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2022 Annual External Radiation Monitoring Report Paducah Gaseous Diffusion Plant, Paducah, Kentucky

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

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2022 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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TABLES

ACRONYMS

ANSI	American National Standards Institute
ASER	annual site environmental report
CY	calendar year
D&R	deactivation and remediation
DOE	U.S. Department of Energy
DUF_6	Depleted Uranium Hexafluoride
E	effective dose
EMP	environmental monitoring plan
FY	fiscal year
GDS	Global Dosimetry Solutions
LA	Limited Area
MEI	maximally exposed individual
O	order
OSL	optically stimulated luminescence
PGDP	Paducah Gaseous Diffusion Plant
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 2022 are summarized in this report.

In 2022, 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 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 2023 Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (FY 2023 EMP) (FRNP 2022a). The environmental monitoring plan (EMP) is approved by DOE on a fiscal year (FY) basis; accordingly, the EMPs for FY 2022 and FY 2023 apply to calendar year (CY) 2022 TLD and OSL monitoring locations.

In 2022, 15 out of 64 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. These locations were adjacent to or in close proximity of the UF_6 cylinder storage yards. All 14 of these locations 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 use, which was open to the public; 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 2022, 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 2022, the potential E for the member of the public at the DOE boundary exposure scenario was 1.8E+00 mrem.

In 2022, 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 was 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 2022, 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 was located in the C-810 Parking Area and, in 2022, the food vendor was at this location for a total of 15 days. In 2022, 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 the food vendor was 0.0E+00 mrem.

- TLD-97 was located on the east side of the C-100 building and, in 2022, the food vendor was at this location for a total of 169 days. In 2022, 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 the food vendor was 0.0E+00 mrem.

For 2022, 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 4.2E+00 mrem. This result is consistent with previous results cited in annual site environmental reports (ASERs).

For 2022, 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 6.3E-01 person-roentgen equivalent man (rem). 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 was 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 2022 are summarized in this report.

In 2022, 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 2023 Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (FY 2023 EMP) (FRNP 2022a). The environmental monitoring plan (EMP) is approved by DOE on a fiscal year (FY) basis; accordingly, the EMPs for FY 2022 and FY 2023 apply to calendar year (CY) 2022 TLD and OSL monitoring locations.

2. METHODOLOGY

2.1 MEASUREMENT OF DIRECT RADIATION

The D&R Contractor used the Global Dosimetry Solutions Environmental (GDS) 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 supporting the use of this dosimeter indicates the following:

- Energy response range is 40 kiloelectron volt (keV) to 6 mega-electron volt (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 N545-1975, *Performance, Testing, and Procedural Specifications for Thermoluminescence Dosimetry (Environmental Applications)*, and ANSI/Health Physics Society N13.37-2014 (R2019), *Environmental Dosimetry-Criteria for System Design and Implementation*. This type of dosimeter uses a carbon-doped 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 rem.

Landauer processed the dosimeters received from the D&R Contractor, 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 64 TLD locations and 7 OSL locations, along with 1 control location in 2022 (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 is divided into the following groups for data analysis.

- Background—There were 11 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-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 were 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 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 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 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 of 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 were below DOE release criteria and U.S. Department of Transportation levels for regulated materials).

2.4 THERMOLUMINESCENT DOSIMETER LOCATION CHANGES

As of January 1, 2022, the D&R Contractor was no longer able to access the residential properties at two background TLD locations (TLD-54 and TLD-85) because these properties have been sold. As a result, these background TLD locations have been removed from the surveillance network.

TLD-54 was located at a residence on Jalusian Trail in Lone Oak, Kentucky, and was approximately 15.1 miles from the Paducah Gaseous Diffusion Plant (PGDP).

TLD-85 was located at a residence on the corner of Springwell Lane and Buckner Lane in Paducah, Kentucky, and was approximately 10.4 miles from PGDP.

An evaluation was performed to determine if these two background TLD locations needed to be replaced with new background TLD locations. The evaluation determined that these locations would not be replaced because 11 other background TLD locations outside of the DOE boundary for PGDP were still available for background analysis—including 1 TLD location that was located at a residence approximately 2.2 miles from PGDP (TLD-94).

The deletion of these two locations lowered the total TLD locations used to measure external gamma radiation from 66 to 64 locations.

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 have been converted to mrem using a 1:1 ratio.

2.5.2 Direct Neutron Radiation

Direct neutron radiation exposure is reported in mrem.

3. THERMOLUMINESCENT DOSIMETER AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETER RESULTS

Design analysis and calculation DAC-ENV-FA5950-0003, *2022 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 THERMOLUMINESCENT DOSIMETER AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETER RESULTS

3.1.1 Thermoluminescent Dosimeter Results

There were 64 TLD locations monitored for external gamma radiation for an average of 78 days. Results ranged from 11 to 455 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 7 mrem. These results were indistinguishable from the background results, 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 the Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	1/19/2022	4/7/2022	78	17	0.22
679	86	1/19/2022	4/7/2022	78	15	0.19
680	87	1/19/2022	4/7/2022	78	15	0.19
681	88	1/19/2022	4/7/2022	78	16	0.21
682	89	1/19/2022	4/7/2022	78	16	0.21
683	90	1/19/2022	4/7/2022	78	16	0.21
684	91	1/19/2022	4/7/2022	78	15	0.19
685	92	1/19/2022	4/7/2022	78	14	0.18
686	93	1/19/2022	4/7/2022	78	16	0.21
687	94	1/19/2022	4/7/2022	78	16	0.21
688	95	1/19/2022	4/7/2022	78	18	0.23

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	1/19/2022	4/7/2022	78	16	0.21
628	4	1/19/2022	4/7/2022	78	15	0.19
629	5	1/19/2022	4/7/2022	78	17	0.22
630	6	1/19/2022	4/7/2022	78	14	0.18
647	50	1/19/2022	4/7/2022	78	37	0.47
648	52	1/19/2022	4/7/2022	78	14	0.18
652	59	1/19/2022	4/7/2022	78	11	0.14
653	60	1/19/2022	4/7/2022	78	301	3.86
654	61	1/19/2022	4/7/2022	78	455	5.83
655	62	1/19/2022	4/7/2022	78	13	0.17
656	63	1/19/2022	4/7/2022	78	11	0.14
658	65	1/19/2022	4/7/2022	78	13	0.17
661	68	1/19/2022	4/7/2022	78	16	0.21

Table 3. First Quarter Results for the 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	1/19/2022	4/7/2022	78	169	2.17
626	2	1/19/2022	4/7/2022	78	280	3.59
631	7	1/19/2022	4/7/2022	78	23	0.29
634	13	1/19/2022	4/7/2022	78	18	0.23
636	15	1/19/2022	4/7/2022	78	13	0.17
640	25	1/19/2022	4/7/2022	78	21	0.27
642	35	1/19/2022	4/7/2022	78	20	0.26
643	37	1/19/2022	4/7/2022	78	15	0.19
646	46	1/19/2022	4/7/2022	78	13	0.17
649	53	1/19/2022	4/7/2022	78	94	1.21
651	58	1/19/2022	4/7/2022	78	11	0.14
657	64	1/19/2022	4/7/2022	78	11	0.14
662	69	1/19/2022	4/7/2022	78	13	0.17
663	70	1/19/2022	4/7/2022	78	35	0.45
664	71	1/19/2022	4/7/2022	78	28	0.36
665	72	1/19/2022	4/7/2022	78	16	0.21
671	78	1/19/2022	4/7/2022	78	18	0.23
674	81	1/19/2022	4/7/2022	78	82	1.05
675	82	1/19/2022	4/7/2022	78	21	0.27
676	83	1/19/2022	4/7/2022	78	52	0.67
689	96	1/19/2022	4/7/2022	78	14	0.18
692	97	1/19/2022	4/7/2022	78	14	0.18

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

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
632	9	1/19/2022	4/7/2022	78	14[b]	0.17[b]
633	12	1/19/2022	4/7/2022	78	14	0.18
635	14	1/19/2022	4/7/2022	78	14	0.18
638	19	1/19/2022	4/7/2022	78	16	0.21
644	38	1/19/2022	4/7/2022	78	15	0.19
659	66	1/19/2022	4/7/2022	78	14	0.18
660	67	1/19/2022	4/7/2022	78	17	0.22
669	76	1/19/2022	4/7/2022	78	16[c]	0.21[c]
670	77	1/19/2022	4/7/2022	78	15	0.19
672	79	1/19/2022	4/7/2022	78	13	0.17
677	84	1/19/2022	4/7/2022	78	16	0.21

[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 1.

[b] The results for TLD-9 were estimated for this quarter because the TLD was missing on the collection date. The equation used for the estimate can be found in Section 5.6.1. of DAC-ENV-FA5950-0003.

[c] The results for TLD-76 were estimated for this quarter because the TLD was missing on the collection date. The equation used for the estimate can be found in Section 5.6.2 of DAC-ENV-FA5950-0003.

Table 5. First Quarter Results for the 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	1/19/2022	4/7/2022	78	17	0.22
641	30	1/19/2022	4/7/2022	78	17	0.22
645	40	1/19/2022	4/7/2022	78	19	0.24
666	73	1/19/2022	4/7/2022	78	14	0.18
667	74	1/19/2022	4/7/2022	78	16	0.21
668	75	1/19/2022	4/7/2022	78	15	0.19
673	80	1/19/2022	4/7/2022	78	14	0.18

*Background TLDs located outside the DOE Boundary are not listed in this table because they are listed in Table 1.

3.1.2 Optically Stimulated Luminescence Dosimeter Results

In the first quarter, 7 locations were monitored for external neutron radiation for an average of 78 days (see Table 6).

All results collected in the first quarter were reported as "M" (i.e., dose equivalents below the minimum measurable quantity); therefore, analysis of the 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	1/19/2022	4/7/2022	78	M	M	M
2883	3	1/19/2022	4/7/2022	78	M	M	M
2884	50	1/19/2022	4/7/2022	78	M	M	M
2885	65	1/19/2022	4/7/2022	78	M	M	M
2886	68	1/19/2022	4/7/2022	78	M	M	M
2887	81	1/19/2022	4/7/2022	78	M	M	M
2888	83	1/19/2022	4/7/2022	78	M	M	M

3.2 SECOND QUARTER THERMOLUMINESCENT DOSIMETER AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETER RESULTS

3.2.1 Thermoluminescent Dosimeter Results

There were 64 TLD locations monitored for external gamma radiation for an average of 90 days. Results ranged from 13 to 533 mrem.

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

The field blank result was 10 mrem, and the trip blank result was 9 mrem. These results were indistinguishable from the background results, 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 the Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	4/7/2022	7/6/2022	90	19	0.21
679	86	4/7/2022	7/6/2022	90	18	0.20
680	87	4/7/2022	7/6/2022	90	16	0.18
681	88	4/7/2022	7/6/2022	90	18	0.20
682	89	4/7/2022	7/6/2022	90	18	0.20
683	90	4/7/2022	7/6/2022	90	18	0.20
684	91	4/7/2022	7/6/2022	90	15	0.17
685	92	4/7/2022	7/6/2022	90	16	0.18
686	93	4/7/2022	7/6/2022	90	16	0.18
687	94	4/7/2022	7/6/2022	90	17	0.19
688	95	4/7/2022	7/6/2022	90	17	0.19

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	4/7/2022	7/6/2022	90	18	0.20
628	4	4/7/2022	7/6/2022	90	17	0.19
629	5	4/7/2022	7/6/2022	90	19	0.21
630	6	4/7/2022	7/6/2022	90	15	0.17
647	50	4/7/2022	7/6/2022	90	42	0.47
648	52	4/7/2022	7/6/2022	90	14	0.16
652	59	4/7/2022	7/6/2022	90	14	0.16
653	60	4/7/2022	7/6/2022	90	337	3.74
654	61	4/7/2022	7/6/2022	90	533	5.92
655	62	4/7/2022	7/6/2022	90	14	0.16
656	63	4/7/2022	7/6/2022	90	13	0.14
658	65	4/7/2022	7/6/2022	90	13	0.14
661	68	4/7/2022	7/6/2022	90	17	0.19

Table 9. Second Quarter Results for the 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	4/7/2022	7/6/2022	90	202	2.24
626	2	4/7/2022	7/6/2022	90	241	2.68
631	7	4/7/2022	7/6/2022	90	24	0.27
634	13	4/7/2022	7/6/2022	90	18	0.20
636	15	4/7/2022	7/6/2022	90	14	0.16
640	25	4/7/2022	7/6/2022	90	30	0.33
642	35	4/7/2022	7/6/2022	90	23	0.26
643	37	4/7/2022	7/6/2022	90	16	0.18
646	46	4/7/2022	7/6/2022	90	16	0.18
649	53	4/7/2022	7/6/2022	90	90	1.00
651	58	4/7/2022	7/6/2022	90	13	0.14
657	64	4/7/2022	7/6/2022	90	14	0.16
662	69	4/7/2022	7/6/2022	90	13	0.14
663	70	4/7/2022	7/6/2022	90	38	0.42
664	71	4/7/2022	7/6/2022	90	30	0.33
665	72	4/7/2022	7/6/2022	90	17	0.19
671	78	4/7/2022	7/6/2022	90	19	0.21
674	81	4/7/2022	7/6/2022	90	95	1.06
675	82	4/7/2022	7/6/2022	90	25	0.28
676	83	4/7/2022	7/6/2022	90	53	0.59
689	96	4/7/2022	7/6/2022	90	17	0.19
692	97	4/7/2022	7/6/2022	90	16	0.18

Table 10. Second 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	4/7/2022	7/6/2022	90	15	0.17
633	12	4/7/2022	7/6/2022	90	15	0.17
635	14	4/7/2022	7/6/2022	90	16	0.18
638	19	4/7/2022	7/6/2022	90	16	0.18
644	38	4/7/2022	7/6/2022	90	17	0.19
659	66	4/7/2022	7/6/2022	90	15	0.17
660	67	4/7/2022	7/6/2022	90	18	0.20
669	76	4/7/2022	7/6/2022	90	15	0.17
670	77	4/7/2022	7/6/2022	90	15	0.17
672	79	4/7/2022	7/6/2022	90	14	0.16
677	84	4/7/2022	7/6/2022	90	17	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 7.

Table 11. Second Quarter Results for the 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	4/7/2022	7/6/2022	90	19	0.21
641	30	4/7/2022	7/6/2022	90	19	0.21
645	40	4/7/2022	7/6/2022	90	21	0.23
666	73	4/7/2022	7/6/2022	90	15	0.17
667	74	4/7/2022	7/6/2022	90	18	0.20
668	75	4/7/2022	7/6/2022	90	18	0.20
673	80	4/7/2022	7/6/2022	90	17	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 Optically Stimulated Luminescence Dosimeter Results

In the second quarter, 7 locations were monitored for external neutron radiation for an average of 90 days (Table 12).

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

Table 12. Second Quarter Results for the OSL Locations

Landauer Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Total Neutron	Fast Neutron	Thermal Neutron
2882	2	4/7/2022	7/6/2022	90	M	M	M
2883	3	4/7/2022	7/6/2022	90	M	M	M
2884	50	4/7/2022	7/6/2022	90	M	M	M
2885	65	4/7/2022	7/6/2022	90	M	M	M
2886	68	4/7/2022	7/6/2022	90	M	M	M
2887	81	4/7/2022	7/6/2022	90	M	M	M
2888	83	4/7/2022	7/6/2022	90	M	M	M

3.3 THIRD QUARTER THERMOLUMINESCENT DOSIMETER AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETER RESULTS

3.3.1 Thermoluminescent Dosimeter Results

There were 64 TLD locations monitored for external gamma radiation for an average of 97 days. Results ranged from 15 to 708 mrem.

The background results ranged from 19 to 24 mrem. The mean background result was 21 mrem.

The field blank result was 11 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 13 through Table 17 show the results for the third quarter.

