TLD-15	N/A
4/12/2021 13:20 2115-637	AW	7/6/2021 14:28	AW	TLD-16	N/A
4/12/2021 14:48 116-638	AW	7/6/2021 14:52	AW	TLD-19	N/A
4/12/2021 14:25 2117-639	AW	7/6/2021 12:10	AW	TLD-22	N/A
4/12/2021 8:19 2118-640	AW	7/6/2021 8:50	AW	TLD-25	N/A
4/12/2021 13:13 2119-641	AW	7/6/2021 14:19	AW	TLD-30	N/A
4/12/2021 9:35 2120-642	AW	7/6/2021 9:41	AW	TLD-35	N/A
4/12/2021 10:15 2121-643	AW	7/6/2021 10:19	AW	TLD-37	N/A
4/12/2021 13:53 2122-644	AW	7/6/2021 14:58	AW	TLD-38	N/A
4/12/2021 8:22 2123-645	AW	7/6/2021 8:52	AW	TLD-40	N/A
4/12/2021 9:42 2124-646	AW	7/6/2021 9:50	AW	TLD-46	N/A
4/12/2021 10:07 2125-647 2884	AW	7/6/2021 10:12	AW	TLD-50	N/A
4/12/2021 7:27 2126-648	AW	7/6/2021 7:45	AW	TLD-52	N/A
4/12/2021 8:40 2127-649	AW	7/6/2021 9:00	AW	TLD-53	N/A

Table B.2. Second Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
4/12/2021 14:53 2128-650	AW	7/6/2021 12:35	AW	TLD-54	N/A
4/12/2021 7:31 2129-651	AW	7/6/2021 7:48	AW	TLD-58	N/A
4/12/2021 15:54 2130-652	AW	7/6/2021 15:47	AW	TLD-59	N/A
4/12/2021 16:09 2131-653	AW	7/6/2021 16:01	AW	TLD-60	N/A
4/12/2021 16:10 2132-654	AW	7/6/2021 16:00	AW	TLD-61	N/A
4/12/2021 16:00 2133-655	AW	7/6/2021 15:53	AW	TLD-62	N/A
4/13/2021 12:25 2134-656	AW	7/6/2021 16:10	AW	TLD-63	N/A
4/12/2021 10:45 2135-657	AW	7/6/2021 10:47	AW	TLD-64	N/A
4/12/2021 7:56 2136-658 2885	AW	7/6/2021 8:26	AW	TLD-65	N/A
4/12/2021 7:43 2137-659	AW	7/6/2021 8:13	AW	TLD-66	N/A
4/12/2021 7:41 2138-660	AW	7/6/2021 8:09	AW	TLD-67	N/A
4/12/2021 10:13 2139-661 2886	AW	7/6/2021 10:14	AW	TLD-68	N/A
4/12/2021 9:59 2140-662	AW	7/6/2021 10:05	AW	TLD-69	N/A
4/12/2021 9:10 2141-663	AW	7/6/2021 9:24	AW	TLD-70	N/A
4/12/2021 9:06 2142-664	AW	7/6/2021 9:25	AW	TLD-71	N/A
4/12/2021 8:52 2143-665	AW	7/6/2021 9:17	AW	TLD-72	N/A
4/12/2021 13:50 2144-666	AW	7/6/2021 15:09	AW	TLD-73	N/A
4/12/2021 12:16 2145-667	AW	7/6/2021 13:08	AW	TLD-74	N/A
4/12/2021 12:18 2146-668	AW	7/6/2021 13:11	AW	TLD-75	N/A
4/12/2021 12:23 2147-669	AW	7/6/2021 13:25	AW	TLD-76	N/A
4/12/2021 12:29 2148-670	AW	7/6/2021 13:30	AW	TLD-77	N/A
4/12/2021 12:54 2149-671	AW	7/6/2021 13:57	AW	TLD-78	N/A
4/12/2021 10:24 2150-672	AW	7/6/2021 10:28	AW	TLD-79	N/A
4/12/2021 13:18 2151-673	AW	7/6/2021 14:25	AW	TLD-80	N/A

Table B.2. Second Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
4/12/2021 9:04 2152-674 2887	AW	7/6/2021 9:23	AW	TLD-81	N/A
4/12/2021 8:12 2153-675	AW	7/6/2021 8:33	AW	TLD-82	N/A
4/12/2021 8:15 2154-676 2888	AW	7/6/2021 8:36	AW	TLD-83	N/A
4/12/2021 7:39 2155-677	AW	Lost	AW	TLD-84	Estimate will be performed based on results of other quarters.
4/12/2021 9:45 2156-678	AW	7/6/2021 5:30	SO	TLD-85	N/A
4/12/2021 12:13 2157-679	AW	7/6/2021 13:04	AW	TLD-86	N/A
4/12/2021 14:12 2158-680	AW	7/6/2021 15:14	AW	TLD-87	N/A
4/12/2021 15:39 2159-681	AW	7/6/2021 14:44	AW	TLD-88	N/A
4/12/2021 15:34 2160-682	AW	7/6/2021 14:40	AW	TLD-89	N/A
4/12/2021 15:30 2161-683	AW	7/6/2021 14:35	AW	TLD-90	N/A
4/12/2021 13:07 2162-684	AW	7/6/2021 14:14	AW	TLD-91	N/A
4/12/2021 13:00 2163-685	AW	Lost	AW	TLD-92	Estimate will be performed based on results of other quarters.
4/12/2021 12:37 2164-686	AW	7/6/2021 13:39	AW	TLD-93	N/A
4/12/2021 12:42 2165-687	AW	7/6/2021 13:42	AW	TLD-94	N/A
4/12/2021 12:32 2166-688	AW	7/6/2021 13:33	AW	TLD-95	N/A
4/12/2021 9:14 2167-689	AW	7/6/2021 9:32	AW	TLD-96	N/A
4/13/2021 12:00 2170-692	AW	7/6/2021 15:40	AW	TLD-97	N/A
4/13/2021 13:00 2168-690	AW	7/6/2021 16:20	AW	TLD-FB	N/A
4/12/2021 7:00 2169-691	AW	7/6/2021 7:00	AW	TLD-TB	N/A

Table B.3. Third Quarter TLD and OSL Issue and Collection Dates

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
7/6/2021 9:19 3759-625	AW	9/30/2021 9:02	PB	TLD-1	N/A
7/6/2021 8:56 3762-626 2882	AW	9/30/2021 8:55	PB	TLD-2	N/A
7/6/2021 8:22 3763-627 2883	AW	9/30/2021 7:43	PB	TLD-3	N/A
7/6/2021 10:36 3764-628	AW	9/30/2021 10:30	PB	TLD-4	N/A
7/6/2021 10:32 3765-629	AW	9/30/2021 10:21	PB	TLD-5	N/A
7/6/2021 10:23 3766-630	AW	9/30/2021 10:09	PB	TLD-6	N/A
7/6/2021 9:46 3767-631	AW	9/30/2021 9:26	PB	TLD-7	N/A
7/6/2021 15:02 3768-632	AW	9/30/2021 15:19	PB	TLD-9	N/A
7/6/2021 13:45 3769-633	AW	9/30/2021 14:21	PB	TLD-12	N/A
7/6/2021 13:52 3770-634	AW	9/30/2021 14:25	PB	TLD-13	N/A
7/6/2021 8:15 3771-635	AW	9/30/2021 7:38	PB	TLD-14	N/A
7/6/2021 7:53 3772-636	AW	9/30/2021 7:26	PB	TLD-15	N/A
7/6/2021 14:28 3773-637	AW	9/30/2021 14:50	PB	TLD-16	N/A
7/6/2021 14:52 3774-638	AW	9/30/2021 15:10	PB	TLD-19	N/A
7/6/2021 12:10 3775-639	AW	9/30/2021 12:52	PB	TLD-22	N/A
7/6/2021 8:50 3776-640	AW	9/30/2021 8:26	PB	TLD-25	N/A
7/6/2021 14:19 3777-641	AW	9/30/2021 14:44	PB	TLD-30	N/A
7/6/2021 9:41 3778-642	AW	9/30/2021 9:23	PB	TLD-35	N/A
7/6/2021 10:19 3779-643	AW	9/30/2021 10:00	PB	TLD-37	N/A
7/6/2021 14:58 3780-644	AW	9/30/2021 15:15	PB	TLD-38	N/A
7/6/2021 8:52 3781-645	AW	9/30/2021 8:31	PB	TLD-40	N/A
7/6/2021 9:50 3782-646	AW	9/30/2021 9:35	PB	TLD-46	N/A
7/6/2021 10:12 3783-647 2884	AW	9/30/2021 9:53	PB	TLD-50	N/A
7/6/2021 7:45 3784-648	AW	9/30/2021 7:14	PB	TLD-52	N/A
7/6/2021 9:00 3785-649	AW	9/30/2021 8:50	PB	TLD-53	N/A

Table B.3. Third Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
7/6/2021 12:35 3786-650	AW	9/30/2021 13:18	PB	TLD-54	N/A
7/6/2021 7:48 3787-651	AW	9/30/2021 7:23	PB	TLD-58	N/A
7/6/2021 15:47 3788-652	AW	9/30/2021 16:05	PB	TLD-59	N/A
7/6/2021 16:01 3789-653	AW	9/30/2021 15:51	PB	TLD-60	N/A
7/6/2021 16:00 3790-654	AW	9/30/2021 15:52	PB	TLD-61	N/A
7/6/2021 15:53 3791-655	AW	9/30/2021 16:07	PB	TLD-62	N/A
7/6/2021 16:10 3792-656	AW	9/30/2021 15:58	PB	TLD-63	N/A
7/6/2021 10:47 3793-657	AW	9/30/2021 10:42	PB	TLD-64	N/A
7/6/2021 8:26 3794-658 2885	AW	9/30/2021 7:54	PB	TLD-65	N/A
7/6/2021 8:13 3795-659	AW	9/30/2021 7:36	PB	TLD-66	N/A
7/6/2021 8:09 3796-660	AW	9/30/2021 7:34	PB	TLD-67	N/A
7/6/2021 10:14 3797-661 2886	AW	9/30/2021 9:57	PB	TLD-68	N/A
7/6/2021 10:05 3798-662	AW	9/30/2021 9:43	PB	TLD-69	N/A
7/6/2021 9:24 3799-663	AW	9/30/2021 9:15	PB	TLD-70	N/A
7/6/2021 9:25 3800-664	AW	9/30/2021 9:12	PB	TLD-71	N/A
7/6/2021 9:17 3801-665	AW	9/30/2021 8:59	PB	TLD-72	N/A
7/6/2021 15:09 3802-666	AW	9/30/2021 15:24	PB	TLD-73	N/A
7/6/2021 13:08 3803-667	AW	9/30/2021 13:47	PB	TLD-74	N/A
7/6/2021 13:11 3804-668	AW	9/30/2021 13:53	PB	TLD-75	N/A
7/6/2021 13:25 3805-669	AW	9/30/2021 13:59	PB	TLD-76	N/A
7/6/2021 13:30 3806-670	AW	9/30/2021 14:01	PB	TLD-77	N/A
7/6/2010 13:57 3807-671	AW	9/30/2021 14:28	PB	TLD-78	N/A
7/6/2021 10:28 3808-672	AW	9/30/2021 10:12	PB	TLD-79	N/A
7/6/2021 14:25 3809-673	AW	9/30/2021 14:48	PB	TLD-80	N/A

Table B.3. Third Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
7/6/2021 9:23 3810-674 2887	AW	9/30/2021 9:10	PB	TLD-81	N/A
7/6/2021 8:33 3811-675	AW	9/30/2021 8:07	PB	TLD-82	N/A
7/6/2021 8:36 3812-676 2888	AW	9/30/2021 8:11	PB	TLD-83	N/A
7/6/2021 8:06 3813-677	AW	9/30/2021 7:32	PB	TLD-84	N/A
7/6/2021 5:30 3814-678	AW	9/30/2021 13:27	PB	TLD-85	N/A
7/6/2021 13:04 3815-679	AW	9/30/2021 13:42	PB	TLD-86	N/A
7/6/2021 15:14 3816-680	AW	9/30/2021 15:29	PB	TLD-87	N/A
7/6/2021 14:44 3817-681	AW	9/30/2021 15:04	PB	TLD-88	N/A
7/6/2021 14:40 3818-682	AW	9/30/2021 15:00	PB	TLD-89	N/A
7/6/2021 14:35 3819-683	AW	9/30/2021 14:55	PB	TLD-90	N/A
7/6/2021 14:14 3820-684	AW	9/30/2021 14:40	PB	TLD-91	N/A
7/6/2021 14:02 3821-685	AW	9/30/2021 14:36	PB	TLD-92	N/A
7/6/2021 13:39 3822-686	AW	9/30/2021 14:13	PB	TLD-93	N/A
7/6/2021 13:42 3823-687	AW	9/30/2021 14:18	PB	TLD-94	N/A
7/6/2021 13:33 3824-688	AW	9/30/2021 14:08	PB	TLD-95	N/A
7/6/2021 9:32 3825-689	AW	9/30/2021 9:19	PB	TLD-96	N/A
7/6/2021 15:40 3828-692	AW	9/30/2021 15:37	PB	TLD-97	N/A
7/6/2021 16:20 3826-690	AW	9/30/2021 16:20	PB	TLD-FB	N/A
7/6/2021 7:00 3827-691	AW	9/30/2021 7:00	AW	TLD-TB	N/A

