

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit A-1. Labor Categories and Occupation Codes.**

The following is a list of the Occupation Codes that are reported with each individual's dose record to the DOE Radiation Exposure Monitoring System (REMS) in accordance with DOE Order 231.1B. Occupation Codes are grouped into Labor Categories for the purposes of analysis and summary in this report. The occupation codes are listed in the REMS Reporting Guide, Table G-7, and represent a subset of the occupations listed in the Department of Commerce's Standard Occupational Classification (SOC) Manual (1980).

Labor Category	Occupation Code	Occupation Name
Agriculture	562	Groundskeepers
	570	Forest Workers
	580	Misc. Agriculture
Construction/Repair	610	Mechanics/Repairers
	641	Masons
	642	Carpenters
	643	Electricians
	644	Painters
	645	Pipe Fitter
	650	Miners/Drillers
	660	Misc. Repair/Construction
Laborers	850	Handlers/Laborers/Helpers
Management	110	Manager - Administrator
	400	Sales
	450	Admin. Support and Clerical
Misc.	910	Military
	990	Miscellaneous
Production	681	Machinists
	682	Sheet Metal Workers
	690	Operators, Plant/System/Utility
	710	Machine Setup/Operators
	771	Welders and Solderers
	780	Misc. Precision/Production
Professional	160	Engineer
	170	Scientist
	184	Health Physicist
	200	Misc. Professional
	260	Doctors and Nurses
Service Workers	512	Firefighters
	513	Security Guards
	521	Food Service Employees
	524	Janitors
	525	Misc. Service
Technicians	350	Technicians
	360	Health Technicians
	370	Engineering Technicians
	380	Science Technicians
	383	Radiation Monitors/Techs.
	390	Misc. Technicians
Transport Workers	820	Truck Drivers
	821	Bus Drivers
	825	Pilots
	830	Equipment Operators
	840	Misc. Transport
Unknown	1	Unknown

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit A-2. Organizations Reporting to DOE REMS, 2012–2016.

The following is a list of all organizations reporting to the DOE REMS from 2012–2016.

The list provides the Site groupings used in this report as well as the organization reporting code and name.

Site	Org. Code	Organization Name	2012	2013	2014	2015	2016
Albuquerque	OST3100	Office of Secure Transportation	-	●	●	●	●
Ames Laboratory	1000503	Ames Laboratory (Iowa State)	●	●	●	●	●
Argonne National Laboratory (ANL)	1000703	Argonne National Laboratory	●	●	●	●	●
	1004031	New Brunswick Laboratory	-	-	-	-	●
Brookhaven National Laboratory (BNL)	1001003	Brookhaven National Laboratory	●	●	●	●	●
DOE Headquarters	1504001	DOE Headquarters	●	●	●	●	●
	1523016	SPRU-NY (Building remediation)	●	●	●	●	●
Energy Technology Engineering Center	8001003	Boeing North America, Inc. - Research	●	●	●	-	-
	8002001	Cabrera Services	-	-	-	●	●
Fermi National Accelerator Lab. (FERMI)	1002503	Fermilab	●	●	●	●	●
Hanford	4700805	Bechtel National Corporation	●	●	●	●	●
	4701001	DOE, Office of River Protection	●	●	●	●	●
	4702004	Advance Technology Laboratories	●	●	●	●	●
	4702005	Wastren Advantage, Inc.	-	-	-	●	●
	4707104	Washington River Protection Solutions, LLC	●	●	●	●	●
	NA-2000	NNSA - Visitors	-	●	●	●	●
	NA-2100	NNSA - Management and Support Personnel	●	●	●	●	●
	NA-2101	NNSA - Mgmt. & Support Personnel: MELE Assoc.	●	●	●	●	●
	NA-2110	NNSA - North and South America	●	●	●	●	●
	NA-2120	NNSA - Europe, Africa and the Middle East	●	●	●	●	●
	NA-2130	NNSA - Asia and Members of the Former Soviet	●	●	●	-	-
	7500503	Battelle - PNNL	●	●	●	●	●
	7500504	Battelle -PNNL- Subs	-	-	●	●	●
	7500521	Pacific Northwest Site Office	-	-	●	●	●
	7500605	Washington Closure Hanford	●	●	●	●	●
	7502504	AdvanceMed Hanford	●	●	●	●	●
	7505055	Lockheed Martin Services, Inc.	-	●	-	-	-
	7505214	Mission Support Alliance (MSA)	●	●	●	●	●
	7505304	CH2M Hill Plateau Remediation Company	●	●	●	●	●
	7506001	DOE-Richland Field Office	●	●	●	●	●
Idaho Site	3004001	Idaho Field Office	-	-	●	●	●
	3004404	BBWI Service Subs	-	-	●	●	-
	3005003	INL - BEA, LLC - Research	●	●	●	●	●
	3005004	INL - BEA, LLC - Services	●	●	●	●	●
	3005009	INL - BEA, LLC - Security	●	●	●	●	●
	3005012	INL - BEA, LLC - Production	●	●	●	●	●
	3006002	INL - CWI - Projects	●	●	●	●	-
	3006002	INL - Fluor- Projects	-	-	-	-	●
	3006004	ICP - CWI - Subcontractors	●	●	●	●	-
	3006004	ICP - Fluor - Subcontractors	-	-	-	-	●
	3006005	ICP - CWI - Support	●	●	●	●	●
	3006016	ICP - CWI - Construction Subs	●	●	●	●	-
	3006016	ICP - Fluor - Construction Subs	-	-	-	-	●

Site	Org. Code	Organization Name	2012	2013	2014	2015	2016
Kansas City Plant	0531002	Honeywell FM & T/KC Production	●	●	●	●	-
Kansas City National Security Campus	0531002	Honeywell FM & T	-	-	-	-	●
Lawrence Berkeley National Lab. (LBNL)	8003003	Lawrence Berkeley National Laboratory	●	●	●	●	●
Lawrence Livermore National Lab. (LLNL)	0580403	Lawrence Livermore National Laboratory	●	●	●	●	●
	0580701	LLNL - DOE Site Office	●	●	●	●	●
	0580503	LLNL - Nevada	●	●	●	●	●
Los Alamos National Lab. (LANL)	0540001	NNSA Los Alamos Site Office	●	●	●	●	●
	0544003	Los Alamos National Laboratory	●	●	●	●	●
	0544809	Protection Technologies Los Alamos	●	●	●	●	●
	0544904	Johnson Controls, Inc.	●	●	●	●	●
National Renewable Energy Laboratory	2806003	National Renewable Energy Laboratory	●	●	●	●	●
Nevada National Security Site	0501001	NNSA Service Center	●	●	●	●	●
	0520001	NNSA Nevada Site Office	●	●	●	●	●
	0521104	Bechtel Nevada - Amador Valley	●	●	●	●	●
	0521204	Bechtel Nevada - Las Vegas	●	●	●	●	●
	0521304	Bechtel Nevada - Los Alamos	●	●	●	●	●
	0521405	Bechtel Nevada - NTS	●	●	●	●	●
	0521416	Bechtel Nevada - NTS - subcontractors	●	●	●	●	●
	0521503	Bechtel Nevada - Special Tech Lab.	●	●	●	●	●
	0528002	Centerra-Nevada	-	-	●	●	●
	0528004	Centerra-Nevada Subcontractors Lockheed	-	-	●	●	●
	3505104	Navarro-Intera LLC	●	●	●	●	●
	3508004	Nye County Sheriff - NSTec	●	●	●	●	●
	3508703	SAIC - NV	●	●	-	-	-
New Brunswick Laboratory	1004031	New Brunswick Laboratory - Research	●	●	●	●	●
Oak Ridge Site	4004203	Oak Ridge Inst. For Science & Educ. (ORISE)	●	●	●	●	●
	4004501	Oak Ridge Office	●	-	-	-	-
	4004525	SEC Oak Ridge	●	●	-	-	-
	4004526	LATA Sharp	-	●	-	-	-
	4003602	UT-Battelle: ORNL-Isotek	●	●	●	●	●
	4004602	UT-Battelle: Foster Wheeler	●	-	-	-	-
	4004602	Wastren Advantage, Inc.	-	●	●	●	-
	4004602	NorthWind Solutions	-	-	-	-	●
	4005104	USEC: Oak Ridge, K25	●	●	●	●	●
	4006002	UCOR - ETPP	●	●	●	●	●
	4006503	UT-Battelle - ORNL	●	●	●	●	●
	4006510	Bechtel Jacobs - ORNL	●	-	-	-	-
	4006510	UCOR - ORNL	-	-	●	●	●
	4007509	Wackenhut Services	●	-	-	-	-
	4007509	UCOR	●	●	●	●	●
	4007509	National Strategic Protective Services	-	●	●	●	●
	4008010	Bechtel-Jacobs, Y-12	●	-	-	-	-
	4008010	UCOR- Y-12	●	●	●	●	●
	4018102	BWXT LLC, Y-12	●	-	-	-	-
	4018102	CNS, LLC, Y-12	-	●	●	●	●
Paducah Gaseous Diff. Plant (PGDP)	4007002	Swift & Staley Team	●	●	●	●	●
	6203004	LATA Environmental Services	-	●	●	●	-
	6203004	Paducah Remediation Services	●	-	-	-	-

Site	Org. Code	Organization Name	2012	2013	2014	2015	2016
	6203106	Uranium Disposition Services - Paducah Sub	●	●	-	-	-
	6203106	B&W Conversions Services, LLC	-	●	●	●	-
	6203106	DUF6 Paducah Construction Subs - MACS	-	-	-	-	●
	6503304	Fluor Paducah Deactivation Project					●
Pantex Plant (PP)	0510001	B & W Pantex - PXSO/NNSA and DOE Couriers	●	●	-	-	-
	0510001	CNS Pantex	-	-	●	●	●
	0514004	Battelle - Pantex	●	●	-	-	-
	0514004	CNS Pantex	-	-	●	●	●
	0515002	B & W Pantex	●	●	-	-	-
	0515002	CNS Pantex	-	-	●	●	●
	0515006	B & W Pantex - Subcontractors	●	●	-	-	-
	0515006	CNS Pantex	-	-	●	●	●
	0515009	B & W Pantex - Security Forces	●	●	-	-	-
	0515009	CNS Pantex	-	-	●	●	●
Portsmouth Gaseous Diff. Plant (PORTS)	6202106	Uranium Disposition Services - Portsmouth Sub	●	●	●	●	-
	6202106	DUF6 Portsmouth Construction Subs - MACS	-	-	-	-	●
	6202204	Wastren - Portsmouth Services	●	●	●	●	●
	6202304	FLUOR B & W Portsmouth	●	●	●	●	●
Princeton Plasma Physics Laboratory	1005003	Princeton Plasma Physics Laboratory	●	●	●	●	●
Sandia National Laboratories (SNL)	0578003	Sandia National Laboratories	●	●	●	●	●
Savannah River Site (SRS)	8500505	Bechtel Construction - SR	●	●	●	●	●
	8500516	Miscellaneous SRS Construction Subs	●	●	●	●	●
	8501042	SRR Operations	●	●	●	●	●
	8501044	SRR Service Subs	●	●	●	●	●
	8505501	Savannah River Field Office	●	●	●	●	●
	8505504	Misc. DOE Contractors - SR	●	●	●	●	●
	8505525	Savannah River Nuclear Solutions, Inc.	-	●	-	●	●
	8505526	SR Construction - Parsons Subcontractors	●	●	●	●	●
	8509003	Univ. of Georgia Ecology Laboratories	-	●	●	●	●
	8509509	Wackenhut Services, Inc. - SRNS	●	●	●	●	●
	8511002	Savannah River Nuclear Solutions, Inc.	●	●	●	●	●
	8511003	Savannah River National Laboratory	-	-	-	-	●
	8511004	SRNS Service Subs	●	●	●	●	●
	8511005	SRNS Construction	●	●	●	●	●
	8511006	SRNS Construction Subs	●	●	●	●	●
Separations Process Research Unit	1522005	DeNuke Services: SPRU LA	●	-	-	-	-
	1523016	NY SPRU	●	●	●	●	●
SLAC National Accelerator Facility	8008003	Stanford Linear Accelerator Center	●	●	●	●	●
Thomas Jefferson National Accelerator Facility	1509521	Jefferson Laboratory - DOE Employees	-	●	●	●	●
	1509503	Thomas Jefferson National Accelerator Facility	-	●	●	●	●
	4004501	Jefferson Laboratory	●	-	-	-	-
	4009503	Thomas Jefferson National Accelerator Facility	●	-	-	-	-
Uranium Mill Tailings Remediation Action Project	3260645	Uranium Mill Tailings Remedial Action - Moab	●	●	●	●	●
Waste Isolation Pilot Plant	0701001	Carlsbad Field Office	●	●	●	●	●
	0702003	LANL - WIPP	-	●	-	●	●
	0703104	Washington TRU Solutions LLC-WIPP	●	●	●	●	●
	0703109	Santa Fe Protective Services - WIPP	-	●	●	●	●
	0703114	WTS Subcontractors - WIPP	-	●	-	●	●

Site	Org. Code	Organization Name	2012	2013	2014	2015	2016
	0703124	WTS - Small Subs	-	●	-	-	-
	0704003	Sandia National Laboratories - WIPP	-	●	-	-	●
West Valley Project	4539004	West Valley Nuclear Services, Inc. (WVNS)	●	●	●	●	●
Pittsburg Naval Reactor Office	6007504	PNR - BAPL & BPMI-P	●	●	●	●	●
	6008003	PNR - BAPL & BPMI-P	●	●	●	●	●
	6009003	Naval Reactors - Idaho	●	●	●	●	●
Schenectady Naval Reactor Office	9004003	Knolls Atomic Power Laboratory	●	●	●	●	●
	9005003	Knolls Atomic Power Laboratory	●	●	●	●	●
	9005004	Knolls Atomic Power Laboratory	●	●	●	●	●

## DOE Occupational Radiation Exposure: 2016 Annual Report Exhibit A-3. Facility Type Codes.

The following is a list of Facility Type Codes reported to REMS in accordance with the REMS Reporting Guide. A facility type code is reported with each individual's dose record and indicates the facility type where the majority of the individual's dose was accrued during the monitoring year.

