

Fact Sheet



Defense Threat Reduction Agency

Nuclear Test Personnel Review (NTPR) Program: Program Reviews and Scientific Studies (Toll Free Helpline: 800-462-3683)

The Defense Threat Reduction Agency (DTRA) is the Department of Defense (DoD) executive agent for the Nuclear Test Personnel Review (NTPR) Program. It serves approximately 550,000 DoD personnel who participated in four missions: 1) post-World War II occupation forces of Hiroshima and Nagasaki; 2) prisoners of war in Japan at the conclusion of World War II; 3) participants of U.S. atmospheric nuclear tests (1945 - 1962), conducted primarily in Nevada and the Pacific Ocean; and 4) participants of U.S. underground nuclear testing between (1951 - 1992), conducted primarily in Nevada. The primary purpose of the NTPR Program is to provide participant data and radiation dose information for atomic veterans.

Program Reviews

In 1985, the NTPR dose reconstruction methodology was published in Title 32, Code of Federal Regulations, Part 218 (32 CFR 218). Since that time, the scientific methods used by the NTPR Program have been reviewed several times by the Government Accountability Office (GAO, formerly the General Accounting Office), the National Research Council (NRC) of the National Academy of Sciences (NAS), and the Veterans' Advisory Board on Dose Reconstruction (VBDR).

GAO:

The GAO is the investigative arm of Congress, chartered to study the programs and expenditures of the federal government in an independent and nonpartisan fashion. The GAO was directed by Congress to perform four independent reviews of the NTPR Program:

- "Operation CROSSROADS: Personnel Radiation Exposure Estimates Should be Improved" (1985)
This review was commissioned to examine issues regarding radiation safety activities during Operation CROSSROADS, a U.S. atmospheric nuclear test series conducted at Bikini Atoll in 1946. The report concluded that some adjustments to the radiation exposure estimates calculated for test participants may be necessary because allowances were not made for film badge inaccuracies, comprehensive personnel decontamination procedures were either inadequate or not implemented, exposure estimates from ingestion or open wounds were not calculated, and inhalation estimates may have been underestimated.
- "Nuclear Health and Safety: Radiation Exposures for Some Cloud-Sampling Personnel Need to be Reexamined" (1987)
This review was commissioned to determine the number of personnel involved in nuclear cloud sampling activities at three selected operations and how much radiation exposure they may have received. The report concluded that external exposure for some personnel was understated and required reexamination. In addition, protective breathing devices were not consistently used by ground personnel working around contaminated aircraft, necessitating reevaluation of their internal radiation exposures.

- “Nuclear Health and Safety: Mortality Study of Atmospheric Nuclear Test Participants is Flawed” (1992)
This review was commissioned to determine the accuracy of the participation and radiation exposure data supplied to the NAS for its 1985 report “Mortality of Nuclear Weapons Test Participants.” The report concluded that the magnitude of the inaccuracies in the data used by the NAS raised serious questions about the study's findings, and that the study should be repeated.
- “Veteran’s Benefits: Independent Review Could Improve Credibility of Radiation Exposure Estimates” (2000)
This review was commissioned to evaluate the validity of dose reconstruction as a tool for estimating radiation exposures, to examine alternatives for deciding radiation-related claims, and to determine what oversight activities are in place. The report concluded that dose reconstruction is a valid method for estimating doses and identified no better alternatives for deciding radiation-related claims. However, concerns were expressed regarding the lack of independent review, specifically quality control and peer review. Establishing an independent review process could build greater public confidence in the dose reconstruction program.

NAS/NRC:

The NAS is a non-profit organization chartered and mandated by Congress to advise the federal government on scientific and technical matters. The NRC, acting as the principal operating agency of the NAS, has performed various reviews of the NTPR Program:

- “Review of the Methods Used to Assign Radiation Doses to Service Personnel at Nuclear Weapons Tests” (1985)
The purpose of this study was to evaluate whether the methods used by the NTPR Program to assign radiation doses were comprehensive and scientifically sound, but did not include audits of dose reconstructions for specific veterans. The review committee concluded that the procedures used to estimate external doses were reasonably sound, and that a bias may exist that probably tends to overestimate the most likely dose (especially for internal emitters). The committee had concerns about the methods for estimating internal doses, but conceded that inhalation exposures had only a minor impact on total doses.
- “Film Badge Dosimetry in Atmospheric Nuclear Tests” (1989)
This study was an evaluation of dosimetry practices used during weapons testing, concluding that it was feasible to estimate participant radiation doses with reasonable certainty. It included methods for addressing uncertainties in dosimetry readings and the conversion of readings to organ doses.
- “A Review of the Dosimetry Data Available in the NTPR Program” (1995)
Anticipating completion of the Five Series Study in 1997, this review was necessary to verify the suitability of reconstructed doses as a basis for dose-response analysis and was published as Appendix A of the “Five Series Study” (see below). This review concluded that NTPR radiation dose data were not suitable for dose-response analysis due to inconsistencies in dose reconstruction methods and uncertainty estimation, as well as a lack of documentation about dose assignment methods and the NTPR database.
- “A Review of the Dose Reconstruction Program of the Defense Threat Reduction Agency” (2003)
Prompted by the GAO (2000) report to Congress, this review included random sampling of dose reconstructions. Known as the “green book” by many veterans, the review recommended improvements to the NTPR dose reconstruction process that have since been instituted by DTRA.

VBDR:

The VBDR, established under the provisions of Section 601(c) of Title VI of Public Law 108-183 (2003) and the Federal Advisory Committee Act of 1972, was jointly chartered by DTRA and VA to provide independent oversight of DTRA's radiation dose reconstruction. Between 2005 and 2013, the VBDR provided 21 recommendations to DTRA, all of which were accepted. These recommendations resulted in significant advances in radiation dose reconstruction and associated quality assurance procedures that are posted on the DTRA hyperlink at the bottom of this fact sheet.