Table B.4. Fourth Quarter TLD and OSL Issue and Collection Dates

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
9/30/2021 9:02 5778-625	PB	1/19/2022 10:18	PB	TLD-1	N/A
9/30/2021 8:55 5781-626 2882	PB	1/19/2022 10:00	PB	TLD-2	N/A
9/30/2021 7:43 5782-627 2883	PB	1/19/2022 9:14	PB	TLD-3	N/A
9/30/2021 10:30 5783-628	PB	1/19/2022 12:28	PB	TLD-4	N/A
9/30/2021 10:21 784-629	PB	1/19/2022 12:37	PB	TLD-5	N/A
9/30/2021 10:09 5785-630	PB	1/19/2022 12:14	PB	TLD-6	N/A
9/30/2021 9:26 5786-631	PB	1/19/2022 10:43	PB	TLD-7	N/A
9/30/2021 15:19 5787-632	PB	1/19/2022 15:52	PB	TLD-9	N/A
9/30/2021 14:21 5788-633	PB	1/19/2022 14:35	PB	TLD-12	N/A
9/30/2021 14:25 5789-634	PB	1/19/2022 14:40	PB	TLD-13	N/A
9/30/2021 7:38 5790-635	PB	1/19/2022 9:04	PB	TLD-14	N/A
9/30/2021 7:26 5791-636	PB	1/19/2022 8:48	PB	TLD-15	N/A
9/30/2021 14:50 5792-637	PB	1/19/2022 15:16	PB	TLD-16	N/A
9/30/2021 15:10 5793-638	PB	1/19/2022 15:42	PB	TLD-19	N/A
9/30/2021 12:52 5794-639	PB	1/19/2022 13:23	PB	TLD-22	N/A
9/30/2021 8:26 5795-640	PB	1/19/2022 9:46	PB	TLD-25	N/A
9/30/2021 14:44 5796-641	PB	1/19/2022 15:06	PB	TLD-30	N/A
9/30/2021 9:23 5797-642	PB	1/19/2022 10:40	PB	TLD-35	N/A
9/30/2021 10:00 5798-643	PB	1/19/2022 12:01	PB	TLD-37	N/A
9/30/2021 15:15 5799-644	PB	1/19/2022 15:47	PB	TLD-38	N/A
9/30/2021 8:31 5800-645	PB	1/19/2022 9:48	PB	TLD-40	N/A
9/30/2021 09:35 5801-646	PB	1/19/2022 10:46	PB	TLD-46	N/A
9/30/2021 9:53 5802-647 2884	PB	1/19/2022 11:49	PB	TLD-50	N/A
9/30/2021 7:14 5803-648	PB	1/19/2022 8:51	PB	TLD-52	N/A
9/30/2021 8:50 5804-649	PB	1/19/2022 9:55	PB	TLD-53	N/A

Table B.4. Fourth Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
9/30/2021 13:18 5805-650	PB	1/20/2022 7:30	PB	TLD-54	N/A
9/30/2021 7:23 5806-651	PB	1/19/2022 8:42	PB	TLD-58	N/A
9/30/2021 16:05 5807-652	PB	1/19/2022 7:59	PB	TLD-59	N/A
9/30/2021 15:51 5808-653	PB	1/19/2022 8:20	PB	TLD-60	N/A
9/30/2021 15:52 5809-654	PB	1/19/2022 8:21	PB	TLD-61	N/A
9/30/2021 16:07 5810-655	PB	1/19/2022 7:51	PB	TLD-62	N/A
9/30/2021 15:58 5811-656	PB	1/19/2022 8:14	PB	TLD-63	N/A
9/30/2021 10:42 5812-657	PB	1/19/2022 12:46	PB	TLD-64	N/A
9/30/2021 7:54 5813-658 2885	PB	1/19/2022 9:16	PB	TLD-65	N/A
9/30/2021 7:36 5814-659	PB	1/19/2022 9:01	PB	TLD-66	N/A
9/30/2021 7:34 5815-660	PB	1/19/2022 8:58	PB	TLD-67	N/A
9/30/2021 9:57 5816-661 2886	PB	1/19/2022 11:55	PB	TLD-68	N/A
9/30/2021 9:43 5817-662	PB	1/19/2022 10:58	PB	TLD-69	N/A
9/30/2021 9:15 5818-663	PB	1/19/2022 10:32	PB	TLD-70	N/A
9/30/2021 9:12 5819-664	PB	1/19/2022 10:28	PB	TLD-71	N/A
9/30/2021 8:59 5820-665	PB	1/19/2022 10:15	PB	TLD-72	N/A
9/30/2021 15:24 5821-666	PB	1/19/2022 15:59	PB	TLD-73	N/A
9/30/2021 13:47 5822-667	PB	1/19/2022 13:59	PB	TLD-74	N/A
9/30/2021 13:53 5823-668	PB	1/19/2022 14:03	PB	TLD-75	N/A
9/30/2021 13:59 5824-669	PB	1/19/2022 14:09	PB	TLD-76	N/A
9/30/2021 14:01 5825-670	PB	1/19/2022 14:16	PB	TLD-77	N/A
9/30/2021 14:28 5826-671	PB	1/19/2022 14:45	PB	TLD-78	N/A
9/30/2021 10:12 5827-672	PB	1/19/2022 12:19	PB	TLD-79	N/A
9/30/2021 14:48 5828-673	PB	1/19/2022 15:12	PB	TLD-80	N/A
9/30/2021 9:10 5829-674 2887	PB	1/19/2022 10:21	PB	TLD-81	N/A

Table B.4. Fourth Quarter TLD and OSL Issue and Collection Dates (Continued)

Date/Time Issued/Badge ID	Issued By	Date/Time Collected	Collected By	Location Name	Comments
9/30/2021 8:07 5830-675	PB	1/19/2022 9:24	PB	TLD-82	N/A
9/30/2021 8:11 5831-676 2888	PB	1/19/2022 9:29	PB	TLD-83	N/A
9/30/2021 7:32 5832-677	PB	1/19/2022 8:56	PB	TLD-84	N/A
9/30/2021 13:27 5833-678	PB	1/19/2022 10:50	SO	TLD-85	N/A
9/30/2021 13:42 5834-679	PB	1/19/2022 13:42	PB	TLD-86	N/A
9/30/2021 15:29 5835-680	PB	1/19/2022 16:05	PB	TLD-87	N/A
9/30/2021 15:04 5836-681	PB	1/19/2022 15:34	PB	TLD-88	N/A
9/30/2021 15:00 5837-682	PB	1/19/2022 15:29	PB	TLD-89	N/A
9/30/2021 14:55 5838-683	PB	1/19/2022 15:19	PB	TLD-90	N/A
9/30/2021 14:40 5839-684	PB	1/19/2022 15:00	PB	TLD-91	N/A
9/30/2021 14:36 5840-685	PB	1/19/2022 14:51	PB	TLD-92	N/A
9/30/2021 14:13 5841-686	PB	1/19/2022 14:27	PB	TLD-93	N/A
9/30/2021 14:18 5842-687	PB	1/19/2022 14:32	PB	TLD-94	N/A
9/30/2021 14:08 5843-688	PB	1/19/2022 14:20	PB	TLD-95	N/A
9/30/2021 9:19 5844-689	PB	1/19/2022 10:37	PB	TLD-96	N/A
9/30/2021 15:37 5847-692	PB	1/19/2022 8:28	PB	TLD-97	N/A
9/30/2021 16:20 5845-690	PB	1/19/2022 16:20	PB	TLD-FB	N/A
9/30/2021 7:00 5846-691	AW	1/19/2022 7:00	PB	TLD-TB	N/A

APPENDIX C

TLD ANALYTICAL DATA

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MIRION TECHNOLOGIES

Dosimetry Services Division
2652 McGaw Ave
Irvine, CA 92614

Toll Free: (800) 251-3331
Tel: (949) 419-1000
Fax: (949) 296-1144
www.mirion.com

June 8, 2021

Four Rivers Nuclear Partnership, LLC
Attn: Woods Julie
PO 0001160
5511 Hobbs Road
Building C-720 Receiving
KEVIL, KY 42053

Dear Woods Julie,

Enclosed is the environmental report for the location, and wear period listed below reported in units of mR:

Account	Location	Wear Period
98365	00000LAT	01/01/2021

As a reminder, no background has been applied. Only fade and reader corrections have been applied.
The Analysis and Reporting of these results are performed in accordance with the Mirion Technologies (GDS) Inc. Quality Assurance Manual and Standard Operating Procedures T-550 Production of Environmental Reports.

If you have any questions, please contact customer service.

Sincerely,

Tamhangvo

Tam Hang Vo
Dose Analysis Team

MIRION TECHNOLOGIES

Dosimetry Services Division
2652 McGaw Avenue
Irvine, CA 92614

Toll Free: (800) 251-3331
Tel.: (949) 296-1800
Fax: (949) 296-1144
www.mirion.com

ACCOUNT_NO	LOCATIONID	WEARER_NO	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	REC_DATE	E1	E2	E3 *	E4 *	mR
98365	00000LAT	622	1/1/2021	ENVIRONMENTAL	2240363	8012636	12/14/2020	248834	4/26/2021	12	12	17	17	12
98365	00000LAT	623	1/1/2021	ENVIRONMENTAL	2240364	8010066	12/14/2020	248834	4/26/2021	12	12	16	18	12
98365	00000LAT	624	1/1/2021	ENVIRONMENTAL	2240361	8003675	12/14/2020	248834	4/26/2021	12	11	16	17	12
98365	00000LAT	625	1/1/2021	ENVIRONMENTAL	2240362	8011600	12/14/2020	248834	4/26/2021	212	227	237	234	220
98365	00000LAT	626	1/1/2021	ENVIRONMENTAL	2240365	8010288	12/14/2020	248834	4/26/2021	283	280	337	345	282
98365	00000LAT	627	1/1/2021	ENVIRONMENTAL	2240366	8016966	12/14/2020	248834	4/26/2021	22	22	24	26	22
98365	00000LAT	628	1/1/2021	ENVIRONMENTAL	2240367	8016520	12/14/2020	248834	4/26/2021	21	20	23	28	20
98365	00000LAT	629	1/1/2021	ENVIRONMENTAL	2240368	8014473	12/14/2020	248834	4/26/2021	23	21	28	29	22
98365	00000LAT	630	1/1/2021	ENVIRONMENTAL	2240369	8006802	12/14/2020	248834	4/26/2021	19	18	22	24	19
98365	00000LAT	631	1/1/2021	ENVIRONMENTAL	2240370	8014559	12/14/2020	248834	4/26/2021	26	24	31	31	25
98365	00000LAT	632	1/1/2021	ENVIRONMENTAL	2240371	8005650	12/14/2020	248834	4/26/2021	17	18	22	23	18
98365	00000LAT	633	1/1/2021	ENVIRONMENTAL	2240372	8016169	12/14/2020	248834	4/26/2021	19	18	24	26	19
98365	00000LAT	634	1/1/2021	ENVIRONMENTAL	2240373	8016355	12/14/2020	248834	4/26/2021	24	24	25	28	24
98365	00000LAT	635	1/1/2021	ENVIRONMENTAL	2240374	8005153	12/14/2020	248834	4/26/2021	0.17 **	18	26	26	18
98365	00000LAT	636	1/1/2021	ENVIRONMENTAL	2240375	8007530	12/14/2020	248834	4/26/2021	18	17	26	26	17
98365	00000LAT	637	1/1/2021	ENVIRONMENTAL	2240376	8007825	12/14/2020	248834	4/26/2021	24	23	26	30	23
98365	00000LAT	638	1/1/2021	ENVIRONMENTAL	2240377	8013482	12/14/2020	248834	4/26/2021	20	19	24	27	20
98365	00000LAT	639	1/1/2021	ENVIRONMENTAL	2240378	8005114	12/14/2020	248834	4/26/2021	21	22	27	28	22
98365	00000LAT	640	1/1/2021	ENVIRONMENTAL	2240379	8016270	12/14/2020	248834	4/26/2021	28	29	38	39	28
98365	00000LAT	641	1/1/2021	ENVIRONMENTAL	2240380	8009775	12/14/2020	248834	4/26/2021	23	23	27	29	23
98365	00000LAT	642	1/1/2021	ENVIRONMENTAL	2240381	8016630	12/14/2020	248834	4/26/2021	23	24	31	30	23
98365	00000LAT	643	1/1/2021	ENVIRONMENTAL	2240382	8006995	12/14/2020	248834	4/26/2021	20	20	25	27	20
98365	00000LAT	644	1/1/2021	ENVIRONMENTAL	2240383	8014449	12/14/2020	248834	4/26/2021	22	22	24	25	22
98365	00000LAT	645	1/1/2021	ENVIRONMENTAL	2240384	8016325	12/14/2020	248834	4/26/2021	28	24	30	36	26
98365	00000LAT	646	1/1/2021	ENVIRONMENTAL	2240385	8005413	12/14/2020	248834	4/26/2021	20	19	24	25	20
98365	00000LAT	647	1/1/2021	ENVIRONMENTAL	2240386	8012972	12/14/2020	248834	4/26/2021	50	44	52	52	47
98365	00000LAT	648	1/1/2021	ENVIRONMENTAL	2240387	8010851	12/14/2020	248834	4/26/2021	18	19	23	23	18
98365	00000LAT	649	1/1/2021	ENVIRONMENTAL	2240388	8011538	12/14/2020	248834	4/26/2021	117	114	144	139	115
98365	00000LAT	650	1/1/2021	ENVIRONMENTAL	2240389	8008467	12/14/2020	248834	4/26/2021	23	22	24	28	22
98365	00000LAT	651	1/1/2021	ENVIRONMENTAL	2240390	8008184	12/14/2020	248834	4/26/2021	13	14	19	21	14
98365	00000LAT	652	1/1/2021	ENVIRONMENTAL	2240391	8011521	12/14/2020	248834	4/26/2021	18	17	19	22	17