Facility Type Code	Description
10	Accelerator
21	Fuel/Uranium Enrichment
22	Fuel Fabrication
23	Fuel Processing
40	Maintenance and Support (Site-Wide)
50	Reactor
61	Research, General
62	Research, Fusion
70	Waste Processing/Mgmt.
80	Weapons Fab. and Testing
99	Other

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-1. Site Dose Data, 2014.

Site	Collective TED (person-rem)	Percent Change - Coll. TED	Number with Meas. Dose	Percent Change - # with Meas. Dose	Avg. Meas. TED (rem)	Percent Change - Avg. Meas. TED	Percentage of Coll. TED above 0.500 rem	Percent Change - Coll. TED above 0.500 rem
Ames Laboratory	0.873	-	33	-	0.026	-	-	-
Argonne National Laboratory	16.492	26% ▲	84	14% ▲	<b>0.196</b>	11% ▲	<b>67%</b>	10% ▲
Brookhaven National Laboratory	7.282	4% ▲	129	-34% ▼	0.056	57% ▲	-	-
Energy Technology Engineering Center	0.489	-	69	-	0.007	-	-	-
Fermi National Accelerator Laboratory	11.070	-44% ▼	193	10% ▲	0.057	-49% ▼	-	-
Hanford: Hanford Site	40.715	-19% ▼	659	-8% ▼	0.062	-12% ▼	19%	-36% ▼
Hanford: Office of River Protection	14.653	-20% ▼	412	-8% ▼	0.036	-13% ▼	-	-
Hanford: Pacific Northwest National Laboratory	14.634	1% ▲	479	19% ▲	0.031	-15% ▼	5%	-
Idaho National Laboratory	86.202	20% ▲	1,174	-18% ▼	0.073	47% ▲	11%	-
Kansas City Plant	0.022	-	11	-	0.002	-	-	-
Lawrence Berkeley National Laboratory	0.463	-	8	-	0.058	-	-	-
Lawrence Livermore National Laboratory	8.353	-1% ▼	108	5% ▲	0.077	-6% ▼	7%	-74% ▼
Los Alamos National Laboratory	<b>95.436</b>	-31% ▼	1,401	-18% ▼	0.068	-16% ▼	13%	-14% ▼
National Renewable Energy Laboratory	0.107	-	7	-	0.015	-	-	-
Nevada National Security Site	5.638	75% ▲	116	30% ▲	0.049	34% ▲	-	-
New Brunswick Laboratory	0.023	-	2	-	0.012	-	-	-
Oak Ridge: East Tennessee Technology Park	0.004	-	1	-	0.004	-	-	-
Oak Ridge: Oak Ridge Institute for Science and Education	0.210	-	23	-	0.009	-	-	-
Oak Ridge: Oak Ridge National Laboratory	71.304	-4% ▼	618	-4% ▼	0.115	-1% ▼	19%	30% ▲
Oak Ridge: Y-12 National Security Complex	59.296	18% ▲	1,326	-1% ▼	0.045	19% ▲	3%	<b>125%</b> ▲
Office of Secure Transportation	0.090	-	5	-	0.018	-	-	-
Paducah Gaseous Diffusion Plant	10.306	60% ▲	139	51% ▲	0.074	6% ▲	-	-
Pantex Plant	31.084	42% ▲	305	-8% ▼	0.102	54% ▲	10%	-
Portsmouth Gaseous Diffusion Plant	10.302	19% ▲	95	-7% ▼	0.108	28% ▲	11%	-
Princeton Plasma Physics Laboratory	0.693	-	123	-	0.006	-	-	-
Sandia National Laboratories	5.982	40% ▲	88	-23% ▼	0.068	84% ▲	-	-
Savannah River Site	93.027	5% ▲	<b>1,584</b>	8% ▲	0.059	-2% ▼	-	-
Separations Process Research Unit	9.338	<b>219%</b> ▲	76	<b>52%</b> ▲	0.123	110% ▲	-	-
SLAC National Accelerator Laboratory	0.246	-	9	-	0.027	-	-	-
Thomas Jefferson National Accelerator Facility	4.452	196% ▲	42	-13% ▼	0.106	<b>239%</b> ▲	12%	-
Uranium Mill Tailings Remedial Action Project	7.756	5% ▲	61	11% ▲	0.127	-6% ▼	14%	-
Waste Isolation Pilot Plant	0.034	-	3	-	0.011	-	-	-
West Valley Demonstration Project	13.424	4% ▲	112	11% ▲	0.120	-6% ▼	-	-
Service Center Personnel*	0.103	-	6	-	0.017	-	-	-
<b>Totals</b>	<b>620.103</b>	<b>-1%</b> ▼	<b>9,501</b>	<b>-4%</b> ▼	<b>0.065</b>	<b>3%</b> ▲	<b>10%</b>	<b>2%</b> ▲

Note: Boxed values (gray background) indicate the greatest value in each column.

\* Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP, in addition to several smaller facilities not associated with a DOE site.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-2. Site Dose Data, 2015.

Site	Collective TED (person-rem)	Percent Change - Coll. TED		Number with Meas. Dose	Percent Change - # with Meas. Dose		Avg. Meas. TED (rem)	Percent Change - Avg. Meas. TED		Percentage of Coll. TED above 0.500 rem	Percent Change - Coll. TED above 0.500 rem	
Ames Laboratory	1.247	43% ▲		39	18% ▲		0.032	21% ▲		-	-	-
Argonne National Laboratory	14.818	-10% ▼		83	-1% ▼		0.179	-9% ▼		51%	-24% ▼	
Brookhaven National Laboratory	3.345	-54% ▼		134	4% ▲		0.025	-56% ▼		-	-	-
Energy Technology Engineering Center	0.068	-	-	3	-	-	0.023	-	-	-	-	-
Fermi National Accelerator Laboratory	16.640	50% ▲		235	22% ▲		0.071	23% ▲		-	-	-
Hanford: Hanford Site	62.612	54% ▲		687	4% ▲		0.091	48% ▲		51%	172% ▲	
Hanford: Office of River Protection	38.608	163% ▲		648	57% ▲		0.060	68% ▲		3%	-	-
Hanford: Pacific Northwest National Laboratory	12.581	-14% ▼		461	-4% ▼		0.027	-11% ▼		-	-	-
Idaho National Laboratory	123.232	43% ▲		1,331	13% ▲		0.093	26% ▲		19%	73% ▲	
Kansas City Plant	0.020	-	-	12	-	-	0.002	-	-	-	-	-
Lawrence Berkeley National Laboratory	0.796	-	-	11	-	-	0.072	-	-	-	-	-
Lawrence Livermore National Laboratory	7.573	-9% ▼		105	-3% ▼		0.072	-7% ▼		27%	283% ▲	
Los Alamos National Laboratory	97.209	2% ▲		1,135	-19% ▼		0.086	26% ▲		24%	85% ▲	
National Renewable Energy Laboratory	0.028	-	-	4	-	-	0.007	-	-	-	-	-
Nevada National Security Site	5.045	-11% ▼		98	-16% ▼		0.051	6% ▲		-	-	-
Oak Ridge: East Tennessee Technology Park	0.059	-	-	4	-	-	0.015	-	-	-	-	-
Oak Ridge: Oak Ridge Institute for Science and Education	0.122	-	-	10	-	-	0.012	-	-	-	-	-
Oak Ridge: Oak Ridge National Laboratory	59.959	-16% ▼		598	-3% ▼		0.100	-13% ▼		17%	-11% ▼	
Oak Ridge: Y-12 National Security Complex	58.010	-2% ▼		1,201	-9% ▼		0.048	8% ▲		2%	-22% ▼	
Office of Secure Transportation	0.029	-	-	2	-	-	0.015	-	-	-	-	-
Paducah Gaseous Diffusion Plant	7.058	-32% ▼		337	142% ▲		0.021	-72% ▼		-	-	-
Pantex Plant	22.618	-27% ▼		301	-1% ▼		0.075	-26% ▼		8%	-16% ▼	
Portsmouth Gaseous Diffusion Plant	4.716	-54% ▼		59	-38% ▼		0.080	-26% ▼		-	-	-
Princeton Plasma Physics Laboratory	0.623	-	-	126	-	-	0.005	-	-	-	-	-
Sandia National Laboratories	5.284	-12% ▼		99	13% ▲		0.053	-21% ▼		-	-	-
Savannah River Site	94.871	2% ▲		1,882	19% ▲		0.050	-14% ▼		-	-	-
Separations Process Research Unit	69.291	642% ▲		149	96% ▲		0.465	278% ▲		78%	-	-
SLAC National Accelerator Laboratory	0.069	-	-	2	-	-	0.035	-	-	-	-	-
Thomas Jefferson National Accelerator Facility	3.348	-25% ▼		47	12% ▲		0.071	-33% ▼		-	-	-
Uranium Mill Tailings Remedial Action Project	7.177	-7% ▼		86	41% ▲		0.083	-34% ▼		-	-	-
Waste Isolation Pilot Plant	0.161	-	-	12	-	-	0.013	-	-	-	-	-
West Valley Demonstration Project	28.107	109% ▲		122	9% ▲		0.230	92% ▲		34%	-	-
Service Center Personnel*	0.011	-	-	1	-	-	0.011	-	-	-	-	-
<b>Totals</b>	<b>745.335</b>	<b>20% ▲</b>		<b>10,024</b>	<b>6% ▲</b>		<b>0.074</b>	<b>14% ▲</b>		<b>22%</b>	<b>120% ▲</b>	

Note: Boxed values (gray background) indicate the greatest value in each column.

\* Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP, in addition to several smaller facilities not associated with a DOE site.



# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-3. Site Dose Data, 2016.

Site	Collective TED (person-rem)	Percent Change - Coll. TED	Number with Meas. Dose	Percent Change - # with Meas. Dose	Avg. Meas. TED (rem)	Percent Change - Avg. Meas. TED	Percentage of Coll. TED above 0.500 rem	Percent Change - Coll. TED above 0.500 rem
Ames Laboratory	1,240	-1% ▼	41	5% ▲	0.030	-5% ▼	-	-
Argonne National Laboratory	13,080	-12% ▼	70	-16% ▼	0.187	5% ▲	56%	11% ▲
Brookhaven National Laboratory	3,217	-4% ▼	84	-37% ▼	0.038	<b>53% ▲</b>	-	-
Energy Technology Engineering Center	0.089	-	2	-	0.045	-	-	-
Fermi National Accelerator Laboratory	11,930	-28% ▼	232	-1% ▼	0.051	-27% ▼	-	-
Hanford: Hanford Site	41,109	-34% ▼	1,218	<b>77% ▲</b>	0.034	-63% ▼	2%	-96% ▼
Hanford: Office of River Protection	37,391	-3% ▼	944	46% ▲	0.040	-34% ▼	-	-
Hanford: Pacific Northwest National Laboratory	11,599	-8% ▼	420	-9% ▼	0.028	1% ▲	-	-
Idaho National Laboratory	92,670	-25% ▼	1,273	-4% ▼	0.073	-21% ▼	3%	-85% ▼
Kansas City National Security Campus	0.063	-	24	-	0.003	-	-	-
Lawrence Berkeley National Laboratory	0.823	-	13	-	0.063	-	-	-
Lawrence Livermore National Laboratory	8,215	8% ▲	98	-7% ▼	0.084	16% ▲	33%	23% ▲
Los Alamos National Laboratory	95,565	-2% ▼	1,106	-3% ▼	0.086	1% ▲	24%	1% ▲
National Renewable Energy Laboratory	0.034	-	7	-	0.005	-	-	-
Nevada National Security Site	3,295	-35% ▼	84	-14% ▼	0.039	-24% ▼	-	-
New Brunswick Laboratory	0.096	-	4	-	0.024	-	-	-
Oak Ridge: East Tennessee Technology Park	0.114	-	3	-	0.038	-	-	-
Oak Ridge: Oak Ridge Institute for Science and Education	0.171	-	9	-	0.019	-	-	-
Oak Ridge: Oak Ridge National Laboratory	69,551	16% ▲	618	3% ▲	0.113	12% ▲	18%	4% ▲
Oak Ridge: Y-12 National Security Complex	72,807	26% ▲	1,460	22% ▲	0.050	3% ▲	2%	3% ▲
Office of Secure Transportation	0.072	-	3	-	0.024	-	-	-
Paducah Gaseous Diffusion Plant	6,201	-12% ▼	559	66% ▲	0.011	-47% ▼	-	-
Pantex Plant	25,918	15% ▲	295	-2% ▼	0.088	17% ▲	10%	32% ▲
Portsmouth Gaseous Diffusion Plant	2,509	-47% ▼	40	-32% ▼	0.063	-22% ▼	-	-
Princeton Plasma Physics Laboratory	0.311	-	78	-	0.004	-	-	-
Sandia National Laboratories	2,756	-48% ▼	68	-31% ▼	0.041	-24% ▼	-	-
Savannah River National Lab	12,363	-	362	-	0.034	-	-	-
Savannah River Site	<b>98,975</b>	4% ▲	<b>2,437</b>	29% ▲	0.041	-19% ▼	-	-
Separations Process Research Unit	47,541	-31% ▼	101	-32% ▼	<b>0.471</b>	1% ▲	<b>77%</b>	-1% ▼
SLAC National Accelerator Laboratory	0.170	-	6	-	0.028	-	-	-
Thomas Jefferson National Accelerator Facility	0.777	-	30	-	0.026	-	-	-
Uranium Mill Tailings Remedial Action Project	7,044	-2% ▼	131	52% ▲	0.054	-36% ▼	8%	-
Waste Isolation Pilot Plant	0.311	-	22	-	0.014	-	-	-
West Valley Demonstration Project	41,122	<b>46% ▲</b>	147	20% ▲	0.280	21% ▲	47%	<b>39% ▲</b>
Service Center Personnel*	0.268	-	16	-	0.017	-	-	-
<b>Totals</b>	<b>709,397</b>	<b>-5% ▼</b>	<b>12,005</b>	<b>20% ▲</b>	<b>0.059</b>	<b>-21% ▼</b>	<b>15%</b>	<b>-31% ▼</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\* Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP, in addition to several smaller facilities not associated with a DOE site.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-4. Internal Dose by Site, 2014–2016.**