Table 13. Third Quarter Results for the Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	7/6/2022	10/11/2022	97	21	0.22
679	86	7/6/2022	10/11/2022	97	21	0.22
680	87	7/6/2022	10/11/2022	97	19	0.20
681	88	7/6/2022	10/11/2022	97	21	0.22
682	89	7/6/2022	10/11/2022	97	22	0.23
683	90	7/6/2022	10/11/2022	97	21	0.22
684	91	7/6/2022	10/11/2022	97	20	0.21
685	92	7/6/2022	10/11/2022	97	20	0.21
686	93	7/6/2022	10/11/2022	97	22	0.23
687	94	7/6/2022	10/11/2022	97	24	0.25
688	95	7/6/2022	10/11/2022	97	22	0.23

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	7/6/2022	10/11/2022	97	21	0.22
628	4	7/6/2022	10/11/2022	97	20	0.21
629	5	7/6/2022	10/11/2022	97	23	0.24
630	6	7/6/2022	10/11/2022	97	19	0.20
647	50	7/6/2022	10/11/2022	97	51	0.53
648	52	7/6/2022	10/11/2022	97	16	0.16
652	59	7/6/2022	10/11/2022	97	16	0.16
653	60	7/6/2022	10/11/2022	97	376	3.88
654	61	7/6/2022	10/11/2022	97	708	7.30
655	62	7/6/2022	10/11/2022	97	18	0.19
656	63	7/6/2022	10/11/2022	97	16	0.16
658	65	7/6/2022	10/11/2022	97	18	0.19
661	68	7/6/2022	10/11/2022	97	21	0.22

Table 15. Third Quarter Results for the 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	7/6/2022	10/11/2022	97	253	2.61
626	2	7/6/2022	10/11/2022	97	367	3.78
631	7	7/6/2022	10/11/2022	97	30	0.31
634	13	7/6/2022	10/11/2022	97	23	0.24
636	15	7/6/2022	10/11/2022	97	17	0.18
640	25	7/6/2022	10/11/2022	97	30	0.31
642	35	7/6/2022	10/11/2022	97	26	0.27
643	37	7/6/2022	10/11/2022	97	18	0.19
646	46	7/6/2022	10/11/2022	97	18	0.19
649	53	7/6/2022	10/11/2022	97	117	1.21
651	58	7/6/2022	10/11/2022	97	15	0.15
657	64	7/6/2022	10/11/2022	97	17	0.18
662	69	7/6/2022	10/11/2022	97	16	0.16
663	70	7/6/2022	10/11/2022	97	46	0.47
664	71	7/6/2022	10/11/2022	97	29	0.30
665	72	7/6/2022	10/11/2022	97	21	0.22
671	78	7/6/2022	10/11/2022	97	24	0.25
674	81	7/6/2022	10/11/2022	97	111	1.14
675	82	7/6/2022	10/11/2022	97	29	0.30
676	83	7/6/2022	10/11/2022	97	63	0.65
689	96	7/6/2022	10/11/2022	97	20	0.21
692	97	7/6/2022	10/11/2022	97	19	0.20

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	7/6/2022	10/11/2022	97	18	0.19
633	12	7/6/2022	10/11/2022	97	19	0.20
635	14	7/6/2022	10/11/2022	97	17	0.18
638	19	7/6/2022	10/11/2022	97	20	0.21
644	38	7/6/2022	10/11/2022	97	21	0.22
659	66	7/6/2022	10/11/2022	97	21	0.22
660	67	7/6/2022	10/11/2022	97	25	0.26
669	76	7/6/2022	10/11/2022	97	22	0.23
670	77	7/6/2022	10/11/2022	97	21	0.22
672	79	7/6/2022	10/11/2022	97	21	0.22
677	84	7/6/2022	10/11/2022	97	22	0.23

*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 the 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	7/6/2022	10/11/2022	97	23	0.24
641	30	7/6/2022	10/11/2022	97	25	0.26
645	40	7/6/2022	10/11/2022	97	26	0.27
666	73	7/6/2022	10/11/2022	97	18	0.19
667	74	7/6/2022	10/11/2022	97	25	0.26
668	75	7/6/2022	10/11/2022	97	23	0.24
673	80	7/6/2022	10/11/2022	97	21	0.22

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

3.3.2 Optically Stimulated Luminescence Dosimeter Results

In the third quarter, 7 locations were monitored for external neutron radiation for an average of 97 days (see Table 18).

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

Table 18. Third Quarter Results for the OSL Locations

Landauer Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Total Neutron	Fast Neutron	Thermal Neutron
2882	2	7/6/2022	10/11/2022	97	M	M	M
2883	3	7/6/2022	10/11/2022	97	M	M	M
2884	50	7/6/2022	10/11/2022	97	M	M	M
2885	65	7/6/2022	10/11/2022	97	M	M	M
2886	68	7/6/2022	10/11/2022	97	M	M	M
2887	81	7/6/2022	10/11/2022	97	M	M	M
2888	83	7/6/2022	10/11/2022	97	M	M	M

3.4 FOURTH QUARTER THERMOLUMINESCENT DOSIMETER AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETER RESULTS

3.4.1 Thermoluminescent Dosimeter Results

There were 64 TLD locations monitored for external gamma radiation for an average of 118 days. Results ranged from 15 to 759 mrem.

The background results ranged from 21 to 28 mrem. The mean background result was 24 mrem.

The field blank result was 10 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 the Background TLD Locations

Mirion Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Effective Dose (mrem)	Normalized Effective Dose/day
639	22	10/11/2022	2/6/2023	118	25	0.21
679	86	10/11/2022	2/6/2023	118	24	0.20
680	87	10/11/2022	2/6/2023	118	21	0.18
681	88	10/11/2022	2/6/2023	118	23	0.19
682	89	10/11/2022	2/6/2023	118	24	0.20
683	90	10/11/2022	2/6/2023	118	23	0.19
684	91	10/11/2022	2/6/2023	118	24	0.20
685	92	10/11/2022	2/6/2023	118	22	0.19
686	93	10/11/2022	2/6/2023	118	24	0.20
687	94	10/11/2022	2/6/2023	118	28	0.24
688	95	10/11/2022	2/6/2023	118	27	0.23

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	10/11/2022	2/6/2023	118	24	0.20
628	4	10/11/2022	2/6/2023	118	23	0.19
629	5	10/11/2022	2/6/2023	118	25	0.21
630	6	10/11/2022	2/6/2023	118	20	0.17
647	50	10/11/2022	2/6/2023	118	60	0.51
648	52	10/11/2022	2/6/2023	118	23	0.19
652	59	10/11/2022	2/2/2023	114	17	0.15
653	60	10/11/2022	2/2/2023	114	473	4.15
654	61	10/11/2022	2/2/2023	114	759	6.66
655	62	10/11/2022	2/2/2023	114	18	0.16
656	63	10/11/2022	2/2/2023	114	15	0.13
658	65	10/11/2022	2/6/2023	118	19	0.16
661	68	10/11/2022	2/6/2023	118	25	0.21

Table 21. Fourth Quarter Results for the 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	10/11/2022	2/6/2023	118	290	2.46
626	2	10/11/2022	2/6/2023	118	474	4.02
631	7	10/11/2022	2/6/2023	118	33	0.28
634	13	10/11/2022	2/6/2023	118	28	0.24
636	15	10/11/2022	2/6/2023	118	18	0.15
640	25	10/11/2022	2/6/2023	118	36	0.31
642	35	10/11/2022	2/6/2023	118	29	0.25
643	37	10/11/2022	2/6/2023	118	21	0.18
646	46	10/11/2022	2/6/2023	118	21	0.18
649	53	10/11/2022	2/6/2023	118	162	1.37
651	58	10/11/2022	2/6/2023	118	16	0.14
657	64	10/11/2022	2/6/2023	118	15	0.13
662	69	10/11/2022	2/6/2023	118	20	0.17
663	70	10/11/2022	2/6/2023	118	54	0.46
664	71	10/11/2022	2/6/2023	118	44	0.37
665	72	10/11/2022	2/6/2023	118	25	0.21
671	78	10/11/2022	2/6/2023	118	27	0.23
674	81	10/11/2022	2/6/2023	118	131	1.11
675	82	10/11/2022	2/6/2023	118	33	0.28
676	83	10/11/2022	2/6/2023	118	91	0.77
689	96	10/11/2022	2/6/2023	118	24	0.20
692	97	10/11/2022	2/2/2023	114	22	0.19

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	10/11/2022	2/6/2023	118	20	0.17
633	12	10/11/2022	2/6/2023	118	21	0.18
635	14	10/11/2022	2/6/2023	118	21	0.18
638	19	10/11/2022	2/6/2023	118	27	0.23
644	38	10/11/2022	2/6/2023	118	24	0.20
659	66	10/11/2022	2/6/2023	118	24	0.20
660	67	10/11/2022	2/6/2023	118	24	0.20
669	76	10/11/2022	2/6/2023	118	27	0.23
670	77	10/11/2022	2/6/2023	118	22	0.19
672	79	10/11/2022	2/6/2023	118	22	0.19
677	84	10/11/2022	2/6/2023	118	25	0.21

*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	10/11/2022	2/6/2023	118	26	0.22
641	30	10/11/2022	2/6/2023	118	26	0.22
645	40	10/11/2022	2/6/2023	118	28	0.24
666	73	10/11/2022	2/6/2023	118	21	0.18
667	74	10/11/2022	2/6/2023	118	27	0.23
668	75	10/11/2022	2/6/2023	118	27	0.23
673	80	10/11/2022	2/6/2023	118	21	0.18

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

3.4.2 Optically Stimulated Luminescence Dosimeter 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 measurable quantity); therefore, analysis of annual neutron dose was not required and no dose equations were used.

Table 24. Fourth Quarter Results for the OSL Locations

Landauer Badge Number	TLD Location Number	Start Date	End Date	Exposure Days	Total Neutron	Fast Neutron	Thermal Neutron
2882	2	10/11/2022	2/6/2023	118	M	M	M
2883	3	10/11/2022	2/6/2023	118	M	M	M
2884	50	10/11/2022	2/6/2023	118	M	M	M
2885	65	10/11/2022	2/6/2023	118	M	M	M
2886	68	10/11/2022	2/6/2023	118	M	M	M
2887	81	10/11/2022	2/6/2023	118	M	M	M
2888	83	10/11/2022	2/6/2023	118	M	M	M

3.5 ANNUAL THERMOLUMINESCENT DOSIMETER AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETER RESULTS

3.5.1 Annualized Thermoluminescent Dosimeter Results Summary

There were 64 TLD locations monitored for external gamma radiation for an average of 383 days. Annualized results ranged from 52 to 2,364 mrem.

The annualized background results ranged from 68 to 81 mrem. The annualized mean background result was 75 mrem.

Tables 25 through 30 show the annualized results.

Table 25. Annualized Results for the 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	82	383	78	75	3	0.009	0.000
86	78	383	74	75	-1	-0.002	0.000
87	71	383	68	75	-7	-0.020	-0.001
88	78	383	74	75	-1	-0.002	0.000
89	80	383	76	75	1	0.003	0.000
90	78	383	74	75	-1	-0.002	0.000
91	74	383	71	75	-4	-0.012	-0.001
92	72	383	69	75	-6	-0.017	-0.001
93	78	383	74	75	-1	-0.002	0.000
94	85	383	81	75	6	0.016	0.001
95	84	383	80	75	5	0.014	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	79	383	75	75	0	0.001	0.000
4	75	383	71	75	-4	-0.010	0.000
5	84	383	80	75	5	0.014	0.001
6	68	383	65	75	-10	-0.028	-0.001
50	190	383	181	75	106	0.291	0.012
52	67	383	64	75	-11	-0.031	-0.001
59	58	379	56	75	-19	-0.052	-0.002
60	1,487	379	1,432	75	1,357	3.718	0.155
61	2,455	379	2,364	75	2,289	6.272	0.261
62	63	379	61	75	-14	-0.039	-0.002
63	55	379	53	75	-22	-0.060	-0.003
65	53	383	60	75	-15	-0.041	-0.002
68	79	383	75	75	0	0.001	0.000

Table 27. Annualized Results for the 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	914	383	871	75	796	2.181	0.091
2	1,362	383	1,298	75	1,223	3.351	0.140
7	110	383	105	75	30	0.082	0.003
13	87	383	83	75	8	0.022	0.001
15	62	383	59	75	-16	-0.044	-0.002
25	117	383	112	75	37	0.100	0.004
35	98	383	93	75	18	0.050	0.002
37	70	383	67	75	-8	-0.023	-0.001
46	68	383	65	75	-10	-0.028	-0.001
53	463	383	441	75	366	1.003	0.042
58	55	383	52	75	-23	-0.062	-0.003
64	57	383	54	75	-21	-0.057	-0.002
69	62	383	59	75	-16	-0.044	-0.002
70	173	383	165	75	90	0.246	0.010
71	131	383	125	75	50	0.137	0.006
72	79	383	75	75	0	0.001	0.000
78	88	383	84	75	9	0.024	0.001
81	419	383	399	75	324	0.889	0.037
82	108	383	103	75	28	0.077	0.003
83	259	383	247	75	172	0.471	0.020
96	75	383	71	75	-4	-0.010	0.000
97	71	379	68	75	-7	-0.018	-0.001

Table 28. Annualized Results for the 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	67	383	63	75	-12	-0.032	-0.001
12	69	383	66	75	-9	-0.025	-0.001
14	68	383	65	75	-10	-0.028	-0.001
19	79	383	75	75	0	0.001	0.000
38	77	383	73	75	-2	-0.004	0.000
66	74	383	71	75	-4	-0.012	-0.001
67	84	383	80	75	5	0.014	0.001
76	80	383	76	75	1	0.004	0.000
77	73	383	70	75	-5	-0.015	-0.001
79	70	383	67	75	-8	-0.023	-0.001
84	80	383	76	75	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	85	383	81	75	6	0.016	0.001
30	87	383	83	75	8	0.022	0.001
40	94	383	90	75	15	0.040	0.002
73	68	383	65	75	-10	-0.028	-0.001
74	86	383	82	75	7	0.019	0.001
75	83	383	79	75	4	0.011	0.000
80	73	383	70	75	-5	-0.015	-0.001

*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 the Food Vendor

Potential Estimated Dose for Food Vendor	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Normalized E mrem/day at location TLD-96	0.18	0.19	0.21	0.20
Number of days food vendor on-site at TLD-96	0	3	12	0
Normalized E mrem/day at location TLD-97	0.18	0.18	0.20	0.19
Number of days food vendor on-site at TLD-97	46	33	36	54
Number of hours/day	24	24	24	24
Number of hours/day food vendor on-site	4	4	4	4
Food vendor mrem/hour	0.34	0.27	0.40	0.43
Annualized mean background	75	75	75	75
Background mrem/day	0.21	0.21	0.21	0.21
Background mrem/hour	0.39	0.31	0.41	0.46
Food vendor mrem	1.38	1.07	1.59	1.74
Food vendor background mrem	1.58	1.23	1.64	1.85
Net Estimated E (mrem)	-0.20	-0.16	-0.06	-0.11
Estimated E for food vendor* (mrem)	**-0.53**			

*Because the calculated estimated E is a negative value, 0.0 mrem was assigned as the food vendor E.

3.5.2 Determination of Thermoluminescent Dosimeter 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 were calculated using a normal distribution. The result was a standard deviation of 4.32 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 3 standard deviations from the annual mean background measurement are considered to be above background with 99.7% confidence. The result for 3 standard deviations was 13 mrem ($4.32 \times 3 = 12.96$).

The annual mean background was 74.51 mrem. The result for the annual mean background, plus three standard deviations, provides an upper range result of 87 mrem ($74.51 + 12.96 = 87.47$).

One TLD location outside the DOE boundary (i.e., TLD-40) exceeded 87 mrem. This TLD location is accessible to the public and is discussed further in Section 3.5.8 of this report.

The remaining TLD locations where the annualized E equaled or exceeded 87 mrem are listed in Tables 31 and 32.

Table 31. LA TLD Locations with Results Statistically Above Background*

TLD Location Number	Annualized Effective Dose (mrem)	Annualized Mean Background (mrem)	Annualized Mean Background Plus 3 Standard Deviations (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
50	181	75	87	106	0.291	0.012
60	1,432	75	87	1,357	3.718	0.155
61	2,364	75	87	2,289	6.272	0.261

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

Table 32. 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 3 Standard Deviations (mrem)	Net Annualized Effective Dose (mrem)	Net Annualized mrem/day	Net Annualized mrem/hour
1	871	75	87	796	2.181	0.091
2	1,298	75	87	1,223	3.351	0.140
7	105	75	87	30	0.082	0.003
25	112	75	87	37	0.100	0.004
35	93	75	87	18	0.050	0.002
53	441	75	87	366	1.003	0.042
70	165	75	87	90	0.246	0.010
71	125	75	87	50	0.137	0.006
81	399	75	87	324	0.889	0.037
82	103	75	87	28	0.077	0.003
83	247	75	87	172	0.471	0.020

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

3.5.3 Annualized Optically Stimulated Luminescence Dosimeter Results Summary

The OSL locations were monitored for external neutron radiation for an average of 383 days. All neutron results collected were reported as “M” (i.e., dose equivalents below the minimum measurable quantity); therefore, analysis of annual neutron dose was not required and no dose equations were used.

3.5.4 Analysis of the Annual Thermoluminescent Dosimeter and Optically Stimulated Luminescence Dosimeter Results

Since the fall of 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 2022, 15 out of 64 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. These locations were adjacent to or in close proximity to the UF_6 cylinder storage yards. All 14 of these locations 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 was 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 licensed a portion of the DOE Reservation to the Kentucky Department of Fish and Wildlife Resources for recreational use, which were open to the public; 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 2022, there were three TLD locations inside the DOE 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 was located north of the LA security fence and south of Ogden Landing Road. In CY 2009, security restrictions were eased to allow regular public access to Harmony Cemetery. In 2022, 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 was located in the C-810 parking lot and, in 2022, the food vendor was at this location for a total of 15 days. In 2022, 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 the food vendor was 0.0E+00 mrem (see Table 30).

- TLD-97 was located on the east side of the C-100 building and, in 2022, the food vendor was at this location for a total of 169 days. In 2022, 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 the food vendor was 0.0E+00 mrem (see Table 30).

3.5.7 Potential Effective Dose Scenario for a Member of the Public at the U.S. Department of Energy 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-FA5950-0003 and the following equation.

$$(15 \text{ mrem} \times 104 \text{ days per year} \times 10 \text{ hours per day}) \div (365 \text{ days/year} \times 24 \text{ hours/day}) = 1.78 \text{ mrem}$$

A member of the public would receive an estimated external radiation E of 1.8E+00 mrem at the DOE boundary.