*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

Approved by: Tam Hang Vo 6/8/2021

MIRION TECHNOLOGIES

Dosimetry Services Division
2652 McGaw Avenue
Irvine, CA 92614

Toll Free: (800) 251-3331
Tel.: (949) 296-1800
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ACCOUNT_NO	LOCATIONID	WEARER_NO	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	REC_DATE	E1	E2	E3 *	E4 *	mR
98365	00000LAT	653	1/1/2021	ENVIRONMENTAL	2240392	8011506	12/14/2020	248834	4/26/2021	389	383	450	470	386
98365	00000LAT	654	1/1/2021	ENVIRONMENTAL	2240393	8015153	12/14/2020	248834	4/26/2021	491	517	539	520	504
98365	00000LAT	655	1/1/2021	ENVIRONMENTAL	2240394	8016783	12/14/2020	248834	4/26/2021	18	17	23	23	18
98365	00000LAT	656	1/1/2021	ENVIRONMENTAL	2240395	8006157	12/14/2020	248834	4/26/2021	16	15	19	21	15
98365	00000LAT	657	1/1/2021	ENVIRONMENTAL	2240396	8016125	12/14/2020	248834	4/26/2021	16	17	21	22	16
98365	00000LAT	658	1/1/2021	ENVIRONMENTAL	2240397	8011206	12/14/2020	248834	4/26/2021	18	17	22	23	17
98365	00000LAT	659	1/1/2021	ENVIRONMENTAL	2240398	8008721	12/14/2020	248834	4/26/2021	18	18	23	24	18
98365	00000LAT	660	1/1/2021	ENVIRONMENTAL	2240399	8016775	12/14/2020	248834	4/26/2021	22	22	26	29	22
98365	00000LAT	661	1/1/2021	ENVIRONMENTAL	2240400	8006180	12/14/2020	248834	4/26/2021	22	21	26	29	22
98365	00000LAT	662	1/1/2021	ENVIRONMENTAL	2240401	8007728	12/14/2020	248834	4/26/2021	17	17	22	24	17
98365	00000LAT	663	1/1/2021	ENVIRONMENTAL	2240402	8010476	12/14/2020	248834	4/26/2021	42	41	49	50	41
98365	00000LAT	664	1/1/2021	ENVIRONMENTAL	2240403	8012082	12/14/2020	248834	4/26/2021	26	24	30	31	25
98365	00000LAT	665	1/1/2021	ENVIRONMENTAL	2240404	8010220	12/14/2020	248834	4/26/2021	23	23	26	28	23
98365	00000LAT	667	1/1/2021	ENVIRONMENTAL	2240406	8010752	12/14/2020	248834	4/26/2021	26	25	31	33	25
98365	00000LAT	668	1/1/2021	ENVIRONMENTAL	2240407	8012034	12/14/2020	248834	4/26/2021	23	20	25	27	21
98365	00000LAT	669	1/1/2021	ENVIRONMENTAL	2240408	8007083	12/14/2020	248834	4/26/2021	19	19	24	26	19
98365	00000LAT	670	1/1/2021	ENVIRONMENTAL	2240409	8010327	12/14/2020	248834	4/26/2021	22	22	26	28	22
98365	00000LAT	671	1/1/2021	ENVIRONMENTAL	2240410	8008715	12/14/2020	248834	4/26/2021	23	24	30	30	24
98365	00000LAT	672	1/1/2021	ENVIRONMENTAL	2240411	8012731	12/14/2020	248834	4/26/2021	19	20	24	25	20
98365	00000LAT	673	1/1/2021	ENVIRONMENTAL	2240412	8011880	12/14/2020	248834	4/26/2021	24	22	27	31	23
98365	00000LAT	674	1/1/2021	ENVIRONMENTAL	2240413	8007748	12/14/2020	248834	4/26/2021	104	99	99	126	101
98365	00000LAT	675	1/1/2021	ENVIRONMENTAL	2240414	8014935	12/14/2020	248834	4/26/2021	30	29	33	36	30
98365	00000LAT	676	1/1/2021	ENVIRONMENTAL	2240415	8005786	12/14/2020	248834	4/26/2021	72	107	70	71	72
98365	00000LAT	677	1/1/2021	ENVIRONMENTAL	2240416	8012531	12/14/2020	248834	4/26/2021	18	18	23	25	18
98365	00000LAT	678	1/1/2021	ENVIRONMENTAL	2240417	8015174	12/14/2020	248834	4/26/2021	21	20	23	26	21
98365	00000LAT	679	1/1/2021	ENVIRONMENTAL	2240418	8003563	12/14/2020	248834	4/26/2021	22	22	25	27	22
98365	00000LAT	680	1/1/2021	ENVIRONMENTAL	2240419	8011952	12/14/2020	248834	4/26/2021	22	22	25	28	22
98365	00000LAT	681	1/1/2021	ENVIRONMENTAL	2240420	8010830	12/14/2020	248834	4/26/2021	22	21	23	26	22
98365	00000LAT	682	1/1/2021	ENVIRONMENTAL	2240421	8005954	12/14/2020	248834	4/26/2021	23	23	25	26	23
98365	00000LAT	683	1/1/2021	ENVIRONMENTAL	2240422	8007831	12/14/2020	248834	4/26/2021	21	20	24	26	21
98365	00000LAT	684	1/1/2021	ENVIRONMENTAL	2240423	8009924	12/14/2020	248834	4/26/2021	23	22	25	27	23

*E1 is not used in envrionmental dose calculation for badge type 20

*E3, E4 are not used in envrionmental dose calculation for badge type 17

Approved by: Tam Hang Vo 6/8/2021

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Dosimetry Services Division
2652 McGaw Avenue
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ACCOUNT_NO	LOCATIONID	WEARER_NO	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	REC_DATE	E1	E2	E3 *	E4 *	mR
98365	00000LAT	685	1/1/2021	ENVIRONMENTAL	2240424	8010583	12/14/2020	248834	4/26/2021	21	20	22	24	20
98365	00000LAT	686	1/1/2021	ENVIRONMENTAL	2240425	8016130	12/14/2020	248834	4/26/2021	20	19	23	27	20
98365	00000LAT	687	1/1/2021	ENVIRONMENTAL	2240426	8003275	12/14/2020	248834	4/26/2021	22	22	24	27	22
98365	00000LAT	688	1/1/2021	ENVIRONMENTAL	2240427	8006745	12/14/2020	248834	4/26/2021	24	25	26	29	25
98365	00000LAT	689	1/1/2021	ENVIRONMENTAL	2240428	8014696	12/14/2020	248834	4/26/2021	22	22	25	27	22
98365	00000LAT	691	1/1/2021	ENVIRONMENTAL	2240430	8013178	12/14/2020	248834	4/26/2021	13	12	16	17	12
98365	00000LAT	692	1/1/2021	ENVIRONMENTAL	2240431	8013517	12/14/2020	248834	4/26/2021	16	15	19	22	15
98365	00000LAT	693	1/1/2021	ENVIRONMENTAL	2240432	8011480	12/14/2020	248834	4/26/2021	14	12	15	18	13
98365	00000LAT	694	1/1/2021	ENVIRONMENTAL	2240433	8014402	12/14/2020	248834	4/26/2021	13	12	16	18	13
98365	00000LAT	695	1/1/2021	ENVIRONMENTAL	2240434	8015103	12/14/2020	248834	4/26/2021	13	13	15	17	13
98365	00000LAT	696	1/1/2021	ENVIRONMENTAL	2240435	8013058	12/14/2020	248834	4/26/2021	13	13	16	17	13
98365	00000LAT		1/1/2021	CONTROL	2240359	8015284	12/14/2020	248834	4/26/2021	13	11	16	17	12
98365	00000LAT		1/1/2021	CONTROL	2240360	8016310	12/14/2020	248834	4/26/2021	12	13	18	19	12

** Damaged E1

C-6

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*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

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Global Dosimetry Solutions Environmental Report

Account	98365 Four Rivers Nuclear Partnership, LLC
Location	00000LAT
Monitoring Period	1/1/2021
Process	0247903

Badge Number	Name	Exposure mR*
690	ENVIRONMENTAL	6

*- No control exposures have been subtracted, and only element, reader and fade corrections have been made.

+ - Unusual element result observed. D - Element damaged and cannot be evaluated.

REP4109_0

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ACCOUNT_NO	LOCATIONID	WEARER_NO	BADGE_TYPE	WEAR_DATE	BADGEUSE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	REC_DATE	E1	E1	E3	E4	mR
98365	00000LAT	622	17	4/1/2021	E	ENVIRONMENTAL	2242102	8007374	2/24/2021	249431	7/14/2021	11	11	14	17	11
98365	00000LAT	623	17	4/1/2021	E	ENVIRONMENTAL	2242103	8010666	2/24/2021	249431	7/14/2021	12	12	15	16	12
98365	00000LAT	624	17	4/1/2021	E	ENVIRONMENTAL	2242100	8013593	2/24/2021	249431	7/14/2021	11	11	15	16	11
98365	00000LAT	625	17	4/1/2021	E	ENVIRONMENTAL	2242101	8013024	2/24/2021	249431	7/14/2021	173	173	203	206	173
98365	00000LAT	626	17	4/1/2021	E	ENVIRONMENTAL	2242104	8011025	2/24/2021	249431	7/14/2021	213	208	221	217	210
98365	00000LAT	627	17	4/1/2021	E	ENVIRONMENTAL	2242105	8011077	2/24/2021	249431	7/14/2021	17	17	23	23	17
98365	00000LAT	628	17	4/1/2021	E	ENVIRONMENTAL	2242106	8011452	2/24/2021	249431	7/14/2021	17	17	21	24	17
98365	00000LAT	629	17	4/1/2021	E	ENVIRONMENTAL	2242107	8013620	2/24/2021	249431	7/14/2021	19	17	27	30	18
98365	00000LAT	630	17	4/1/2021	E	ENVIRONMENTAL	2242108	8010580	2/24/2021	249431	7/14/2021	15	13	20	20	14
98365	00000LAT	631	17	4/1/2021	E	ENVIRONMENTAL	2242109	8012640	2/24/2021	249431	7/14/2021	22	21	27	31	21
98365	00000LAT	632	17	4/1/2021	E	ENVIRONMENTAL	2242110	8015143	2/24/2021	249431	7/14/2021	17	16	22	22	17
98365	00000LAT	633	17	4/1/2021	E	ENVIRONMENTAL	2242111	8009114	2/24/2021	249431	7/14/2021	16	15	20	22	15
98365	00000LAT	634	17	4/1/2021	E	ENVIRONMENTAL	2242112	8006099	2/24/2021	249431	7/14/2021	19	18	24	27	18
98365	00000LAT	635	17	4/1/2021	E	ENVIRONMENTAL	2242113	8011910	2/24/2021	249431	7/14/2021	15	14	19	20	15
98365	00000LAT	636	17	4/1/2021	E	ENVIRONMENTAL	2242114	8013175	2/24/2021	249431	7/14/2021	15	13	18	21	14
98365	00000LAT	637	17	4/1/2021	E	ENVIRONMENTAL	2242115	8008894	2/24/2021	249431	7/14/2021	18	18	23	23	18
98365	00000LAT	638	17	4/1/2021	E	ENVIRONMENTAL	2242116	8006361	2/24/2021	249431	7/14/2021	18	16	19	23	17
98365	00000LAT	639	17	4/1/2021	E	ENVIRONMENTAL	2242117	8012925	2/24/2021	249431	7/14/2021	18	17	21	24	17
98365	00000LAT	640	17	4/1/2021	E	ENVIRONMENTAL	2242118	8008324	2/24/2021	249431	7/14/2021	22	22	30	31	22
98365	00000LAT	641	17	4/1/2021	E	ENVIRONMENTAL	2242119	8011374	2/24/2021	249431	7/14/2021	20	17	24	25	18
98365	00000LAT	642	17	4/1/2021	E	ENVIRONMENTAL	2242120	8009925	2/24/2021	249431	7/14/2021	20	21	26	27	21
98365	00000LAT	643	17	4/1/2021	E	ENVIRONMENTAL	2242121	8012916	2/24/2021	249431	7/14/2021	29	18	21	23	18
98365	00000LAT	644	17	4/1/2021	E	ENVIRONMENTAL	2242122	8009474	2/24/2021	249431	7/14/2021	18	17	27	28	18
98365	00000LAT	645	17	4/1/2021	E	ENVIRONMENTAL	2242123	8012989	2/24/2021	249431	7/14/2021	23	20	23	28	21
98365	00000LAT	646	17	4/1/2021	E	ENVIRONMENTAL	2242124	8010846	2/24/2021	249431	7/14/2021	14	13	24	27	14
98365	00000LAT	647	17	4/1/2021	E	ENVIRONMENTAL	2242125	8008909	2/24/2021	249431	7/14/2021	42	38	44	46	40
98365	00000LAT	648	17	4/1/2021	E	ENVIRONMENTAL	2242126	8006210	2/24/2021	249431	7/14/2021	15	13	19	21	14
98365	00000LAT	649	17	4/1/2021	E	ENVIRONMENTAL	2242127	8014484	2/24/2021	249431	7/14/2021	92	96	108	121	94
98365	00000LAT	650	17	4/1/2021	E	ENVIRONMENTAL	2242128	8013586	2/24/2021	249431	7/14/2021	20	18	23	25	19
98365	00000LAT	651	17	4/1/2021	E	ENVIRONMENTAL	2242129	8009612	2/24/2021	249431	7/14/2021	13	12	17	19	12
98365	00000LAT	652	17	4/1/2021	E	ENVIRONMENTAL	2242130	8012426	2/24/2021	249431	7/14/2021	16	16	19	21	16