Site	No. of Individuals with Measurable CED* 2014	No. of Individuals with Measurable CED* 2015	No. of Individuals with Measurable CED* 2016	Collective CED Dose (person-rem) 2014	Collective CED Dose (person-rem) 2015	Collective CED Dose (person-rem) 2016	Average Measurable CED 2014	Average Measurable CED 2015	Average Measurable CED 2016
Argonne National Laboratory	9	4	1	0.179	0.180	0.114	0.020	0.045	0.114
Hanford: Hanford Site	–	4	3	–	0.034	0.016	–	0.009	0.005
Hanford: Pacific Northwest National Laboratory	4	–	2	0.113	–	0.004	0.028	–	0.002
Idaho National Laboratory	9	3	2	0.266	0.061	0.065	0.030	0.020	0.033
Lawrence Livermore National Laboratory	5	3	2	0.208	0.051	0.029	0.042	0.017	0.015
Los Alamos National Laboratory	17	31	29	0.143	0.144	0.111	0.008	0.005	0.004
Oak Ridge: Oak Ridge National Laboratory	9	2	4	0.764	0.186	0.055	<b>0.085</b> ◀	<b>0.093</b> ◀	0.014
Oak Ridge: Y-12 National Security Complex	<b>1,078</b> ◀	<b>1,042</b> ◀	<b>1,130</b> ◀	<b>49</b> ◀	<b>48.72</b> ◀	<b>59.165</b> ◀	0.045	0.047	<b>0.052</b> ◀
Paducah Gaseous Diffusion Plant	2	4	7	0.039	0.086	0.087	0.020	0.022	0.012
Pantex Plant	8	2	1	0.014	0.003	0.001	0.002	0.002	0.001
Sandia National Laboratories	–	–	1	–	–	0.001	–	–	0.001
Savannah River Site	10	4	5	0.371	0.013	0.020	0.037	0.003	0.004
Separations Process Research Unit	–	3	–	–	0.084	–	–	0.028	–
Uranium Mill Tailings Remedial Action Project	48	45	54	2.974	2.104	1.876	0.062	0.047	0.035
Waste Isolation Pilot Plant	1	–	–	0.011	–	–	0.011	–	–
<b>Totals</b>	<b>1,200</b>	<b>1,147</b>	<b>1,241</b>	<b>54.082</b>	<b>51.666</b>	<b>61.544</b>	<b>0.045</b>	<b>0.045</b>	<b>0.050</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\* The number of internal depositions represents the number of internal dose records with positive results reported for each individual.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-5. Neutron Dose Distribution by Site, 2016.**

Site	No. Meas. Dose	Meas. < 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.00	1.0–2.0	>2.0	Total Monitored *	No. of Individuals with Meas. Dose	% of Individuals with Meas. Dose	Collective Neutron Dose (person-rem)	Avg. Meas. Neutron Dose (rem)
Ames Laboratory	190	–	–	–	–	–	–	–	190	–	–	–	–
Argonne National Laboratory	1,786	–	–	–	–	–	–	–	1,786	–	–	–	–
Brookhaven National Laboratory	3,178	–	–	–	–	–	–	–	3,178	–	–	–	–
Energy Technology Engineering Center	5	–	–	–	–	–	–	–	5	–	–	–	–
Fermi National Accelerator Laboratory	1,382	–	–	–	–	–	–	–	1,382	–	–	–	–
Hanford: Hanford Site	3,930	354	–	–	–	–	–	–	4,284	354	8%	3.628	0.010
Hanford: Office of River Protection	2,628	27	–	–	–	–	–	–	2,655	27	1%	0.813	0.030
Hanford: Pacific Northwest National Laboratory	2,470	–	–	–	–	–	–	–	2,470	–	–	–	–
Idaho National Laboratory	6,527	13	–	1	–	–	–	–	6,541	14	0%	0.780	0.056
Kansas City National Security Campus	97	–	–	–	–	–	–	–	97	–	–	–	–
Lawrence Berkeley National Laboratory	923	1	–	–	–	–	–	–	924	1	0%	0.020	0
Lawrence Livermore National Laboratory	8,699	35	3	1	–	–	–	–	8,738	39	0%	1.829	0.047
Los Alamos National Laboratory	8,917	579	95	31	11	2	2	–	9,637	720	7%	52.417	0.073
National Renewable Energy Laboratory	11	–	–	–	–	–	–	–	11	–	–	–	–
Nevada National Security Site	1,619	–	–	–	–	–	–	–	1,619	–	–	–	–
New Brunswick Laboratory	26	–	–	–	–	–	–	–	26	–	–	–	–
Oak Ridge: East Tennessee Technology Park	355	1	–	–	–	–	–	–	356	1	0%	0.081	0.081
Oak Ridge: Oak Ridge Institute for Science and Education	102	–	–	–	–	–	–	–	102	–	–	–	–
Oak Ridge: Oak Ridge National Laboratory	3,500	184	22	8	1	–	–	–	3,715	215	6%	13.627	0.063
Oak Ridge: Oak Ridge: Oak Ridge National Laboratory	352	13	–	–	–	–	–	–	365	13	4%	0.383	0.029
Oak Ridge: Y-12 National Security Complex	6,359	8	1	–	–	–	–	–	6,368	9	0%	0.243	0
Office of Secure Transportation	344	–	–	–	–	–	–	–	344	–	–	–	–
Paducah Gaseous Diffusion Plant	2,183	–	–	–	–	–	–	–	2,183	–	–	–	–
Pantex Plant	4,559	27	2	–	–	–	–	–	4,588	29	1%	1.366	0.047
Portsmouth Gaseous Diffusion Plant	2,527	14	–	–	–	–	–	–	2,541	14	1%	0.703	0
Princeton Plasma Physics Laboratory	408	–	–	–	–	–	–	–	408	–	–	–	–
Sandia National Laboratories	1,848	4	1	–	–	–	–	–	1,853	5	0%	0.382	0.076
Savannah River National Lab	677	3	1	–	–	–	–	–	681	4	1%	0.265	0
Savannah River Site	5,573	142	31	16	–	–	–	–	5,762	189	3%	16.363	0.087
Separations Process Research Unit	202	–	–	–	–	–	–	–	202	–	–	–	–
SLAC National Accelerator Laboratory	2,036	–	–	–	–	–	–	–	2,036	–	–	–	–
Thomas Jefferson National Accelerator Facility	1,207	–	–	–	–	–	–	–	1,207	–	–	–	–
Uranium Mill Tailings Remedial Action Project	153	–	–	–	–	–	–	–	153	–	–	–	–
Waste Isolation Pilot Plant	598	–	–	–	–	–	–	–	598	–	–	–	–
West Valley Demonstration Project	391	–	–	–	–	–	–	–	391	–	–	–	–
Service Center Personnel**	440	–	–	–	–	–	–	–	440	–	–	–	–
<b>Totals</b>	<b>76,202</b>	<b>1,405</b>	<b>156</b>	<b>57</b>	<b>12</b>	<b>2</b>	<b>2</b>	<b>–</b>	<b>77,836</b>	<b>1,634</b>	<b>2%</b>	<b>92.900</b>	<b>0.057</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\*Represents the total number of monitoring records. The number of individuals specifically monitored for neutron radiation cannot be determined.

\*\*Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP, in addition to several smaller facilities not associated with a DOE site.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-6a. Distribution of TED by Facility Type, 2014.**

<b>TOTAL EFFECTIVE DOSE (TED)</b>																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Facility Type	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Accelerator	6,501	277	63	14	1	–	–	–	–	–	–	6,856	5%	355	22.339	0.063
Fuel Processing	664	181	12	1	–	–	–	–	–	–	–	858	23%	194	7.127	0.037
Fuel/Uranium Enrichment	1,030	40	–	–	–	–	–	–	–	–	–	1,070	4%	40	0.156	0.004
Maintenance and Support	11,512	1,938	256	94	23	7	–	–	–	–	–	13,830	17%	2,318	149.085	0.064
Other	6,118	313	20	–	–	–	–	–	–	–	–	6,451	5%	333	8.616	0.026
Reactor	61	15	6	4	–	–	–	–	–	–	–	86	29%	25	2.703	<b>0.108</b> ◀
Research, Fusion	285	125	–	–	–	–	–	–	–	–	–	410	<b>30%</b> ◀	125	0.743	0.006
Research, General	27,594	2,282	427	169	38	8	6	–	–	–	–	<b>30,524</b> ◀	10%	<b>2,930</b> ◀	<b>225.368</b> ◀	0.077
Waste Processing/Management	3,891	1,145	262	104	2	–	–	–	–	–	–	5,404	28%	1,513	113.069	0.075
Weapons Fabrication and Testing	8,290	1,391	211	58	8	–	–	–	–	–	–	9,958	17%	1,668	90.897	0.054
<b>Totals</b>	<b>65,946</b>	<b>7,707</b>	<b>1,257</b>	<b>444</b>	<b>72</b>	<b>15</b>	<b>6</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>75,447</b>	<b>13%</b>	<b>9,501</b>	<b>620.103</b>	<b>0.065</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-6b. Distribution of TED by Facility Type, 2015.**

<b>TOTAL EFFECTIVE DOSE (TED)</b>																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Facility Type	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Accelerator	6,680	310	58	15	–	–	–	–	–	–	–	7,063	5%	383	22.847	0.060
Fuel Processing	649	205	13	–	–	–	–	–	–	–	–	867	25%	218	7.374	0.034
Fuel/Uranium Enrichment	756	43	–	–	–	–	–	–	–	–	–	799	5%	43	0.329	0.008
Maintenance and Support	11,284	1,772	285	81	41	20	11	–	–	–	–	13,494	16%	2,210	176.856	0.080
Other	6,210	396	37	28	2	–	–	–	–	–	–	6,673	7%	463	26.649	0.058
Reactor	67	16	9	1	–	–	–	–	–	–	–	93	28%	26	2.407	0.093
Research, Fusion	312	128	–	–	–	–	–	–	–	–	–	440	29% ◀	128	0.647	0.005
Research, General	27,147	2,449	397	129	46	13	3	–	–	–	–	30,184 ◀	10%	3,037 ◀	213.292	0.070
Waste Processing/Management	3,935	1,392	349	149	29	16	27	–	–	–	–	5,897	33%	1,962	213.490 ◀	0.109 ◀
Weapons Fabrication and Testing	8,493	1,311	193	45	5	–	–	–	–	–	–	10,047	15%	1,554	81.444	0.052
<b>Totals</b>	<b>65,533</b>	<b>8,022</b>	<b>1,341</b>	<b>448</b>	<b>123</b>	<b>49</b>	<b>41</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>75,557</b>	<b>13%</b>	<b>10,024</b>	<b>745.335</b>	<b>0.074</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-6c. Distribution of TED by Facility Type, 2016.**

<b>TOTAL EFFECTIVE DOSE (TED)</b>																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Facility Type	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Accelerator	7,035	288	41	7	–	–	–	–	–	–	–	7,371	5%	336	15.724	0.047
Fuel Processing	481	303	8	1	–	–	–	–	–	–	–	793	39%	312	9.043	0.029
Fuel/Uranium Enrichment	709	59	–	–	–	–	–	–	–	–	–	768	8%	59	0.517	0.009
Maintenance and Support	10,643	2,134	287	68	19	8	4	–	–	–	–	13,163	19%	2,520	149.660	0.059
Other	5,970	828	42	20	–	–	–	–	–	–	–	6,860	13%	890	29.364	0.033
Reactor	69	24	2	–	–	–	–	–	–	–	–	95	27%	26	1.230	0.047
Research, Fusion	385	82	–	–	–	–	–	–	–	–	–	467	18%	82	0.414	0.005
Research, General	26,971	2,692	340	129	17	3	8	–	–	–	–	<b>30,160</b> ◀	11%	<b>3,189</b> ◀	184.072	0.058
Waste Processing/Management	3,583	2,161	316	161	48	26	8	–	–	–	–	6,303	<b>43%</b> ◀	2,720	<b>219.525</b> ◀	<b>0.081</b> ◀
Weapons Fabrication and Testing	9,985	1,588	211	65	6	1	–	–	–	–	–	11,856	16%	1,871	99.848	0.053
<b>Totals</b>	<b>65,831</b>	<b>10,159</b>	<b>1,247</b>	<b>451</b>	<b>90</b>	<b>38</b>	<b>20</b>	–	–	–	–	<b>77,836</b>	<b>15%</b>	<b>12,005</b>	<b>709.397</b>	<b>0.059</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-7a. Collective TED by Site and Facility Type, 2014.

