

The NCRP Operation Tomodachi Radiation Dose Assessment Peer Review



VBDR 13th Meeting
Arlington, Virginia

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DOD Operation Tomodachi Registry Effort

- OTR – Operation Tomodachi Registry was established for US Forces Japan taking part in “Operation Friendship” and affiliated individuals following the March 11, 2011 great Tohoku Earthquake and Tsunamis.
- Period – March 12 to May 11, 2011 was identified as the principal time for potential exposure to Fukushima Daiichi Nuclear Power Station (FDNPS) radiological releases.
- POI – Population of Interest was made up of 70,000 DOD-affiliated individuals ashore and afloat.
- NCRP – Provided peer review of a series of reports produced by DOD’s OTR Dose Assessment and Recording Working Group.
- OTR Website – <https://registry.csd.disa.mil/>



Scientific Committee 6-8 Peer Review

- DARWG-TP-12-01 “Post 3-11 Radiological Assessment of U.S. Military Installations in Japan” – Comments submitted to DOD on 5/16/12
- DTRA-TR-12-001 “Radiation Dose Assessments for Shore-Based Individuals in Operation Tomodachi” - Comments submitted to DOD on 6/25/12
- OTR Website - Comments submitted to DOD on 11/1/12
- DTRA-TR-12-002 “Probabilistic Analysis of Radiation Doses for Shore-Based individuals in Operation Tomodachi” - Comments submitted to DOD on 12/10/12
- DTRA-TR-12-004 “Radiation Internal Monitoring by In Vivo Scanning in Operation Tomodachi” - Comments submitted to DOD on 12/14/12
- DARWG-TM-12-03 “Cosmic Radiation Component of MEXT Data Results” - Comments submitted to DOD on 12/29/12
- DTRA-TR-12-017 “Radiation Dose Assessments for the Embryo, Fetus, and Nursing Infant during Operation Tomodachi” - Comments submitted to DOD on 4/2/13
- DTRA-TR-12-041 “Radiation Dose Assessments for Fleet-Based Individuals in Operation Tomodachi” - Comments submitted to DOD on 6/13/13

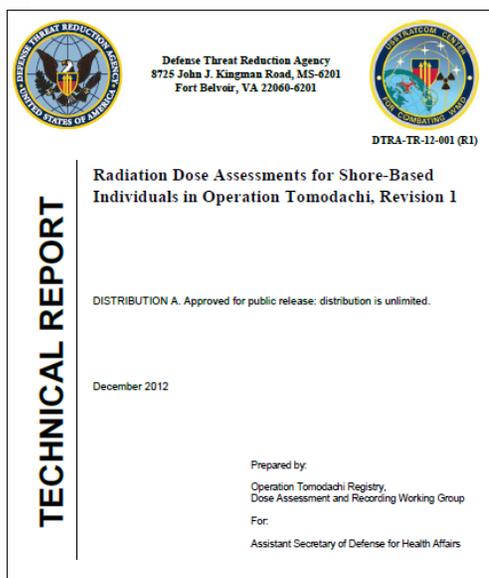


Key Aspects SC 6-8 Looked For

- Realistic but high sided (95th percentile) estimates of dose – confirmed by the probabilistic dose assessment
- Realistic exposure scenarios (such as pathways analyzed were valid)
- Comparison of dose estimates with those from other sources (such as the World Health Organization’s 2012 report “Preliminary Dose Estimation from the Nuclear Accident after the 2011 Great East Japan Earthquake and Tsunami”)
- Comprehensive use of available data
- Quality assurance
- Clear communication of methods and findings



RDA for Shore-based Individual (DTRA-TR-12-001 [R1]) – SC 6-8 Comments



This report is available on the OTR website.

- Use of the term “upper bound” dose was deleted
- Emphasized the magnitude of the doses are small and would not result in discernible short-term or long-term health effects
- Executive Summary was added to the Report
- Encouraged further clarification and justification of the assumptions used
- SC 6-8 agrees the doses provided are high-sided doses suitable for scoping studies but not for radioepidemiological or individual dose assessment studies



Operation Tomodachi Registry Website

Environmental Health Surveillance Registries
U.S. Department of Defense

Home About the Registries Newsroom Registry: Operation Tomodachi

Operation Tomodachi Registry

About this Registry Event DOD Response Dose Estimates FAQs References Links Contact Us

About this Registry

The Department of Defense (DOD) began establishing the Operation Tomodachi Registry following the devastating March 11, 2011 earthquake and tsunami in Japan. These unfortunate events caused severe damage to the Fukushima Daiichi Nuclear Power Station, which resulted in the release of radiation into the environment. This Registry will include the names of nearly 70,000 DOD-affiliated individuals who were on or near the mainlands of Japan during the period from March 12, 2011 to May 11, 2011 along with radiation exposure estimates for each of these individuals.