*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

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98365	00000LAT	653	17	4/1/2021	E	ENVIRONMENTAL	2242131	8004293	2/24/2021	249431	7/14/2021	293	287	367	385	290
98365	00000LAT	654	17	4/1/2021	E	ENVIRONMENTAL	2242132	8011991	2/24/2021	249431	7/14/2021	489	504	516	548	496
98365	00000LAT	655	17	4/1/2021	E	ENVIRONMENTAL	2242133	8015054	2/24/2021	249431	7/14/2021	15	14	18	21	14
98365	00000LAT	656	17	4/1/2021	E	ENVIRONMENTAL	2242134	8012962	2/24/2021	249431	7/14/2021	15	14	19	20	15
98365	00000LAT	657	17	4/1/2021	E	ENVIRONMENTAL	2242135	8010871	2/24/2021	249431	7/14/2021	16	15	19	20	15
98365	00000LAT	658	17	4/1/2021	E	ENVIRONMENTAL	2242136	8012465	2/24/2021	249431	7/14/2021	14	13	18	21	14
98365	00000LAT	659	17	4/1/2021	E	ENVIRONMENTAL	2242137	8008753	2/24/2021	249431	7/14/2021	17	17	20	22	17
98365	00000LAT	660	17	4/1/2021	E	ENVIRONMENTAL	2242138	8007620	2/24/2021	249431	7/14/2021	18	18	25	27	18
98365	00000LAT	661	17	4/1/2021	E	ENVIRONMENTAL	2242139	8012863	2/24/2021	249431	7/14/2021	18	17	22	25	18
98365	00000LAT	662	17	4/1/2021	E	ENVIRONMENTAL	2242140	8010095	2/24/2021	249431	7/14/2021	14	13	20	20	14
98365	00000LAT	663	17	4/1/2021	E	ENVIRONMENTAL	2242141	8013248	2/24/2021	249431	7/14/2021	35	33	40	38	34
98365	00000LAT	664	17	4/1/2021	E	ENVIRONMENTAL	2242142	8014551	2/24/2021	249431	7/14/2021	20	19	26	30	19
98365	00000LAT	665	17	4/1/2021	E	ENVIRONMENTAL	2242143	8015055	2/24/2021	249431	7/14/2021	19	19	23	26	19
98365	00000LAT	666	17	4/1/2021	E	ENVIRONMENTAL	2242144	8004607	2/24/2021	249431	7/14/2021	15	14	19	21	15
98365	00000LAT	667	17	4/1/2021	E	ENVIRONMENTAL	2242145	8014880	2/24/2021	249431	7/14/2021	20	17	22	26	18
98365	00000LAT	668	17	4/1/2021	E	ENVIRONMENTAL	2242146	8008856	2/24/2021	249431	7/14/2021	19	19	21	25	19
98365	00000LAT	669	17	4/1/2021	E	ENVIRONMENTAL	2242147	8014509	2/24/2021	249431	7/14/2021	17	15	21	23	16
98365	00000LAT	670	17	4/1/2021	E	ENVIRONMENTAL	2242148	8013126	2/24/2021	249431	7/14/2021	16	15	21	23	16
98365	00000LAT	671	17	4/1/2021	E	ENVIRONMENTAL	2242149	8014901	2/24/2021	249431	7/14/2021	20	17	25	26	19
98365	00000LAT	672	17	4/1/2021	E	ENVIRONMENTAL	2242150	8003426	2/24/2021	249431	7/14/2021	16	15	19	21	15
98365	00000LAT	673	17	4/1/2021	E	ENVIRONMENTAL	2242151	8012072	2/24/2021	249431	7/14/2021	17	16	19	23	16
98365	00000LAT	674	17	4/1/2021	E	ENVIRONMENTAL	2242152	8011557	2/24/2021	249431	7/14/2021	70	65	85	96	68
98365	00000LAT	675	17	4/1/2021	E	ENVIRONMENTAL	2242153	8012730	2/24/2021	249431	7/14/2021	26	22	31	37	24
98365	00000LAT	676	17	4/1/2021	E	ENVIRONMENTAL	2242154	8005353	2/24/2021	249431	7/14/2021	51	50	63	60	50
98365	00000LAT	678	17	4/1/2021	E	ENVIRONMENTAL	2242156	8005782	2/24/2021	249431	7/14/2021	17	16	22	25	16
98365	00000LAT	679	17	4/1/2021	E	ENVIRONMENTAL	2242157	8006602	2/24/2021	249431	7/14/2021	17	16	20	20	16
98365	00000LAT	680	17	4/1/2021	E	ENVIRONMENTAL	2242158	8004146	2/24/2021	249431	7/14/2021	17	15	21	22	16
98365	00000LAT	681	17	4/1/2021	E	ENVIRONMENTAL	2242159	8004162	2/24/2021	249431	7/14/2021	17	15	20	21	16
98365	00000LAT	682	17	4/1/2021	E	ENVIRONMENTAL	2242160	8011892	2/24/2021	249431	7/14/2021	19	18	23	23	19
98365	00000LAT	683	17	4/1/2021	E	ENVIRONMENTAL	2242161	8009882	2/24/2021	249431	7/14/2021	17	16	23	24	16
98365	00000LAT	684	17	4/1/2021	E	ENVIRONMENTAL	2242162	8010983	2/24/2021	249431	7/14/2021	17	17	21	24	17

*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

Approved by: *Tam Hang Vo* 7/28/2021

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Irvine, CA 92614

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ACCOUNT_NO	LOCATIONID	WEARER_NO	BADGE_TYPE	WEAR_DATE	BADGEUSE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	REC_DATE	E1	E1	E3	E4	mR
98365	00000LAT	686	17	4/1/2021	E	ENVIRONMENTAL	2242164	8010733	2/24/2021	249431	7/14/2021	16	16	22	24	16
98365	00000LAT	687	17	4/1/2021	E	ENVIRONMENTAL	2242165	8009314	2/24/2021	249431	7/14/2021	18	17	21	23	18
98365	00000LAT	688	17	4/1/2021	E	ENVIRONMENTAL	2242166	8009450	2/24/2021	249431	7/14/2021	20	19	24	24	19
98365	00000LAT	689	17	4/1/2021	E	ENVIRONMENTAL	2242167	8004623	2/24/2021	249431	7/14/2021	16	16	20	23	16
98365	00000LAT	690	17	4/1/2021	E	ENVIRONMENTAL	2242168	8014766	2/24/2021	249431	7/14/2021	12	12	15	17	12
98365	00000LAT	691	17	4/1/2021	E	ENVIRONMENTAL	2242169	8012151	2/24/2021	249431	7/14/2021	12	11	15	17	12
98365	00000LAT	692	17	4/1/2021	E	ENVIRONMENTAL	2242170	8014867	2/24/2021	249431	7/14/2021	15	14	18	22	14
98365	00000LAT	693	17	4/1/2021	E	ENVIRONMENTAL	2242171	8011390	2/24/2021	249431	7/14/2021	11	10	17	20	10
98365	00000LAT	694	17	4/1/2021	E	ENVIRONMENTAL	2242172	8010526	2/24/2021	249431	7/14/2021	11	11	16	18	11
98365	00000LAT	695	17	4/1/2021	E	ENVIRONMENTAL	2242173	8007061	2/24/2021	249431	7/14/2021	12	11	14	16	11
98365	00000LAT	696	17	4/1/2021	E	ENVIRONMENTAL	2242174	8009952	2/24/2021	249431	7/14/2021	11	10	15	17	11
98365	00000LAT		17	4/1/2021	C	CONTROL	2242099	8008028	2/24/2021	249431	7/14/2021	12	12	22	17	12
98365	00000LAT		17	4/1/2021	C	CONTROL	2242098	8011848	2/24/2021	249431	7/14/2021	12	12	15	16	12

Approved by: *Tam Hang Vo* 7/28/2021

*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

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ACCOUNT_NO	LOCATIONID	WEARER_NO	BADGE_TYPE	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	REC_DATE	E1	E2	E3	E4	mR
98365	00000LAT	622	17	7/1/2021	ENVIRONMENTAL	2243760	8009786	5/27/2021	250184	10/12/2021	11	10	14	16	11
98365	00000LAT	623	17	7/1/2021	ENVIRONMENTAL	2243761	8011915	5/27/2021	250184	10/12/2021	12	11	15	18	11
98365	00000LAT	624	17	7/1/2021	ENVIRONMENTAL	2243758	8004629	5/27/2021	250184	10/12/2021	11	10	15	17	11
98365	00000LAT	625	17	7/1/2021	ENVIRONMENTAL	2243759	8007784	5/27/2021	250184	10/12/2021	199	197	176	203	198
98365	00000LAT	626	17	7/1/2021	ENVIRONMENTAL	2243762	8012896	5/27/2021	250184	10/12/2021	210	212	229	236	211
98365	00000LAT	627	17	7/1/2021	ENVIRONMENTAL	2243763	8010039	5/27/2021	250184	10/12/2021	18	18	20	22	18
98365	00000LAT	628	17	7/1/2021	ENVIRONMENTAL	2243764	8013088	5/27/2021	250184	10/12/2021	16	15	20	21	16
98365	00000LAT	629	17	7/1/2021	ENVIRONMENTAL	2243765	8004509	5/27/2021	250184	10/12/2021	18	17	21	24	18
98365	00000LAT	630	17	7/1/2021	ENVIRONMENTAL	2243766	8008463	5/27/2021	250184	10/12/2021	16	15	18	19	16
98365	00000LAT	631	17	7/1/2021	ENVIRONMENTAL	2243767	8013316	5/27/2021	250184	10/12/2021	25	23	25	28	24
98365	00000LAT	632	17	7/1/2021	ENVIRONMENTAL	2243768	8011469	5/27/2021	250184	10/12/2021	16	15	19	21	15
98365	00000LAT	633	17	7/1/2021	ENVIRONMENTAL	2243769	8009396	5/27/2021	250184	10/12/2021	16	15	19	21	15
98365	00000LAT	634	17	7/1/2021	ENVIRONMENTAL	2243770	8004833	5/27/2021	250184	10/12/2021	18	17	22	25	17
98365	00000LAT	635	17	7/1/2021	ENVIRONMENTAL	2243771	8007862	5/27/2021	250184	10/12/2021	16	15	18	20	15
98365	00000LAT	636	17	7/1/2021	ENVIRONMENTAL	2243772	8010844	5/27/2021	250184	10/12/2021	15	14	18	20	14
98365	00000LAT	637	17	7/1/2021	ENVIRONMENTAL	2243773	8006747	5/27/2021	250184	10/12/2021	19	17	25	26	18
98365	00000LAT	638	17	7/1/2021	ENVIRONMENTAL	2243774	8011963	5/27/2021	250184	10/12/2021	18	17	20	21	18
98365	00000LAT	639	17	7/1/2021	ENVIRONMENTAL	2243775	8017048	5/27/2021	250184	10/12/2021	19	18	20	23	19
98365	00000LAT	640	17	7/1/2021	ENVIRONMENTAL	2243776	8012404	5/27/2021	250184	10/12/2021	26	25	27	32	26
98365	00000LAT	641	17	7/1/2021	ENVIRONMENTAL	2243777	8007273	5/27/2021	250184	10/12/2021	21	19	23	25	20
98365	00000LAT	642	17	7/1/2021	ENVIRONMENTAL	2243778	8007604	5/27/2021	250184	10/12/2021	22	21	24	28	22
98365	00000LAT	643	17	7/1/2021	ENVIRONMENTAL	2243779	8009766	5/27/2021	250184	10/12/2021	18	17	22	23	18
98365	00000LAT	644	17	7/1/2021	ENVIRONMENTAL	2243780	8008398	5/27/2021	250184	10/12/2021	21	17	22	23	19
98365	00000LAT	645	17	7/1/2021	ENVIRONMENTAL	2243781	8006862	5/27/2021	250184	10/12/2021	23	23	24	25	23
98365	00000LAT	646	17	7/1/2021	ENVIRONMENTAL	2243782	8010675	5/27/2021	250184	10/12/2021	15	16	19	21	16
98365	00000LAT	647	17	7/1/2021	ENVIRONMENTAL	2243783	8014392	5/27/2021	250184	10/12/2021	42	42	49	51	42
98365	00000LAT	648	17	7/1/2021	ENVIRONMENTAL	2243784	8010889	5/27/2021	250184	10/12/2021	16	15	17	19	15
98365	00000LAT	649	17	7/1/2021	ENVIRONMENTAL	2243785	8008287	5/27/2021	250184	10/12/2021	95	92	89	106	94
98365	00000LAT	650	17	7/1/2021	ENVIRONMENTAL	2243786	8009362	5/27/2021	250184	10/12/2021	18	15	20	24	17
98365	00000LAT	651	17	7/1/2021	ENVIRONMENTAL	2243787	8004842	5/27/2021	250184	10/12/2021	13	11	15	18	12
98365	00000LAT	652	17	7/1/2021	ENVIRONMENTAL	2243788	8012716	5/27/2021	250184	10/12/2021	15	14	18	20	15

*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

Approved by: *Tam Hang Vo* 11/3/2021

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Dosimetry Services Division
2652 McGaw Avenue
Irvine, CA 92614

