

OE-3: 2015-01

January 2015

DOE Occupational Radiation Exposures for 2013

PURPOSE

This Operating Experience Level 3 (OE-3) document provides an overview summary of radiation doses from occupational exposures at the Department of Energy (DOE), including the National Nuclear Security Administration for the year 2013.

BACKGROUND

The Office of Environment, Health, Safety and Security (EHSS) provides the corporate-level leadership and strategic vision necessary to establish clear expectations regarding health, safety, environment, and security programs. In support of this mission, the Office of Analysis provides for the collection, analysis, and dissemination of data and performance indicators, such as occupational radiation exposure information.

DOE Order 231.1B, *Environment Safety and Health Reporting*, requires the reporting of radiation exposure data to the Radiation Exposure Monitoring System (REMS) database. The DOE annual report on occupational exposure provides a detailed evaluation of DOE-wide performance regarding compliance with Title 10, Code of Federal Regulations (C.F.R.), Part 835, *Occupational Radiation Protection*, which includes requirements on occupational dose limits, as well as the principle of reducing radiation exposure to levels as low as reasonably achievable (ALARA). In addition, the report provides data to DOE organizations responsible for developing procedures for protection of workers from exposure to radiation. The occupational radiation exposure information over the past 5-year period is analyzed

in terms of aggregate data, dose to individuals, and dose by site.

DISCUSSION

The occupational radiation exposure records show that in 2013, DOE facilities continued to comply with DOE dose limits and Administrative Control Levels and worked to minimize exposure to individuals.

Highlights of occupational radiation exposure data collected across DOE between 2012 and 2013:

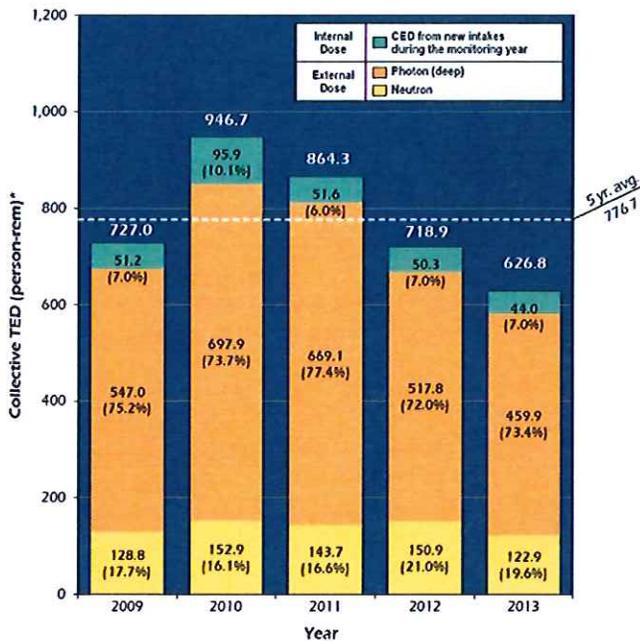
- The collective TED decreased 12.8% from 719 person-rem (7,190 person-millisievert (mSv)) in 2012 to 627 person-rem (6,270 person-mSv) in 2013.
- The collective internal dose (CED) decreased by 13% between 2012 (50.253 person-rem) and 2013 (43.966 person-rem).
- The number of individuals with measurable CED decreased by 11% from 1,361 in 2012 to 1,215 in 2013.
- The collective photon dose decreased by 11% from 517.8 person-rem (5,178 person-mSv) in 2012 to 459.9 person-rem (4,599 person-mSv) in 2013.
- The neutron component of the TED decreased by 19% from 150.9 person-rem (1,509 person-mSv) in 2012 to 122.9 person-rem (1,229 person-mSv) in 2013.
- The average measurable TED decreased by 9% from 0.069 rem (0.69 mSv) in 2012 to 0.063 rem (0.63 mSv) in 2013.

Information on collective total effective dose (TED) is an indicator of the overall amount of radiation dose received during the conduct of operations at DOE. The TED is comprised of the effective dose (ED) from external sources (which includes neutron and photon radiation) and the internal committed effective dose (CED), which results from the intake of radioactive material into the body.

- The number of workers with measurable TED decreased by 5% from 10,461 in 2012 to 9,901 in 2013.

Exhibit 1 shows the components of the collective TED from 2009-2013, including the external dose contributions from photon and neutron, as well as the internal dose from intakes.

Exhibit 1:
Components of TED, 2009-2013.



* The percentages in parentheses represent the percentage of each dose component to the collective TED.

Exhibit 2 shows the average measurable TED, which normalizes the collective dose over the population of workers who actually received a measurable dose from 2009 to 2013. This value has remained within 10% of the 5-year average of 0.067 rem (0.67 mSv) over this time period.