The Operation Tomodachi Registry is being completed in phases. This website provides radiation exposure estimates for 13 different shore-based locations. Those locations were selected since most of the members of the DOD-affiliated population resided on or near the 13 DOD installations in Japan or in the cities represented.

Final radiation dose estimates are expected to be available by the end of 2012. These estimates may include updates to dose estimates for shore-based locations as well as dose estimates for U.S. Navy ships located off the mainland of Japan during the March 12 through May 11, 2011 timeframe. By the end of 2012, radiation doses are also expected to be available for upwards of 8,000 individuals who had their external or internal radiation measured directly.

Due to privacy and security concerns, individuals will be unable to link directly to the Registry through this website. They will be able to learn more about the event that ultimately led to establishing this registry and obtain location-based radiation dose estimates. Individuals may also contact the Registry administrators to confirm their inclusion in the Registry as well as obtain answers to their questions.

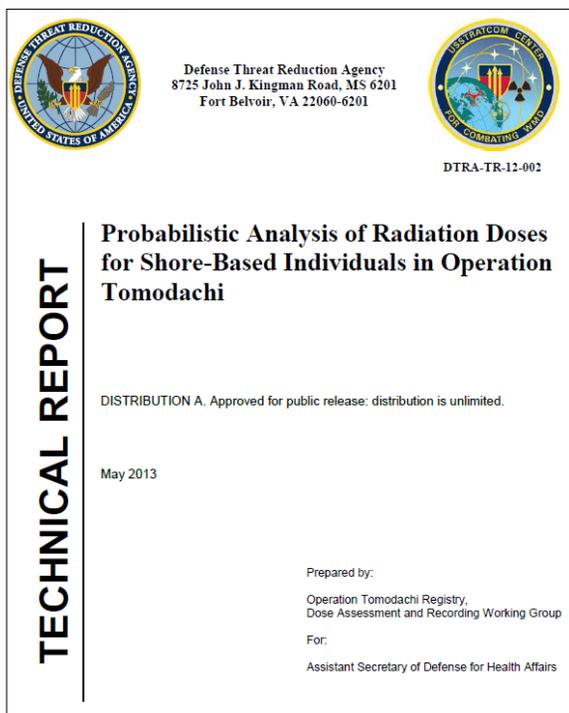
Stay Connected at the DOD Social Media Hub → Privacy & Security Notice | Disclaimer | Webmaster | FOIA | Site Map
Official U.S. Department of Defense website maintained by DHSS.

<https://registry.csd.disa.mil>

- 8/10/12 – DOD releases OTR website for internal review
- 9/5/12 – DOD releases OTR website for public review
- 11/1/12 – SC 6-8 comments on OTR website were generally favorable and recognized the action as an important step in providing information to the public



Probabilistic Analysis of Radiation Doses for Shore-based Individuals (DTRA-TR-12-002)

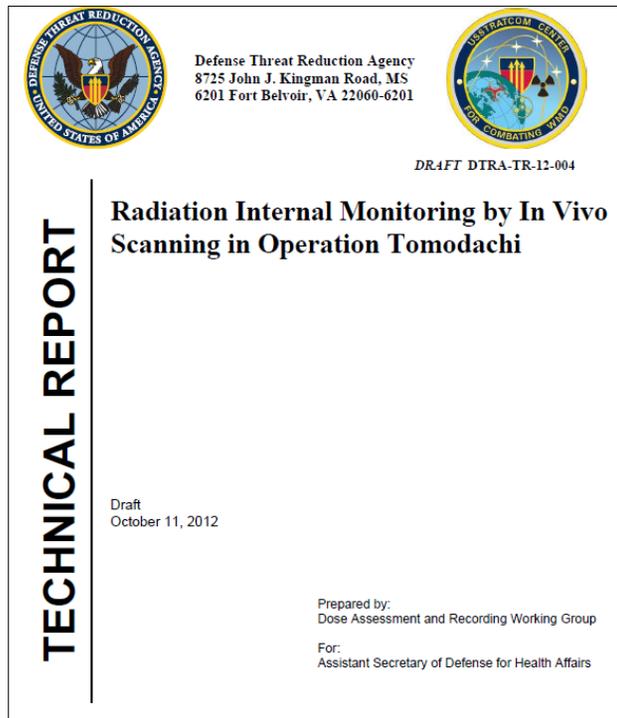


This report is available on the OTR website.