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Tel.: (949) 296-1800
Fax: (949) 296-1144
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98365	00000LAT	653	17	7/1/2021	ENVIRONMENTAL	2243789	8013077	5/27/2021	250184	10/12/2021	336	359	365	371	348
98365	00000LAT	654	17	7/1/2021	ENVIRONMENTAL	2243790	8014713	5/27/2021	250184	10/12/2021	562	554	555	610	558
98365	00000LAT	655	17	7/1/2021	ENVIRONMENTAL	2243791	8004480	5/27/2021	250184	10/12/2021	15	14	17	19	14
98365	00000LAT	656	17	7/1/2021	ENVIRONMENTAL	2243792	8007830	5/27/2021	250184	10/12/2021	15	14	17	20	15
98365	00000LAT	657	17	7/1/2021	ENVIRONMENTAL	2243793	8011874	5/27/2021	250184	10/12/2021	15	15	20	21	15
98365	00000LAT	658	17	7/1/2021	ENVIRONMENTAL	2243794	8011267	5/27/2021	250184	10/12/2021	16	15	17	18	15
98365	00000LAT	659	17	7/1/2021	ENVIRONMENTAL	2243795	8010660	5/27/2021	250184	10/12/2021	20	18	23	25	19
98365	00000LAT	660	17	7/1/2021	ENVIRONMENTAL	2243796	8012422	5/27/2021	250184	10/12/2021	30	18	20	22	18
98365	00000LAT	661	17	7/1/2021	ENVIRONMENTAL	2243797	8007045	5/27/2021	250184	10/12/2021	20	18	20	25	19
98365	00000LAT	662	17	7/1/2021	ENVIRONMENTAL	2243798	8010848	5/27/2021	250184	10/12/2021	14	13	17	19	14
98365	00000LAT	663	17	7/1/2021	ENVIRONMENTAL	2243799	8013326	5/27/2021	250184	10/12/2021	38	36	39	43	37
98365	00000LAT	664	17	7/1/2021	ENVIRONMENTAL	2243800	8012900	5/27/2021	250184	10/12/2021	22	24	27	29	23
98365	00000LAT	665	17	7/1/2021	ENVIRONMENTAL	2243801	8016071	5/27/2021	250184	10/12/2021	20	19	21	24	20
98365	00000LAT	666	17	7/1/2021	ENVIRONMENTAL	2243802	8008761	5/27/2021	250184	10/12/2021	15	16	20	20	15
98365	00000LAT	667	17	7/1/2021	ENVIRONMENTAL	2243803	8008906	5/27/2021	250184	10/12/2021	20	19	23	25	20
98365	00000LAT	668	17	7/1/2021	ENVIRONMENTAL	2243804	8009354	5/27/2021	250184	10/12/2021	20	17	23	26	18
98365	00000LAT	669	17	7/1/2021	ENVIRONMENTAL	2243805	8010628	5/27/2021	250184	10/12/2021	17	18	21	23	17
98365	00000LAT	670	17	7/1/2021	ENVIRONMENTAL	2243806	8014944	5/27/2021	250184	10/12/2021	18	16	22	23	17
98365	00000LAT	671	17	7/1/2021	ENVIRONMENTAL	2243807	8010421	5/27/2021	250184	10/12/2021	21	20	22	24	20
98365	00000LAT	672	17	7/1/2021	ENVIRONMENTAL	2243808	8007901	5/27/2021	250184	10/12/2021	16	16	18	21	16
98365	00000LAT	673	17	7/1/2021	ENVIRONMENTAL	2243809	8009116	5/27/2021	250184	10/12/2021	18	18	19	21	18
98365	00000LAT	674	17	7/1/2021	ENVIRONMENTAL	2243810	8003095	5/27/2021	250184	10/12/2021	138	138	152	158	138
98365	00000LAT	675	17	7/1/2021	ENVIRONMENTAL	2243811	8012409	5/27/2021	250184	10/12/2021	25	26	30	32	25
98365	00000LAT	676	17	7/1/2021	ENVIRONMENTAL	2243812	8016454	5/27/2021	250184	10/12/2021	62	61	63	66	61
98365	00000LAT	677	17	7/1/2021	ENVIRONMENTAL	2243813	8008955	5/27/2021	250184	10/12/2021	20	18	19	22	19
98365	00000LAT	678	17	7/1/2021	ENVIRONMENTAL	2243814	8014508	5/27/2021	250184	10/12/2021	19	16	20	22	18
98365	00000LAT	679	17	7/1/2021	ENVIRONMENTAL	2243815	8016529	5/27/2021	250184	10/12/2021	18	17	23	24	17
98365	00000LAT	680	17	7/1/2021	ENVIRONMENTAL	2243816	8003750	5/27/2021	250184	10/12/2021	17	16	17	21	16
98365	00000LAT	681	17	7/1/2021	ENVIRONMENTAL	2243817	8009328	5/27/2021	250184	10/12/2021	18	16	21	22	17
98365	00000LAT	682	17	7/1/2021	ENVIRONMENTAL	2243818	8016316	5/27/2021	250184	10/12/2021	19	17	22	25	18
98365	00000LAT	683	17	7/1/2021	ENVIRONMENTAL	2243819	8010275	5/27/2021	250184	10/12/2021	17	16	22	24	17

*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

Approved by: *Tam Hang Vo* 11/3/2021

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Dosimetry Services Division
2652 McGaw Avenue
Irvine, CA 92614

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Fax: (949) 296-1144
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ACCOUNT_NO	LOCATIONID	WEARER_NO	BADGE_TYPE	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	REC_DATE	E1	E2	E3	E4	mR
98365	00000LAT	684	17	7/1/2021	ENVIRONMENTAL	2243820	8010831	5/27/2021	250184	10/12/2021	17	17	23	24	17
98365	00000LAT	685	17	7/1/2021	ENVIRONMENTAL	2243821	8008340	5/27/2021	250184	10/12/2021	17	16	19	21	17
98365	00000LAT	686	17	7/1/2021	ENVIRONMENTAL	2243822	8012090	5/27/2021	250184	10/12/2021	17	16	18	19	17
98365	00000LAT	687	17	7/1/2021	ENVIRONMENTAL	2243823	8008348	5/27/2021	250184	10/12/2021	17	16	19	22	17
98365	00000LAT	688	17	7/1/2021	ENVIRONMENTAL	2243824	8014655	5/27/2021	250184	10/12/2021	19	18	23	22	18
98365	00000LAT	689	17	7/1/2021	ENVIRONMENTAL	2243825	8003102	5/27/2021	250184	10/12/2021	19	18	21	23	18
98365	00000LAT	690	17	7/1/2021	ENVIRONMENTAL	2243826	8006002	5/27/2021	250184	10/12/2021	11	10	14	16	11
98365	00000LAT	691	17	7/1/2021	ENVIRONMENTAL	2243827	8016955	5/27/2021	250184	10/12/2021	11	10	15	17	11
98365	00000LAT	692	17	7/1/2021	ENVIRONMENTAL	2243828	8013417	5/27/2021	250184	10/12/2021	17	14	19	22	15
98365	00000LAT	693	17	7/1/2021	ENVIRONMENTAL	2243829	8009290	5/27/2021	250184	10/12/2021	12	11	14	16	11
98365	00000LAT	694	17	7/1/2021	ENVIRONMENTAL	2243830	8013690	5/27/2021	250184	10/12/2021	11	10	14	17	11
98365	00000LAT	695	17	7/1/2021	ENVIRONMENTAL	2243831	8006763	5/27/2021	250184	10/12/2021	11	10	13	15	10
98365	00000LAT	696	17	7/1/2021	ENVIRONMENTAL	2243832	8016820	5/27/2021	250184	10/12/2021	11	10	14	16	10
98365	00000LAT		17	7/1/2021	CONTROL	2243757	8014461	5/27/2021	250184	10/12/2021	12	11	15	16	11
98365	00000LAT		17	7/1/2021	CONTROL	2243756	8016418	5/27/2021	250184	10/12/2021	11	11	15	16	11

Approved by: *Tam Hang Vo* 11/3/2021

*E1 is not used in envrionmental dose calculation for badge type 20
*E3, E4 are not used in envrionmental dose calculation for badge type 17

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ACCOUNT	LOCATIONID	WEARER_NO	BADGE_TYPE	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	NOTE	REC_DATE	E1	E2	E3	E4	mR
98365	00000LAT	622	17	10/1/2021	ENVIRONMENTAL	2245779	8008057	8/26/2021	250954		1/28/2022	8	8	13	13	8
98365	00000LAT	623	17	10/1/2021	ENVIRONMENTAL	2245780	8005286	8/26/2021	250954		1/28/2022	9	8	13	13	9
98365	00000LAT	624	17	10/1/2021	ENVIRONMENTAL	2245777	8014578	8/26/2021	250954		1/28/2022	9	8	22	14	9
98365	00000LAT	625	17	10/1/2021	ENVIRONMENTAL	2245778	8016289	8/26/2021	250954		1/28/2022	169	164	229	216	167
98365	00000LAT	626	17	10/1/2021	ENVIRONMENTAL	2245781	8012193	8/26/2021	250954		1/28/2022	258	249	325	329	253
98365	00000LAT	627	17	10/1/2021	ENVIRONMENTAL	2245782	8016293	8/26/2021	250954		1/28/2022	15	15	23	24	15
98365	00000LAT	628	17	10/1/2021	ENVIRONMENTAL	2245783	8012538	8/26/2021	250954		1/28/2022	14	15	17	20	15
98365	00000LAT	629	17	10/1/2021	ENVIRONMENTAL	2245784	8011091	8/26/2021	250954		1/28/2022	17	16	25	24	17
98365	00000LAT	630	17	10/1/2021	ENVIRONMENTAL	2245785	8009920	8/26/2021	250954		1/28/2022	13	13	21	24	13
98365	00000LAT	631	17	10/1/2021	ENVIRONMENTAL	2245786	8016433	8/26/2021	250954		1/28/2022	20	19	37	29	20
98365	00000LAT	632	17	10/1/2021	ENVIRONMENTAL	2245787	8013358	8/26/2021	250954		1/28/2022	14	13	21	22	13
98365	00000LAT	633	17	10/1/2021	ENVIRONMENTAL	2245788	8009100	8/26/2021	250954		1/28/2022	14	15	19	19	14
98365	00000LAT	634	17	10/1/2021	ENVIRONMENTAL	2245789	8013265	8/26/2021	250954		1/28/2022	16	16	23	25	16
98365	00000LAT	635	17	10/1/2021	ENVIRONMENTAL	2245790	8013665	8/26/2021	250954		1/28/2022	14	14	26	26	14
98365	00000LAT	636	17	10/1/2021	ENVIRONMENTAL	2245791	8015005	8/26/2021	250954		1/28/2022	13	13	19	19	13
98365	00000LAT	637	17	10/1/2021	ENVIRONMENTAL	2245792	8009637	8/26/2021	250954		1/28/2022	17	18	27	27	17
98365	00000LAT	638	17	10/1/2021	ENVIRONMENTAL	2245793	8004500	8/26/2021	250954		1/28/2022	14	13	22	23	14
98365	00000LAT	639	17	10/1/2021	ENVIRONMENTAL	2245794	8015116	8/26/2021	250954		1/28/2022	18	18	23	24	18
98365	00000LAT	640	17	10/1/2021	ENVIRONMENTAL	2245795	8013664	8/26/2021	250954		1/28/2022	21	21	34	33	21
98365	00000LAT	641	17	10/1/2021	ENVIRONMENTAL	2245796	8004288	8/26/2021	250954		1/28/2022	16	15	23	23	16
98365	00000LAT	642	17	10/1/2021	ENVIRONMENTAL	2245797	8011252	8/26/2021	250954		1/28/2022	19	20	34	32	19
98365	00000LAT	643	17	10/1/2021	ENVIRONMENTAL	2245798	8010746	8/26/2021	250954		1/28/2022	15	16	20	22	15
98365	00000LAT	644	17	10/1/2021	ENVIRONMENTAL	2245799	8007307	8/26/2021	250954		1/28/2022	17	16	21	22	16
98365	00000LAT	645	17	10/1/2021	ENVIRONMENTAL	2245800	8009895	8/26/2021	250954		1/28/2022	19	19	27	27	19
98365	00000LAT	646	17	10/1/2021	ENVIRONMENTAL	2245801	8010559	8/26/2021	250954		1/28/2022	15	15	27	26	15
98365	00000LAT	647	17	10/1/2021	ENVIRONMENTAL	2245802	8009311	8/26/2021	250954		1/28/2022	36	37	55	55	36
98365	00000LAT	648	17	10/1/2021	ENVIRONMENTAL	2245803	8013122	8/26/2021	250954		1/28/2022	14	14	20	20	14
98365	00000LAT	649	17	10/1/2021	ENVIRONMENTAL	2245804	8012028	8/26/2021	250954		1/28/2022	92	86	124	123	89
98365	00000LAT	650	17	10/1/2021	ENVIRONMENTAL	2245805	8016146	8/26/2021	250954		1/28/2022	16	16	23	26	16
98365	00000LAT	651	17	10/1/2021	ENVIRONMENTAL	2245806	8013313	8/26/2021	250954		1/28/2022	12	12	17	18	12
98365	00000LAT	652	17	10/1/2021	ENVIRONMENTAL	2245807	8011731	8/26/2021	250954		1/28/2022	12	12	18	19	12
98365	00000LAT	653	17	10/1/2021	ENVIRONMENTAL	2245808	8013418	8/26/2021	250954		1/28/2022	267	292	463	422	279
98365	00000LAT	654	17	10/1/2021	ENVIRONMENTAL	2245809	8012185	8/26/2021	250954		1/28/2022	455	479	660	626	467
98365	00000LAT	655	17	10/1/2021	ENVIRONMENTAL	2245810	8004201	8/26/2021	250954		1/28/2022	13	12	20	21	13
98365	00000LAT	656	17	10/1/2021	ENVIRONMENTAL	2245811	8007406	8/26/2021	250954		1/28/2022	11	11	16	18	11