Exhibit 2:
Average Measurable TED, 2009-2013.

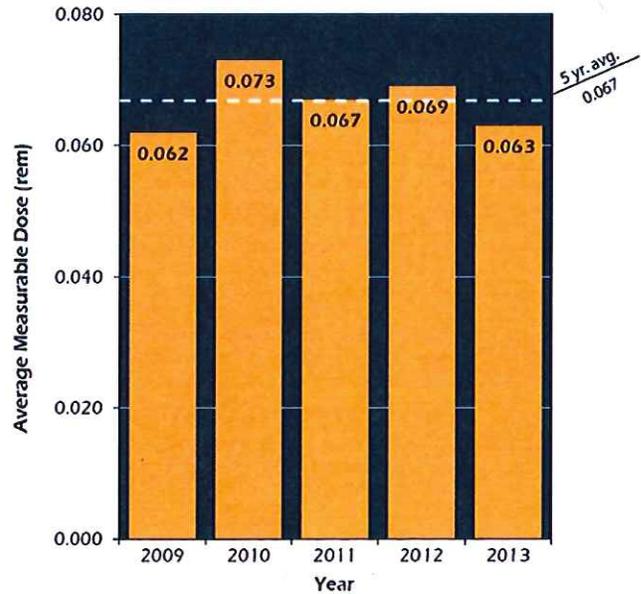
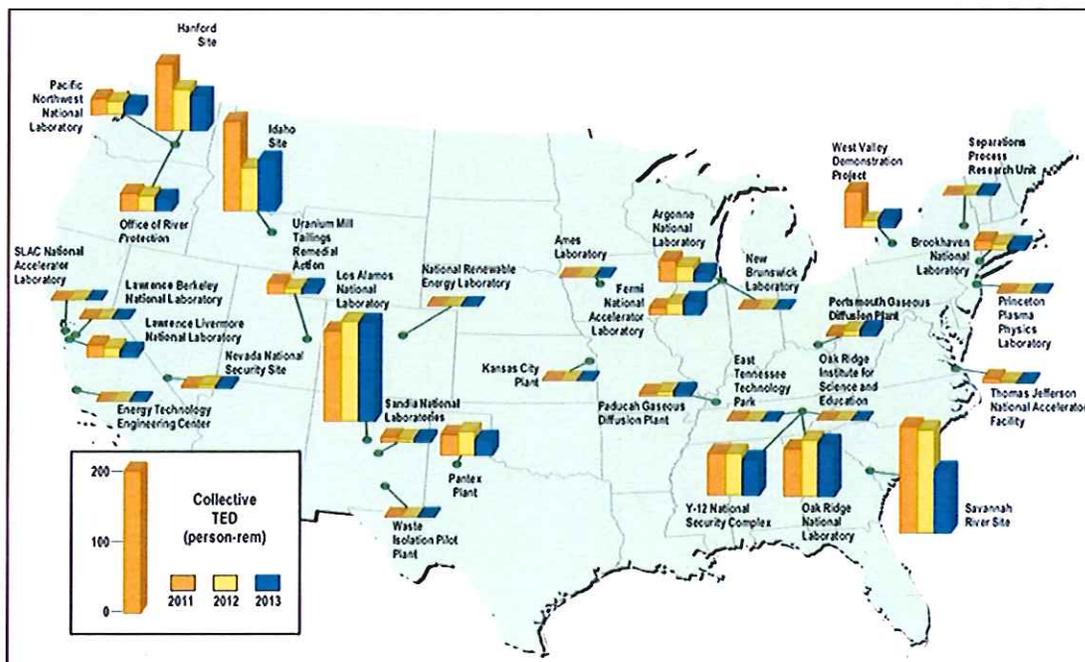


Exhibit 3 illustrates the collective TED at all DOE sites.

Exhibit 3:
Collective TED by DOE Site for 2011-2013.



In 2013, the five sites that contributed significantly to the collective TED (81%) are presented in descending order of collective TED: Los Alamos National Laboratory (LANL), Oak Ridge, Savannah River Site (SRS), Hanford, and Idaho.

The collective TED decreased at four of the five sites with the largest collective TED (LANL, Oak Ridge, SRS, and Hanford).

For these four sites, the decrease in collective TED in 2013 was attributed to a number of reasons. At LANL, this decrease was the result of a mid-year pause at TA-55 due to concerns with the criticality safety program. At Y-12, there was an overall decrease in the radworker population throughout the complex and an approximate 2-month decrease in production work in preparation for the government shutdown during the sequestration in October 2013. At SRS, budget issues arose during the year and many projects were put on hold. At Hanford, there were reductions in work due to budgetary constraints. Work at several Richland projects, including Transuranic Retrieval, were reduced to a minimum safety status, and backshift work at the Plutonium Finishing Plant was curtailed.