Site	Accelerator	Fuel/Uranium Enrichment	Fuel Processing	Maintenance and Support	Reactor	Research, General	Research, Fusion	Waste Processing/Management	Weapons Fabrication and Testing	Other	Totals
Ames Laboratory	-	-	-	-	-	0.873	-	-	-	-	0.873
Argonne National Laboratory	-	-	-	-	-	16.492	-	-	-	-	16.492
Brookhaven National Laboratory	6.146	-	-	0.714	0.032	0.051	-	0.339	-	-	7.282
Energy Technology Engineering Center	-	-	-	-	-	-	-	-	-	0.489	0.489
Fermi National Accelerator Laboratory	11.07	-	-	-	-	-	-	-	-	-	11.070
Hanford: Hanford Site	-	-	-	38.977	-	-	-	-	-	1.738	40.715
Hanford: Office of River Protection	0.010	-	-	3.835	-	-	-	7.914	-	2.894	14.653
Hanford: Pacific Northwest National Laboratory	-	-	-	-	-	14.634	-	-	-	-	14.634
Idaho National Laboratory	-	-	-	-	-	86.202	-	-	-	-	86.202
Kansas City National Security Campus	-	-	-	-	-	-	-	-	0.022	-	0.022
Lawrence Berkeley National Laboratory	-	-	-	-	-	0.463	-	-	-	-	0.463
Lawrence Livermore National Laboratory	-	-	-	-	-	8.353	-	-	-	-	8.353
Los Alamos National Laboratory	0.010	-	-	94.007	-	0.063	-	-	-	1.356	95.436
National Renewable Energy Laboratory	-	-	-	-	-	0.107	-	-	-	-	0.107
Nevada National Security Site	-	-	-	5.638	-	-	-	-	-	-	5.638
New Brunswick Laboratory	-	-	-	-	-	0.023	-	-	-	-	0.023
Oak Ridge: East Tennessee Technology Park	-	0.004	-	-	-	-	-	-	-	-	0.004
Oak Ridge: Oak Ridge Institute for Science and Education	-	-	-	-	-	0.210	-	-	-	-	0.210
Oak Ridge: Oak Ridge National Laboratory	-	-	-	-	-	71.304	-	-	-	-	71.304
Oak Ridge: Y-12 National Security Complex	-	-	-	-	-	-	-	-	59.296	-	59.296
Office of Secure Transportation	-	-	-	-	-	-	-	-	0.090	-	0.090
Paducah Gaseous Diffusion Plant	-	0.152	-	-	-	10.154	-	-	-	-	10.306
Pantex Plant	-	-	-	-	-	-	-	-	31.084	-	31.084
Portsmouth Gaseous Diffusion Plant	-	-	-	-	-	10.302	-	-	-	-	10.302
Princeton Plasma Physics Laboratory	-	-	-	-	-	-	0.693	-	-	-	0.693
Sandia National Laboratories	0.405	-	-	0.576	2.671	0.721	0.050	0.934	0.150	0.475	5.982
Savannah River Site	-	-	7.127	5.338	-	5.313	-	73.33	0.255	1.664	93.027
Separations Process Research Unit	-	-	-	-	-	-	-	9.338	-	-	9.338
SLAC National Accelerator Laboratory	0.246	-	-	-	-	-	-	-	-	-	0.246
Thomas Jefferson National Accelerator Facility	4.452	-	-	-	-	-	-	-	-	-	4.452
Uranium Mill Tailings Remedial Action Project	-	-	-	-	-	-	-	7.756	-	-	7.756
Waste Isolation Pilot Plant	-	-	-	-	-	-	-	0.034	-	-	0.034
West Valley Demonstration Project	-	-	-	-	-	-	-	13.424	-	-	13.424
Service Center Personnel*	-	-	-	-	-	0.103	-	-	-	-	0.103
<b>Totals</b>	<b>22.339</b>	<b>0.156</b>	<b>7.127</b>	<b>149.085</b>	<b>2.703</b>	<b>225.368</b>	<b>0.743</b>	<b>113.069</b>	<b>90.897</b>	<b>8.616</b>	<b>620.103</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\* Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-7b. Collective TED by Site and Facility Type, 2015.

Site	Accelerator	Fuel/Uranium Enrichment	Fuel Processing	Maintenance and Support	Reactor	Research, General	Research, Fusion	Waste Processing/Management	Weapons Fabrication and Testing	Other	Totals
Ames Laboratory	-	-	-	-	-	1,247	-	-	-	-	1,247
Argonne National Laboratory	-	-	-	-	-	14,818	-	-	-	-	14,818
Brookhaven National Laboratory	2,440	-	-	0.577	0.010	0.030	-	0.288	-	-	3,345
Energy Technology Engineering Center	-	-	-	-	-	-	-	-	-	0.068	0.068
Fermi National Accelerator Laboratory	16.64	-	-	-	-	-	-	-	-	-	16,640
Hanford: Hanford Site	-	-	-	57,571	-	-	-	-	-	5,041	62,612
Hanford: Office of River Protection	-	-	-	11,579	-	-	-	10,725	-	16,304	38,608
Hanford: Pacific Northwest National Laboratory	-	-	-	-	-	12,581	-	-	-	-	12,581
Idaho National Laboratory	-	-	-	-	-	123,232	-	-	-	-	123,232
Kansas City National Security Campus	-	-	-	-	-	-	-	-	0.020	-	0.020
Lawrence Berkeley National Laboratory	-	-	-	-	-	0,796	-	-	-	-	0,796
Lawrence Livermore National Laboratory	-	-	-	-	-	7,573	-	-	-	-	7,573
Los Alamos National Laboratory	-	-	-	95,987	-	0,041	-	-	-	1,181	97,209
National Renewable Energy Laboratory	-	-	-	-	-	0,028	-	-	-	-	0,028
Nevada National Security Site	-	-	-	5,045	-	-	-	-	-	-	5,045
Oak Ridge: East Tennessee Technology Park	-	0,059	-	-	-	-	-	-	-	-	0,059
Oak Ridge: Oak Ridge Institute for Science and Education	-	-	-	-	-	0,122	-	-	-	-	0,122
Oak Ridge: Oak Ridge National Laboratory	-	-	-	-	-	35,941	-	24,018	-	-	59,959
Oak Ridge: Y-12 National Security Complex	-	-	-	-	-	-	-	-	58,01	-	58,010
Office of Secure Transportation	-	-	-	-	-	-	-	-	0,029	-	0,029
Paducah Gaseous Diffusion Plant	-	0,27	-	-	-	5,256	-	1,532	-	-	7,058
Pantex Plant	-	-	-	-	-	-	-	-	22,618	-	22,618
Portsmouth Gaseous Diffusion Plant	-	-	-	-	-	4,716	-	-	-	-	4,716
Princeton Plasma Physics Laboratory	-	-	-	-	-	-	0,623	-	-	-	0,623
Sandia National Laboratories	0,350	-	-	0,258	2,397	0,917	0,024	0,472	0,197	0,669	5,284
Savannah River Site	-	-	7,374	5,839	-	5,983	-	71,719	0,570	3,386	94,871
Separations Process Research Unit	-	-	-	-	-	-	-	69,291	-	-	69,291
SLAC National Accelerator Laboratory	0,069	-	-	-	-	-	-	-	-	-	0,069
Thomas Jefferson National Accelerator Facility	3,348	-	-	-	-	-	-	-	-	-	3,348
Uranium Mill Tailings Remedial Action Project	-	-	-	-	-	-	-	7,177	-	-	7,177
Waste Isolation Pilot Plant	-	-	-	-	-	-	-	0,161	-	-	0,161
West Valley Demonstration Project	-	-	-	-	-	-	-	28,107	-	-	28,107
Service Center Personnel*	-	-	-	-	-	0,011	-	-	-	-	0,011
<b>Totals</b>	<b>22,847</b>	<b>0,329</b>	<b>7,374</b>	<b>176,856</b>	<b>2,407</b>	<b>213,292</b>	<b>0,647</b>	<b>213,490</b>	<b>81,444</b>	<b>26,649</b>	<b>745,335</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\* Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP.



# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-7c. Collective TED by Site and Facility Type, 2016.

Site	Accelerator	Fuel/Uranium Enrichment	Fuel Processing	Maintenance and Support	Reactor	Research, General	Research, Fusion	Waste Processing/ Management	Weapons Fabrication and Testing	Other	Totals
Ames Laboratory	-	-	-	-	-	1.240	-	-	-	-	1.240
Argonne National Laboratory	-	-	-	-	-	13.080	-	-	-	-	13.080
Brookhaven National Laboratory	2.518	-	-	0.333	-	-	-	0.366	-	-	3.217
Energy Technology Engineering Center	-	-	-	-	-	-	-	-	-	0.089	0.089
Fermi National Accelerator Laboratory	11.93	-	-	-	-	-	-	-	-	-	11.930
Hanford: Hanford Site	-	-	-	32.603	-	-	-	0.015	-	8.491	41.109
Hanford: Office of River Protection	-	-	-	11.280	-	-	-	11.368	-	14.743	37.391
Hanford: Pacific Northwest National Laboratory	-	-	-	-	-	11.599	-	-	-	-	11.599
Idaho National Laboratory	-	-	-	-	-	92.67	-	-	-	-	92.670
Kansas City National Security Campus	-	-	-	-	-	-	-	-	0.063	-	0.063
Lawrence Berkeley National Laboratory	-	-	-	-	-	0.823	-	-	-	-	0.823
Lawrence Livermore National Laboratory	-	-	-	-	-	8.215	-	-	-	-	8.215
Los Alamos National Laboratory	0.006	-	-	93.633	-	0.028	-	-	-	1.898	95.565
National Renewable Energy Laboratory	-	-	-	-	-	0.034	-	-	-	-	0.034
Nevada National Security Site	-	-	-	3.295	-	-	-	-	-	-	3.295
New Brunswick Laboratory	-	-	-	-	-	0.096	-	-	-	-	0.096
Oak Ridge: East Tennessee Technology Park	-	0.114	-	-	-	-	-	-	-	-	0.114
Oak Ridge: Oak Ridge Institute for Science and Education	-	-	-	-	-	0.171	-	-	-	-	0.171
Oak Ridge: Oak Ridge National Laboratory	-	-	-	-	-	41.920	-	27.631	-	-	69.551
Oak Ridge: Y-12 National Security Complex	-	-	-	-	-	-	-	-	72.807	-	72.807
Office of Secure Transportation	-	-	-	-	-	-	-	-	0.072	-	0.072
Paducah Gaseous Diffusion Plant	-	0.403	-	-	-	2.636	-	3.162	-	-	6.201
Pantex Plant	-	-	-	-	-	-	-	-	25.918	-	25.918
Portsmouth Gaseous Diffusion Plant	-	-	-	-	-	2.509	-	-	-	-	2.509
Princeton Plasma Physics Laboratory	-	-	-	-	-	-	0.311	-	-	-	0.311
Sandia National Laboratories	0.323	-	-	0.010	1.230	0.845	0.103	0.024	0.062	0.159	2.756
Savannah River National Lab	-	-	0.745	4.720	-	6.653	-	0.225	0.005	0.015	12.363
Savannah River Site	-	-	8.298	3.786	-	1.296	-	80.705	0.921	3.969	98.975
Separations Process Research Unit	-	-	-	-	-	-	-	47.541	-	-	47.541
SLAC National Accelerator Laboratory	0.170	-	-	-	-	-	-	-	-	-	0.170
Thomas Jefferson National Accelerator Facility	0.777	-	-	-	-	-	-	-	-	-	0.777
Uranium Mill Tailings Remedial Action Project	-	-	-	-	-	-	-	7.044	-	-	7.044
Waste Isolation Pilot Plant	-	-	-	-	-	-	-	0.311	-	-	0.311
West Valley Demonstration Project	-	-	-	-	-	-	-	41.122	-	-	41.122
Service Center Personnel*	-	-	-	-	-	0.257	-	0.011	-	-	0.268
<b>Totals</b>	<b>15.724</b>	<b>0.517</b>	<b>9.043</b>	<b>149.660</b>	<b>1.230</b>	<b>184.072</b>	<b>0.414</b>	<b>219.525</b>	<b>99.848</b>	<b>29.364</b>	<b>709.397</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\* Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP.