3.5.8 Potential Effective Dose for 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-FA5950-003 and the following equation.

Tables 31 and 32 and TLD-40 average of the net annualized mrem/hour × 80 hours.

$$0.053 \text{ mrem/hour} \times 80 \text{ hours per year} = 4.2 \text{ mrem}$$

The estimated potential external radiation E received by the MEI was 4.2E+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 6.3E-01 person-rem.

$$4.2 \text{ mrem} \times 1 \text{ rem}/1000 \text{ mrem} \times 150 \text{ persons} = 0.63 \text{ person-rem}$$

3.5.9 Establish the Potential Radiation Dose from Direct Exposure to U.S. Department of Energy Operations at the Boundary of the U.S. Department of Energy 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 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 OPTICALLY STIMULATED LUMINESCENCE DOSIMETER ANNUALIZED RESULTS

All neutron results collected from 2016 through 2021 were reported as "M" (i.e., dose equivalents below the minimum measurable quantity). In 2022, all neutron results were also reported as "M."

4.2 COMPARISON OF THERMOLUMINESCENT DOSIMETER ANNUALIZED RESULTS

Tables 33 through 38 present comparison of average results from 2015 through 2021 with 2022 results (FRNP 2022b).

4.2.1 Comparison of Annualized Results for Background Thermoluminescent Dosimeter Locations

Table 33 shows the annual results of background minimums, maximums, means, standard deviations, 3 sigma values, and lower and upper ranges for 2015 through 2021 and also compares the results of the averages of 2015 through 2021 with the results from 2022 (FRNP 2022b).

Table 33. Comparison of Annual Background Information*

Annual Background Information	2015 to 2021 Average	2022	Increase or Decrease from Average to 2022	% Change
Background minimum (mrem)	76	68	-8.6	-12.7
Background maximum (mrem)	97	81	-16.1	-19.9
Annualized mean background (mrem)	84	75	-9.8	-13.1
Standard deviation	6	4.32	-1.4	-31.7
3 sigma	17	12.96	-4.1	-31.7
Lower range	67	61.54	-5.7	-9.2
Upper range	101	87.47	-13.9	-15.9

*Includes decimal places not shown when rounding.

Table 34 presents the results of comparison between average results from 2015 through 2021 with 2022 results for individual background TLD locations.

Table 34. Comparison of Annualized Results for Background TLD Locations*

TLD Location Number	2015 to 2021 Average Annualized Effective Dose (mrem)	2022 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2022 (mrem)	% Change
22	84	78	-5.6	-7.1
86	84	74	-9.2	-12.4
87	81	68	-13.5	-19.9
88	82	74	-7.8	-10.5
89	85	76	-9.0	-11.9
90	86	74	-11.5	-15.5
91	84	71	-13.2	-18.7
92	82	69	-13.1	-19.1
93	82	74	-7.4	-9.9
94	87	81	-5.7	-7.0
95	87	80	-7.1	-8.9

*Includes decimal places not shown when rounding.

4.2.2 Comparison of Annualized Results for the Limited Area Thermoluminescent Dosimeter Locations

Table 35 presents the results of comparison between average results from 2015 through 2021 with 2022 results.

TLD locations where the text is in **bold** indicate where the 2022 annualized results were above the maximum background with 99.7% confidence. The highlighted cells are the TLD locations closest to the perimeter of the depleted uranium hexafluoride (DUF_6) facility or operations. Radiation dose rates at these highlighted areas are subject to change as a result of DUF_6 plant operations, such as the UF_6 cylinder relocation, which may explain the dose increases and decreases shown in this table.

Table 35. Comparison of Annualized Results for the LA TLD Locations*

TLD Location Number	2015 to 2021 Average Annualized Effective Dose (mrem)	2022 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2022 (mrem)	% Change
3	82	75	-6.6	-8.7
4	80	71	-8.5	-11.9
5	88	80	-8.1	-10.1
6	74	65	-9.1	-14.0
50	174	181	6.8	3.7
52	74	64	-10.3	-16.1
59	67	56	-11.6	-20.7
60	1,284	1,432	148.2	10.3
61	2,285	2,364	79.6	3.4
62	70	61	-9.0	-14.9
63	66	53	-12.6	-23.8
65	69	60	-9.1	-15.2
68	82	75	-7.1	-9.5

*Includes decimal places not shown when rounding.

4.2.3 Comparison of Annualized Results for Thermoluminescent Dosimeter Locations Outside the Limited Area and Inside the Property Protection Area Boundary

Table 36 presents the results of comparison between average results from 2015 through 2021 with 2022 results.

TLD locations where the text is in **bold** indicate where the 2022 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, such as the UF_6 cylinder relocation, which may explain the dose increases and decreases shown in this table.

Table 36. Comparison of Annualized Results for TLD Locations Outside the LA and Inside the PPA Boundary*

TLD Location Number	2015 to 2021 Average Annualized Effective Dose (mrem)	2022 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2022 (mrem)	% Change
1	793	871	77.9	8.9
2	1,040	1,298	257.7	19.9
7	109	105	-4.6	-4.4
13	90	83	-6.8	-8.2
15	68	59	-8.9	-15.1
25	115	112	-3.4	-3.0
35	102	93	-8.3	-8.9
37	81	67	-14.1	-21.2
46	75	65	-10.6	-16.4
53	404	441	37.7	8.5
58	64	52	-11.9	-22.6
64	68	54	-13.5	-24.9
69	69	59	-10.1	-17.0
70	175	165	-9.8	-6.0
71	136	125	-11.4	-9.2
72	83	75	-7.7	-10.2
78	93	84	-9.0	-10.7
81	386	399	13.3	3.3
82	110	103	-7.2	-7.0
83	229	247	17.4	7.0
96	50	71	21.5	30.0
97	72	68	-3.6	-5.3

*Includes decimal places not shown when rounding.

4.2.4 Comparison of Annualized Results for Thermoluminescent Dosimeter Locations Outside the Property Protection Area and Inside the U.S. Department of Energy Boundary

Table 37 presents the results of comparison between average results from 2015 through 2021, with 2022 results.

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

TLD Location Number	2015 to 2021 Average Annualized Effective Dose (mrem)	2022 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2022 (mrem)	% Change
9	73	63	-9.8	-15.5
12	74	66	-8.0	-12.1
14	73	65	-8.6	-13.3
19	79	75	-4.0	-5.3
38	84	73	-10.9	-14.9
66	82	71	-11.2	-15.9
67	85	80	-5.4	-6.7
76	83	76	-7.0	-9.2
77	80	70	-10.1	-14.6
79	76	67	-9.3	-13.9
84	74	76	2.0	2.6

[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 34.
[b] Includes decimal places not shown when rounding.

4.2.5 Comparison of Annualized Results for Thermoluminescent Dosimeter Locations Outside the U.S. Department of Energy Boundary

Table 38 presents the results of comparison between average results from 2015 through 2021 with 2022 results.

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

TLD Location Number	2015 to 2021 Average Annualized Effective Dose (mrem)	2022 Annualized Effective Dose (mrem)	Increase or Decrease from Average to 2022 (mrem)	% Change
16	93	81	-11.9	-14.6
30	84	83	-1.4	-1.7
40	101	90	-11.4	-12.7
73	74	65	-9.3	-14.4
74	92	82	-10.0	-12.3
75	86	79	-6.9	-8.7
80	81	70	-11.7	-16.8

[a] All background TLD locations located outside the DOE boundary are not listed in this table because they are listed in Table 34.
[b] Includes decimal places not shown when rounding.

4.2.6 Comparison of Annual Site Environmental Reports Direct Radiation Pathway

A review of previous Annual Site Environmental Reports indicate the direct radiation pathway for 2022 is consistent with previous years.

Table 39 presents the results of the direct radiation pathway from 2015 through 2022 (FRNP 2022c).

Table 39. Comparison of the Potential Radiological Dose to the MEI for the Direct Radiation Pathway

Direct Radiation Pathway	2015	2016	2017	2018	2019	2020	2021	2022
Dose to MEI (mrem/year)	5.1E+00	4.2E+00	3.8E+00	5.0E+00	3.0E+00	4.1E+00	3.6E+00	4.2E+00
Percent of DOE 100 mrem/year Limit	5.1%	4.2%	3.8%	5.0%	3.0%	4.1%	3.6%	4.2%
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	5.4E-01	6.3E-01
Population within 50 miles*	150	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 (Four Rivers Nuclear Partnership, LLC) 2022a. *Environmental Monitoring Plan Fiscal Year 2023 Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, CP2-ES-0006/FR8, Four Rivers Nuclear Partnership, LLC, Paducah, KY, October.

FRNP 2022b. *2021 Annual External Radiation Monitoring Report Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0227, Four Rivers Nuclear Partnership, LLC, Paducah, KY, July.

FRNP 2022c. *Paducah Site Annual Site Environmental Report 2021*, FRNP-RPT-0240, Four Rivers Nuclear Partnership, LLC, Paducah, KY, September.

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APPENDIX A

MONITORING LOCATIONS AND DESCRIPTIONS

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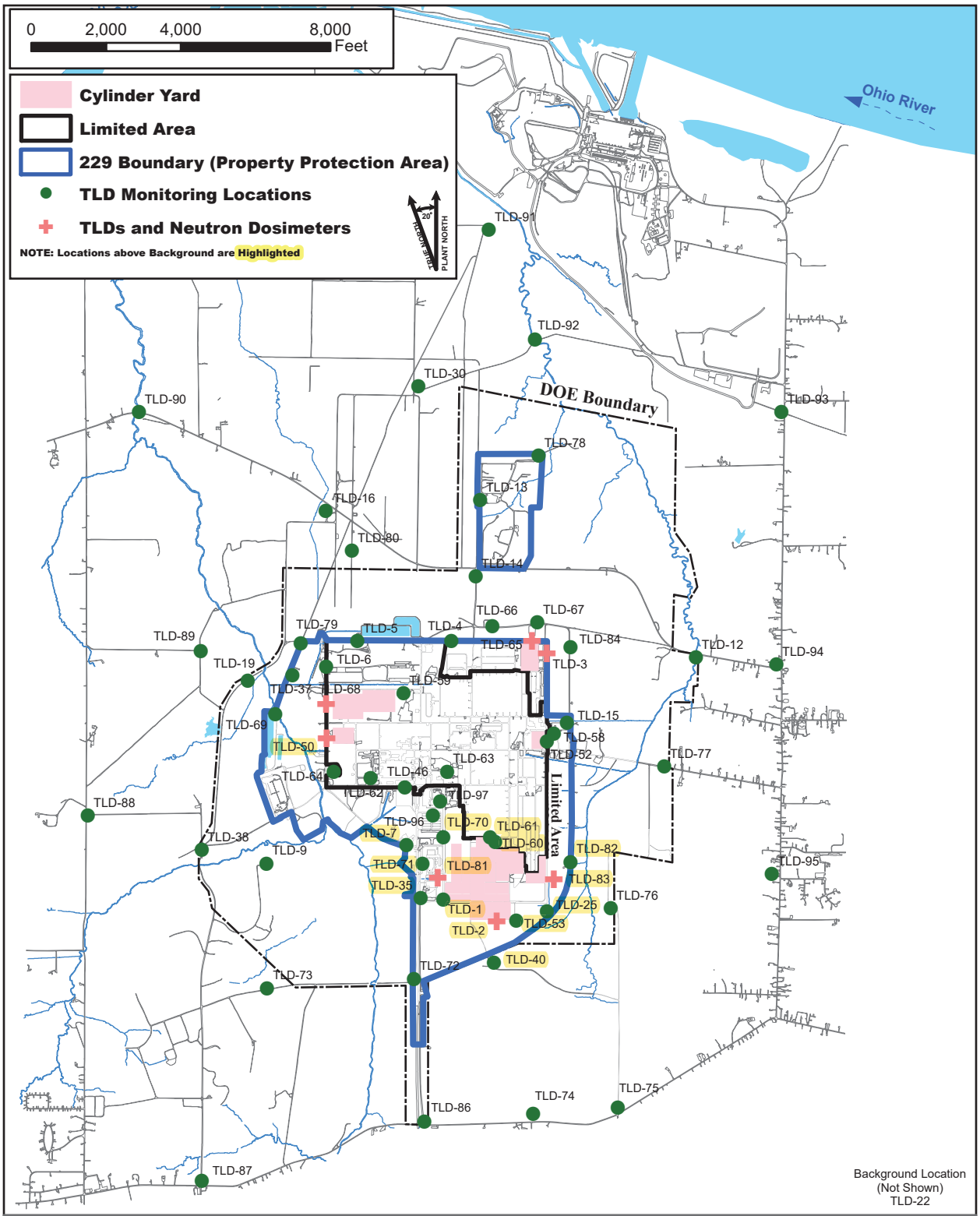

MAP SOURCE INFORMATION
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Streams -- G:\GIS\iPEGASIS.gdb\streams
Limited Area -- G:\GIS\iPEGASIS.gdb\limited_area
DOE Boundary -- G:\GIS\iPEGASIS.gdb\doebnd
Cylinder Yard -- G:\GIS\iPEGASIS.gdb\CylinderYards.shp
TLDs, Neutron Dosimeters -- G:\GIS\iPEGASIS\TLDs
229 Boundary -- G:\GIS\iPEGASIS\Security_229

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 the depleted uranium hexafluoride (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 the 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 NSDD, 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 of the plant access road. Outfall 017 DUF_6 laydown yard.	N 37 06 21.480	W 088 49 03.960	-4773	-5806
TLD-37	Outfall 001 behind the Vortec site. K001.	N 37 07 18.600	W 088 49 15.660	-8202	138
TLD-38	Five-Points Creek with concrete bridge, on tree behind the "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 ½ mile on Kelly Road and then turn left, go about ½ 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-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 health physics 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 the 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 DUF6 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-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	East side of C-100 building on 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.	Not applicable (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