- Used probabilistic method and analyses to obtain doses for comparison with those that used deterministic methods in the Shore-based Report
- Comparison for selected areas showed the deterministic method effective doses were higher than the 95.8th percentile
- SC 6-8 noted in general the analysis was well done and confirmed doses to adults using deterministic methods met the objective of the dose estimation process in the Shore-based Report



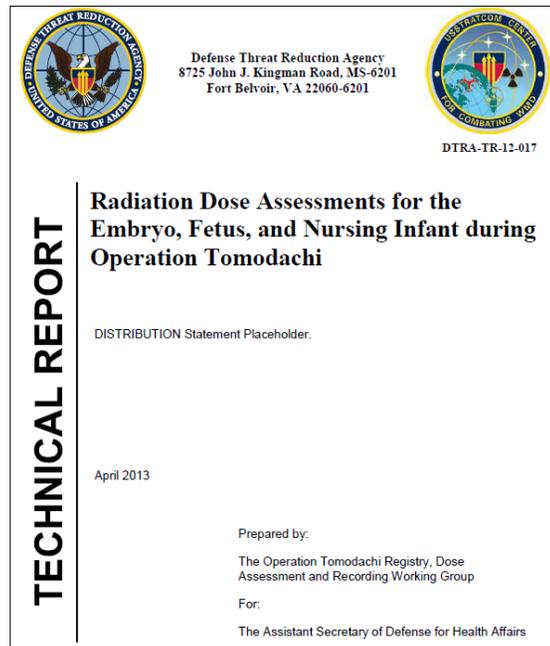
Radiation Internal Monitoring by In Vivo Scanning in OT (DTRA-TR-12-004)



- 7,960 DOD-affiliated individuals internally monitored
- Monitoring took place March 16 to August 31, 2011
- About 3% monitored had results greater than MDA
- Because the thyroid was the critical organ for organ equivalent dose, prompt monitoring for radioiodines in particular was essential
- SC 6-8 noted the need to effectively communicate the low-doses actually measured
- SC 6-8 was concerned about the use of grab samples and issues relating to the Cs-134/Cs-137 ratio



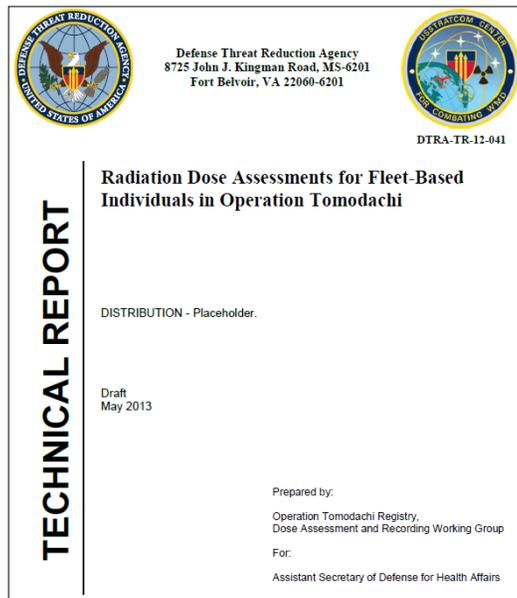
RDA for Embryo, Fetus, and Nursing Infant during OT (DTRA-TR-12-017)



- SC 6-8 was concerned about too much conservatism leading to high-sided doses that were unrealistic (a few scenarios would not have existed)
- SC 6-8 was concerned about overlapping results (*i.e.*, the Shore-Based Report and this Report needed to report the same results)
- SC 6-8 agreed these were very conservative dose estimates
- SC 6-8 cautioned that any concerned individual should have a radiation dose assessment prepared specific to the situation for that individual's location and activities



Radiation Dose Assessments for Fleet-based Individuals in OT (DTRA-TR-12-041)