*C7- Missing ; D- Damaged

Approved by: *Tam Hang Vo* 3/7/2022

*E3, E4 are not used in calculation for badge type 17 ;E1 is not used in calculation for badge type 20

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2652 McGaw Avenue
Irvine, CA 92614

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ACCOUNT	LOCATIONID	WEARER_NO	BADGE_TYPE	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	NOTE	REC_DATE	E1	E2	E3	E4	mR
98365	00000LAT	657	17	10/1/2021	ENVIRONMENTAL	2245812	8010414	8/26/2021	250954		1/28/2022	11	11	19	19	11
98365	00000LAT	658	17	10/1/2021	ENVIRONMENTAL	2245813	8013135	8/26/2021	250954		1/28/2022	14	11	19	20	12
98365	00000LAT	659	17	10/1/2021	ENVIRONMENTAL	2245814	8003583	8/26/2021	250954		1/28/2022	15	15	21	22	15
98365	00000LAT	660	17	10/1/2021	ENVIRONMENTAL	2245815	8010150	8/26/2021	250954		1/28/2022	17	0	25	26	17
98365	00000LAT	661	17	10/1/2021	ENVIRONMENTAL	2245816	8006479	8/26/2021	250954		1/28/2022	17	15	22	23	16
98365	00000LAT	662	17	10/1/2021	ENVIRONMENTAL	2245817	8011428	8/26/2021	250954		1/28/2022	12	12	19	21	12
98365	00000LAT	663	17	10/1/2021	ENVIRONMENTAL	2245818	8015104	8/26/2021	250954		1/28/2022	29	29	41	44	29
98365	00000LAT	664	17	10/1/2021	ENVIRONMENTAL	2245819	8013629	8/26/2021	250954		1/28/2022	22	21	35	33	22
98365	00000LAT	665	17	10/1/2021	ENVIRONMENTAL	2245820	8010604	8/26/2021	250954		1/28/2022	16	16	21	22	16
98365	00000LAT	666	17	10/1/2021	ENVIRONMENTAL	2245821	8006941	8/26/2021	250954		1/28/2022	13	14	24	22	13
98365	00000LAT	667	17	10/1/2021	ENVIRONMENTAL	2245822	8009704	8/26/2021	250954		1/28/2022	18	19	25	26	19
98365	00000LAT	668	17	10/1/2021	ENVIRONMENTAL	2245823	8013028	8/26/2021	250954		1/28/2022	16	13	23	22	15
98365	00000LAT	669	17	10/1/2021	ENVIRONMENTAL	2245824	8007228	8/26/2021	250954		1/28/2022	16	16	23	24	16
98365	00000LAT	670	17	10/1/2021	ENVIRONMENTAL	2245825	8007590	8/26/2021	250954		1/28/2022	16	15	21	23	15
98365	00000LAT	671	17	10/1/2021	ENVIRONMENTAL	2245826	8011109	8/26/2021	250954		1/28/2022	19	19	25	27	19
98365	00000LAT	672	17	10/1/2021	ENVIRONMENTAL	2245827	8007423	8/26/2021	250954		1/28/2022	15	13	21	21	14
98365	00000LAT	673	17	10/1/2021	ENVIRONMENTAL	2245828	8006340	8/26/2021	250954		1/28/2022	14	14	20	21	14
98365	00000LAT	674	17	10/1/2021	ENVIRONMENTAL	2245829	8010461	8/26/2021	250954		1/28/2022	70	77	111	105	74
98365	00000LAT	675	17	10/1/2021	ENVIRONMENTAL	2245830	8012135	8/26/2021	250954		1/28/2022	23	23	33	35	23
98365	00000LAT	676	17	10/1/2021	ENVIRONMENTAL	2245831	8009095	8/26/2021	250954		1/28/2022	51	52	75	75	51
98365	00000LAT	677	17	10/1/2021	ENVIRONMENTAL	2245832	8011911	8/26/2021	250954		1/28/2022	18	17	24	25	17
98365	00000LAT	678	17	10/1/2021	ENVIRONMENTAL	2245833	8014664	8/26/2021	250954		1/28/2022	16	15	22	24	16
98365	00000LAT	679	17	10/1/2021	ENVIRONMENTAL	2245834	8006407	8/26/2021	250954		1/28/2022	16	17	25	21	17
98365	00000LAT	680	17	10/1/2021	ENVIRONMENTAL	2245835	8009560	8/26/2021	250954		1/28/2022	15	15	23	23	15
98365	00000LAT	681	17	10/1/2021	ENVIRONMENTAL	2245836	8013204	8/26/2021	250954		1/28/2022	16	14	22	23	15
98365	00000LAT	682	17	10/1/2021	ENVIRONMENTAL	2245837	8007796	8/26/2021	250954		1/28/2022	17	15	23	23	16
98365	00000LAT	683	17	10/1/2021	ENVIRONMENTAL	2245838	8012096	8/26/2021	250954		1/28/2022	17	17	24	24	17
98365	00000LAT	684	17	10/1/2021	ENVIRONMENTAL	2245839	8005119	8/26/2021	250954		1/28/2022	14	13	18	21	14
98365	00000LAT	685	17	10/1/2021	ENVIRONMENTAL	2245840	8011676	8/26/2021	250954		1/28/2022	15	14	21	23	14
98365	00000LAT	686	17	10/1/2021	ENVIRONMENTAL	2245841	8003176	8/26/2021	250954		1/28/2022	14	14	21	20	14
98365	00000LAT	687	17	10/1/2021	ENVIRONMENTAL	2245842	8008680	8/26/2021	250954		1/28/2022	18	17	23	24	17
98365	00000LAT	688	17	10/1/2021	ENVIRONMENTAL	2245843	8015109	8/26/2021	250954		1/28/2022	16	16	25	24	16
98365	00000LAT	689	17	10/1/2021	ENVIRONMENTAL	2245844	8007887	8/26/2021	250954		1/28/2022	15	14	21	23	14
98365	00000LAT	690	17	10/1/2021	ENVIRONMENTAL	2245845	8010986	8/26/2021	250954		1/28/2022	8	8	17	18	8
98365	00000LAT	691	17	10/1/2021	ENVIRONMENTAL	2245846	8010756	8/26/2021	250954		1/28/2022	8	9	14	14	9

*C7- Missing ; D- Damaged

Approved by: *Tam Hang Vo* 3/7/2022

*E3, E4 are not used in calculation for badge type 17 ;E1 is not used in calculation for badge type 20

MIRION TECHNOLOGIES

Dosimetry Services Division
2652 McGaw Avenue
Irvine, CA 92614

Toll Free: (800) 251-3331
Tel.: (949) 296-1800
Fax: (949) 296-1144
www.mirion.com

ACCOUNT	LOCATIONID	WEARER_NO	BADGE_TYPE	WEAR_DATE	NAME	SERIALNUM	BADGE_ID	ANNEALDATE	PROCESS_ID	NOTE	REC_DATE	E1	E2	E3	E4	mR
98365	00000LAT	692	17	10/1/2021	ENVIRONMENTAL	2245847	8004321	8/26/2021	250954		1/28/2022	13	13	23	24	13
98365	00000LAT	693	17	10/1/2021	ENVIRONMENTAL	2245848	8005213	8/26/2021	250954		1/28/2022	9	9	14	14	9
98365	00000LAT	694	17	10/1/2021	ENVIRONMENTAL	2245849	8012104	8/26/2021	250954		1/28/2022	9	8	14	13	8
98365	00000LAT	695	17	10/1/2021	ENVIRONMENTAL	2245850	8009831	8/26/2021	250954		1/28/2022	8	9	15	14	8
98365	00000LAT	696	17	10/1/2021	ENVIRONMENTAL	2245851	8016036	8/26/2021	250954		1/28/2022	9	8	19	19	8
98365	00000LAT		17	10/1/2021	CONTROL	2245775	8009291	8/26/2021	250954		1/28/2022	8	8	18	18	8
98365	00000LAT		17	1/1/2022	CONTROL	2247308	8015052	1/7/2022	250954	A2	1/28/2022	3	3	18	7	3
98365	00000LAT		17	10/1/2021	CONTROL	2245776	8014608	8/26/2021	250954		1/28/2022	8	9	15	15	9

C-16

*C7- Missing ; D- Damaged

Approved by: *Tam Hang Vo* 3/7/2022

*E3, E4 are not used in calculation for badge type 17 ;E1 is not used in calculation for badge type 20

APPENDIX D

OSL ANALYTICAL DATA

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SWIFT & STANLEY INC
ATTN MICHAEL HARTMAN
5505 HOBBS ROAD
C-755-T26
KEVIL, KY 42053

Received Date / Reported Date	2021-04-21 / 2021-04-27
Page	1 of 1
Analytical Work Order / QC Release	2111100013 / CHA
Copy / Version	0 / 1

The following dose calculation algorithms were used for assessing the reported doses

Dosimeter Model	Dosimeter Type	Algorithm Version
InLight	Whole Body	00101
CR-39--Thermal	Whole Body	03001

LANDAUER®
LANDAUER, Inc., 2 Science Road
Glenwood, Illinois 60425-1586
landauer.com
Telephone: (708) 755-7000
Facsimile: (708) 755-7016
Customer Service: (800) 323-8830
Technical: (800) 438-3241

Radiation Dosimetry Report

Account : 711723 Subaccount: 8018823 Series: DAR

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Equivalent Dose (mrem) for Periods Shown Below												Inception Date	Serial Number
							Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date				
	ID Number	Birth Date					Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin		
For Monitoring Period:							2021-01-01 to 2021-03-31			QUARTER 1			2021			LIFETIME				
	Historical Customer Avg Control Dose		L02TN				**22**	**22**	**22**											
02882	AREA		L02TN	AREA	*P		**182**	**182**	**178**										2018/01	XA02603358F
					*P	M	**182**	**182**	**178**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02883	AREA		L02TN	AREA	*P		**5**	**5**	**5**										2018/01	XA01620384L
					*P		**5**	**5**	**5**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02884	AREA		L02TN	AREA	*P		**22**	**22**	**22**										2018/01	XA00927416E
					*P		**22**	**22**	**22**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02885	AREA		L02TN	AREA	*		**M**	**M**	**M**										2018/01	XA02384567Y
02886	AREA		L02TN	AREA	*		**M**	**M**	**M**										2018/01	XA00567498Y
02887	AREA		L02TN	AREA	*P		**68**	**68**	**67**										2018/01	XA009554780
					*P	H	**68**	**68**	**67**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02888	AREA		L02TN	AREA	*P		**33**	**33**	**31**										2018/01	XA02300504U
					*P		**33**	**33**	**31**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
For Monitoring Period:							2021-01-01 to 2021-12-31			QUARTER 1			2021			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA00378750B

* - Customer average background dose used for control subtraction

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.

Radiation Dosimetry Report

Annual Radiation Exposure Limits (mrem) :

Whole body, blood forming organs, gonads	5,000
Lens of Eye	15,000
Extremities and Skin	50,000
Fetal (Gestation period)	500
General Public	100

Based on the US NRC Regulations, Title 10, Part 20, Code of Federal Regulations and adopted by many states. Certain state and other regulatory agencies may adhere to different limits.
Control Dosimeter: A control dosimeter is included with each shipment of dosimeters for monitoring radiation exposure received during transit. At the customer's facility, store the control in a radiation free area during the wear period.
Minimal Dose Equivalent Reported: Dose equivalents below the minimum measurable quantity for the current monitoring period are recorded as "M." The minimal reporting levels vary by the dosimeter type and radiation quality. "SL" is an elective option for the minimal dose equivalent reported where exposures less than 10 mrem report as "SL" (excludes fetal dosimeters), and/or exposures at or more than 10 mrem begin reporting at 10 mrem and report in increments of 10 mrem.

Dosimeter Type	M (DDE,LDE,SDE)	M (SDE Only)	SL
Luxel+®	1	-	10
InLight®	5	-	10
Whole Body Beta	-	10	10
U Ring	-	30	-
Neutrak® Neutron Fast	20	-	-
Neutrak® Neutron Thermal/Fast	10	-	-
Saturn Ring	-	10	10

Special Calculations: Special dose calculations can be applied to radiation workers who wear lead aprons.
EDE 1 - two dosimeters: one worn at the waist level under lead apron and one worn at the collar level outside lead apron. 1.5 (Waist DDE) + 0.04 (Collar DDE) = Assigned Deep Dose Equivalent.
EDE 2 - one dosimeter: one worn at the collar level outside lead apron. 0.3 (Collar DDE) = Assigned Deep Dose Equivalent.
EDE 122 - one dosimeter: one worn at the collar level outside lead apron. Collar DDE / 5.6 = Assigned Deep Dose Equivalent.
Calc3 - Lens of Eye dosimeter. 0.5 (Lens of Eye LDE) = Assigned Lens of Eye Dose Equivalent.
Lens.175 - Lens of Eye dosimeter. 0.175 (Lens of Eye LDE) = Assigned Lens of Eye Dose Equivalent.
EDE1-NTC EDE1 without Thyroid Collar assigned deep dose equivalent = 0.06 × (collar dose - waist dose) + waist dose
EDE1-TC EDE1 with Thyroid Collar assigned deep dose equivalent = 0.02 × (collar dose - waist dose) + waist dose
The "ASSIGNED" line follows all of the original whole body dosimeter doses with the EDE 1 or EDE 2 calculation results or LANDAUER's standard Dose Assessment Protocol (deep and shallow whole body dose from the highest reading whole body dosimeter, lens dose from dosimeter closest to the eye).

Ring Dosimeter Reading: Ring dosimeter readings report as a shallow dose.