THERMOLUMINESCENT DOSIMETER AND OPTICALLY STIMULATED LUMINESCENCE DOSIMETER 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
1/19/2022 10:18 7312-625	PB	4/7/2022 08:26	TB	TLD-1	Not applicable (N/A)
1/19/2022 10:00 7315-626 and 2882	PB	4/7/2022 08:15	TB	TLD-2	N/A
1/19/2022 09:14 7316-627 and 2883	PB	4/7/2022 07:41	TB	TLD-3	N/A
1/19/2022 12:28 7317-628	PB	4/7/2022 09:31	TB	TLD-4	N/A
1/19/2022 12:37 7318-629	PB	4/7/2022 09:27	TB	TLD-5	N/A
1/19/2022 12:14 7319-630	PB	4/7/2022 09:17	TB	TLD-6	N/A
1/19/2022 10:43 7320-631	PB	4/7/2022 08:46	TB	TLD-7	N/A
1/19/2022 15:52 7321-632	PB	Missing	TB	TLD-9	Estimate will be performed based on results of other quarters.
1/19/2022 14:35 7322-633	PB	4/7/2022 12:57	TB	TLD-12	N/A
1/19/2022 14:40 7323-634	PB	4/7/2022 13:01	TB	TLD-13	N/A
1/19/2022 09:04 7324-635	PB	4/7/2022 07:37	TB	TLD-14	N/A
1/19/2022 08:48 7325-636	PB	4/7/2022 07:25	TB	TLD-15	N/A
1/19/2022 15:16 7326-637	PB	4/7/2022 13:33	TB	TLD-16	N/A
1/19/2022 15:42 7327-638	PB	4/7/2022 13:57	TB	TLD-19	N/A
1/19/2022 13:23 7328-639	PB	4/7/2022 10:09	TB	TLD-22	N/A
1/19/2022 09:46 7329-640	PB	4/7/2022 08:02	TB	TLD-25	N/A
1/19/2022 15:06 7330-641	PB	4/7/2022 13:24	TB	TLD-30	N/A
1/19/2022 10:40 7331-642	PB	4/7/2022 08:50	TB	TLD-35	N/A
1/19/2022 12:01 7332-643	PB	4/7/2022 09:12	TB	TLD-37	N/A
1/19/2022 15:47 7333-644	PB	4/7/2022 14:03	TB	TLD-38	N/A
1/19/2022 09:48 7334-645	PB	4/7/2022 08:05	TB	TLD-40	N/A
1/19/2022 10:46 7335-646	PB	4/7/2022 08:53	TB	TLD-46	N/A
1/19/2022 11:49 7336-647 and 2884	PB	4/7/2022 09:06	TB	TLD-50	N/A
1/19/2022 08:51 7337-648	PB	4/7/2022 07:17	TB	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
1/19/2022 09:55 7338-649	PB	4/7/2022 08:15	TB	TLD-53	N/A
1/19/2022 08:42 7340-651	PB	4/7/2022 07:20	TB	TLD-58	N/A
1/19/2022 07:59 7341-652	PB	4/7/2022 14:55	TB	TLD-59	N/A
1/19/2022 08:20 7342-653	PB	4/7/2022 14:41	TB	TLD-60	N/A
1/19/2022 08:21 7343-654	PB	4/7/2022 14:42	TB	TLD-61	N/A
1/19/2022 07:51 7344-655	PB	4/7/2022 15:00	TB	TLD-62	N/A
1/19/2022 08:14 7345-656	PB	4/7/2022 14:52	TB	TLD-63	N/A
1/19/2022 12:46 7346-657	PB	4/7/2022 09:58	TB	TLD-64	N/A
1/19/2022 09:16 7347-658 and 2885	PB	4/7/2022 07:46	TB	TLD-65	N/A
1/19/2022 09:01 7348-659	PB	4/7/2022 07:34	TB	TLD-66	N/A
1/19/2022 08:58 7349-660	PB	4/7/2022 07:32	TB	TLD-67	N/A
1/19/2022 11:55 7350-661 and 2886	PB	4/7/2022 09:08	TB	TLD-68	N/A
1/19/2022 10:58 7351-662	PB	4/7/2022 09:00	TB	TLD-69	N/A
1/19/2022 10:32 7352-663	PB	4/7/2022 08:33	TB	TLD-70	N/A
1/19/2022 10:28 7353-664	PB	4/7/2022 08:32	TB	TLD-71	N/A
1/19/2022 10:15 7354-665	PB	4/7/2022 08:22	TB	TLD-72	N/A
1/19/2022 15:59 7355-666	PB	4/11/2022 08:30	TB	TLD-73	N/A
1/19/2022 13:59 7356-667	PB	4/7/2022 12:22	TB	TLD-74	N/A
1/19/2022 14:03 7357-668	PB	4/7/2022 12:25	TB	TLD-75	N/A
1/19/2022 14:09 7358-669	PB	Missing	TB	TLD-76	Estimate will be performed based on results of other quarters.
1/19/2022 14:16 7359-670	PB	4/7/2022 12:39	TB	TLD-77	N/A
1/19/2022 14:45 7360-671	PB	4/7/2022 14:06	TB	TLD-78	N/A
1/19/2022 12:19 7361-672	PB	4/7/2022 09:19	TB	TLD-79	N/A
1/19/2022 15:12 7362-673	PB	4/7/2022 13:30	TB	TLD-80	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
1/19/2022 10:21 7363-674 and 2887	PB	4/7/2022 08:30	TB	TLD-81	N/A
1/19/2022 09:24 7364-675	PB	4/7/2022 07:52	TB	TLD-82	N/A
1/19/2022 09:29 7365-676 and 2888	PB	4/7/2022 08:00	TB	TLD-83	N/A
1/19/2022 08:56 7366-677	PB	4/7/2022 07:30	TB	TLD-84	N/A
1/19/2022 13:42 7368-679	PB	4/7/2022 12:19	TB	TLD-86	N/A
1/19/2022 16:05 7369-680	PB	4/7/2022 14:20	TB	TLD-87	N/A
1/19/2022 15:34 7370-681	PB	4/7/2022 13:50	TB	TLD-88	N/A
1/19/2022 15:29 7371-682	PB	4/7/2022 13:46	TB	TLD-89	N/A
1/19/2022 15:19 7372-683	PB	4/7/2022 13:42	TB	TLD-90	N/A
1/19/2022 15:00 7373-684	PB	4/7/2022 14:20	TB	TLD-91	N/A
1/19/2022 14:51 7374-685	PB	4/7/2022 13:12	TB	TLD-92	N/A
1/19/2022 14:27 7375-686	PB	4/7/2022 12:50	TB	TLD-93	N/A
1/19/2022 14:32 7376-687	PB	4/7/2022 12:54	TB	TLD-94	N/A
1/19/2022 14:20 7377-688	PB	4/7/2022 12:42	TB	TLD-95	N/A
1/19/2022 10:37 7378-689	PB	4/7/2022 08:40	TB	TLD-96	N/A
1/19/2022 08:28 7381-692	PB	4/7/2022 14:31	TB	TLD-97	N/A
01/19/2022 16:20 7379-690	PB	4/7/2022 15:30	TB	TLD-FB	N/A
1/19/2022 07:00 7380-691	AW	4/7/2022 07:00	TB	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
4/7/2022 08:26 8906-625	TB	7/6/2022 08:22	BH	TLD-1	N/A
4/7/2022 08:15 8909-626 and 2882	TB	7/6/2022 08:06	BH	TLD-2	N/A
4/7/2022 07:41 8910-627 and 2883	TB	7/6/2022 07:31	BH	TLD-3	N/A
4/7/2022 09:31 8911-628	TB	7/6/2022 09:40	BH	TLD-4	N/A
4/7/2022 09:27 8912-629	TB	7/6/2022 09:29	BH	TLD-5	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
4/7/2022 09:17 8913-630	TB	7/6/2022 09:19	BH	TLD-6	N/A
4/7/2022 08:46 8914-631	TB	7/6/2022 08:48	BH	TLD-7	N/A
4/7/2022 14:05 8915-632	TB	7/6/2022 13:51	BH	TLD-9	N/A
4/7/2022 12:57 8916-633	TB	7/6/2022 12:41	BH	TLD-12	N/A
4/7/2022 13:01 8917-634	TB	7/6/2022 12:45	BH	TLD-13	N/A
4/7/2022 07:37 8918-635	TB	7/6/2022 07:27	BH	TLD-14	N/A
4/7/2022 07:25 8919-636	TB	7/6/2022 07:15	BH	TLD-15	N/A
4/7/2022 13:33 8920-637	TB	7/6/2022 13:14	BH	TLD-16	N/A
4/7/2022 13:57 8921-638	TB	7/6/2022 13:40	BH	TLD-19	N/A
4/7/2022 10:09 8922-639	TB	7/6/2022 10:03	BH	TLD-22	N/A
4/7/2022 08:02 8923-640	TB	7/6/2022 07:52	BH	TLD-25	N/A
4/7/2022 13:24 8924-641	TB	7/6/2022 13:07	BH	TLD-30	N/A
4/7/2022 08:50 8925-642	TB	7/6/2022 08:34	BH	TLD-35	N/A
4/7/2022 09:12 8926-643	TB	7/6/2022 09:15	BH	TLD-37	N/A
4/7/2022 14:03 8927-644	TB	7/6/2022 13:47	BH	TLD-38	N/A
4/7/2022 08:05 8928-645	TB	7/6/2022 08:00	BH	TLD-40	N/A
4/7/2022 08:53 8929-646	TB	7/6/2022 08:51	BH	TLD-46	N/A
4/7/2022 09:06 8930-647 and 2884	TB	7/6/2022 09:09	BH	TLD-50	N/A
4/7/2022 07:17 8931-648	TB	7/6/2022 07:09	BH	TLD-52	N/A
4/7/2022 08:15 8932-649	TB	7/6/2022 08:09	BH	TLD-53	N/A
4/7/2022 07:20 8934-651	TB	7/6/2022 07:12	BH	TLD-58	N/A
4/7/2022 14:55 8935-652	TB	7/6/2022 11:41	BH	TLD-59	N/A
4/7/2022 14:41 8936-653	TB	7/6/2022 11:31	BH	TLD-60	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
4/7/2022 14:42 8937-654	TB	7/6/2022 11:33	BH	TLD-61	N/A
4/7/2022 15:00 8938-655	TB	7/6/2022 11:50	BH	TLD-62	N/A
4/7/2022 14:52 8939-656	TB	7/6/2022 11:36	BH	TLD-63	N/A
4/7/2022 09:58 8940-657	TB	7/6/2022 09:02	BH	TLD-64	N/A
4/7/2022 07:46 8941-658 and 2885	TB	7/6/2022 07:35	BH	TLD-65	N/A
4/7/2022 07:34 8942-659	TB	7/6/2022 07:25	BH	TLD-66	N/A
4/7/2022 07:32 8943-660	TB	7/6/2022 07:23	BH	TLD-67	N/A
4/7/2022 09:08 8944-661 and 2886	TB	7/6/2022 09:12	BH	TLD-68	N/A
4/7/2022 09:00 8945-662	TB	7/6/2022 08:57	BH	TLD-69	N/A
4/7/2022 08:33 8946-663	TB	7/6/2022 08:38	BH	TLD-70	N/A
4/7/2022 08:32 8947-664	TB	7/6/2022 08:29	BH	TLD-71	N/A
4/7/2022 08:22 8948-665	TB	7/6/2022 08:17	BH	TLD-72	N/A
4/11/2022 08:30 8949-666	TB	7/6/2022 13:56	BH	TLD-73	N/A
4/7/2022 12:22 8950-667	TB	7/6/2022 12:10	BH	TLD-74	N/A
4/7/2022 12:25 8951-668	TB	7/6/2022 12:13	BH	TLD-75	N/A
4/7/2022 12:31 8952-669	TB	7/6/2022 12:17	BH	TLD-76	N/A
4/7/2022 12:39 8953-670	TB	7/6/2022 12:22	BH	TLD-77	N/A
4/7/2022 14:06 8954-671	TB	7/6/2022 12:48	BH	TLD-78	N/A
4/7/2022 09:19 8955-672	TB	7/6/2022 09:22	BH	TLD-79	N/A
4/7/2022 13:30 8956-673	TB	7/6/2022 13:11	BH	TLD-80	N/A
4/7/2022 08:30 8957-674 and 2887	TB	7/6/2022 08:24	BH	TLD-81	N/A
4/7/2022 07:52 8958-675	TB	7/6/2022 07:43	BH	TLD-82	N/A
4/7/2022 08:00 8959-676 and 2888	TB	7/6/2022 07:48	BH	TLD-83	N/A
4/7/2022 07:30 8960-677	TB	7/6/2022 07:21	BH	TLD-84	N/A
4/7/2022 12:19 8962-679	TB	7/6/2022 12:04	BH	TLD-86	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
4/7/2022 14:20 8963-680	TB	7/6/2022 14:01	BH	TLD-87	N/A
4/7/2022 13:50 8964-681	TB	7/6/2022 13:32	BH	TLD-88	N/A
4/7/2022 13:46 8965-682	TB	7/6/2022 13:27	BH	TLD-89	N/A
4/7/2022 13:42 8966-683	TB	7/6/2022 13:20	BH	TLD-90	N/A
4/7/2022 14:20 8967-684	TB	7/6/2022 13:02	BH	TLD-91	N/A
4/7/2022 13:12 8968-685	TB	7/6/2022 12:54	BH	TLD-92	N/A
4/7/2022 12:50 8969-686	TB	7/6/2022 12:33	BH	TLD-93	N/A
4/7/2022 12:54 8970-687	TB	7/6/2022 12:38	BH	TLD-94	N/A
4/7/2022 12:42 8971-688	TB	7/6/2022 12:27	BH	TLD-95	N/A
4/7/2022 08:40 8972-689	TB	7/6/2022 08:40	BH	TLD-96	N/A
4/7/2022 14:31 8975-692	TB	7/6/2022 15:30	BH	TLD-97	N/A
4/7/2022 15:30 8973-690	TB	7/6/2022 16:00	BH	TLD-FB	N/A
4/7/2022 07:00 8974-691	TB	7/6/2022 07:00	BH	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
7/6/2022 08:22 1095-625	BH	10/11/2022 09:57	BH	TLD-1	N/A
7/6/2022 08:06 1098-626 and 2882	BH	10/11/2022 09:44	BH	TLD-2	N/A
7/6/2222 07:31 1099-627 and 2883	BH	10/11/2022 09:16	BH	TLD-3	N/A
7/6/2022 09:40 1100-628	BH	10/11/2022 10:59	BH	TLD-4	N/A
7/6/2022 09:29 1101-629	BH	10/11/2022 10:52	BH	TLD-5	N/A
7/6/2022 09:19 1102-630	BH	10/11/2022 10:46	BH	TLD-6	N/A
7/6/2022 08:48 1103-631	BH	10/11/2022 10:21	BH	TLD-7	N/A
7/6/2022 13:51 1104-632	BH	10/11/2022 14:26	BH	TLD-9	N/A
7/6/2022 12:41 1105-633	BH	10/11/2022 13:15	BH	TLD-12	N/A
7/6/2022 12:45 1106-634	BH	10/11/2022 13:25	BH	TLD-13	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
7/6/2022 07:27 1107-635	BH	10/11/2022 09:10	BH	TLD-14	N/A
7/6/2022 07:15 1108-636	BH	10/11/2022 09:00	BH	TLD-15	N/A
7/6/2022 13:14 1109-637	BH	10/11/2022 13:52	BH	TLD-16	N/A
7/6/2022 13:40 1110-638	BH	10/11/2022 14:16	BH	TLD-19	N/A
7/6/2022 10:03 1111-639	BH	10/11/2022 12:26	BH	TLD-22	N/A
7/6/2022 07:52 1112-640	BH	10/11/2022 09:37	BH	TLD-25	N/A
7/6/2022 13:07 1113-641	BH	10/11/2022 13:44	BH	TLD-30	N/A
7/6/2022 08:34 1114-642	BH	10/11/2022 10:19	BH	TLD-35	N/A
7/6/2022 09:15 1115-643	BH	10/11/2022 10:43	BH	TLD-37	N/A
7/6/2022 13:47 1116-644	BH	10/11/2022 14:22	BH	TLD-38	N/A
7/6/2022 08:00 1117-645	BH	10/11/2022 09:40	BH	TLD-40	N/A
7/6/2022 08:51 1118-646	BH	10/11/2022 10:25	BH	TLD-46	N/A
7/6/2022 09:09 1119-647 and 2884	BH	10/11/2022 10:38	BH	TLD-50	N/A
7/6/2022 07:09 1120-648	BH	10/11/2022 08:52	BH	TLD-52	N/A
7/6/2022 08:09 1121-649	BH	10/11/2022 09:45	BH	TLD-53	N/A
7/6/2022 07:12 1123-651	BH	10/11/2022 08:56	BH	TLD-58	N/A
7/6/2022 11:41 1124-652	BH	10/11/2022 15:41	BH	TLD-59	N/A
7/6/2022 11:31 1125-653	BH	10/11/2022 16:05	BH	TLD-60	N/A
7/6/2022 11:33 1126-654	BH	10/11/2022 16:06	BH	TLD-61	N/A
7/6/2022 11:50 1127-655	BH	10/11/2022 15:51	BH	TLD-62	N/A
7/6/2022 11:36 1128-656	BH	10/11/2022 14:59	BH	TLD-63	N/A
7/6/2022 09:02 1129-657	BH	10/11/2022 11:02	BH	TLD-64	N/A
7/6/2022 07:35 1130-658 and 2885	BH	10/11/2022 09:22	BH	TLD-65	N/A
7/6/2022 07:25 1131-659	BH	10/11/2022 09:08	BH	TLD-66	N/A
7/6/2022 07:23 1132-660	BH	10/11/2022 09:06	BH	TLD-67	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
7/6/2022 09:12 1133-661 and 2886	BH	10/11/2022 10:40	BH	TLD-68	N/A
7/6/2022 08:57 1134-662	BH	10/11/2022 10:31	BH	TLD-69	N/A
7/6/2022 08:38 1135-663	BH	10/11/2022 10:08	BH	TLD-70	N/A
7/6/2022 08:29 1136-664	BH	10/11/2022 10:04	BH	TLD-71	N/A
7/6/2022 08:17 1137-665	BH	10/11/2022 09:52	BH	TLD-72	N/A
7/6/2022 13:56 1138-666	BH	10/11/2022 14:35	BH	TLD-73	N/A
7/6/2022 12:10 1139-667	BH	10/11/2022 12:45	BH	TLD-74	N/A
7/6/2022 12:13 1140-668	BH	10/11/2022 12:48	BH	TLD-75	N/A
7/6/2022 12:17 1141-669	BH	10/11/2022 12:53	BH	TLD-76	N/A
7/6/2022 12:22 1142-670	BH	10/11/2022 12:58	BH	TLD-77	N/A
7/6/2022 12:48 1143-671	BH	10/11/2022 13:24	BH	TLD-78	N/A
7/6/2022 09:22 1144-672	BH	10/11/2022 10:47	BH	TLD-79	N/A
7/6/2022 13:11 1145-673	BH	10/11/2022 13:49	BH	TLD-80	N/A
7/6/2022 08:24 1146-674 and 2887	BH	10/11/2022 10:00	BH	TLD-81	N/A
7/6/2022 07:43 1147-6751	BH	10/11/2022 09:30	BH	TLD-82	N/A
7/6/2022 07:48 1148-676 and 2888	BH	10/11/2022 14:50	BH	TLD-83	N/A
7/6/2022 07:21 1149-677	BH	10/11/2022 09:05	BH	TLD-84	N/A
7/6/2022 12:04 1151-679	BH	10/11/2022 12:42	BH	TLD-86	N/A
7/6/2022 14:01 1152-680	BH	10/11/2022 14:40	BH	TLD-87	N/A
7/6/2022 13:32 1153-681	BH	10/11/2022 14:08	BH	TLD-88	N/A
7/6/2022 13:27 1154-682	BH	10/11/2022 14:03	BH	TLD-89	N/A
7/6/2022 13:20 1155-683	BH	10/11/2022 14:00	BH	TLD-90	N/A
7/6/2022 13:02 1156-684	BH	10/11/2022 13:40	BH	TLD-91	N/A
7/6/2022 12:54 1157-685	BH	10/11/2022 13:33	BH	TLD-92	N/A
7/6/2022 12:33 1158-686	BH	10/11/2022 13:07	BH	TLD-93	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
7/6/2022 12:38 1159-687	BH	10/11/2022 13:12	BH	TLD-94	N/A
7/6/2022 12:27 1160-688	BH	10/11/2022 13:01	BH	TLD-95	N/A
7/6/2022 08:40 1161-689	BH	10/11/2022 10:12	BH	TLD-96	N/A
7/6/2022 15:30 1164-692	BH	10/11/2022 16:18	BH	TLD-97	N/A
7/6/2022 16:00 1162-690	BH	10/11/2022 16:25	BH	TLD-FB	N/A
7/6/2022 07:00 1163-691	BH	10/11/2022 07:00	BH	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
10/11/2022 09:57 2595-625	BH	2/6/2023 13:04	MQ	TLD-1	N/A
10/11/2022 09:44 2598-626 and 2882	BH	2/6/2023 12:50	MQ	TLD-2	N/A
10/11/2022 09:16 2599-627 and 2883	BH	2/6/2023 12:26	MQ	TLD-3	N/A
10/11/2022 10:59 2600-628	BH	2/6/2023 14:00	MQ	TLD-4	N/A
10/11/2022 10:52 2601-629	BH	2/6/2023 13:56	MQ	TLD-5	N/A
10/11/2022 10:46 2602-630	BH	2/6/2023 13:48	MQ	TLD-6	N/A
10/11/2022 10:21 2603-631	BH	2/6/2023 13:23	MQ	TLD-7	N/A
10/11/2022 14:26 2604-632	BH	2/6/2023 10:02	MQ	TLD-9	N/A
10/11/2022 13:15 2605-633	BH	2/6/2023 09:00	MQ	TLD-12	N/A
10/11/2022 13:25 2606-634	BH	2/6/2023 09:04	MQ	TLD-13	N/A
10/11/2022 09:10 2607-635	BH	2/6/2023 12:18	MQ	TLD-14	N/A
10/11/2022 09:00 2608-636	BH	2/6/2023 12:09	MQ	TLD-15	N/A
10/11/2022 13:52 2609-637	BH	2/6/2023 9:31	MQ	TLD-16	N/A
10/11/2022 14:16 2610-638	BH	2/6/2023 9:55	MQ	TLD-19	N/A
10/11/2022 12:26 2611-639	BH	2/6/2023 8:01	MQ	TLD-22	N/A
10/11/2022 09:37 2612-640	BH	2/6/2023 12:43	MQ	TLD-25	N/A
10/11/2022 13:44 2613-641	BH	2/6/2023 09:24	MQ	TLD-30	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
10/11/2022 10:19 2614-642	BH	2/6/2023 13:20	MQ	TLD-35	N/A
10/11/2022 10:43 2615-643	BH	2/6/2023 13:45	MQ	TLD-37	N/A
10/11/2022 14:22 2616-644	BH	2/6/2023 10:00	MQ	TLD-38	N/A
10/11/2022 09:40 2617-645	BH	2/6/2023 12:47	MQ	TLD-40	N/A
10/11/2022 10:25 2618-646	BH	2/6/2023 13:27	MQ	TLD-46	N/A
10/11/2022 10:38 2619-647 and 2884	BH	2/6/2023 13:40	MQ	TLD-50	N/A
10/11/2022 08:52 2620-648	BH	2/6/2023 11:59	MQ	TLD-52	N/A
10/11/2022 09:45 2621-649	BH	2/6/2023 12:55	MQ	TLD-53	N/A
10/11/2022 08:56 2623-651	BH	2/6/2023 12:02	MQ	TLD-58	N/A
10/11/2022 15:41 2624-652	BH	2/2/2023 14:40	MQ	TLD-59	N/A
10/11/2022 16:05 2625-653	BH	2/2/2023 14:29	MQ	TLD-60	N/A
10/11/2022 16:06 2626-654	BH	2/2/2023 14:31	MQ	TLD-61	N/A
10/11/2022 15:51 2627-655	BH	2/2/2023 14:47	MQ	TLD-62	N/A
10/11/2022 14:59 2628-656	BH	2/2/2023 15:10	MQ	TLD-63	N/A
10/11/2022 11:02 2629-657	BH	2/6/2023 14:50	MQ	TLD-64	N/A
10/11/2022 09:22 2630-658 and 2885	BH	2/6/2023 12:27	MQ	TLD-65	N/A
10/11/2022 09:08 2631-659	BH	2/6/2023 12:17	MQ	TLD-66	N/A
10/11/2022 09:06 2632-660	BH	2/6/2023 12:14	MQ	TLD-67	N/A
10/11/2022 10:40 2633-661 and 2886	BH	2/6/2023 13:42	MQ	TLD-68	N/A
10/11/2022 10:31 2634-662	BH	2/6/2023 13:36	MQ	TLD-69	N/A
10/11/2022 10:08 2635-663	BH	2/6/2023 13:14	MQ	TLD-70	N/A
10/11/2022 10:04 2636-664	BH	2/6/2023 13:12	MQ	TLD-71	N/A
10/11/2022 09:52 2637-665	BH	2/6/2023 13:01	MQ	TLD-72	N/A
10/11/2022 14:35 2638-666	BH	2/6/2023 10:09	MQ	TLD-73	N/A
10/11/2022 12:45 2639-667	BH	2/6/2023 08:34	MQ	TLD-74	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
10/11/2022 12:48 2640-668	BH	2/6/2023 08:36	MQ	TLD-75	N/A
10/11/2022 12:53 2641-669	BH	2/6/2023 08:41	MQ	TLD-76	N/A
10/11/2022 12:58 2642-670	BH	2/6/2023 08:45	MQ	TLD-77	N/A
10/11/2022 13:24 2643-671	BH	2/6/2023 09:07	MQ	TLD-78	N/A
10/11/2022 10:47 2644-672	BH	2/6/2023 13:52	MQ	TLD-79	N/A
10/11/2022 13:49 2645-673	BH	2/6/2023 09:29	MQ	TLD-80	N/A
10/11/2022 10:00 2646-674 and 2887	BH	2/6/2023 13:07	MQ	TLD-81	N/A
10/11/2022 09:30 2647-675	BH	2/6/2023 12:35	MQ	TLD-82	N/A
10/11/2022 14:50 2648-676 and 2888	BH	2/6/2023 12:41	MQ	TLD-83	N/A
10/11/2022 09:05 2649-677	BH	2/6/2023 12:12	MQ	TLD-84	N/A
10/11/2022 12:42 2651-679	BH	2/6/2023 08:31	MQ	TLD-86	N/A
10/11/2022 14:40 2652-680	BH	2/6/2023 10:14	MQ	TLD-87	N/A
10/11/2022 14:08 2653-681	BH	2/6/2023 09:48	MQ	TLD-88	N/A
10/11/2022 14:03 2654-682	BH	2/6/2023 09:44	MQ	TLD-89	N/A
10/11/2022 14:00 2655-683	BH	2/6/2023 09:40	MQ	TLD-90	N/A
10/11/2022 13:40 2656-684	BH	2/6/2023 09:20	MQ	TLD-91	N/A
10/11/2022 13:33 2657-685	BH	2/6/2023 09:13	MQ	TLD-92	N/A
10/11/2022 13:07 2658-686	BH	2/6/2023 08:54	MQ	TLD-93	N/A
10/11/2022 13:12 2659-687	BH	2/6/2023 08:58	MQ	TLD-94	N/A
10/11/2022 13:01 2660-688	BH	2/6/2023 08:49	MQ	TLD-95	N/A
10/11/2022 10:12 2661-689	BH	2/6/2023 13:17	MQ	TLD-96	N/A
10/11/2022 16:18 2664-692	BH	2/2/2023 14:19	MQ	TLD-97	N/A
10/11/2022 16:25 2662-690	BH	2/6/2023 15:00	MQ	TLD-FB	N/A
10/11/2022 07:00 2663-691	BH	2/2/2023 11:30	MQ	TLD-TB	N/A