## DOE Occupational Radiation Exposure: 2016 Annual Report

### Exhibit B-8. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Accelerator Facilities, 2016.

#### ACCELERATORS

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)

Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Sandia National Laboratories	374	4	1	–	–	–	–	–	–	–	–	379	1%	5	0.323	<b>0.065</b> ◀
Fermi National Accelerator Lab	1,150	196	30	6	–	–	–	–	–	–	–	1,382	<b>17%</b> ◀	<b>232</b> ◀	<b>11.93</b> ◀	0.051
Brookhaven National Laboratory	2,276	52	9	1	–	–	–	–	–	–	–	<b>2,338</b> ◀	3%	62	2.518	0.041
SLAC National Accelerator Laboratory	2,030	6	–	–	–	–	–	–	–	–	–	2,036	0%	6	0.170	0.028
Thomas Jefferson Natl. Accel. Facil.	1,171	29	1	–	–	–	–	–	–	–	–	1,201	2%	30	0.777	0.026
Los Alamos National Laboratory	26	1	–	–	–	–	–	–	–	–	–	27	4%	1	0.006	0.006
Office of Secure Transportation	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
Thomas Jefferson Site Office-DOE Employees	6	–	–	–	–	–	–	–	–	–	–	6	0%	0	0.000	0.000
Washington River Protection Solutions LLC	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
<b>Totals</b>	<b>7,035</b>	<b>288</b>	<b>41</b>	<b>7</b>	–	–	–	–	–	–	–	<b>7,371</b>	<b>5%</b>	<b>336</b>	<b>15.724</b>	<b>0.047</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-9. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Fuel Facilities, 2016.

FUEL FACILITIES																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
<b>ENRICHMENT</b>																
URS/CH2MHill - Oak Ridge (UCOR): ETPP	353	3	–	–	–	–	–	–	–	–	–	356	1%	3	0.114	0.038
Swift and Staley Team	355	56	–	–	–	–	–	–	–	–	–	411	14%	56	0.403	0.007
National Strategic Protective Services: NSPS	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
<b>Totals</b>	<b>709</b>	<b>59</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>768</b>	<b>8%</b>	<b>59</b>	<b>0.517</b>	<b>0.009</b>
<b>FABRICATION</b>																
	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
<b>PROCESSING</b>																
Savannah River Nuclear Solutions	3	9	3	–	–	–	–	–	–	–	–	15	80%	12	0.745	0.062
SRNS Construction	15	19	2	1	–	–	–	–	–	–	–	37	59%	22	0.913	0.042
SRNS Service Subs	1	1	–	–	–	–	–	–	–	–	–	2	50%	1	0.036	0.036
Wackenhut Services Inc. - SR	354	230	3	–	–	–	–	–	–	–	–	587	40%	233	6.759	0.029
Bechtel Construction - SR	86	31	–	–	–	–	–	–	–	–	–	117	26%	31	0.466	0.015
Savannah River Field Office	9	5	–	–	–	–	–	–	–	–	–	14	36%	5	0.060	0.012
Los Alamos National Laboratory	10	8	–	–	–	–	–	–	–	–	–	18	44%	8	0.064	0.008
Misc. DOE Contractors - SR	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
SR construction - Parsons Subcontractors	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
SRNS Construction Subs	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
<b>Totals</b>	<b>481</b>	<b>303</b>	<b>8</b>	<b>1</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>793</b>	<b>39%</b>	<b>312</b>	<b>9.043</b>	<b>0.029</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-10. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Maintenance and Support, 2016.

### MAINTENANCE AND SUPPORT

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)

Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Los Alamos National Laboratory	5,385	735	179	58	19	7	4	–	–	–	–	6,387	16%	1,002	93.586	0.093
SRNL	16	46	19	–	–	–	–	–	–	–	–	81	80%	65	4.720	0.073
Wastren Advantage, Inc.	5	12	3	–	–	–	–	–	–	–	–	20	75%	15	0.976	0.065
Centerra-Nevada	235	2	–	–	–	–	–	–	–	–	–	237	1%	2	0.113	0.057
SRR Operations	–	12	–	–	–	–	–	–	–	–	–	12	100%	12	0.587	0.049
NSTec - NTS	706	30	3	–	–	–	–	–	–	–	–	739	4%	33	1.550	0.047
CH2M Hill Plateau Remediation Company (CHPRC)	906	548	57	7	–	1	–	–	–	–	–	1,519	40%	613	26.328	0.043
NSTec - Las Vegas	365	46	2	–	–	–	–	–	–	–	–	413	12%	48	1.614	0.034
Washington River Protection Solutions LLC	373	311	10	2	–	–	–	–	–	–	–	696	46%	323	10.304	0.032
Savannah River Nuclear Solutions	93	95	6	–	–	–	–	–	–	–	–	194	52%	101	2.971	0.029
Mission Support Alliance	863	260	7	1	–	–	–	–	–	–	–	1,131	24%	268	6.264	0.023
Brookhaven National Laboratory	763	14	1	–	–	–	–	–	–	–	–	778	2%	15	0.333	0.022
Bechtel Construction - SR	1	1	–	–	–	–	–	–	–	–	–	2	50%	1	0.018	0.018
NNSA Nevada Site Office	93	1	–	–	–	–	–	–	–	–	–	94	1%	1	0.018	0.018
SRNS Construction	10	6	–	–	–	–	–	–	–	–	–	16	38%	6	0.100	0.017
SRNS Service Subs	12	5	–	–	–	–	–	–	–	–	–	17	29%	5	0.086	0.017
NNSA Los Alamos Site Office	101	4	–	–	–	–	–	–	–	–	–	105	4%	4	0.047	0.012
DOE-Richland Field Office	4	1	–	–	–	–	–	–	–	–	–	5	20%	1	0.011	0.011
Sandia National Laboratories	352	1	–	–	–	–	–	–	–	–	–	353	0%	1	0.010	0.010
Savannah River Field Office	3	3	–	–	–	–	–	–	–	–	–	6	50%	3	0.019	0.006
SRNS Construction Subs	2	1	–	–	–	–	–	–	–	–	–	3	33%	1	0.005	0.005
Battelle - Pantex	25	–	–	–	–	–	–	–	–	–	–	25	0%	0	0.000	0.000
Battelle - PNNL	24	–	–	–	–	–	–	–	–	–	–	24	0%	0	0.000	0.000
Centerra-Nevada Subcontractors Lockheed	13	–	–	–	–	–	–	–	–	–	–	13	0%	0	0.000	0.000
DOE Headquarters	136	–	–	–	–	–	–	–	–	–	–	136	0%	0	0.000	0.000
Johnson Controls Inc.	6	–	–	–	–	–	–	–	–	–	–	6	0%	0	0.000	0.000
Navarro-Intera LLC	20	–	–	–	–	–	–	–	–	–	–	20	0%	0	0.000	0.000
NNSA Albuquerque Complex	10	–	–	–	–	–	–	–	–	–	–	10	0%	0	0.000	0.000
NSTec - Livermore Operations	7	–	–	–	–	–	–	–	–	–	–	7	0%	0	0.000	0.000
NSTec - Los Alamos	17	–	–	–	–	–	–	–	–	–	–	17	0%	0	0.000	0.000
NSTec - NTS subcontractors	63	–	–	–	–	–	–	–	–	–	–	63	0%	0	0.000	0.000
NSTec - Special Tech. Lab	11	–	–	–	–	–	–	–	–	–	–	11	0%	0	0.000	0.000
Nye County Sheriff	5	–	–	–	–	–	–	–	–	–	–	5	0%	0	0.000	0.000
Office of Secure Transportation	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
Protection Technologies Los Alamos	5	–	–	–	–	–	–	–	–	–	–	5	0%	0	0.000	0.000
SRR Service Subs	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
UT-Battelle ORNL	9	–	–	–	–	–	–	–	–	–	–	9	0%	0	0.000	0.000
Wackenhut Services Inc. - SR	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
<b>Totals</b>	<b>10,643</b>	<b>2,134</b>	<b>287</b>	<b>68</b>	<b>19</b>	<b>8</b>	<b>4</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>13,163</b>	<b>19%</b>	<b>2,520</b>	<b>149.660</b>	<b>0.059</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-11. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Reactor Facilities, 2016.

### REACTOR FACILITIES

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)

Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Sandia National Laboratories	57	24	2	–	–	–	–	–	–	–	–	83	31%	26	1.23	0.047
Brookhaven National Laboratory	12	–	–	–	–	–	–	–	–	–	–	12	0%	0	0	0
<b>Totals</b>	<b>69</b>	<b>24</b>	<b>2</b>	–	–	–	–	–	–	–	–	<b>95</b>	<b>27%</b>	<b>26</b>	<b>1.23</b>	<b>0.047</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-12. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Research, General, 2016.

### RESEARCH, GENERAL

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)

Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Argonne National Laboratory	1,716	47	10	7	1	–	5	–	–	–	–	1,786	4%	70	13.080	0.187
ICP - CWI - Construction Subs	8	2	2	1	–	–	–	–	–	–	–	13	38%	5	0.618	0.124
ICP - Flour Projects (ICP and AMWTP)	567	169	45	29	3	–	–	–	–	–	–	813	30%	246	25.242	0.103
UT-Batelle ORNL	3,067	306	56	36	11	1	2	–	–	–	–	3,479	12%	412	40.009	0.097
Lawrence Livermore National Laboratory	8,333	70	11	2	–	2	1	–	–	–	–	8,419	1%	86	7.701	0.090
DUF6 Portsmouth Const. Subs - MACS Subs	282	10	8	–	–	–	–	–	–	–	–	300	6%	18	1.581	0.088
INL - BEA LLC - Security	59	6	4	–	–	–	–	–	–	–	–	69	14%	10	0.829	0.083
ICP - Flour Service Subcontractors ICP/AMWTP	684	244	63	26	2	–	–	–	–	–	–	1,019	33%	335	27.303	0.082
ICP - CWI - Support	117	30	9	1	–	–	–	–	–	–	–	157	25%	40	2.842	0.071
Lawrence Berkeley Laboratory	911	11	1	1	–	–	–	–	–	–	–	924	1%	13	0.823	0.063
INL - BEA LLC - Services	3,177	437	81	19	–	–	–	–	–	–	–	3,714	14%	537	31.583	0.059
URS/CH2MHill - Oak Ridge (UCOR): ETTP	326	34	5	–	–	–	–	–	–	–	–	365	11%	39	1.911	0.049
INL - BEA LLC - Production	220	46	8	1	–	–	–	–	–	–	–	275	20%	55	2.536	0.046
Lawrence Livermore National Laboratory Nevada	219	12	–	–	–	–	–	–	–	–	–	231	5%	12	0.514	0.043
Fluor/B&W - Portsmouth	2,059	20	2	–	–	–	–	–	–	–	–	2,081	1%	22	0.928	0.042
INL - BEA LLC - Research	211	33	5	–	–	–	–	–	–	–	–	249	15%	38	1.593	0.042
Sandia National Laboratories	331	20	2	–	–	–	–	–	–	–	–	353	6%	22	0.845	0.038
Ames Laboratory (Iowa State)	149	41	–	–	–	–	–	–	–	–	–	190	22%	41	1.240	0.030
Battelle - PNNL	1,816	371	20	5	–	–	–	–	–	–	–	2,212	18%	396	11.416	0.029
New Brunswick Laboratory - Research	22	4	–	–	–	–	–	–	–	–	–	26	15%	4	0.096	0.024
SRNL	272	265	7	1	–	–	–	–	–	–	–	545	50%	273	6.653	0.024
USEC - Oak Ridge	74	1	–	–	–	–	–	–	–	–	–	75	1%	1	0.024	0.024
Oak Ridge Institute for Science & Education	93	9	–	–	–	–	–	–	–	–	–	102	9%	9	0.171	0.019
Idaho Field Office	225	7	–	–	–	–	–	–	–	–	–	232	3%	7	0.124	0.018
National Strategic Protective Services: NSPS	107	2	–	–	–	–	–	–	–	–	–	109	2%	2	0.036	0.018
Isotek (Bldg 3019)	65	12	–	–	–	–	–	–	–	–	–	77	16%	12	0.197	0.016
SRNS Service Subs	47	21	1	–	–	–	–	–	–	–	–	69	32%	22	0.338	0.015
Los Alamos National Laboratory	48	2	–	–	–	–	–	–	–	–	–	50	4%	2	0.028	0.014
SRNS Construction	43	24	–	–	–	–	–	–	–	–	–	67	36%	24	0.296	0.012
Univ. of Georgia Ecology Laboratory	11	5	–	–	–	–	–	–	–	–	–	16	31%	5	0.057	0.011
Pacific Northwest Site Office	20	12	–	–	–	–	–	–	–	–	–	32	38%	12	0.104	0.009
Savannah River Nuclear Solutions	87	42	–	–	–	–	–	–	–	–	–	129	33%	42	0.386	0.009
Wackenhut Services Inc. - SR	63	20	–	–	–	–	–	–	–	–	–	83	24%	20	0.184	0.009
FLUOR Paducah Deactivation Project	1,083	333	–	–	–	–	–	–	–	–	–	1,416	24%	333	2.636	0.008
Battelle - PNNL - Subs	188	12	–	–	–	–	–	–	–	–	–	200	6%	12	0.079	0.007
Misc. DOE Contractors - SR	4	2	–	–	–	–	–	–	–	–	–	6	33%	2	0.014	0.007
Savannah River Field Office	9	3	–	–	–	–	–	–	–	–	–	12	25%	3	0.021	0.007
National Renewable Energy Laboratory	4	7	–	–	–	–	–	–	–	–	–	11	64%	7	0.034	0.005
Brookhaven National Laboratory	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
Lawrence Livermore National Laboratories	88	–	–	–	–	–	–	–	–	–	–	88	0%	0	0.000	0.000
SRNS Construction Subs	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
SRR Operations	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
SRR Service Subs	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
Wastren - Portsmouth Services	160	–	–	–	–	–	–	–	–	–	–	160	0%	0	0.000	0.000
<b>Totals</b>	<b>26,971</b>	<b>2,692</b>	<b>340</b>	<b>129</b>	<b>17</b>	<b>3</b>	<b>8</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>30,160</b>	<b>11%</b>	<b>3,189</b>	<b>184.072</b>	<b>0.058</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