CONCLUSION

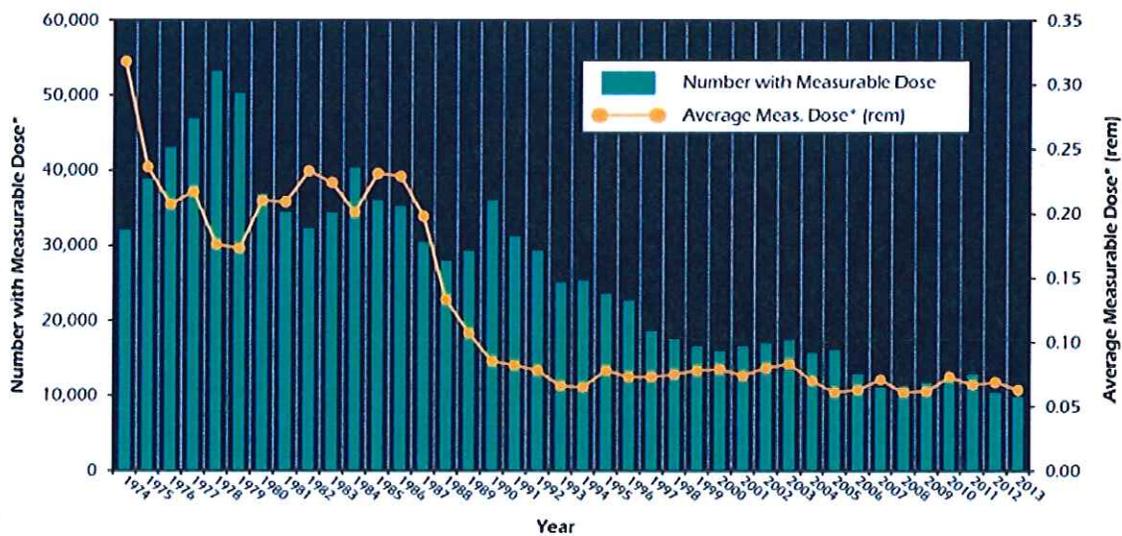
Over the past 5-year period, only one individual exceeded the 5 rems (50 mSv) TED regulatory limit, and no individual exceeded the 2 rems (20 mSv) TED administrative control limit (other than the one who exceeded 5 rems).

Exhibit 4 illustrates the general decreasing trend for collective dose and average measurable dose from 1974 through 2013.

The DOE 2013 Occupational Radiation Exposure report contains a description of work activities in relation to occupational radiation exposure for each DOE facility.

In addition, descriptions of reported ALARA activities at DOE facilities are included in the REMS annual report to illustrate improvement in radiation exposure reduction. DOE emphasizes the importance to control exposures to maintain doses ALARA.

Exhibit 4:
Number of Workers with Measurable Dose and Average Measurable Dose, 1974–2013.



* 1974–1989 collective dose = DDE
 1990–1992 collective dose = DDE + AEDE
 1993–2009 collective dose = DDE + CEDE
 2010–2013 collective dose = ED + CED

1946–1974 Atomic Energy Commission (AEC)
 1974–1977 Energy Research and Development Administration (ERDA)
 1977–Present Department of Energy (DOE)

The REMS data base contains annual occupational radiation exposure dose records from 1987 through 2013 and is currently undergoing a revision to accommodate improved query techniques and data visualization. Notification will be posted to the DOE EHSS web site when the query tool is available.

REFERENCES

To access this report and other information on occupational radiation exposure at DOE, visit the DOE EHSS web site at:

<http://energy.gov/ehss/occupational-radiation-exposure>

ADDITIONAL SOURCES OF INFORMATION

The Computerized Accident and Incident Reporting System (CAIRS) contains information on accidents and incidents, including the size of the DOE workforce that is used in this report.

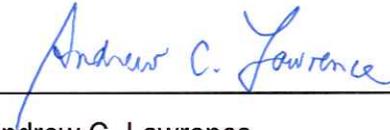
<http://energy.gov/ehss/policy-guidance-reports/databases/computerized-accident-incident-reporting-system>

The Occurrence Reporting and Processing System contains information on occurrences including radiation exposures in excess of DOE limits, personnel contaminations, and other occurrences involving radiation which served as a valuable reference for this report.

<http://energy.gov/ehss/policy-guidance-reports/databases/occurrence-reporting-and-processing-system>

Questions regarding this OE-3 document can be directed to N. Rao at (301) 903-2297 or e-mail nimi.rao@hq.doe.gov.

This OE-3 document requires no follow-up report or written response.



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