Fetal Dosimeter: A declared pregnant worker will possess a fetal exposure on an extra page of the report based upon the whole body dosimeter worn closest to the fetus. The fetal dose is reported for the current wear period, plus the estimated dose from conception to declaration (if provided by customer), and the total dose from declaration to present.

Use	Description	Use	Description
AREA	Area Monitor	OEXTRM	Other Extremity
CHEST	Chest	OWHBDY	Other Whole Body
CNTRL	Control	RANKLE	Right Ankle
COLLAR	Collar	RFINGR	Right Hand Ring
EYE	Eye	RUARM	Right Upper Arm
FETAL	Fetal	RULEG	Right Upper Leg
LANKLE	Left Ankle	RWRIST	Right Wrist
LFINGR	Left Hand Ring	SPCPUR	Special Purpose
LUARM	Left Upper Arm	UPBACK	Upper Back
LULEG	Left Upper Leg	WAIST	Waist
LWBACK	Lower Back	WHBODY	Whole Body
LWRIST	Left Wrist		

Code	Radiation Quality Description (Type and/or Energy)
B	beta
BH	beta high energy, e.g. Strontium, Phosphorus
BL	beta low energy e.g. Thallium, Krypton
BS	Strontium beta
BT	Thallium beta
BU	Uranium beta
BN	beta, neutron mixture
NF	neutron fast
NT	neutron thermal
P	photon (x or gamma ray)
PB	photon, beta mixture
PBN	photon, beta, neutron mixture
PH	photon high energy greater than 200 keV
PL	photon low energy less than 40 keV
PM	photon medium energy 40 keV to 200 keV
PN	photon, neutron mixture

First Line Explanation
Participant Number: Unique number assigned by LANDAUER.
Name: Participant to whom the dosimeter is assigned.
Dosimeter: Badge type according to radiation monitoring needs.

Dosimeter	Code	Type of Radiation Monitored				
		Photons			Neutrons	
		X	Gamma	Beta	Fast	Thermal
InLight Model 2	L02NN	Yes	Yes	Yes		
InLight Model 2J	L02JN	Yes	Yes	Yes	Yes	
InLight Model 2T	L02TN	Yes	Yes	Yes	Yes	Yes
Luxel+	Pa	Yes	Yes	Yes		
Luxel+	Ja	Yes	Yes	Yes	Yes	
Luxel+	Ta	Yes	Yes	Yes	Yes	Yes
Luxel+ Escort	Pa	Yes	Yes			
Neutrak	N				Yes	
Neutrak	E				Yes	Yes
Ring, Single TLD	U or S	Yes	Yes	Yes		

Deep, Eye and Shallow Dose Equivalents: Deep dose equivalent (DDE) applies to external whole body exposure at a tissue depth of 1 cm (1000 mg/cm^2).
Eye dose equivalent (LDE) applies to external exposure of the lens at a tissue depth of 0.3 cm (300 mg/cm^2).
Shallow dose equivalent (SDE) applies to the external exposure of the skin or extremity at a tissue depth of 0.007 cm (7 mg/cm^2) averaged over an area 1 cm^2.

Deep, eye and shallow dose equivalents report for the time frame indicated by "For Monitoring Period." These doses represent the dose received only for the account/subaccount specified. Individual radiation component results and combined totals report in separate lines.

Quarterly accumulated results reflect total dose received within a calendar 3-months time frame and the customer defined start day. (Note: Quarterly accumulated columns are eliminated for bimonthly service or display "Not applicable.") Year to date accumulation totals dose received from the beginning of the current year to report date. Lifetime accumulation totals all dose received from inception date of dosimeter service to report date, and could include earlier dose history if supplied by customer. Reported quarterly, annual and lifetime dose accumulations represent the doses totaling from all account/subaccount dosimeters to be reported at the customer level.

Inception Date: The date LANDAUER began keeping dosimeter records for a given dosimeter for a badging participant on the current customer.

Serial Number: Dosimeter serial number.

Second Line Explanation
Participant's personal information consisting of ID number and birth date. This information can be suppressed on "Duplicate and Original Reports" for privacy and/or posting needs.

Notes: Text messages explaining any abnormalities or comments. The notes with message appears on a separate line below all dosimeter exposure information.

U.S. Patents
6,316,702; 6,127,685; 5,892,234

LANDAUER®

SWIFT & STANLEY INC
ATTN MICHAEL HARTMAN
5505 HOBBS ROAD
C-755-T26
KEVIL, KY 42053

Received Date / Reported Date	2021-07-27 / 2021-08-09
Page	1 of 2
Analytical Work Order / QC Release	2120700016 / LCA
Copy / Version	0 / 1

The following dose calculation algorithms were used for assessing the reported doses

Dosimeter Model	Dosimeter Type	Algorithm Version
InLight	Whole Body	00101
CR-39--Thermal	Whole Body	03001

LANDAUER®
LANDAUER, Inc., 2 Science Road
Glenwood, Illinois 60425-1586
landauer.com
Telephone: (708) 755-7000
Facsimile: (708) 755-7016
Customer Service: (800) 323-8830
Technical: (800) 438-3241

Radiation Dosimetry Report

Account : 711723 Subaccount: 8018823 Series: DAR

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Equivalent Dose (mrem) for Periods Shown Below												Inception Date	Serial Number
							Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date				
	ID Number	Birth Date					Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin		
For Monitoring Period:							2021-04-01 to 2021-06-30			QUARTER 2			2021			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA03558557X
	Control Dose Used		L02TN				**15**	**15**	**15**											
02882	AREA		L02TN	AREA	P		**223**	**223**	**216**										2018/01	XA035588620
					P	M	**223**	**223**	**216**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02883	AREA		L02TN	AREA	P		**5**	**5**	**5**										2018/01	XA035577243
					P		**5**	**5**	**5**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02884	AREA		L02TN	AREA	P		**25**	**25**	**25**										2018/01	XA03562142K
					P		**25**	**25**	**25**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02885	AREA		L02TN	AREA			**M**	**M**	**M**										2018/01	XA03557579S
02886	AREA		L02TN	AREA	P		**7**	**7**	**7**										2018/01	XA035574075
					P		**7**	**7**	**7**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02887	AREA		L02TN	AREA	P		**64**	**64**	**62**										2018/01	XA03557430G
					P	M	**64**	**64**	**62**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

D-5

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SWIFT & STANLEY INC
ATTN MICHAEL HARTMAN
5505 HOBBS ROAD
C-755-T26
KEVIL, KY 42053

Received Date / Reported Date	2021-07-27 / 2021-08-09
Page	2 of 2
Analytical Work Order / QC Release	2120700016 / LCA
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The following dose calculation algorithms were used for assessing the reported doses

Dosimeter Model	Dosimeter Type	Algorithm Version
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CR-39--Thermal	Whole Body	03001

LANDAUER®
LANDAUER, Inc., 2 Science Road
Glenwood, Illinois 60425-1586
landauer.com
Telephone: (708) 755-7000
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Customer Service: (800) 323-8830
Technical: (800) 438-3241

Radiation Dosimetry Report

Account : 711723 Subaccount: 8018823 Series: DAR

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Equivalent Dose (mrem) for Periods Shown Below												Inception Date	Serial Number
							Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date				
	ID Number	Birth Date					Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin		
For Monitoring Period:							2021-04-01 to 2021-06-30			QUARTER 2			2021			LIFETIME				
02888	AREA		L02TN	AREA	P		**34**	**34**	**34**										2018/01	XA035574190
					P		**34**	**34**	**34**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

Radiation Dosimetry Report

Annual Radiation Exposure Limits (mrem) :

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Dosimeter Type	M (DDE,LDE,SDE)	M (SDE Only)	SL
Luxel+®	1	-	10
InLight®	5	-	10
Whole Body Beta	-	10	10
U Ring	-	30	-
Neutrak® Neutron Fast	20	-	-
Neutrak® Neutron Thermal/Fast	10	-	-
Saturn Ring	-	10	10

Special Calculations: Special dose calculations can be applied to radiation workers who wear lead aprons.
EDE 1 - two dosimeters: one worn at the waist level under lead apron and one worn at the collar level outside lead apron. 1.5 (Waist DDE) + 0.04 (Collar DDE) = Assigned Deep Dose Equivalent.
EDE 2 - one dosimeter: one worn at the collar level outside lead apron. 0.3 (Collar DDE) = Assigned Deep Dose Equivalent.
EDE 122 - one dosimeter: one worn at the collar level outside lead apron. Collar DDE / 5.6 = Assigned Deep Dose Equivalent.
Calc3 - Lens of Eye dosimeter. 0.5 (Lens of Eye LDE) = Assigned Lens of Eye Dose Equivalent.
Lens.175 - Lens of Eye dosimeter. 0.175 (Lens of Eye LDE) = Assigned Lens of Eye Dose Equivalent.
EDE1-NTC EDE1 without Thyroid Collar assigned deep dose equivalent = 0.06 × (collar dose - waist dose) + waist dose
EDE1-TC EDE1 with Thyroid Collar assigned deep dose equivalent = 0.02 × (collar dose - waist dose) + waist dose
The "ASSIGNED" line follows all of the original whole body dosimeter doses with the EDE 1 or EDE 2 calculation results or LANDAUER's standard Dose Assessment Protocol (deep and shallow whole body dose from the highest reading whole body dosimeter, lens dose from dosimeter closest to the eye).

Ring Dosimeter Reading: Ring dosimeter readings report as a shallow dose.

Fetal Dosimeter: A declared pregnant worker will possess a fetal exposure on an extra page of the report based upon the whole body dosimeter worn closest to the fetus. The fetal dose is reported for the current wear period, plus the estimated dose from conception to declaration (if provided by customer), and the total dose from declaration to present.

Use	Description	Use	Description
AREA	Area Monitor	OEXTRM	Other Extremity
CHEST	Chest	OWHBDY	Other Whole Body
CNTRL	Control	RANKLE	Right Ankle
COLLAR	Collar	RFINGR	Right Hand Ring
EYE	Eye	RUARM	Right Upper Arm
FETAL	Fetal	RULEG	Right Upper Leg
LANKLE	Left Ankle	RWRIST	Right Wrist
LFINGR	Left Hand Ring	SPCPUR	Special Purpose
LUARM	Left Upper Arm	UPBACK	Upper Back
LULEG	Left Upper Leg	WAIST	Waist
LWBACK	Lower Back	WHBODY	Whole Body
LWRIST	Left Wrist		

Code	Radiation Quality Description (Type and/or Energy)
B	beta
BH	beta high energy, e.g. Strontium, Phosphorus
BL	beta low energy e.g. Thallium, Krypton
BS	Strontium beta
BT	Thallium beta
BU	Uranium beta
BN	beta, neutron mixture
NF	neutron fast
NT	neutron thermal
P	photon (x or gamma ray)
PB	photon, beta mixture
PBN	photon, beta, neutron mixture
PH	photon high energy greater than 200 keV
PL	photon low energy less than 40 keV
PM	photon medium energy 40 keV to 200 keV
PN	photon, neutron mixture

First Line Explanation
Participant Number: Unique number assigned by LANDAUER.
Name: Participant to whom the dosimeter is assigned.
Dosimeter: Badge type according to radiation monitoring needs.

Dosimeter	Code	Type of Radiation Monitored				
		Photons			Neutrons	
		X	Gamma	Beta	Fast	Thermal
InLight Model 2	L02NN	Yes	Yes	Yes		
InLight Model 2J	L02JN	Yes	Yes	Yes	Yes	
InLight Model 2T	L02TN	Yes	Yes	Yes	Yes	Yes
Luxel+	Pa	Yes	Yes	Yes		
Luxel+	Ja	Yes	Yes	Yes	Yes	
Luxel+	Ta	Yes	Yes	Yes	Yes	Yes
Luxel+ Escort	Pa	Yes	Yes			
Neutrak	N				Yes	
Neutrak	E				Yes	Yes
Ring, Single TLD	U or S	Yes	Yes	Yes		

Deep, Eye and Shallow Dose Equivalents: Deep dose equivalent (DDE) applies to external whole body exposure at a tissue depth of 1 cm (1000 mg/cm^2).
Eye dose equivalent (LDE) applies to external exposure of the lens at a tissue depth of 0.3 cm (300 mg/cm^2).
Shallow dose equivalent (SDE) applies to the external exposure of the skin or extremity at a tissue depth of 0.007 cm (7 mg/cm^2) averaged over an area 1 cm^2.

Deep, eye and shallow dose equivalents report for the time frame indicated by "For Monitoring Period." These doses represent the dose received only for the account/subaccount specified. Individual radiation component results and combined totals report in separate lines.

Quarterly accumulated results reflect total dose received within a calendar 3-months time frame and the customer defined start day. (Note: Quarterly accumulated columns are eliminated for bimonthly service or display "Not applicable.") Year to date accumulation totals dose received from the beginning of the current year to report date. Lifetime accumulation totals all dose received from inception date of dosimeter service to report date, and could include earlier dose history if supplied by customer. Reported quarterly, annual and lifetime dose accumulations represent the doses totaling from all account/subaccount dosimeters to be reported at the customer level.

Inception Date: The date LANDAUER began keeping dosimeter records for a given dosimeter for a badging participant on the current customer.

Serial Number: Dosimeter serial number.

Second Line Explanation
Participant's personal information consisting of ID number and birth date. This information can be suppressed on "Duplicate and Original Reports" for privacy and/or posting needs.

Notes: Text messages explaining any abnormalities or comments. The notes with message appears on a separate line below all dosimeter exposure information.