## DOE Occupational Radiation Exposure: 2016 Annual Report

### Exhibit B-13. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Research, Fusion, 2016.

RESEARCH, FUSION																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Sandia National Laboratories	53	4	–	–	–	–	–	–	–	–	–	57	7%	4	0.103	<b>0.026</b> ◀
Princeton Plasma Physics Laboratory	330	78	–	–	–	–	–	–	–	–	–	<b>408</b> ◀	<b>19%</b> ◀	<b>78</b> ◀	<b>0.311</b> ◀	0.004
Los Alamos National Laboratory	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
<b>Totals</b>	<b>385</b>	<b>82</b>	–	–	–	–	–	–	–	–	–	<b>467</b>	<b>18%</b>	<b>82</b>	<b>0.414</b>	<b>0.005</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-14. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Waste Processing, 2016.

### WASTE PROCESSING

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)

Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
SPRU-NY (Building remediation)	101	22	14	19	16	22	8	–	–	–	–	202	50%	101	47.541 ◀	0.471 ◀
West Valley Nuclear Services Inc.	244	50	26	41	26	4	–	–	–	–	–	391	38%	147	41.122	0.280
TRU WASTE PROCESSING CENTER - ORNL	60	71	57	34	5	–	–	–	–	–	–	227	74%	167	27.631	0.165
Savannah River Nuclear Solutions	237	200	32	17	–	–	–	–	–	–	–	486	51%	249	15.201	0.061
SRNS Construction	35	18	5	1	–	–	–	–	–	–	–	59	41%	24	1.422	0.059
Bechtel Construction - SR	115	283	29	17	–	–	–	–	–	–	–	444	74%	329	18.041	0.055
Energy Solutions - UMTRA Project - Moab	22	110	15	5	1	–	–	–	–	–	–	153	86%	131	7.044	0.054
Brookhaven National Laboratory	41	6	1	–	–	–	–	–	–	–	–	48	15%	7	0.366	0.052
SR construction - Parsons	3	2	1	–	–	–	–	–	–	–	–	6	50%	3	0.153	0.051
SRR Operations	749	641	106	27	–	–	–	–	–	–	–	1,523 ◀	51%	774 ◀	39.641	0.051
SRNS Service Subs	90	56	4	–	–	–	–	–	–	–	–	150	40%	60	2.108	0.035
Misc. DOE Contractors - SR	5	2	–	–	–	–	–	–	–	–	–	7	29%	2	0.067	0.034
Washington River Protection Solutions LLC	787	331	19	–	–	–	–	–	–	–	–	1,137	31%	350	10.889	0.031
Wackenhut Services Inc. - SR	104	113	2	–	–	–	–	–	–	–	–	219	53%	115	3.494	0.030
Wastren Advantage, Inc.	18	15	2	–	–	–	–	–	–	–	–	35	49%	17	0.479	0.028
SRNL	3	8	1	–	–	–	–	–	–	–	–	12	75%	9	0.225	0.025
Misc. S.R.S. Const. Subcontractors	12	10	–	–	–	–	–	–	–	–	–	22	45%	10	0.225	0.023
DUF6 Paducah Const. Subs - MACS Subs	186	168	2	–	–	–	–	–	–	–	–	356	48%	170	3.162	0.019
Savannah River Field Office	50	14	–	–	–	–	–	–	–	–	–	64	22%	14	0.221	0.016
Mission Support Alliance	–	1	–	–	–	–	–	–	–	–	–	1	100% ◀	1	0.015	0.015
Washington TRU Solutions LLC-WIPP	517	19	–	–	–	–	–	–	–	–	–	536	4%	19	0.277	0.015
SRNS Construction Subs	4	2	–	–	–	–	–	–	–	–	–	6	33%	2	0.023	0.012
Carlsbad Field Office	26	1	–	–	–	–	–	–	–	–	–	27	4%	1	0.011	0.011
WTS Subcontractors - WIPP	56	3	–	–	–	–	–	–	–	–	–	59	5%	3	0.034	0.011
SRR Service Subs	39	12	–	–	–	–	–	–	–	–	–	51	24%	12	0.109	0.009
Sandia National Laboratories	53	3	–	–	–	–	–	–	–	–	–	56	5%	3	0.024	0.008
Battelle - PNNL	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
Bechtel National Corporation	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
CH2M Hill Plateau Remediation Company (CHPRC)	6	–	–	–	–	–	–	–	–	–	–	6	0%	0	0.000	0.000
DOE-Richland Field Office	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
Los Alamos National Lab - WIPP	3	–	–	–	–	–	–	–	–	–	–	3	0%	0	0.000	0.000
Los Alamos National Laboratory	3	–	–	–	–	–	–	–	–	–	–	3	0%	0	0.000	0.000
Sandia National Lab - WIPP	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
Santa Fe Protective Services (WIPP)	3	–	–	–	–	–	–	–	–	–	–	3	0%	0	0.000	0.000
SR construction - Parsons Subcontractors	6	–	–	–	–	–	–	–	–	–	–	6	0%	0	0.000	0.000
<b>Totals</b>	<b>3,583</b>	<b>2,161</b>	<b>316</b>	<b>161</b>	<b>48</b>	<b>26</b>	<b>8</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>6,303</b>	<b>43%</b>	<b>2,720</b>	<b>219.525</b>	<b>0.081</b>

Note: Boxed values (gray background) indicate the greatest value in each column.



# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-15. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Weapons Fabrication, 2016.

WEAPONS FABRICATION																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
CNS, LLC - Pantex	3,649	218	44	25	3	1	–	–	–	–	–	3,940	7%	291	25.854	0.089
CNS, LLC - Y-12	4,817	1,248	166	40	3	–	–	–	–	–	–	6,274	23%	1,457	72.724	0.050
Sandia National Laboratories	128	2	–	–	–	–	–	–	–	–	–	130	2%	2	0.062	0.031
URS/CH2MHill - Oak Ridge (UCOR): Y-12	91	3	–	–	–	–	–	–	–	–	–	94	3%	3	0.083	0.028
Office of Secure Transportation	334	3	–	–	–	–	–	–	–	–	–	337	1%	3	0.072	0.024
CNS, LLC - Security	527	3	–	–	–	–	–	–	–	–	–	530	1%	3	0.052	0.017
CNS, LLC - Subcontractors	66	1	–	–	–	–	–	–	–	–	–	67	1%	1	0.012	0.012
SRNS Service Subs	1	1	–	–	–	–	–	–	–	–	–	2	50%	1	0.012	0.012
Savannah River Nuclear Solutions	225	75	1	–	–	–	–	–	–	–	–	301	25%	76	0.836	0.011
SRNS Construction	16	8	–	–	–	–	–	–	–	–	–	24	33%	8	0.066	0.008
Misc. DOE Contractors - SR	–	1	–	–	–	–	–	–	–	–	–	1	100%	1	0.007	0.007
SRNL	23	1	–	–	–	–	–	–	–	–	–	24	4%	1	0.005	0.005
Kansas City National Security Campus	73	24	–	–	–	–	–	–	–	–	–	97	25%	24	0.063	0.003
Los Alamos National Laboratory	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
PXSO/NNSA and DOE Couriers	26	–	–	–	–	–	–	–	–	–	–	26	0%	0	0.000	0.000
Savannah River Field Office	7	–	–	–	–	–	–	–	–	–	–	7	0%	0	0.000	0.000
<b>Totals</b>	<b>9,985</b>	<b>1,588</b>	<b>211</b>	<b>65</b>	<b>6</b>	<b>1</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>11,856</b>	<b>16%</b>	<b>1,871</b>	<b>99.848</b>	<b>0.053</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-16. Distribution of TED by Facility Type Listed in Descending Order of Average Measurable TED for Other, 2016.

OTHER																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Site/Contractor	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Wastren Advantage, Inc.	13	2	–	1	–	–	–	–	–	–	–	16	19%	3	0.305	0.102
Washington River Protection Solutions LLC	410	165	23	19	–	–	–	–	–	–	–	617	34%	207	13.732	0.066
Cabrera Services	3	2	–	–	–	–	–	–	–	–	–	5	40%	2	0.089	0.045
CH2M Hill Plateau Remediation Company (CHPRC)	406	127	8	–	–	–	–	–	–	–	–	541	25%	135	4.641	0.034
SRNS Service Subs	145	21	3	–	–	–	–	–	–	–	–	169	14%	24	0.797	0.033
Sandia National Laboratories	437	5	–	–	–	–	–	–	–	–	–	442	1%	5	0.159	0.032
Office of River Protection	85	24	1	–	–	–	–	–	–	–	–	110	23%	25	0.640	0.026
DOE-Richland Field Office	305	96	3	–	–	–	–	–	–	–	–	404	25%	99	2.073	0.021
Los Alamos National Laboratory	2,949	95	2	–	–	–	–	–	–	–	–	3,046	3%	97	1.898	0.020
Savannah River Nuclear Solutions	421	120	2	–	–	–	–	–	–	–	–	543	22%	122	2.352	0.019
Washington Closure Hanford LLC (WCH)	470	95	–	–	–	–	–	–	–	–	–	565	17%	95	1.701	0.018
Bechtel National Corporation	17	4	–	–	–	–	–	–	–	–	–	21	19%	4	0.066	0.017
SRNS Construction	90	27	–	–	–	–	–	–	–	–	–	117	23%	27	0.445	0.016
Misc. S.R.S. Const. Subcontractors	1	2	–	–	–	–	–	–	–	–	–	3	67%	2	0.027	0.014
Mission Support Alliance	77	6	–	–	–	–	–	–	–	–	–	83	7%	6	0.076	0.013
Savannah River Field Office	42	20	–	–	–	–	–	–	–	–	–	62	32%	20	0.246	0.012
SRNL	2	2	–	–	–	–	–	–	–	–	–	4	50%	2	0.015	0.008
Univ. of Georgia Ecology Laboratory	6	3	–	–	–	–	–	–	–	–	–	9	33%	3	0.023	0.008
Wackenhut Services Inc. - SR	35	9	–	–	–	–	–	–	–	–	–	44	20%	9	0.062	0.007
SRR Service Subs	6	2	–	–	–	–	–	–	–	–	–	8	25%	2	0.012	0.006
SRR Operations	6	1	–	–	–	–	–	–	–	–	–	7	14%	1	0.005	0.005
Advanced Technologies and Laboratories Int'l	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
Battelle - PNNL	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
CSC Hanford Occupational Health Services	28	–	–	–	–	–	–	–	–	–	–	28	0%	0	0.000	0.000
Misc. DOE Contractors - SR	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
NNSA Los Alamos Site Office	2	–	–	–	–	–	–	–	–	–	–	2	0%	0	0.000	0.000
Office of Secure Transportation	4	–	–	–	–	–	–	–	–	–	–	4	0%	0	0.000	0.000
Protection Technologies Los Alamos	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
SR construction - Parsons	1	–	–	–	–	–	–	–	–	–	–	1	0%	0	0.000	0.000
SRNS Construction Subs	4	–	–	–	–	–	–	–	–	–	–	4	0%	0	0.000	0.000
<b>Totals</b>	<b>5,970</b>	<b>828</b>	<b>42</b>	<b>20</b>	–	–	–	–	–	–	–	<b>6,860</b>	<b>13%</b>	<b>890</b>	<b>29.364</b>	<b>0.033</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-17. Internal Dose by Facility Type and Nuclide, 2014–2016.**