- SC 6-8 provided a large number of comments in June 2013 on the 2nd revision of the report which is not expected to be completed before August 2013
- Noted a unique analysis since it involves both measured data and mathematical modeling
- Observed that more verification of the source term was needed
- Noted that the dispersion modeling needed strengthened support
- Opportunities for validation of the methods using data from different sources



Summary and Conclusions

- NCRP review process was thorough, timely and met all contract deliverables within budget
- Response of DOD to SC 6-8 comments was exceptionally good based on the final reports published to date
- NCRP will publish a summary of the Operation Tomodachi peer reviews as an official document in the future



Questions and Contact Information



- National Council on Radiation Protection and Measurements – <http://www.ncrponline.org>
- 7910 Woodmont Avenue, Suite 400, Bethesda, Maryland 20814-3095
- Phone: (301) 657-2652
- Fax: (301) 907-8768

What about the doses?

Shore-Based Report – Changes in Process (Published on OTR Website)

Table ES-1. Range of estimated doses during Operation Tomodachi

Group	Effective Dose (rem [mSv])	Thyroid Dose (rem [mSv])
Children (<17 y)	0.002 to 0.16 [0.02 to 1.6]	0.008 to 2.7 [0.08 to 27]
Adults (≥17 y)	0.002 to 0.12 [0.02 to 1.2]	0.007 to 1.2 [0.07 to 12]

← 12/10/2012 Version

Table ES-1. Range of estimated doses during Operation Tomodachi

Group	Effective Dose (rem [mSv])	Thyroid Dose (rem [mSv])
Children (<17 y)	0.001 to 0.16 [0.01 to 1.6]	0.003 to 2.7 [0.03 to 27]
Adults (≥17 y)	0.001 to 0.12 [0.01 to 1.2]	0.003 to 1.2 [0.07 to 12]

← 2/5/2013 Version

Internal Monitoring Report – Changes in Process (Publication Pending)

This report documents the radiation internal monitoring (IM) program conducted by the Department of Defense (DOD) during Operation Tomodachi (OT). During this program, 8,378 DOD-affiliated individuals were internally monitored as part of the radiological safety program established between and including March 16 and August 31, 2011¹. About 3% of those monitored had a measured activity greater than the minimum detectable activity (MDA). Those persons with measured activities greater than MDA had a maximum committed effective dose of 0.03 rem (0.3 mSv) and a maximum thyroid committed equivalent dose of 0.5 rem (5 mSv). About 11% were monitored in the United States using existing equipment at naval shipyards, about 87% were monitored in and around Japan using a combination of portable instruments and fixed whole-body monitoring systems, and about 2% were monitored as part of a voluntary self-referral or open monitoring period.

← 10/11/2012 Version

↙ 7/1/2013 Update

A total of 8,380 measurements were made on approximately 7,960 individuals. (The number of individuals is less than the total number of measurements because more than one valid measurement was made on approximately 400 individuals.)

The maximum committed effective dose was 0.40 mSv and the maximum committed equivalent thyroid is 6.54 mSv. Mean values for personnel with detectable doses are 0.07 mSv committed effective doses and 1.13 mSv committed equivalent thyroid.



More Doses

Embryo, Fetus and Nursing Infant Report – Changes in Process (Publication Pending)

Table ES-1. Range of estimated doses during Operation Tomodachi

Group	Effective Dose (mSv [rem])	Thyroid Dose(mSv [rem])
Embryo/fetus	0.01–1.5 [0.001–0.15]	0.04–20 [0.004–2.0]
Nursing Infant	0.05–2.8 [0.003–0.28]	0.16–42 [0.004–4.2]

← 2/22/2013 Version

Table ES-1. Ranges of estimated radiation doses during Operation Tomodachi

Group	Effective Dose (mSv [rem])	Thyroid Dose (mSv [rem])
Embryo/fetus	0.01–0.89 [0.001–0.089]	0.04–12 [0.004–1.2]
Nursing Infant	0.02–1.3 [0.002–0.13]	0.04–21 [0.004–2.1]

← 7/1/2013 Update

Fleet-Based Report – Significant Changes in Process (Publication Pending)

Table ES-1. Maximum external, internal, and total effective and thyroid doses for all PEPs

PEP	Maximum Total Effective Dose (mSv [rem])	Maximum Total Thyroid Dose (mSv [rem])
A, B, and C	0.38 (0.038)	3.4 (0.34)

← 5/8/2013 Update (still preliminary)