Scientific Studies

The NTPR Program supports independent scientific studies to ascertain whether U.S. atmospheric nuclear test participants have experienced adverse health effects as a result of their participation. Three cohort epidemiological studies and one chromosomal aberration study are summarized below:

- “Mortality of Veteran Participants in the CROSSROADS Nuclear Test” (1996)
Conducted in the Pacific in 1946, Operation CROSSROADS was the first peacetime atmospheric nuclear test series. This study focused on a cohort of approximately 40,000 Navy participants, finding that these participants experienced a 4.6 percent increase in mortality (deaths from all causes when compared with a comparable number of military personnel who were not participants). This finding was statistically significant at the 95 percent confidence level. When malignancies (cancer) and leukemia were considered, participant mortality was slightly elevated, but the results were not statistically significant. The increase in mortality from all causes did not concentrate in any disease group examined, and the results did not vary when participants engaging in higher exposure occupations were compared to the rest of the participants. This report concluded that exposure to radiation was not the cause of the increase in mortality from all causes among CROSSROADS participants.
- “The Five Series Study: Mortality of Military Participants in U.S. Nuclear Weapons Tests” (2000)
To overcome the limitations of a similar study completed in 1985 (“Mortality of Nuclear Weapons Test Participants”), this study focused on a cohort of approximately 68,000 military personnel who participated in at least one of five selected U.S. atmospheric test series: Operations GREENHOUSE (1951), UPSHOT-KNOTHOLE (1953), CASTLE (1954), REDWING (1956), and PLUMBBOB (1957). The risk of death for test participants was compared to that of a control group of approximately 65,000 comparable military personnel who were not test participants. The study concluded:
 - Overall, participants and controls had basically the same risk of death from all causes;
 - Overall, participants did not experience widespread early death;
 - Participants and controls had basically the same risk of death from cancer;
 - Excess cancer (leukemia, nasal, and prostate) deaths among participants amounted to less than about 100 cases, which the NAS concluded could be attributed to chance as well as participation;
 - Statistical significance in risk of participant death was noted as follows:
 - Increased risk overall from external causes, such as motor vehicle accidents;
 - Increased risk overall from nasal cancer and prostate cancer;
 - Increased risk from leukemia in Nevada Test Site (UPSHOT-KNOTHOLE and PLUMBBOB) participants;
 - Increased risk of death from all causes in Pacific Ocean (GREENHOUSE, CASTLE, and REDWING) participants.
- “The Eight Series Study: Mortality of Military Participants in U.S. Nuclear Weapons Tests” (Ongoing)
This Vanderbilt University study of 115,000 atomic veterans is part of a unique, low-dose rate, U.S. Million Person Study (MPS). The MPS includes 115,000 atomic veterans, 360,000 Manhattan Project and equivalent workers, 150,000 nuclear utility workers, 130,000 industrial radiographers, and 250,000 medical workers. It is 12 times larger than the study of 86,000 Japanese atomic bomb survivors with

estimated doses. This atomic veteran study investigates correlation of standardized mortality ratios, by disease, with ionizing radiation organ doses, while accounting for confounding factors.

One publication from this study (Caldwell et al., J. Radiol. Prot. 36 (2016) 474–489; doi:10.1088/0952-4746/36/3/474), followed-up on a 1979 study of Operation PLUMBBOB, Shot SMOKY military veterans at the Nevada Test Site in 1957. Shot SMOKY was one of 30 Operation PLUMBBOB shots. The 1979 study reported an increased risk for leukemia that was not evaluated with respect to radiation dose. This 2016 publication found that Operation PLUMBBOB veterans remained relatively healthy after 53 years and died at a lower rate than the general population. In contrast, and in comparison with national rates, SMOKY participants showed significant increases in all causes of death, respiratory cancer, leukemia, nephritis and nephrosis, and accidents, possibly related in part to lifestyle factors common to enlisted men who made up 81% of the SMOKY cohort. Compared with national rates, a statistically significant excess of non-CLL leukemia was observed among SMOKY participants. Leukemia risk, initially reported to be significantly increased among SMOKY participants, remained elevated, but this risk diminished over time. Despite an intense dose reconstruction, the risk for leukemia was not found to increase with increasing levels of radiation dose to the red bone marrow. An explanation for the observed excess of leukemia remains unresolved but conceivably could be related to chance due to small numbers, subtle biases in the study design and/or high tobacco use among enlisted men. Larger studies should elucidate further the possible relationship between fallout radiation, leukemia and cancer among atomic veterans.

- The National Cancer Institute Study (Ongoing)

The objective of this study is to estimate radiation dose of the most highly exposed atomic veterans using fluorescence in-situ hybridization (FISH assay) of chromosomes from peripheral blood lymphocytes and compare this to radiation dose reconstructions employing historical radiation measurements and veteran questionnaire responses. The study veterans are: (i) 9 military weathermen exposed to fallout on Rongerik Atoll in the Pacific in 1954 from Operation CASTLE, Shot BRAVO, and (ii) 7 military nuclear test observers at the Nevada Test Site from 1951-1952. Publication of the study results in the peer review literature should occur in 2018.

NTPR Inquiries

Individuals seeking information about the NTPR Program can address their inquiries to:

Defense Threat Reduction Agency
Nuclear Test Personnel Review Program
8725 John J. Kingman Road, Stop 6201
Fort Belvoir, Virginia 22060-6201
800-462-3683
E-mail: dtra-ntpr@mail.mil
<http://www.dtra.mil/Home/Nuclear-Test-Personnel-Review/>

SEP 2017