U.S. Patents
6,316,702; 6,127,685; 5,892,234

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SWIFT & STANLEY INC
ATTN MICHAEL HARTMAN
5505 HOBBS ROAD
C-755-T26
KEVIL, KY 42053

Received Date / Reported Date	2021-10-29 / 2021-11-03
Page	1 of 2
Analytical Work Order / QC Release	2130200026 / CHA
Copy / Version	0 / 1

The following dose calculation algorithms were used for assessing the reported doses

Dosimeter Model	Dosimeter Type	Algorithm Version
InLight	Whole Body	00101
CR-39--Thermal	Whole Body	03001

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LANDAUER, Inc., 2 Science Road
Glenwood, Illinois 60425-1586
landauer.com
Telephone: (708) 755-7000
Facsimile: (708) 755-7016
Customer Service: (800) 323-8830
Technical: (800) 438-3241

Radiation Dosimetry Report

Account : 711723 Subaccount: 8018823 Series: DAR

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Equivalent Dose (mrem) for Periods Shown Below												Inception Date	Serial Number
							Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date				
	ID Number	Birth Date					Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin		
For Monitoring Period:							2021-07-01 to 2021-09-30			QUARTER 3			2021			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA005728826
				NOTE			Control not used in assessment.													
02882	AREA		L02TN	AREA	*P		**270**	**270**	**270**										2018/01	XA005446189
					*P	H	**270**	**270**	**270**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02883	AREA		L02TN	AREA	*P		**23**	**23**	**23**										2018/01	XA02069696X
					*P		**23**	**23**	**23**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02884	AREA		L02TN	AREA	*P		**47**	**47**	**46**										2018/01	XA00592031P
					*P		**47**	**47**	**46**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02885	AREA		L02TN	AREA	*P		**22**	**22**	**22**										2018/01	XA00908198B
					*P		**22**	**22**	**22**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02886	AREA		L02TN	AREA	*P		**25**	**25**	**25**										2018/01	XA00736391J
					*P		**25**	**25**	**25**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											
02887	AREA		L02TN	AREA	*P		**162**	**162**	**160**										2018/01	XA01420284P
					*P	H	**162**	**162**	**160**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											

D-8

* - No control dose subtracted

SWIFT & STANLEY INC
ATTN MICHAEL HARTMAN
5505 HOBBS ROAD
C-755-T26
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Received Date / Reported Date	2021-10-29 / 2021-11-03
Page	2 of 2
Analytical Work Order / QC Release	2130200026 / CHA
Copy / Version	0 / 1

The following dose calculation algorithms were used for assessing the reported doses

Dosimeter Model	Dosimeter Type	Algorithm Version
InLight	Whole Body	00101
CR-39--Thermal	Whole Body	03001

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LANDAUER, Inc., 2 Science Road
Glenwood, Illinois 60425-1586
landauer.com
Telephone: (708) 755-7000
Facsimile: (708) 755-7016
Customer Service: (800) 323-8830
Technical: (800) 438-3241

Radiation Dosimetry Report

Account : 711723 Subaccount: 8018823 Series: DAR

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Equivalent Dose (mrem) for Periods Shown Below												Inception Date	Serial Number
							Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date				
	ID Number	Birth Date					Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin		
For Monitoring Period:							2021-07-01 to 2021-09-30			QUARTER 3			2021			LIFETIME				
02888	AREA		L02TN	AREA	*P		**53**	**53**	**52**										2018/01	XA01003569G
					*P	M	**53**	**53**	**52**											
					*N	T	**M**	**M**	**M**											
					*N	F	**M**	**M**	**M**											

* - No control dose subtracted

Radiation Dosimetry Report

Annual Radiation Exposure Limits (mrem) :

Whole body, blood forming organs, gonads	5,000
Lens of Eye	15,000
Extremities and Skin	50,000
Fetal (Gestation period)	500
General Public	100

Based on the US NRC Regulations, Title 10, Part 20, Code of Federal Regulations and adopted by many states. Certain state and other regulatory agencies may adhere to different limits.
Control Dosimeter: A control dosimeter is included with each shipment of dosimeters for monitoring radiation exposure received during transit. At the customer's facility, store the control in a radiation free area during the wear period.
Minimal Dose Equivalent Reported: Dose equivalents below the minimum measurable quantity for the current monitoring period are recorded as "M." The minimal reporting levels vary by the dosimeter type and radiation quality. "SL" is an elective option for the minimal dose equivalent reported where exposures less than 10 mrem report as "SL" (excludes fetal dosimeters), and/or exposures at or more than 10 mrem begin reporting at 10 mrem and report in increments of 10 mrem.

Dosimeter Type	M (DDE,LDE,SDE)	M (SDE Only)	SL
Luxel+®	1	-	10
InLight®	5	-	10
Whole Body Beta	-	10	10
U Ring	-	30	-
Neutrak® Neutron Fast	20	-	-
Neutrak® Neutron Thermal/Fast	10	-	-
Saturn Ring	-	10	10

Special Calculations: Special dose calculations can be applied to radiation workers who wear lead aprons.
EDE 1 - two dosimeters: one worn at the waist level under lead apron and one worn at the collar level outside lead apron. 1.5 (Waist DDE) + 0.04 (Collar DDE) = Assigned Deep Dose Equivalent.
EDE 2 - one dosimeter: one worn at the collar level outside lead apron. 0.3 (Collar DDE) = Assigned Deep Dose Equivalent.
EDE 122 - one dosimeter: one worn at the collar level outside lead apron. Collar DDE / 5.6 = Assigned Deep Dose Equivalent.
Calc3 - Lens of Eye dosimeter. 0.5 (Lens of Eye LDE) = Assigned Lens of Eye Dose Equivalent.
Lens.175 - Lens of Eye dosimeter. 0.175 (Lens of Eye LDE) = Assigned Lens of Eye Dose Equivalent.
EDE1-NTC EDE1 without Thyroid Collar assigned deep dose equivalent = 0.06 × (collar dose - waist dose) + waist dose
EDE1-TC EDE1 with Thyroid Collar assigned deep dose equivalent = 0.02 × (collar dose - waist dose) + waist dose
The "ASSIGNED" line follows all of the original whole body dosimeter doses with the EDE 1 or EDE 2 calculation results or LANDAUER's standard Dose Assessment Protocol (deep and shallow whole body dose from the highest reading whole body dosimeter, lens dose from dosimeter closest to the eye).

Ring Dosimeter Reading: Ring dosimeter readings report as a shallow dose.

Fetal Dosimeter: A declared pregnant worker will possess a fetal exposure on an extra page of the report based upon the whole body dosimeter worn closest to the fetus. The fetal dose is reported for the current wear period, plus the estimated dose from conception to declaration (if provided by customer), and the total dose from declaration to present.

Use	Description	Use	Description
AREA	Area Monitor	OEXTRM	Other Extremity
CHEST	Chest	OWHBDY	Other Whole Body
CNTRL	Control	RANKLE	Right Ankle
COLLAR	Collar	RFINGR	Right Hand Ring
EYE	Eye	RUARM	Right Upper Arm
FETAL	Fetal	RULEG	Right Upper Leg
LANKLE	Left Ankle	RWRIST	Right Wrist
LFINGR	Left Hand Ring	SPCPUR	Special Purpose
LUARM	Left Upper Arm	UPBACK	Upper Back
LULEG	Left Upper Leg	WAIST	Waist
LWBACK	Lower Back	WHBODY	Whole Body
LWRIST	Left Wrist		

Code	Radiation Quality Description (Type and/or Energy)
B	beta
BH	beta high energy, e.g. Strontium, Phosphorus
BL	beta low energy e.g. Thallium, Krypton
BS	Strontium beta
BT	Thallium beta
BU	Uranium beta
BN	beta, neutron mixture
NF	neutron fast
NT	neutron thermal
P	photon (x or gamma ray)
PB	photon, beta mixture
PBN	photon, beta, neutron mixture
PH	photon high energy greater than 200 keV
PL	photon low energy less than 40 keV
PM	photon medium energy 40 keV to 200 keV
PN	photon, neutron mixture

First Line Explanation
Participant Number: Unique number assigned by LANDAUER.
Name: Participant to whom the dosimeter is assigned.
Dosimeter: Badge type according to radiation monitoring needs.

Dosimeter	Code	Type of Radiation Monitored				
		Photons			Neutrons	
		X	Gamma	Beta	Fast	Thermal
InLight Model 2	L02NN	Yes	Yes	Yes		
InLight Model 2J	L02JN	Yes	Yes	Yes	Yes	
InLight Model 2T	L02TN	Yes	Yes	Yes	Yes	Yes
Luxel+	Pa	Yes	Yes	Yes		
Luxel+	Ja	Yes	Yes	Yes	Yes	
Luxel+	Ta	Yes	Yes	Yes	Yes	Yes
Luxel+ Escort	Pa	Yes	Yes			
Neutrak	N				Yes	
Neutrak	E				Yes	Yes
Ring, Single TLD	U or S	Yes	Yes	Yes		

Deep, Eye and Shallow Dose Equivalents: Deep dose equivalent (DDE) applies to external whole body exposure at a tissue depth of 1 cm (1000 mg/cm^2).
Eye dose equivalent (LDE) applies to external exposure of the lens at a tissue depth of 0.3 cm (300 mg/cm^2).
Shallow dose equivalent (SDE) applies to the external exposure of the skin or extremity at a tissue depth of 0.007 cm (7 mg/cm^2) averaged over an area 1 cm^2.

Deep, eye and shallow dose equivalents report for the time frame indicated by "For Monitoring Period." These doses represent the dose received only for the account/subaccount specified. Individual radiation component results and combined totals report in separate lines.

Quarterly accumulated results reflect total dose received within a calendar 3-months time frame and the customer defined start day. (Note: Quarterly accumulated columns are eliminated for bimonthly service or display "Not applicable.") Year to date accumulation totals dose received from the beginning of the current year to report date. Lifetime accumulation totals all dose received from inception date of dosimeter service to report date, and could include earlier dose history if supplied by customer. Reported quarterly, annual and lifetime dose accumulations represent the doses totaling from all account/subaccount dosimeters to be reported at the customer level.

Inception Date: The date LANDAUER began keeping dosimeter records for a given dosimeter for a badging participant on the current customer.

Serial Number: Dosimeter serial number.

Second Line Explanation
Participant's personal information consisting of ID number and birth date. This information can be suppressed on "Duplicate and Original Reports" for privacy and/or posting needs.

Notes: Text messages explaining any abnormalities or comments. The notes with message appears on a separate line below all dosimeter exposure information.

U.S. Patents
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SWIFT & STANLEY INC
ATTN MICHAEL HARTMAN
5505 HOBBS ROAD
C-755-T26
KEVIL, KY 42053

Received Date / Reported Date	2022-01-28 / 2022-02-10
Page	1 of 2
Analytical Work Order / QC Release	2202700667 / LCA
Copy / Version	0 / 1

The following dose calculation algorithms were used for assessing the reported doses

Dosimeter Model	Dosimeter Type	Algorithm Version
InLight	Whole Body	00101
CR-39--Thermal	Whole Body	03001

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LANDAUER, Inc., 2 Science Road
Glenwood, Illinois 60425-1586
landauer.com
Telephone: (708) 755-7000
Facsimile: (708) 755-7016
Customer Service: (800) 323-8830
Technical: (800) 438-3241

Radiation Dosimetry Report

Account : 711723 Subaccount: 8018823 Series: DAR

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Equivalent Dose (mrem) for Periods Shown Below												Inception Date	Serial Number
							Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date				
	ID Number	Birth Date					Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin		
For Monitoring Period:							2021-10-01 to 2021-12-31			QUARTER 4			2021			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA00097008E
	Control Dose Used		L02TN				**10**	**9**	**9**											
02882	AREA		L02TN	AREA	P		**291**	**305**	**291**										2018/01	XA00868943Z
					P	M	**291**	**305**	**291**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02883	AREA		L02TN	AREA	P		**12**	**12**	**12**										2018/01	XA025905925
					P		**12**	**12**	**12**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02884	AREA		L02TN	AREA	P		**34**	**34**	**34**										2018/01	XA025378742
					P		**34**	**34**	**34**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02885	AREA		L02TN	AREA	P		**6**	**6**	**6**										2018/01	XA00593183D
					P		**6**	**6**	**6**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02886	AREA		L02TN	AREA	P		**10**	**10**	**10**										2018/01	XA01934901E
					P		**10**	**10**	**10**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02887	AREA		L02TN	AREA	P		**108**	**108**	**107**										2018/01	XA00532393L
					P	H	**108**	**108**	**107**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

SWIFT & STANLEY INC
ATTN MICHAEL HARTMAN
5505 HOBBS ROAD
C-755-T26
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Received Date / Reported Date	2022-01-28 / 2022-02-10
Page	2 of 2
Analytical Work Order / QC Release	2202700667 / LCA
Copy / Version	0 / 1

The following dose calculation algorithms were used for assessing the reported doses

Dosimeter Model	Dosimeter Type	Algorithm Version
InLight	Whole Body	00101
CR-39--Thermal	Whole Body	03001

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LANDAUER, Inc., 2 Science Road
Glenwood, Illinois 60425-1586
landauer.com
Telephone: (708) 755-7000
Facsimile: (708) 755-7016
Customer Service: (800) 323-8830
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Radiation Dosimetry Report

Account : 711723 Subaccount: 8018823 Series: DAR

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Equivalent Dose (mrem) for Periods Shown Below												Inception Date	Serial Number
							Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date				
	ID Number	Birth Date					Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin	Whole Body	Lens	Skin		
For Monitoring Period:							2021-10-01 to 2021-12-31			QUARTER 4			2021			LIFETIME				
02888	AREA		L02TN	AREA	P		**37**	**37**	**37**										2018/01	XA00826997W
					P		**37**	**37**	**37**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											