Facility Type	Nuclide*	No. of Individuals with Measurable CED** 2014	No. of Individuals with Measurable CED** 2015	No. of Individuals with Measurable CED** 2016	Collective CED Dose (person-rem) 2014	Collective CED Dose (person-rem) 2015	Collective CED Dose (person-rem) 2016	Average Measurable CED (rem) 2014	Average Measurable CED (rem) 2015	Average Measurable CED (rem) 2016
Accelerator	Total	–	–	–	–	–	–	–	–	–
Fuel Fabrication	Total	–	–	–	–	–	–	–	–	–
Fuel Processing	Plutonium	3	2	4	0.011	0.006	0.016	0.004	0.003	0.004
	Total	3	2	4	0.011	0.006	0.016	0.004	0.003	0.004
Fuel/Uranium Enrichment	Total	–	–	–	–	–	–	–	–	–
Maintenance and Support	Americium	1	3	2	0.048	0.027	0.014	0.048	0.009	0.007
	Hydrogen-3	3	16	16	0.007	0.035	0.042	0.002	0.002	0.003
	Plutonium	2	2	–	0.095	0.014	–	0.048	0.007	–
	Uranium	11	13	12	0.040	0.101	0.068	0.004	0.008	0.006
	Total	17	34	30	0.190	0.177	0.124	0.011	0.005	0.004
Other	Hydrogen-3	–	–	1	–	–	0.001	–	–	0.001
	Plutonium	–	–	1	–	–	0.002	–	–	0.002
	Uranium	1	1	–	0.001	0.001	–	0.001	0.001	–
	Total	1	1	2	0.001	0.001	0.003	0.001	0.001	0.002
Reactor	Total	–	–	–	–	–	–	–	–	–
Research, Fusion	Total	–	–	–	–	–	–	–	–	–
Research, General	Americium	16	4	2	0.417	0.092	0.065	0.026	0.023	0.033
	Californium	1	–	–	0.010	–	–	0.010	–	–
	Hydrogen-3	4	1	4	0.010	0.012	0.025	0.003	0.012	0.006
	Mixed	4	3	2	0.274	0.255	–	0.069	<b>0.128</b> ◀	–
	Other	2	–	–	0.089	–	–	0.045	–	–
	Plutonium	3	2	–	0.272	0.068	–	0.091	0.034	–
	Polonium	–	–	1	–	–	0.024	–	–	0.024
	Uranium	10	6	9	0.659	0.122	0.211	0.066	0.020	0.023
	Total	40	16	18	1.731	0.564	0.354	0.043	0.035	0.020
Waste Processing/Mgmt.	Americium	2	–	–	0.035	–	–	0.018	–	–
	Mixed	–	1	–	–	0.015	–	–	0.015	–
	Other	–	–	1	–	–	0.001	–	–	0.001
	Plutonium	2	2	–	0.120	0.069	–	0.060	0.035	–
	Uranium	48	45	54	2.974	2.104	1.876	<b>0.062</b> ◀	0.047	0.035
	Total	52	48	55	3.129	2.188	1.877	0.060	0.046	0.034
Weapons Fab. and Testing	Hydrogen-3	1	2	2	0.006	0.007	0.005	0.006	0.004	0.003
	Mixed	48	33	19	1.277	0.764	0.296	0.027	0.023	0.016
	Uranium	<b>1,038</b> ◀	<b>1,011</b> ◀	<b>1,111</b> ◀	<b>47.737</b> ◀	<b>47.959</b> ◀	<b>58.869</b> ◀	0.046	0.047	<b>0.053</b> ◀
	Total	1,087	1,046	1,132	49.020	48.730	59.170	0.045	0.047	0.052
	<b>Totals</b>	<b>1,200</b>	<b>1,147</b>	<b>1,241</b>	<b>54.082</b>	<b>51.666</b>	<b>61.544</b>	<b>0.045</b>	<b>0.045</b>	<b>0.050</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\*Intakes grouped by nuclide. Intakes involving multiple nuclides were grouped into "mixed." Nuclides where fewer than 10 individuals had intakes were grouped as "other."

\*\*The number of internal depositions represents the number of internal dose records with positive results reported for each individual.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-18a. Distribution of TED by Labor Category, 2014.**

<b>TOTAL EFFECTIVE DOSE (TED)</b>																
Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Labor Category	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Agriculture	56	1	–	–	–	–	–	–	–	–	–	57	2%	1	0.050	0.050
Construction/Repair	3,348	903	164	59	5	2	–	–	–	–	–	4,481	25%	1,133	76.127	0.067
Laborers	1,010	237	52	17	6	–	–	–	–	–	–	1,322	24%	312	24.592	0.079
Management	6,375	587	39	14	1	–	–	–	–	–	–	7,016	9%	641	24.144	0.038
Miscellaneous	8,783	654	111	19	3	1	–	–	–	–	–	9,571	8%	788	42.451	0.054
Production	2,035	937	215	90	14	3	–	–	–	–	–	3,294	38% ◀	1,259	106.103	0.084
Professional/Scientists	18,417	1,705	147	23	3	3	–	–	–	–	–	20,298 ◀	9%	1,881 ◀	73.307	0.039
Service Workers	4,027	407	23	6	–	–	–	–	–	–	–	4,463	10%	436	14.810	0.034
Technicians	6,048	1,336	345	129	25	6	6	–	–	–	–	7,895	23%	1,847	168.229 ◀	0.091
Transport Workers	1,087	47	14	13	2	–	–	–	–	–	–	1,163	7%	76	8.872	0.117 ◀
Unknown	14,760	893	147	74	13	–	–	–	–	–	–	15,887	7%	1,127	81.418	0.072
<b>Totals</b>	<b>65,946</b>	<b>7,707</b>	<b>1,257</b>	<b>444</b>	<b>72</b>	<b>15</b>	<b>6</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>75,447</b>	<b>13%</b>	<b>9,501</b>	<b>620.103</b>	<b>0.065</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-18b. Distribution of TED by Labor Category, 2015.**

**TOTAL EFFECTIVE DOSE (TED)**

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)

Labor Category	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Agriculture	70	5	–	–	–	–	–	–	–	–	–	75	7%	5	0.126	0.025
Construction/Repair	3,434	1,050	204	66	9	2	1	–	–	–	–	4,766	28%	1,332	92.139	0.069
Laborers	946	179	66	48	20	11	1	–	–	–	–	1,271	26%	325	57.823	<b>0.178</b> ◀
Management	6,820	686	50	16	1	–	1	–	–	–	–	7,574	10%	754	28.750	0.038
Miscellaneous	4,315	363	114	34	6	–	–	–	–	–	–	4,832	11%	517	43.809	0.085
Production	2,328	962	214	68	27	8	7	–	–	–	–	3,614	<b>36%</b> ◀	1,286	119.463	0.093
Professional/Scientists	19,808	1,940	152	44	2	1	1	–	–	–	–	<b>21,948</b> ◀	10%	<b>2,140</b> ◀	85.665	0.040
Service Workers	4,579	515	36	10	1	1	–	–	–	–	–	5,142	11%	563	23.077	0.041
Technicians	6,626	1,371	370	120	52	24	30	–	–	–	–	8,593	23%	1,967	<b>233.866</b> ◀	0.119
Transport Workers	1,019	72	23	6	3	1	–	–	–	–	–	1,124	9%	105	10.042	0.096
Unknown	15,588	879	112	36	2	1	–	–	–	–	–	16,618	6%	1,030	50.575	0.049
<b>Totals</b>	<b>65,533</b>	<b>8,022</b>	<b>1,341</b>	<b>448</b>	<b>123</b>	<b>49</b>	<b>41</b>	–	–	–	–	<b>75,557</b>	<b>13%</b>	<b>10,024</b>	<b>745.335</b>	<b>0.074</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-18c. Distribution of TED by Labor Category, 2016.**

**TOTAL EFFECTIVE DOSE (TED)**

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)

Labor Category	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Agriculture	80	1	–	–	–	–	–	–	–	–	–	81	1%	1	0.005	0.005
Construction/Repair	3,296	1,232	178	46	3	–	–	–	–	–	–	4,755	31%	1,459	77.782	0.053
Laborers	917	309	67	45	1	–	–	–	–	–	–	1,339	32%	422	35.875	0.085
Management	6,693	1,026	42	8	–	1	–	–	–	–	–	7,770	14%	1,077	29.904	0.028
Miscellaneous	4,615	409	81	21	2	–	1	–	–	–	–	5,129	10%	514	34.509	0.067
Production	2,469	1,080	246	137	32	5	1	–	–	–	–	3,970	38%	1,501	145.666	0.097
Professional/Scientists	18,153	2,548	154	33	7	2	–	–	–	–	–	20,897	13%	2,744	92.594	0.034
Service Workers	5,252	790	48	16	–	–	–	–	–	–	–	6,106	14%	854	30.239	0.035
Technicians	7,189	1,612	377	136	41	29	18	–	–	–	–	9,402	24%	2,213	228.123	0.103
Transport Workers	999	120	17	4	3	1	–	–	–	–	–	1,144	13%	145	9.587	0.066
Unknown	16,168	1,032	37	5	1	–	–	–	–	–	–	17,243	6%	1,075	25.113	0.023
<b>Totals</b>	<b>65,831</b>	<b>10,159</b>	<b>1,247</b>	<b>451</b>	<b>90</b>	<b>38</b>	<b>20</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>77,836</b>	<b>15%</b>	<b>12,005</b>	<b>709.397</b>	<b>0.059</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

## DOE Occupational Radiation Exposure: 2016 Annual Report

### Exhibit B-19. Internal Dose by Labor Category, 2014–2016.

Labor Category	No. of Individuals with Measurable CED* 2013	No. of Individuals with Measurable CED* 2014	No. of Individuals with Measurable CED* 2015	Collective CED Dose (person-rem) 2013	Collective CED Dose (person-rem) 2014	Collective CED Dose (person-rem) 2015	Average Measurable CED (rem) 2013	Average Measurable CED (rem) 2014	Average Measurable CED (rem) 2015
Construction/Repair	224	193	230	8.657	8.548	9.481	0.039	0.044	0.041
Laborers	59	64	68	4.227	4.953	6.752	0.072	<b>0.077</b> ◀	<b>0.099</b> ◀
Management	95	93	93	3.581	4.555	4.319	0.038	0.049	0.046
Miscellaneous	20	9	18	0.649	0.221	0.314	0.032	0.025	0.017
Production	<b>329</b> ◀	<b>325</b> ◀	<b>345</b> ◀	<b>20.191</b> ◀	<b>18.931</b> ◀	<b>22.435</b> ◀	0.061	0.058	0.065
Professional/Scientists	166	173	181	5.044	4.194	5.783	0.030	0.024	0.032
Service Workers	36	33	35	1.621	1.166	1.530	0.045	0.035	0.044
Technicians	121	111	129	4.727	4.345	5.635	0.039	0.039	0.044
Transport Workers	27	27	27	2.214	1.465	1.200	<b>0.082</b> ◀	0.054	0.044
Unknown	123	119	115	3.171	3.288	4.095	0.026	0.028	0.036
<b>Totals</b>	<b>1,200</b>	<b>1,147</b>	<b>1,241</b>	<b>54.082</b>	<b>51.666</b>	<b>61.544</b>	<b>0.045</b>	<b>0.045</b>	<b>0.050</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\*The number of internal depositions represents the number of internal dose records with positive results reported for each individual.