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APPENDIX C

THERMOLUMINESCENT DOSIMETER ANALYTICAL DATA

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MIRION TECHNOLOGIES

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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	622	17	ARE	1/1/2022	ENVIRONMENTAL	2247313	8007468	53	1/7/2022	251592	4/18/2022	8	7	9	12	7
98365	00000LAT	623	17	ARE	1/1/2022	ENVIRONMENTAL	2247314	8012767	53	1/7/2022	251592	4/18/2022	8	8	11	12	8
98365	00000LAT	624	17	ARE	1/1/2022	ENVIRONMENTAL	2247311	8014926	53	1/7/2022	251592	4/18/2022	7	7	10	12	7
98365	00000LAT	625	17	ARE	1/1/2022	ENVIRONMENTAL	2247312	8010372	53	1/7/2022	251592	4/18/2022	167	171	170	180	169
98365	00000LAT	626	17	ARE	1/1/2022	ENVIRONMENTAL	2247315	8013150	53	1/7/2022	251592	4/18/2022	285	276	295	306	280
98365	00000LAT	627	17	ARE	1/1/2022	ENVIRONMENTAL	2247316	8014788	53	1/7/2022	251592	4/18/2022	17	16	21	23	16
98365	00000LAT	628	17	ARE	1/1/2022	ENVIRONMENTAL	2247317	8012183	53	1/7/2022	251592	4/18/2022	15	15	22	23	15
98365	00000LAT	629	17	ARE	1/1/2022	ENVIRONMENTAL	2247318	8013604	53	1/7/2022	251592	4/18/2022	17	17	20	21	17
98365	00000LAT	630	17	ARE	1/1/2022	ENVIRONMENTAL	2247319	8014653	53	1/7/2022	251592	4/18/2022	15	14	18	20	14
98365	00000LAT	631	17	ARE	1/1/2022	ENVIRONMENTAL	2247320	8014981	53	1/7/2022	251592	4/18/2022	24	21	25	26	23
98365	00000LAT	633	17	ARE	1/1/2022	ENVIRONMENTAL	2247322	8011832	53	1/7/2022	251592	4/18/2022	14	14	17	19	14
98365	00000LAT	634	17	ARE	1/1/2022	ENVIRONMENTAL	2247323	8010726	53	1/7/2022	251592	4/18/2022	18	17	21	23	18
98365	00000LAT	635	17	ARE	1/1/2022	ENVIRONMENTAL	2247324	8010238	53	1/7/2022	251592	4/18/2022	14	14	33	27	14
98365	00000LAT	636	17	ARE	1/1/2022	ENVIRONMENTAL	2247325	8007355	53	1/7/2022	251592	4/18/2022	13	13	15	17	13
98365	00000LAT	637	17	ARE	1/1/2022	ENVIRONMENTAL	2247326	8010596	53	1/7/2022	251592	4/18/2022	18	16	20	22	17
98365	00000LAT	638	17	ARE	1/1/2022	ENVIRONMENTAL	2247327	8009574	53	1/7/2022	251592	4/18/2022	16	16	18	25	16
98365	00000LAT	639	17	ARE	1/1/2022	ENVIRONMENTAL	2247328	8004420	53	1/7/2022	251592	4/18/2022	17	17	19	20	17
98365	00000LAT	640	17	ARE	1/1/2022	ENVIRONMENTAL	2247329	8011525	53	1/7/2022	251592	4/18/2022	22	20	27	28	21
98365	00000LAT	641	17	ARE	1/1/2022	ENVIRONMENTAL	2247330	8004305	53	1/7/2022	251592	4/18/2022	17	17	21	23	17
98365	00000LAT	642	17	ARE	1/1/2022	ENVIRONMENTAL	2247331	8012321	53	1/7/2022	251592	4/18/2022	21	19	23	25	20
98365	00000LAT	643	17	ARE	1/1/2022	ENVIRONMENTAL	2247332	8009545	53	1/7/2022	251592	4/18/2022	16	14	17	18	15
98365	00000LAT	644	17	ARE	1/1/2022	ENVIRONMENTAL	2247333	8010480	53	1/7/2022	251592	4/18/2022	15	15	20	20	15
98365	00000LAT	645	17	ARE	1/1/2022	ENVIRONMENTAL	2247334	8013713	53	1/7/2022	251592	4/18/2022	20	19	23	24	19
98365	00000LAT	646	17	ARE	1/1/2022	ENVIRONMENTAL	2247335	8012563	53	1/7/2022	251592	4/18/2022	13	12	20	23	13
98365	00000LAT	647	17	ARE	1/1/2022	ENVIRONMENTAL	2247336	8008804	53	1/7/2022	251592	4/18/2022	36	39	43	45	37
98365	00000LAT	648	17	ARE	1/1/2022	ENVIRONMENTAL	2247337	8008677	53	1/7/2022	251592	4/18/2022	14	13	16	18	14
98365	00000LAT	649	17	ARE	1/1/2022	ENVIRONMENTAL	2247338	8015053	53	1/7/2022	251592	4/18/2022	94	94	124	113	94
98365	00000LAT	650	17	ARE	1/1/2022	ENVIRONMENTAL	2247339	8011010	53	1/7/2022	251592	4/18/2022	7	7	11	12	7
98365	00000LAT	651	17	ARE	1/1/2022	ENVIRONMENTAL	2247340	8010543	53	1/7/2022	251592	4/18/2022	12	11	15	17	11
98365	00000LAT	652	17	ARE	1/1/2022	ENVIRONMENTAL	2247341	8010594	53	1/7/2022	251592	4/18/2022	12	10	14	17	11

*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* 5/26/2022

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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	653	17	ARE	1/1/2022	ENVIRONMENTAL	2247342	8007224	53	1/7/2022	251592	4/18/2022	301	301	371	345	301
98365	00000LAT	654	17	ARE	1/1/2022	ENVIRONMENTAL	2247343	8005230	53	1/7/2022	251592	4/18/2022	433	477	516	500	455
98365	00000LAT	655	17	ARE	1/1/2022	ENVIRONMENTAL	2247344	8007855	53	1/7/2022	251592	4/18/2022	13	13	18	18	13
98365	00000LAT	656	17	ARE	1/1/2022	ENVIRONMENTAL	2247345	8011558	53	1/7/2022	251592	4/18/2022	11	11	14	15	11
98365	00000LAT	657	17	ARE	1/1/2022	ENVIRONMENTAL	2247346	8012954	53	1/7/2022	251592	4/18/2022	12	11	15	15	11
98365	00000LAT	658	17	ARE	1/1/2022	ENVIRONMENTAL	2247347	8011532	53	1/7/2022	251592	4/18/2022	13	13	18	20	13
98365	00000LAT	659	17	ARE	1/1/2022	ENVIRONMENTAL	2247348	8012037	53	1/7/2022	251592	4/18/2022	15	14	17	18	14
98365	00000LAT	660	17	ARE	1/1/2022	ENVIRONMENTAL	2247349	8006476	53	1/7/2022	251592	4/18/2022	18	17	19	21	17
98365	00000LAT	661	17	ARE	1/1/2022	ENVIRONMENTAL	2247350	8014468	53	1/7/2022	251592	4/18/2022	17	16	22	21	16
98365	00000LAT	662	17	ARE	1/1/2022	ENVIRONMENTAL	2247351	8014665	53	1/7/2022	251592	4/18/2022	13	13	16	17	13
98365	00000LAT	663	17	ARE	1/1/2022	ENVIRONMENTAL	2247352	8017000	53	1/7/2022	251592	4/18/2022	35	36	40	43	35
98365	00000LAT	664	17	ARE	1/1/2022	ENVIRONMENTAL	2247353	8008912	53	1/7/2022	251592	4/18/2022	29	27	30	33	28
98365	00000LAT	665	17	ARE	1/1/2022	ENVIRONMENTAL	2247354	8016200	53	1/7/2022	251592	4/18/2022	16	15	22	23	16
98365	00000LAT	666	17	ARE	1/1/2022	ENVIRONMENTAL	2247355	8012700	53	1/7/2022	251592	4/18/2022	15	13	17	19	14
98365	00000LAT	667	17	ARE	1/1/2022	ENVIRONMENTAL	2247356	8005304	53	1/7/2022	251592	4/18/2022	17	15	21	21	16
98365	00000LAT	668	17	ARE	1/1/2022	ENVIRONMENTAL	2247357	8004580	53	1/7/2022	251592	4/18/2022	16	14	20	21	15
98365	00000LAT	670	17	ARE	1/1/2022	ENVIRONMENTAL	2247359	8010734	53	1/7/2022	251592	4/18/2022	15	15	18	21	15
98365	00000LAT	671	17	ARE	1/1/2022	ENVIRONMENTAL	2247360	8010352	53	1/7/2022	251592	4/18/2022	19	17	28	26	18
98365	00000LAT	672	17	ARE	1/1/2022	ENVIRONMENTAL	2247361	8008029	53	1/7/2022	251592	4/18/2022	13	13	16	17	13
98365	00000LAT	673	17	ARE	1/1/2022	ENVIRONMENTAL	2247362	8013364	53	1/7/2022	251592	4/18/2022	15	13	19	21	14
98365	00000LAT	674	17	ARE	1/1/2022	ENVIRONMENTAL	2247363	8015165	53	1/7/2022	251592	4/18/2022	90	74	90	98	82
98365	00000LAT	675	17	ARE	1/1/2022	ENVIRONMENTAL	2247364	8014914	53	1/7/2022	251592	4/18/2022	24	19	26	31	21
98365	00000LAT	676	17	ARE	1/1/2022	ENVIRONMENTAL	2247365	8012654	53	1/7/2022	251592	4/18/2022	51	54	57	62	52
98365	00000LAT	677	17	ARE	1/1/2022	ENVIRONMENTAL	2247366	8007930	53	1/7/2022	251592	4/18/2022	16	16	20	20	16
98365	00000LAT	678	17	ARE	1/1/2022	ENVIRONMENTAL	2247367	8012131	53	1/7/2022	251592	4/18/2022	8	8	11	11	8
98365	00000LAT	679	17	ARE	1/1/2022	ENVIRONMENTAL	2247368	8012976	53	1/7/2022	251592	4/18/2022	41	15	20	22	15
98365	00000LAT	680	17	ARE	1/1/2022	ENVIRONMENTAL	2247369	8005690	53	1/7/2022	251592	4/18/2022	15	15	17	18	15
98365	00000LAT	681	17	ARE	1/1/2022	ENVIRONMENTAL	2247370	8016657	53	1/7/2022	251592	4/18/2022	17	16	18	21	16
98365	00000LAT	682	17	ARE	1/1/2022	ENVIRONMENTAL	2247371	8016784	53	1/7/2022	251592	4/18/2022	17	16	19	20	16
98365	00000LAT	683	17	ARE	1/1/2022	ENVIRONMENTAL	2247372	8014935	53	1/7/2022	251592	4/18/2022	16	16	17	20	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

Approved by: *Tam Hang Vo* 5/26/2022

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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	684	17	ARE	1/1/2022	ENVIRONMENTAL	2247373	8010935	53	1/7/2022	251592	4/18/2022	15	15	18	19	15
98365	00000LAT	685	17	ARE	1/1/2022	ENVIRONMENTAL	2247374	8013661	53	1/7/2022	251592	4/18/2022	15	13	16	17	14
98365	00000LAT	686	17	ARE	1/1/2022	ENVIRONMENTAL	2247375	8002204	53	1/7/2022	251592	4/18/2022	16	15	21	22	16
98365	00000LAT	687	17	ARE	1/1/2022	ENVIRONMENTAL	2247376	8009399	53	1/7/2022	251592	4/18/2022	17	16	17	21	16
98365	00000LAT	688	17	ARE	1/1/2022	ENVIRONMENTAL	2247377	8015275	53	1/7/2022	251592	4/18/2022	18	18	21	23	18
98365	00000LAT	689	17	ARE	1/1/2022	ENVIRONMENTAL	2247378	8003224	53	1/7/2022	251592	4/18/2022	15	14	19	20	14
98365	00000LAT	690	17	ARE	1/1/2022	ENVIRONMENTAL	2247379	8011423	53	1/7/2022	251592	4/18/2022	8	7	10	11	8
98365	00000LAT	691	17	ARE	1/1/2022	ENVIRONMENTAL	2247380	8005780	53	1/7/2022	251592	4/18/2022	7	7	11	14	7
98365	00000LAT	692	17	ARE	1/1/2022	ENVIRONMENTAL	2247381	8004416	53	1/7/2022	251592	4/18/2022	15	13	19	20	14
98365	00000LAT	693	17	ARE	1/1/2022	ENVIRONMENTAL	2247382	8011149	53	1/7/2022	251592	4/18/2022				C7	
98365	00000LAT	694	17	ARE	1/1/2022	ENVIRONMENTAL	2247383	8016009	53	1/7/2022	251592	4/18/2022	8	7	12	14	7
98365	00000LAT	695	17	ARE	1/1/2022	ENVIRONMENTAL	2247384	8016068	53	1/7/2022	251592	4/18/2022	8	7	13	11	7
98365	00000LAT	696	17	ARE	1/1/2022	ENVIRONMENTAL	2247385	8011513	53	1/7/2022	251592	4/18/2022	7	6	13	11	7
98365	00000LAT		17		1/1/2022	CONTROL	2247310	8014505	53	1/7/2022	251592	4/18/2022	8	7	9	10	8
98365	00000LAT		17		1/1/2022	CONTROL	2247309	8017055	53	1/7/2022	251592	4/18/2022	8	7	11	12	8

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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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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	622	17	ARE	4/1/2022	ENVIRONMENTAL	2248907	8007696	55	3/17/2022	252417	7/18/2022	9	9	12	14	9
98365	00000LAT	623	17	ARE	4/1/2022	ENVIRONMENTAL	2248908	8005194	55	3/17/2022	252417	7/18/2022	11	10	12	13	11
98365	00000LAT	624	17	ARE	4/1/2022	ENVIRONMENTAL	2248905	8008158	55	3/17/2022	252417	7/18/2022	9	9	11	12	9
98365	00000LAT	625	17	ARE	4/1/2022	ENVIRONMENTAL	2248906	8007327	55	3/17/2022	252417	7/18/2022	212	192	197	209	202
98365	00000LAT	626	17	ARE	4/1/2022	ENVIRONMENTAL	2248909	8011975	55	3/17/2022	252417	7/18/2022	254	228	292	317	241
98365	00000LAT	627	17	ARE	4/1/2022	ENVIRONMENTAL	2248910	8014574	55	3/17/2022	252417	7/18/2022	18	17	19	22	18
98365	00000LAT	628	17	ARE	4/1/2022	ENVIRONMENTAL	2248911	8013479	55	3/17/2022	252417	7/18/2022	18	16	18	21	17
98365	00000LAT	629	17	ARE	4/1/2022	ENVIRONMENTAL	2248912	8011120	55	3/17/2022	252417	7/18/2022	19	18	21	24	19
98365	00000LAT	630	17	ARE	4/1/2022	ENVIRONMENTAL	2248913	8012099	55	3/17/2022	252417	7/18/2022	16	14	17	19	15
98365	00000LAT	631	17	ARE	4/1/2022	ENVIRONMENTAL	2248914	8008756	55	3/17/2022	252417	7/18/2022	23	25	25	27	24
98365	00000LAT	632	17	ARE	4/1/2022	ENVIRONMENTAL	2248915	8014827	55	3/17/2022	252417	7/18/2022	16	15	17	19	15
98365	00000LAT	633	17	ARE	4/1/2022	ENVIRONMENTAL	2248916	8010767	55	3/17/2022	252417	7/18/2022	16	14	17	19	15
98365	00000LAT	634	17	ARE	4/1/2022	ENVIRONMENTAL	2248917	8008490	55	3/17/2022	252417	7/18/2022	19	18	20	23	18
98365	00000LAT	635	17	ARE	4/1/2022	ENVIRONMENTAL	2248918	8013220	55	3/17/2022	252417	7/18/2022	17	15	17	19	16
98365	00000LAT	636	17	ARE	4/1/2022	ENVIRONMENTAL	2248919	8016638	55	3/17/2022	252417	7/18/2022	15	13	15	17	14
98365	00000LAT	637	17	ARE	4/1/2022	ENVIRONMENTAL	2248920	8009541	55	3/17/2022	252417	7/18/2022	20	19	20	22	19
98365	00000LAT	638	17	ARE	4/1/2022	ENVIRONMENTAL	2248921	8006328	55	3/17/2022	252417	7/18/2022	16	15	18	20	16
98365	00000LAT	639	17	ARE	4/1/2022	ENVIRONMENTAL	2248922	8011668	55	3/17/2022	252417	7/18/2022	19	18	20	21	19
98365	00000LAT	640	17	ARE	4/1/2022	ENVIRONMENTAL	2248923	8012094	55	3/17/2022	252417	7/18/2022	30	30	33	36	30
98365	00000LAT	641	17	ARE	4/1/2022	ENVIRONMENTAL	2248924	8012450	55	3/17/2022	252417	7/18/2022	20	19	20	20	19
98365	00000LAT	642	17	ARE	4/1/2022	ENVIRONMENTAL	2248925	8013670	55	3/17/2022	252417	7/18/2022	23	22	25	27	23
98365	00000LAT	643	17	ARE	4/1/2022	ENVIRONMENTAL	2248926	8011482	55	3/17/2022	252417	7/18/2022	17	15	18	20	16
98365	00000LAT	644	17	ARE	4/1/2022	ENVIRONMENTAL	2248927	8016566	55	3/17/2022	252417	7/18/2022	17	17	18	21	17
98365	00000LAT	645	17	ARE	4/1/2022	ENVIRONMENTAL	2248928	8014920	55	3/17/2022	252417	7/18/2022	22	21	23	27	21
98365	00000LAT	646	17	ARE	4/1/2022	ENVIRONMENTAL	2248929	8013095	55	3/17/2022	252417	7/18/2022	16	15	23	23	16
98365	00000LAT	647	17	ARE	4/1/2022	ENVIRONMENTAL	2248930	8008696	55	3/17/2022	252417	7/18/2022	45	39	43	46	42
98365	00000LAT	648	17	ARE	4/1/2022	ENVIRONMENTAL	2248931	8013247	55	3/17/2022	252417	7/18/2022	15	14	22	21	14
98365	00000LAT	649	17	ARE	4/1/2022	ENVIRONMENTAL	2248932	8014863	55	3/17/2022	252417	7/18/2022	95	84	112	117	90
98365	00000LAT	650	17	ARE	4/1/2022	ENVIRONMENTAL	2248933	8013400	55	3/17/2022	252417	7/18/2022	9	9	15	16	9
98365	00000LAT	651	17	ARE	4/1/2022	ENVIRONMENTAL	2248934	8017004	55	3/17/2022	252417	7/18/2022	13	12	15	18	13

*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* 10/5/2022

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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	652	17	ARE	4/1/2022	ENVIRONMENTAL	2248935	8011745	55	3/17/2022	252417	7/18/2022	14	14	17	16	14
98365	00000LAT	653	17	ARE	4/1/2022	ENVIRONMENTAL	2248936	8009339	55	3/17/2022	252417	7/18/2022	338	337	368	367	337
98365	00000LAT	654	17	ARE	4/1/2022	ENVIRONMENTAL	2248937	8010616	55	3/17/2022	252417	7/18/2022	535	531	525	512	533
98365	00000LAT	655	17	ARE	4/1/2022	ENVIRONMENTAL	2248938	8010587	55	3/17/2022	252417	7/18/2022	14	14	16	18	14
98365	00000LAT	656	17	ARE	4/1/2022	ENVIRONMENTAL	2248939	8008258	55	3/17/2022	252417	7/18/2022	14	13	18	19	13
98365	00000LAT	657	17	ARE	4/1/2022	ENVIRONMENTAL	2248940	8014872	55	3/17/2022	252417	7/18/2022	15	14	16	19	14
98365	00000LAT	658	17	ARE	4/1/2022	ENVIRONMENTAL	2248941	8011816	55	3/17/2022	252417	7/18/2022	14	12	16	18	13
98365	00000LAT	659	17	ARE	4/1/2022	ENVIRONMENTAL	2248942	8010806	55	3/17/2022	252417	7/18/2022	16	14	17	21	15
98365	00000LAT	660	17	ARE	4/1/2022	ENVIRONMENTAL	2248943	8012962	55	3/17/2022	252417	7/18/2022	19	17	21	21	18
98365	00000LAT	661	17	ARE	4/1/2022	ENVIRONMENTAL	2248944	8013433	55	3/17/2022	252417	7/18/2022	17	17	21	22	17
98365	00000LAT	662	17	ARE	4/1/2022	ENVIRONMENTAL	2248945	8008449	55	3/17/2022	252417	7/18/2022	14	13	15	15	13
98365	00000LAT	663	17	ARE	4/1/2022	ENVIRONMENTAL	2248946	8009902	55	3/17/2022	252417	7/18/2022	38	37	41	45	38
98365	00000LAT	664	17	ARE	4/1/2022	ENVIRONMENTAL	2248947	8013185	55	3/17/2022	252417	7/18/2022	30	31	36	38	30
98365	00000LAT	665	17	ARE	4/1/2022	ENVIRONMENTAL	2248948	8014765	55	3/17/2022	252417	7/18/2022	18	17	19	24	17
98365	00000LAT	666	17	ARE	4/1/2022	ENVIRONMENTAL	2248949	8005391	55	3/17/2022	252417	7/18/2022	15	14	20	22	15
98365	00000LAT	667	17	ARE	4/1/2022	ENVIRONMENTAL	2248950	8014751	55	3/17/2022	252417	7/18/2022	19	16	21	24	18
98365	00000LAT	668	17	ARE	4/1/2022	ENVIRONMENTAL	2248951	8016968	55	3/17/2022	252417	7/18/2022	19	18	20	23	18
98365	00000LAT	669	17	ARE	4/1/2022	ENVIRONMENTAL	2248952	8015066	55	3/17/2022	252417	7/18/2022	18	13	20	21	15
98365	00000LAT	670	17	ARE	4/1/2022	ENVIRONMENTAL	2248953	8014420	55	3/17/2022	252417	7/18/2022	15	15	20	20	15
98365	00000LAT	671	17	ARE	4/1/2022	ENVIRONMENTAL	2248954	8006521	55	3/17/2022	252417	7/18/2022	19	18	21	21	19
98365	00000LAT	672	17	ARE	4/1/2022	ENVIRONMENTAL	2248955	8005673	55	3/17/2022	252417	7/18/2022	14	15	17	18	14
98365	00000LAT	673	17	ARE	4/1/2022	ENVIRONMENTAL	2248956	8013166	55	3/17/2022	252417	7/18/2022	18	16	19	20	17
98365	00000LAT	674	17	ARE	4/1/2022	ENVIRONMENTAL	2248957	8013712	55	3/17/2022	252417	7/18/2022	105	84	110	119	95
98365	00000LAT	675	17	ARE	4/1/2022	ENVIRONMENTAL	2248958	8013322	55	3/17/2022	252417	7/18/2022	26	24	29	31	25
98365	00000LAT	676	17	ARE	4/1/2022	ENVIRONMENTAL	2248959	8007952	55	3/17/2022	252417	7/18/2022	54	52	51	65	53
98365	00000LAT	677	17	ARE	4/1/2022	ENVIRONMENTAL	2248960	8015174	55	3/17/2022	252417	7/18/2022	18	17	22	23	17
98365	00000LAT	678	17	ARE	4/1/2022	ENVIRONMENTAL	2248961	8010261	55	3/17/2022	252417	7/18/2022	10	9	13	14	9
98365	00000LAT	679	17	ARE	4/1/2022	ENVIRONMENTAL	2248962	8012128	55	3/17/2022	252417	7/18/2022	18	17	19	22	18
98365	00000LAT	680	17	ARE	4/1/2022	ENVIRONMENTAL	2248963	8003313	55	3/17/2022	252417	7/18/2022	17	15	19	19	16
98365	00000LAT	681	17	ARE	4/1/2022	ENVIRONMENTAL	2248964	8008816	55	3/17/2022	252417	7/18/2022	19	17	19	20	18

*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* 10/5/2022

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98365	00000LAT	682	17	ARE	4/1/2022	ENVIRONMENTAL	2248965	8007898	55	3/17/2022	252417	7/18/2022	18	17	18	20	18
98365	00000LAT	683	17	ARE	4/1/2022	ENVIRONMENTAL	2248966	8016618	55	3/17/2022	252417	7/18/2022	18	18	21	22	18
98365	00000LAT	684	17	ARE	4/1/2022	ENVIRONMENTAL	2248967	8005940	55	3/17/2022	252417	7/18/2022	14	15	19	20	15
98365	00000LAT	685	17	ARE	4/1/2022	ENVIRONMENTAL	2248968	8010179	55	3/17/2022	252417	7/18/2022	18	15	29	30	16
98365	00000LAT	686	17	ARE	4/1/2022	ENVIRONMENTAL	2248969	8007365	55	3/17/2022	252417	7/18/2022	16	16	20	20	16
98365	00000LAT	687	17	ARE	4/1/2022	ENVIRONMENTAL	2248970	8010916	55	3/17/2022	252417	7/18/2022	18	16	20	22	17
98365	00000LAT	688	17	ARE	4/1/2022	ENVIRONMENTAL	2248971	8008153	55	3/17/2022	252417	7/18/2022	17	17	18	22	17
98365	00000LAT	689	17	ARE	4/1/2022	ENVIRONMENTAL	2248972	8014650	55	3/17/2022	252417	7/18/2022	18	16	19	21	17
98365	00000LAT	690	17	ARE	4/1/2022	ENVIRONMENTAL	2248973	8008194	55	3/17/2022	252417	7/18/2022	10	9	13	13	10
98365	00000LAT	691	17	ARE	4/1/2022	ENVIRONMENTAL	2248974	8003177	55	3/17/2022	252417	7/18/2022	10	9	16	17	9
98365	00000LAT	692	17	ARE	4/1/2022	ENVIRONMENTAL	2248975	8014394	55	3/17/2022	252417	7/18/2022	16	15	20	21	16
98365	00000LAT	693	17	ARE	4/1/2022	ENVIRONMENTAL	2248976	8007587	55	3/17/2022	252417	7/18/2022	11	9	11	13	10
98365	00000LAT	694	17	ARE	4/1/2022	ENVIRONMENTAL	2248977	8005566	55	3/17/2022	252417	7/18/2022	11	10	12	13	10
98365	00000LAT	695	17	ARE	4/1/2022	ENVIRONMENTAL	2248978	8009566	55	3/17/2022	252417	7/18/2022	10	9	12	14	9
98365	00000LAT	696	17	ARE	4/1/2022	ENVIRONMENTAL	2248979	8009634	55	3/17/2022	252417	7/18/2022	9	10	14	15	9
98365	00000LAT		17		4/1/2022	CONTROL	2248903	8012101	55	3/17/2022	252417	7/18/2022	10	10	12	13	10
98365	00000LAT		17		4/1/2022	CONTROL	2248904	8015088	55	3/17/2022	252417	7/18/2022	11	10	14	14	10