**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-20. Dose Distribution by Labor Category and Occupation, 2016.**

Labor Category	Occupation	Less than Meas.	Meas. to 0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Monitored	Percent of Monitored with Meas. TED	No. with Meas. TED	Collective TED (Person-rem)	Avg. Meas. TED (rem)
Agriculture	Groundkeepers	58	1	–	–	–	–	–	–	–	–	–	59	2%	1	0.005	0.005
	Misc. Agriculture	22	–	–	–	–	–	–	–	–	–	–	22	–	–	–	–
Construction/Repair	Carpenters	251	108	28	5	–	–	–	–	–	–	–	392	36%	141	9.102	0.065
	Electricians	1,115	324	44	8	1	–	–	–	–	–	–	1,492	25%	377	18.681	0.050
	Masons	15	14	2	–	–	–	–	–	–	–	–	31	52%	16	0.735	0.046
	Mechanics/Repairers	493	178	22	8	1	–	–	–	–	–	–	702	30%	209	11.513	0.055
	Miners/Drillers	79	5	–	–	–	–	–	–	–	–	–	84	6%	5	0.172	0.034
	Misc. Repair/Construction	846	430	44	11	1	–	–	–	–	–	–	1,332	36%	486	22.960	0.047
	Painters	126	26	5	–	–	–	–	–	–	–	–	157	20%	31	1.552	0.050
	Pipe Fitter	371	147	33	14	–	–	–	–	–	–	–	565	34%	194	13.067	0.067
Laborers	Handlers/Laborers/Helpers	917	309	67	45	1	–	–	–	–	–	–	1,339	32%	422	35.875	0.085
Management	Admin. Support & Clerical Sec.	1,532	107	3	–	–	–	–	–	–	–	–	1,642	7%	110	2.489	0.023
	Manager - Administrator	5,144	919	39	8	–	1	–	–	–	–	–	6,111	16%	967	27.415	0.028
	Sales	17	–	–	–	–	–	–	–	–	–	–	17	–	–	–	–
Miscellaneous	Military	31	2	–	–	–	–	–	–	–	–	–	33	6%	2	0.017	0.009
	Miscellaneous	4,584	407	81	21	2	–	1	–	–	–	–	5,096	10%	512	34.492	0.067
Production	Machine Setup/Operators	122	130	46	12	–	–	–	–	–	–	–	310	61%	188	14.959	0.080
	Machinists	164	14	3	3	–	–	–	–	–	–	–	184	11%	20	1.784	0.089
	Misc. Precision/Production	497	201	39	13	2	–	–	–	–	–	–	752	34%	255	18.564	0.073
	Operators, Plant/ System/Util.	1,430	680	150	107	29	5	1	–	–	–	–	2,402	40%	972	106.432	0.109
	Sheet Metal Workers	225	47	8	2	1	–	–	–	–	–	–	283	20%	58	3.734	0.064
	Welders and Solderers	31	8	–	–	–	–	–	–	–	–	–	39	21%	8	0.193	0.024
Professional/Scientists	Doctors and Nurses	66	1	–	–	–	–	–	–	–	–	–	67	1%	1	0.011	0.011
	Engineer	5,591	771	36	9	4	2	–	–	–	–	–	6,413	13%	822	27.505	0.033
	Health Physicist	346	71	9	1	–	–	–	–	–	–	–	427	19%	81	3.464	0.043
	Misc. Professional	6,799	1,183	73	14	–	–	–	–	–	–	–	8,069	16%	1,270	39.258	0.031
	Scientist	5,351	522	36	9	3	–	–	–	–	–	–	5,921	10%	570	22.356	0.039
Service Workers	Firefighters	537	64	2	–	–	–	–	–	–	–	–	603	11%	66	1.368	0.021
	Food Service Employees	3	3	–	–	–	–	–	–	–	–	–	6	50%	3	0.042	0.014
	Janitors	369	25	1	–	–	–	–	–	–	–	–	395	7%	26	0.594	0.023
	Misc. Service	2,330	328	38	15	–	–	–	–	–	–	–	2,711	14%	381	19.394	0.051
	Security Guards	2,013	370	7	1	–	–	–	–	–	–	–	2,391	16%	378	8.841	0.023
Technicians	Engineering Technicians	1,847	151	19	7	–	1	1	–	–	–	–	2,026	9%	179	11.647	0.065
	Health Technicians	227	126	11	5	1	–	–	–	–	–	–	370	39%	143	7.354	0.051
	Misc. Technicians	2,348	315	44	27	17	18	13	–	–	–	–	2,782	16%	434	65.826	0.152
	Radiation Monitors/Techs.	927	720	203	74	13	8	–	–	–	–	–	1,945	52%	1,018	97.332	0.096
	Science Technicians	679	146	36	3	–	–	–	–	–	–	–	864	21%	185	10.960	0.059
	Technicians	1,161	154	64	20	10	2	4	–	–	–	–	1,415	18%	254	35.004	0.138
Transport Workers	Bus Drivers	6	–	–	–	–	–	–	–	–	–	–	6	–	–	–	–
	Equipment Operators	151	68	12	2	3	1	–	–	–	–	–	237	36%	86	6.877	0.080
	Misc. Transport	398	10	–	–	–	–	–	–	–	–	–	408	2%	10	0.248	0.025
	Pilots	13	–	–	–	–	–	–	–	–	–	–	13	–	–	–	–
	Truck Drivers	431	42	5	2	–	–	–	–	–	–	–	480	10%	49	2.462	0.050
Unknown	Unknown	16,168	1,032	37	5	1	–	–	–	–	–	–	17,243	6%	1,075	25.113	0.023
<b>Totals</b>		<b>65,831</b>	<b>10,159</b>	<b>1,247</b>	<b>451</b>	<b>90</b>	<b>38</b>	<b>20</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>–</b>	<b>77,836</b>	<b>15%</b>	<b>12,005</b>	<b>709.397</b>	<b>0.059</b>

Note: Boxed values (gray background) indicate the greatest value in each column.



**DOE Occupational Radiation Exposure: 2016 Annual Report**  
**Exhibit B-21. Internal Dose Distribution by Site and Nuclide, 2016.**

Number of Individuals Receiving Radiation Doses in Each Dose Range (rem)																
Site	Nuclide*	Meas. to 0.020	0.020–0.100	0.100–0.250	0.250–0.500	0.500–0.750	0.750–1.000	1.0–2.0	2.0–3.0	3.0–4.0	4.0–5.0	>5.0	Total Individ. with Meas. CED	Collective CED (person-rem)	Avg. CED (rem)	
Argonne National Laboratory	Uranium	–	–	1	–	–	–	–	–	–	–	–	1	0.114	0.114	
Hanford: Hanford Site	Americium	2	–	–	–	–	–	–	–	–	–	–	2	0.014	0.007	
Hanford: Hanford Site	Plutonium	1	–	–	–	–	–	–	–	–	–	–	1	0.002	0.002	
Hanford: Pacific Northwest National Laboratory	Hydrogen-3	2	–	–	–	–	–	–	–	–	–	–	2	0.004	0.002	
Idaho National Laboratory	Americium	–	2	–	–	–	–	–	–	–	–	–	2	0.065	0.033	
Lawrence Livermore National Laboratory	Other	2	–	–	–	–	–	–	–	–	–	–	2	0.029	0.015	
Los Alamos National Laboratory	Hydrogen-3	17	–	–	–	–	–	–	–	–	–	–	17	0.043	0.003	
Los Alamos National Laboratory	Uranium	11	1	–	–	–	–	–	–	–	–	–	12	0.068	0.006	
Oak Ridge: Oak Ridge National Laboratory	Hydrogen-3	2	–	–	–	–	–	–	–	–	–	–	2	0.021	0.011	
Oak Ridge: Oak Ridge National Laboratory	Polonium	–	1	–	–	–	–	–	–	–	–	–	1	0.024	0.024	
Oak Ridge: Oak Ridge National Laboratory	Uranium	1	–	–	–	–	–	–	–	–	–	–	1	0.010	0.010	
Oak Ridge: Y-12 National Security Complex	Mixed	14	5	–	–	–	–	–	–	–	–	–	19	0.296	0.016	
Oak Ridge: Y-12 National Security Complex	Uranium	449	494	130	36	2	–	–	–	–	–	–	1,111	58.869	0.053	
Paducah Gaseous Diffusion Plant	Uranium	7	–	–	–	–	–	–	–	–	–	–	7	0.087	0.012	
Pantex Plant	Hydrogen-3	1	–	–	–	–	–	–	–	–	–	–	1	0.001	0.001	
Sandia National Laboratories	Other	1	–	–	–	–	–	–	–	–	–	–	1	0.001	0.001	
Savannah River Site	Hydrogen-3	1	–	–	–	–	–	–	–	–	–	–	1	0.004	0.004	
Savannah River Site	Plutonium	4	–	–	–	–	–	–	–	–	–	–	4	0.016	0.004	
Uranium Mill Tailings Remedial Action Project	Uranium	31	19	4	–	–	–	–	–	–	–	–	54	1.876	0.035	
<b>Totals</b>		<b>546</b>	<b>522</b>	<b>135</b>	<b>36</b>	<b>2</b>	–	–	–	–	–	–	<b>1,241</b>	<b>61.544</b>	<b>0.050</b>	

Note: Boxed values (gray background) indicate the greatest value in each column.

\*Intakes grouped by nuclide. Intakes involving multiple nuclides were grouped into "mixed." Nuclides where fewer than 10 individuals had intakes were grouped as "other."

# DOE Occupational Radiation Exposure: 2016 Annual Report

## Exhibit B-22. Extremity Dose Distribution by Site, 2016.

Site	No. Meas. Dose	Meas. to 0.100	0.100–1.0	1.0–5.0	5.0–10.0	10.0–20.0	20.0–30.0	>30.0	Total Monitored*	No. with Meas.	No. Above Monitoring Threshold (5 rems)**	Collective Extremity Dose (person-rem)	Avg. Meas. Extremity Dose (rem)
Ames Laboratory	187	3	–	–	–	–	–	–	190	3	–	0.110	0.037
Argonne National Laboratory	1,678	80	16	10	1	1	–	–	1,786	108	2	50.935	0.472
Brookhaven National Laboratory	3,157	7	12	2	–	–	–	–	3,178	21	–	6.670	0.318
Energy Technology Engineering Center	5	–	–	–	–	–	–	–	5	–	–	–	–
Fermi National Accelerator Laboratory	1,373	7	2	–	–	–	–	–	1,382	9	–	0.620	0.069
Hanford: Hanford Site	4,107	67	93	17	–	–	–	–	4,284	177	–	70.832	0.400
Hanford: Office of River Protection	2,112	239	276	28	–	–	–	–	2,655	543	–	133.309	0.246
Hanford: Pacific Northwest National Laboratory	2,050	367	51	2	–	–	–	–	2,470	420	–	30.099	0.072
Idaho National Laboratory	5,238	916	356	21	10	–	–	–	6,541	1,303	10	233.123	0.179
Kansas City National Security Plant	78	19	–	–	–	–	–	–	97	19	–	0.136	0.007
Lawrence Berkeley National Laboratory	901	10	6	6	1	–	–	–	924	23	1	24.099	1.048
Lawrence Livermore National Laboratory	8,695	11	25	6	1	–	–	–	8,738	43	1	25.335	0.589
Los Alamos National Laboratory	8,498	758	298	74	8	1	–	–	9,637	1,139	9	335.810	0.295
National Renewable Energy Laboratory	11	–	–	–	–	–	–	–	11	–	–	–	–
Nevada National Security Site	1,616	3	–	–	–	–	–	–	1,619	3	–	0.118	0.039
New Brunswick Laboratory	25	1	–	–	–	–	–	–	26	1	–	0.027	0.027
Oak Ridge: East Tennessee Technology Park	355	1	–	–	–	–	–	–	356	1	–	0.026	0.026
Oak Ridge: Oak Ridge Institute for Science and Education	102	–	–	–	–	–	–	–	102	–	–	–	–
Oak Ridge: Oak Ridge National Laboratory	3,533	34	90	48	8	2	–	–	3,715	182	10	209.973	1.154
Oak Ridge: Oak Ridge: Oak Ridge National Laboratory	360	5	–	–	–	–	–	–	365	5	–	0.301	0.060
Oak Ridge: Y-12 National Security Complex	6,306	14	35	12	1	–	–	–	6,368	62	1	49.264	0.795
Office of Secure Transportation	344	–	–	–	–	–	–	–	344	–	–	–	–
Paducah Gaseous Diffusion Plant	2,183	–	–	–	–	–	–	–	2,183	–	–	–	–
Pantex Plant	4,439	32	91	26	–	–	–	–	4,588	149	–	88.040	0.591
Portsmouth Gaseous Diffusion Plant	2,540	1	–	–	–	–	–	–	2,541	1	–	0.026	0.026
Princeton Plasma Physics Laboratory	408	–	–	–	–	–	–	–	408	–	–	–	–
Sandia National Laboratories	1,853	–	–	–	–	–	–	–	1,853	–	–	–	–
Savannah River National Lab	552	38	82	9	–	–	–	–	681	129	–	52.260	0.405
Savannah River Site	5,026	204	449	80	2	1	–	–	5,762	736	3	338.998	0.461
Separations Process Research Unit	202	–	–	–	–	–	–	–	202	–	–	–	–
SLAC National Accelerator Laboratory	2,036	–	–	–	–	–	–	–	2,036	–	–	–	–
Thomas Jefferson National Accelerator Facility	1,207	–	–	–	–	–	–	–	1,207	–	–	–	–
Uranium Mill Tailings Remedial Action Project	153	–	–	–	–	–	–	–	153	–	–	–	–
Waste Isolation Pilot Plant	598	–	–	–	–	–	–	–	598	–	–	–	–
West Valley Demonstration Project	338	13	32	8	–	–	–	–	391	53	–	23.780	0.449
Service Center Personnel***	440	–	–	–	–	–	–	–	440	–	–	–	–
<b>Totals</b>	<b>72,706</b>	<b>2,830</b>	<b>1,914</b>	<b>349</b>	<b>32</b>	<b>5</b>	<b>–</b>	<b>–</b>	<b>77,836</b>	<b>5,130</b>	<b>37</b>	<b>1,673.891</b>	<b>0.326</b>

Note: Boxed values (gray background) indicate the greatest value in each column.

\* Represents the total number of monitoring records. The number of individuals provided extremity monitoring cannot be determined.

\*\* All extremity doses above 5 rems were for the upper extremities (hands and forearms). DOE annual limit for extremities is 50 rems.

10 CFR 835.402(a)(1)(ii) requires extremity monitoring for a shallow dose equivalent to the skin or extremity of 5 rems or more in a year.

\*\*\* Includes personnel at NNSA Albuquerque complex, Oak Ridge, and WIPP.