Approved by: *Tam Hang Vo* 10/5/2022

*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	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	622	17	ARE	7/1/2022	ENVIRONMENTAL	2251096	8008334	57	6/9/2022	253417	10/28/2022	12	12	15	16	12
98365	00000LAT	623	17	ARE	7/1/2022	ENVIRONMENTAL	2251097	8010534	57	6/9/2022	253417	10/28/2022	11	12	16	16	11
98365	00000LAT	624	17	ARE	7/1/2022	ENVIRONMENTAL	2251094	8005459	57	6/9/2022	253417	10/28/2022	12	13	14	15	12
98365	00000LAT	625	17	ARE	7/1/2022	ENVIRONMENTAL	2251095	8011089	57	6/9/2022	253417	10/28/2022	256	251	257	268	253
98365	00000LAT	626	17	ARE	7/1/2022	ENVIRONMENTAL	2251098	8013408	57	6/9/2022	253417	10/28/2022	351	382	362	373	367
98365	00000LAT	627	17	ARE	7/1/2022	ENVIRONMENTAL	2251099	8007870	57	6/9/2022	253417	10/28/2022	20	22	40	26	21
98365	00000LAT	628	17	ARE	7/1/2022	ENVIRONMENTAL	2251100	8011201	57	6/9/2022	253417	10/28/2022	19	21	22	23	20
98365	00000LAT	629	17	ARE	7/1/2022	ENVIRONMENTAL	2251101	8015277	57	6/9/2022	253417	10/28/2022	23	24	26	27	23
98365	00000LAT	630	17	ARE	7/1/2022	ENVIRONMENTAL	2251102	8010525	57	6/9/2022	253417	10/28/2022	18	20	22	23	19
98365	00000LAT	631	17	ARE	7/1/2022	ENVIRONMENTAL	2251103	8013444	57	6/9/2022	253417	10/28/2022	31	30	32	31	30
98365	00000LAT	632	17	ARE	7/1/2022	ENVIRONMENTAL	2251104	8011347	57	6/9/2022	253417	10/28/2022	18	19	34	27	18
98365	00000LAT	633	17	ARE	7/1/2022	ENVIRONMENTAL	2251105	8012915	57	6/9/2022	253417	10/28/2022	19	19	18	22	19
98365	00000LAT	634	17	ARE	7/1/2022	ENVIRONMENTAL	2251106	8010665	57	6/9/2022	253417	10/28/2022	24	23	26	27	23
98365	00000LAT	635	17	ARE	7/1/2022	ENVIRONMENTAL	2251107	8007097	57	6/9/2022	253417	10/28/2022	17	17	22	24	17
98365	00000LAT	636	17	ARE	7/1/2022	ENVIRONMENTAL	2251108	8011867	57	6/9/2022	253417	10/28/2022	17	18	19	20	17
98365	00000LAT	637	17	ARE	7/1/2022	ENVIRONMENTAL	2251109	8012428	57	6/9/2022	253417	10/28/2022	23	23	27	29	23
98365	00000LAT	638	17	ARE	7/1/2022	ENVIRONMENTAL	2251110	8012698	57	6/9/2022	253417	10/28/2022	19	20	30	27	20
98365	00000LAT	639	17	ARE	7/1/2022	ENVIRONMENTAL	2251111	8011282	57	6/9/2022	253417	10/28/2022	20	22	27	28	21
98365	00000LAT	640	17	ARE	7/1/2022	ENVIRONMENTAL	2251112	8007800	57	6/9/2022	253417	10/28/2022	29	31	30	32	30
98365	00000LAT	641	17	ARE	7/1/2022	ENVIRONMENTAL	2251113	8009281	57	6/9/2022	253417	10/28/2022	24	25	45	31	25
98365	00000LAT	642	17	ARE	7/1/2022	ENVIRONMENTAL	2251114	8014487	57	6/9/2022	253417	10/28/2022	25	27	29	32	26
98365	00000LAT	643	17	ARE	7/1/2022	ENVIRONMENTAL	2251115	8011168	57	6/9/2022	253417	10/28/2022	18	19	21	23	18
98365	00000LAT	644	17	ARE	7/1/2022	ENVIRONMENTAL	2251116	8013412	57	6/9/2022	253417	10/28/2022	20	22	27	30	21
98365	00000LAT	645	17	ARE	7/1/2022	ENVIRONMENTAL	2251117	8010702	57	6/9/2022	253417	10/28/2022	25	27	28	30	26
98365	00000LAT	646	17	ARE	7/1/2022	ENVIRONMENTAL	2251118	8014881	57	6/9/2022	253417	10/28/2022	18	18	21	22	18
98365	00000LAT	647	17	ARE	7/1/2022	ENVIRONMENTAL	2251119	8006143	57	6/9/2022	253417	10/28/2022	53	49	45	49	51
98365	00000LAT	648	17	ARE	7/1/2022	ENVIRONMENTAL	2251120	8005543	57	6/9/2022	253417	10/28/2022	14	17	28	26	16
98365	00000LAT	649	17	ARE	7/1/2022	ENVIRONMENTAL	2251121	8016551	57	6/9/2022	253417	10/28/2022	112	123	141	128	117
98365	00000LAT	650	17	ARE	7/1/2022	ENVIRONMENTAL	2251122	8014484	57	6/9/2022	253417	10/28/2022	12	12	14	17	12
98365	00000LAT	651	17	ARE	7/1/2022	ENVIRONMENTAL	2251123	8009791	57	6/9/2022	253417	10/28/2022	14	15	19	22	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* 11/21/2022

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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	652	17	ARE	7/1/2022	ENVIRONMENTAL	2251124	8014568	57	6/9/2022	253417	10/28/2022	16	16	19	20	16
98365	00000LAT	653	17	ARE	7/1/2022	ENVIRONMENTAL	2251125	8003571	57	6/9/2022	253417	10/28/2022	367	385	401	385	376
98365	00000LAT	654	17	ARE	7/1/2022	ENVIRONMENTAL	2251126	8012389	57	6/9/2022	253417	10/28/2022	686	730	746	738	708
98365	00000LAT	655	17	ARE	7/1/2022	ENVIRONMENTAL	2251127	8016888	57	6/9/2022	253417	10/28/2022	18	19	28	25	18
98365	00000LAT	656	17	ARE	7/1/2022	ENVIRONMENTAL	2251128	8007951	57	6/9/2022	253417	10/28/2022	15	17	17	20	16
98365	00000LAT	657	17	ARE	7/1/2022	ENVIRONMENTAL	2251129	8007914	57	6/9/2022	253417	10/28/2022	17	17	19	22	17
98365	00000LAT	658	17	ARE	7/1/2022	ENVIRONMENTAL	2251130	8011703	57	6/9/2022	253417	10/28/2022	18	18	20	24	18
98365	00000LAT	659	17	ARE	7/1/2022	ENVIRONMENTAL	2251131	8010458	57	6/9/2022	253417	10/28/2022	20	22	24	26	21
98365	00000LAT	660	17	ARE	7/1/2022	ENVIRONMENTAL	2251132	8016943	57	6/9/2022	253417	10/28/2022	24	25	24	25	25
98365	00000LAT	661	17	ARE	7/1/2022	ENVIRONMENTAL	2251133	8008789	57	6/9/2022	253417	10/28/2022	21	22	38	28	21
98365	00000LAT	662	17	ARE	7/1/2022	ENVIRONMENTAL	2251134	8009635	57	6/9/2022	253417	10/28/2022	16	17	19	20	16
98365	00000LAT	663	17	ARE	7/1/2022	ENVIRONMENTAL	2251135	8015190	57	6/9/2022	253417	10/28/2022	43	49	62	63	46
98365	00000LAT	664	17	ARE	7/1/2022	ENVIRONMENTAL	2251136	8005898	57	6/9/2022	253417	10/28/2022	29	29	28	32	29
98365	00000LAT	665	17	ARE	7/1/2022	ENVIRONMENTAL	2251137	8009548	57	6/9/2022	253417	10/28/2022	20	21	23	25	21
98365	00000LAT	666	17	ARE	7/1/2022	ENVIRONMENTAL	2251138	8009611	57	6/9/2022	253417	10/28/2022	18	18	20	22	18
98365	00000LAT	667	17	ARE	7/1/2022	ENVIRONMENTAL	2251139	8003141	57	6/9/2022	253417	10/28/2022	25	25	46	37	25
98365	00000LAT	668	17	ARE	7/1/2022	ENVIRONMENTAL	2251140	8014600	57	6/9/2022	253417	10/28/2022	22	24	30	27	23
98365	00000LAT	669	17	ARE	7/1/2022	ENVIRONMENTAL	2251141	8008433	57	6/9/2022	253417	10/28/2022	22	23	25	27	22
98365	00000LAT	670	17	ARE	7/1/2022	ENVIRONMENTAL	2251142	8016536	57	6/9/2022	253417	10/28/2022	20	21	44	30	21
98365	00000LAT	671	17	ARE	7/1/2022	ENVIRONMENTAL	2251143	8010361	57	6/9/2022	253417	10/28/2022	24	24	58	36	24
98365	00000LAT	672	17	ARE	7/1/2022	ENVIRONMENTAL	2251144	8013624	57	6/9/2022	253417	10/28/2022	20	22	25	24	21
98365	00000LAT	673	17	ARE	7/1/2022	ENVIRONMENTAL	2251145	8012983	57	6/9/2022	253417	10/28/2022	21	22	24	26	21
98365	00000LAT	674	17	ARE	7/1/2022	ENVIRONMENTAL	2251146	8009367	57	6/9/2022	253417	10/28/2022	111	110	115	117	111
98365	00000LAT	675	17	ARE	7/1/2022	ENVIRONMENTAL	2251147	8005063	57	6/9/2022	253417	10/28/2022	29	30	45	36	29
98365	00000LAT	676	17	ARE	7/1/2022	ENVIRONMENTAL	2251148	8016199	57	6/9/2022	253417	10/28/2022	63	64	72	75	63
98365	00000LAT	677	17	ARE	7/1/2022	ENVIRONMENTAL	2251149	8010634	57	6/9/2022	253417	10/28/2022	22	22	24	27	22
98365	00000LAT	678	17	ARE	7/1/2022	ENVIRONMENTAL	2251150	8011202	57	6/9/2022	253417	10/28/2022	12	12	32	23	12
98365	00000LAT	679	17	ARE	7/1/2022	ENVIRONMENTAL	2251151	8006200	57	6/9/2022	253417	10/28/2022	20	22	49	32	21
98365	00000LAT	680	17	ARE	7/1/2022	ENVIRONMENTAL	2251152	8012609	57	6/9/2022	253417	10/28/2022	17	21	23	27	19
98365	00000LAT	681	17	ARE	7/1/2022	ENVIRONMENTAL	2251153	8009297	57	6/9/2022	253417	10/28/2022	21	21	37	32	21

*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* 11/21/2022

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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	682	17	ARE	7/1/2022	ENVIRONMENTAL	2251154	8014384	57	6/9/2022	253417	10/28/2022	22	22	24	25	22
98365	00000LAT	683	17	ARE	7/1/2022	ENVIRONMENTAL	2251155	8009399	57	6/9/2022	253417	10/28/2022	21	21	20	25	21
98365	00000LAT	684	17	ARE	7/1/2022	ENVIRONMENTAL	2251156	8014653	57	6/9/2022	253417	10/28/2022	20	21	23	24	20
98365	00000LAT	685	17	ARE	7/1/2022	ENVIRONMENTAL	2251157	8009376	57	6/9/2022	253417	10/28/2022	20	21	21	22	20
98365	00000LAT	686	17	ARE	7/1/2022	ENVIRONMENTAL	2251158	8014385	57	6/9/2022	253417	10/28/2022	21	23	24	25	22
98365	00000LAT	687	17	ARE	7/1/2022	ENVIRONMENTAL	2251159	8013699	57	6/9/2022	253417	10/28/2022	23	24	26	29	24
98365	00000LAT	688	17	ARE	7/1/2022	ENVIRONMENTAL	2251160	8014970	57	6/9/2022	253417	10/28/2022	22	23	28	23	22
98365	00000LAT	689	17	ARE	7/1/2022	ENVIRONMENTAL	2251161	8013571	57	6/9/2022	253417	10/28/2022	19	21	23	25	20
98365	00000LAT	690	17	ARE	7/1/2022	ENVIRONMENTAL	2251162	8014548	57	6/9/2022	253417	10/28/2022	11	12	14	16	11
98365	00000LAT	691	17	ARE	7/1/2022	ENVIRONMENTAL	2251163	8010127	57	6/9/2022	253417	10/28/2022	12	13	15	17	12
98365	00000LAT	692	17	ARE	7/1/2022	ENVIRONMENTAL	2251164	8016855	57	6/9/2022	253417	10/28/2022	20	19	23	23	19
98365	00000LAT	693	17	ARE	7/1/2022	ENVIRONMENTAL	2251165	8013020	57	6/9/2022	253417	10/28/2022	12	12	15	16	12
98365	00000LAT	694	17	ARE	7/1/2022	ENVIRONMENTAL	2251166	8007071	57	6/9/2022	253417	10/28/2022	11	12	15	17	11
98365	00000LAT	695	17	ARE	7/1/2022	ENVIRONMENTAL	2251167	8012513	57	6/9/2022	253417	10/28/2022	12	12	16	16	12
98365	00000LAT	696	17	ARE	7/1/2022	ENVIRONMENTAL	2251168	8007825	57	6/9/2022	253417	10/28/2022	11	12	14	15	11
98365	00000LAT		17		7/1/2022	CONTROL	2251092	8007629	57	6/9/2022	253417	10/28/2022	15	14	24	18	14
98365	00000LAT		17		7/1/2022	CONTROL	2251093	8011682	57	6/9/2022	253417	10/28/2022	13	13	16	17	13

Approved by: *Tam Hang Vo* 11/21/2022

*E1 is not used in envrionmental dose calculation for badge type 20
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98365	00000LAT	622	17	ARE	10/1/2022	ENVIRONMENTAL	2252596	8013627	59	9/19/2022	254503	2/10/2023	10	10	14	14	10
98365	00000LAT	623	17	ARE	10/1/2022	ENVIRONMENTAL	2252597	8014837	59	9/19/2022	254503	2/10/2023	10	9	15	15	9
98365	00000LAT	624	17	ARE	10/1/2022	ENVIRONMENTAL	2252594	8011210	59	9/19/2022	254503	2/10/2023	10	10	13	14	10
98365	00000LAT	625	17	ARE	10/1/2022	ENVIRONMENTAL	2252595	8007574	59	9/19/2022	254503	2/10/2023	297	283	263	312	290
98365	00000LAT	626	17	ARE	10/1/2022	ENVIRONMENTAL	2252598	8008614	59	9/19/2022	254503	2/10/2023	472	476	408	382	474
98365	00000LAT	627	17	ARE	10/1/2022	ENVIRONMENTAL	2252599	8009439	59	9/19/2022	254503	2/10/2023	24	23	28	30	24
98365	00000LAT	628	17	ARE	10/1/2022	ENVIRONMENTAL	2252600	8009294	59	9/19/2022	254503	2/10/2023	23	22	28	27	23
98365	00000LAT	629	17	ARE	10/1/2022	ENVIRONMENTAL	2252601	8016206	59	9/19/2022	254503	2/10/2023	26	24	29	29	25
98365	00000LAT	630	17	ARE	10/1/2022	ENVIRONMENTAL	2252602	8010079	59	9/19/2022	254503	2/10/2023	20	20	27	25	20
98365	00000LAT	631	17	ARE	10/1/2022	ENVIRONMENTAL	2252603	8016289	59	9/19/2022	254503	2/10/2023	34	32	35	34	33
98365	00000LAT	632	17	ARE	10/1/2022	ENVIRONMENTAL	2252604	8016036	59	9/19/2022	254503	2/10/2023	21	19	23	25	20
98365	00000LAT	633	17	ARE	10/1/2022	ENVIRONMENTAL	2252605	8007043	59	9/19/2022	254503	2/10/2023	22	20	23	22	21
98365	00000LAT	634	17	ARE	10/1/2022	ENVIRONMENTAL	2252606	8006048	59	9/19/2022	254503	2/10/2023	28	28	31	28	28
98365	00000LAT	635	17	ARE	10/1/2022	ENVIRONMENTAL	2252607	8011644	59	9/19/2022	254503	2/10/2023	22	20	24	25	21
98365	00000LAT	636	17	ARE	10/1/2022	ENVIRONMENTAL	2252608	8008677	59	9/19/2022	254503	2/10/2023	19	18	21	23	18
98365	00000LAT	637	17	ARE	10/1/2022	ENVIRONMENTAL	2252609	8009009	59	9/19/2022	254503	2/10/2023	27	25	27	29	26
98365	00000LAT	638	17	ARE	10/1/2022	ENVIRONMENTAL	2252610	8007947	59	9/19/2022	254503	2/10/2023	31	24	24	25	27
98365	00000LAT	639	17	ARE	10/1/2022	ENVIRONMENTAL	2252611	8013503	59	9/19/2022	254503	2/10/2023	25	25	30	29	25
98365	00000LAT	640	17	ARE	10/1/2022	ENVIRONMENTAL	2252612	8011152	59	9/19/2022	254503	2/10/2023	35	36	41	37	36
98365	00000LAT	641	17	ARE	10/1/2022	ENVIRONMENTAL	2252613	8016526	59	9/19/2022	254503	2/10/2023	27	26	27	27	26
98365	00000LAT	642	17	ARE	10/1/2022	ENVIRONMENTAL	2252614	8015254	59	9/19/2022	254503	2/10/2023	31	28	32	33	29
98365	00000LAT	643	17	ARE	10/1/2022	ENVIRONMENTAL	2252615	8014807	59	9/19/2022	254503	2/10/2023	22	21	22	23	21
98365	00000LAT	644	17	ARE	10/1/2022	ENVIRONMENTAL	2252616	8012105	59	9/19/2022	254503	2/10/2023	25	22	26	27	24
98365	00000LAT	645	17	ARE	10/1/2022	ENVIRONMENTAL	2252617	8005982	59	9/19/2022	254503	2/10/2023	29	27	30	31	28
98365	00000LAT	646	17	ARE	10/1/2022	ENVIRONMENTAL	2252618	8009102	59	9/19/2022	254503	2/10/2023	21	21	25	25	21
98365	00000LAT	647	17	ARE	10/1/2022	ENVIRONMENTAL	2252619	8009507	59	9/19/2022	254503	2/10/2023	62	57	61	67	60
98365	00000LAT	648	17	ARE	10/1/2022	ENVIRONMENTAL	2252620	8011633	59	9/19/2022	254503	2/10/2023	25	20	24	24	23
98365	00000LAT	649	17	ARE	10/1/2022	ENVIRONMENTAL	2252621	8014962	59	9/19/2022	254503	2/10/2023	166	158	165	167	162
98365	00000LAT	650	17	ARE	10/1/2022	ENVIRONMENTAL	2252622	8012525	59	9/19/2022	254503	2/10/2023	10	9	15	15	10
98365	00000LAT	651	17	ARE	10/1/2022	ENVIRONMENTAL	2252623	8005858	59	9/19/2022	254503	2/10/2023	16	16	18	18	16

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

Approved by: *Tam Hang Vo* 2/24/2023 *E3, E4 are not used in envrionmental dose calculation for badge type 17

DOSIMETRY SERVICES
A MIRION MEDICAL COMPANY

Dosimetry Services Division
104 Union Valley Road
Oak Ridge, TN 37830

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

ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	652	17	ARE	10/1/2022	ENVIRONMENTAL	2252624	8010833	59	9/19/2022	254503	2/10/2023	17	16	18	19	17
98365	00000LAT	653	17	ARE	10/1/2022	ENVIRONMENTAL	2252625	8011841	59	9/19/2022	254503	2/10/2023	500	446	520	511	473
98365	00000LAT	654	17	ARE	10/1/2022	ENVIRONMENTAL	2252626	8013364	59	9/19/2022	254503	2/10/2023	756	762	799	793	759
98365	00000LAT	655	17	ARE	10/1/2022	ENVIRONMENTAL	2252627	8013391	59	9/19/2022	254503	2/10/2023	19	17	23	23	18
98365	00000LAT	656	17	ARE	10/1/2022	ENVIRONMENTAL	2252628	8003019	59	9/19/2022	254503	2/10/2023	16	15	20	20	15
98365	00000LAT	657	17	ARE	10/1/2022	ENVIRONMENTAL	2252629	8007615	59	9/19/2022	254503	2/10/2023	15	15	18	19	15
98365	00000LAT	658	17	ARE	10/1/2022	ENVIRONMENTAL	2252630	8011784	59	9/19/2022	254503	2/10/2023	20	18	21	23	19
98365	00000LAT	659	17	ARE	10/1/2022	ENVIRONMENTAL	2252631	8016440	59	9/19/2022	254503	2/10/2023	25	24	26	28	24
98365	00000LAT	660	17	ARE	10/1/2022	ENVIRONMENTAL	2252632	8014779	59	9/19/2022	254503	2/10/2023	24	23	27	31	24
98365	00000LAT	661	17	ARE	10/1/2022	ENVIRONMENTAL	2252633	8016744	59	9/19/2022	254503	2/10/2023	26	25	28	28	25
98365	00000LAT	662	17	ARE	10/1/2022	ENVIRONMENTAL	2252634	8016080	59	9/19/2022	254503	2/10/2023	21	19	21	22	20
98365	00000LAT	663	17	ARE	10/1/2022	ENVIRONMENTAL	2252635	8015064	59	9/19/2022	254503	2/10/2023	52	55	58	55	54
98365	00000LAT	664	17	ARE	10/1/2022	ENVIRONMENTAL	2252636	8013555	59	9/19/2022	254503	2/10/2023	45	42	41	42	44
98365	00000LAT	665	17	ARE	10/1/2022	ENVIRONMENTAL	2252637	8005792	59	9/19/2022	254503	2/10/2023	25	24	25	26	25
98365	00000LAT	666	17	ARE	10/1/2022	ENVIRONMENTAL	2252638	8005072	59	9/19/2022	254503	2/10/2023	21	21	22	22	21
98365	00000LAT	667	17	ARE	10/1/2022	ENVIRONMENTAL	2252639	8015184	59	9/19/2022	254503	2/10/2023	27	27	29	30	27
98365	00000LAT	668	17	ARE	10/1/2022	ENVIRONMENTAL	2252640	8010298	59	9/19/2022	254503	2/10/2023	28	26	28	28	27
98365	00000LAT	669	17	ARE	10/1/2022	ENVIRONMENTAL	2252641	8010307	59	9/19/2022	254503	2/10/2023	27	26	28	29	27
98365	00000LAT	670	17	ARE	10/1/2022	ENVIRONMENTAL	2252642	8005172	59	9/19/2022	254503	2/10/2023	22	22	26	27	22
98365	00000LAT	671	17	ARE	10/1/2022	ENVIRONMENTAL	2252643	8009807	59	9/19/2022	254503	2/10/2023	27	26	30	31	27
98365	00000LAT	672	17	ARE	10/1/2022	ENVIRONMENTAL	2252644	8003579	59	9/19/2022	254503	2/10/2023	22	21	22	23	22
98365	00000LAT	673	17	ARE	10/1/2022	ENVIRONMENTAL	2252645	8014646	59	9/19/2022	254503	2/10/2023	22	21	25	25	21
98365	00000LAT	674	17	ARE	10/1/2022	ENVIRONMENTAL	2252646	8011742	59	9/19/2022	254503	2/10/2023	126	136	140	131	131
98365	00000LAT	675	17	ARE	10/1/2022	ENVIRONMENTAL	2252647	8010798	59	9/19/2022	254503	2/10/2023	35	30	36	41	33
98365	00000LAT	676	17	ARE	10/1/2022	ENVIRONMENTAL	2252648	8007566	59	9/19/2022	254503	2/10/2023	91	90	100	97	91
98365	00000LAT	677	17	ARE	10/1/2022	ENVIRONMENTAL	2252649	8012725	59	9/19/2022	254503	2/10/2023	25	25	28	29	25
98365	00000LAT	678	17	ARE	10/1/2022	ENVIRONMENTAL	2252650	8005803	59	9/19/2022	254503	2/10/2023	10	10	14	12	10
98365	00000LAT	679	17	ARE	10/1/2022	ENVIRONMENTAL	2252651	8003925	59	9/19/2022	254503	2/10/2023	26	23	25	29	24
98365	00000LAT	680	17	ARE	10/1/2022	ENVIRONMENTAL	2252652	8006324	59	9/19/2022	254503	2/10/2023	21	21	23	23	21
98365	00000LAT	681	17	ARE	10/1/2022	ENVIRONMENTAL	2252653	8007602	59	9/19/2022	254503	2/10/2023	23	23	24	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* 2/24/2023

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ACCOUNT NO	LOCATION ID	WEARER NO	BADGE TYPE	BODY REGION	WEAR DATE	NAME	SERIAL NUM	BADGE ID	CONTROL ID	ANNEAL DATE	PROCESS ID	REC DATE	E1	E2	E3	E4	mR/Qtr
98365	00000LAT	682	17	ARE	10/1/2022	ENVIRONMENTAL	2252654	8010007	59	9/19/2022	254503	2/10/2023	24	24	27	27	24
98365	00000LAT	683	17	ARE	10/1/2022	ENVIRONMENTAL	2252655	8010529	59	9/19/2022	254503	2/10/2023	23	23	27	26	23
98365	00000LAT	684	17	ARE	10/1/2022	ENVIRONMENTAL	2252656	8014474	59	9/19/2022	254503	2/10/2023	25	24	25	26	24
98365	00000LAT	685	17	ARE	10/1/2022	ENVIRONMENTAL	2252657	8008133	59	9/19/2022	254503	2/10/2023	23	22	23	25	22
98365	00000LAT	686	17	ARE	10/1/2022	ENVIRONMENTAL	2252658	8009038	59	9/19/2022	254503	2/10/2023	24	24	25	27	24
98365	00000LAT	687	17	ARE	10/1/2022	ENVIRONMENTAL	2252659	8007308	59	9/19/2022	254503	2/10/2023	28	29	28	28	28
98365	00000LAT	688	17	ARE	10/1/2022	ENVIRONMENTAL	2252660	8010633	59	9/19/2022	254503	2/10/2023	28	27	26	27	27
98365	00000LAT	689	17	ARE	10/1/2022	ENVIRONMENTAL	2252661	8013127	59	9/19/2022	254503	2/10/2023	25	23	25	26	24
98365	00000LAT	690	17	ARE	10/1/2022	ENVIRONMENTAL	2252662	8015228	59	9/19/2022	254503	2/10/2023	11	10	15	15	10
98365	00000LAT	691	17	ARE	10/1/2022	ENVIRONMENTAL	2252663	8009430	59	9/19/2022	254503	2/10/2023	10	9	14	14	9
98365	00000LAT	692	17	ARE	10/1/2022	ENVIRONMENTAL	2252664	8015044	59	9/19/2022	254503	2/10/2023	23	21	26	25	22
98365	00000LAT	693	17	ARE	10/1/2022	ENVIRONMENTAL	2252665	8012133	59	9/19/2022	254503	2/10/2023	9	9	14	14	9
98365	00000LAT	694	17	ARE	10/1/2022	ENVIRONMENTAL	2252666	8006340	59	9/19/2022	254503	2/10/2023	10	9	15	14	10
98365	00000LAT	695	17	ARE	10/1/2022	ENVIRONMENTAL	2252667	8014665	59	9/19/2022	254503	2/10/2023	10	10	14	14	10
98365	00000LAT	696	17	ARE	10/1/2022	ENVIRONMENTAL	2252668	8013356	59	9/19/2022	254503	2/10/2023	10	10	14	14	10
98365	00000LAT		17		10/1/2022	CONTROL	2252593	8012180	59	9/19/2022	254503	2/10/2023	11	10	14	14	10
98365	00000LAT		17		10/1/2022	CONTROL	2252592	8013249	59	9/19/2022	254503	2/10/2023	10	10	16	16	10

Approved by: *Tam Hang Vo* 2/24/2023

*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

APPENDIX D

OPTICALLY STIMULATED LUMINESCENCE DOSIMETER 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	2022-04-25 / 2022-04-28
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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®
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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:							2022-01-01 to 2022-03-31			QUARTER 1			2022			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA00786132H
	Control Dose Used		L02TN				**16**	**16**	**16**											
02882	AREA		L02TN	AREA	P		**203**	**203**	**195**										2018/01	XA00757154G
					P	M	**203**	**203**	**195**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02883	AREA		L02TN	AREA	P		**5**	**5**	**5**										2018/01	XA01413074T
					P		**5**	**5**	**5**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02884	AREA		L02TN	AREA	P		**27**	**27**	**27**										2018/01	XA01017654J
					P		**27**	**27**	**27**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02885	AREA		L02TN	AREA	P		**6**	**6**	**6**										2018/01	XA02514712L
					P		**6**	**6**	**6**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02886	AREA		L02TN	AREA	P		**6**	**6**	**6**										2018/01	XA012578264
					P		**6**	**6**	**6**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02887	AREA		L02TN	AREA	P		**58**	**58**	**57**										2018/01	XA02148762A
					P	H	**58**	**58**	**57**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

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

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Analytical Work Order / QC Release	2211200014 / LCA
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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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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:							2022-01-01 to 2022-03-31			QUARTER 1			2022			LIFETIME				
02888	AREA		L02TN	AREA	P		**29**	**29**	**29**										2018/01	XA00625047M
					P		**29**	**29**	**29**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

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®

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Received Date / Reported Date	2022-07-18 / 2022-07-21
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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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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:							2022-04-01 to 2022-06-30			QUARTER 2			2022			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA00833057J
	Control Dose Used		L02TN				**17**	**17**	**17**											
02882	AREA		L02TN	AREA	P		**252**	**252**	**248**										2018/01	XA00871779T
					P	H	**252**	**252**	**248**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02883	AREA		L02TN	AREA	P		**8**	**8**	**8**										2018/01	XA00765222L
					P		**8**	**8**	**8**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02884	AREA		L02TN	AREA	P		**26**	**26**	**26**										2018/01	XA008690684
					P		**26**	**26**	**26**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02885	AREA		L02TN	AREA	P		**5**	**5**	**5**										2018/01	XA00266365D
					P		**5**	**5**	**5**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02886	AREA		L02TN	AREA	P		**7**	**7**	**7**										2018/01	XA01419958Z
					P		**7**	**7**	**7**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02887	AREA		L02TN	AREA	P		**77**	**77**	**76**										2018/01	XA02629123M
					P	M	**77**	**77**	**76**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

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Analytical Work Order / QC Release	2219900001 / LCA
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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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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:							2022-04-01 to 2022-06-30			QUARTER 2			2022			LIFETIME				
02888	AREA		L02TN	AREA	P		**30**	**30**	**30**										2018/01	XA01014482R
					P		**30**	**30**	**30**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

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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
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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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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:							2022-07-01 to 2022-09-30			QUARTER 3			2022			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA012716939
	Control Dose Used		L02TN				13	13	13											
02882	AREA		L02TN	AREA	P		310	310	306										2018/01	XA010110145
					P	H	310	310	306											
					N	T	M	M	M											
					N	F	M	M	M											
02883	AREA		L02TN	AREA	P		9	9	9										2018/01	XA016189661
					P		9	9	9											
					N	T	M	M	M											
					N	F	M	M	M											
02884	AREA		L02TN	AREA	P		40	40	40										2018/01	XA01015982G
					P		40	40	40											
					N	T	M	M	M											
					N	F	M	M	M											
02885	AREA		L02TN	AREA	P		6	6	6										2018/01	XA020468457
					P		6	6	6											
					N	T	M	M	M											
					N	F	M	M	M											
02886	AREA		L02TN	AREA	P		12	12	12										2018/01	XA02043355J
					P		12	12	12											
					N	T	M	M	M											
					N	F	M	M	M											
02887	AREA		L02TN	AREA	P		76	76	74										2018/01	XA00883996P
					P	M	76	76	74											
					N	T	M	M	M											
					N	F	M	M	M											

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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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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:							2022-07-01 to 2022-09-30			QUARTER 3			2022			LIFETIME				
02888	AREA		L02TN	AREA	P		30	30	30										2018/01	XA00670085H
					P		30	30	30											
					N	T	M	M	M											
					N	F	M	M	M											

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

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Received Date / Reported Date	2023-02-15 / 2023-02-23
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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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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:							2022-10-01 to 2022-12-31			QUARTER 4			2022			LIFETIME				
00DAR	CONTROL		L02TN	CNTRL																XA01934704C
	Control Dose Used		L02TN				**16**	**16**	**16**											
02882	AREA		L02TN	AREA	P		**334**	**334**	**329**										2018/01	XA007939041
					P	H	**334**	**334**	**329**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02883	AREA		L02TN	AREA	P		**13**	**13**	**13**										2018/01	XA000010339
					P		**13**	**13**	**13**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02884	AREA		L02TN	AREA	P		**38**	**38**	**39**										2018/01	XA01190712F
					P		**38**	**38**	**39**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02885	AREA		L02TN	AREA			**M**	**M**	**M**										2018/01	XA022080005
02886	AREA		L02TN	AREA	P		**13**	**13**	**13**										2018/01	XA023395582
					P		**13**	**13**	**13**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											
02887	AREA		L02TN	AREA	P		**91**	**91**	**89**										2018/01	XA00789179W
					P	M	**91**	**91**	**89**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

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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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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:							2022-10-01 to 2022-12-31			QUARTER 4			2022			LIFETIME				
02888	AREA		L02TN	AREA	P		**52**	**52**	**52**										2018/01	XA02523465F
					P	H	**52**	**52**	**52**											
					N	T	**M**	**M**	**M**											
					N	F	**M**	**M**	**M**											

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

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