Cold War Era Veteran Nuclear Weapons Technicians
Ionizing Radiation Exposure and Government Inaction

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Purpose and Definitions: Radiation Exposures w/out Knowledge and Informed Consent

The purpose of this document is to provide specific facts to members of the U.S. Congress, Department of Veterans Affairs (VA), Department of Defense (DOD), family members, and others regarding the duties of Cold War-era Nuclear Weapons Technicians (NWTs) and their exposure to deadly ionizing radiation. NWTs were responsible for the maintenance, disassembly, component replacement, assembly, transport, and storage of live nuclear weapons in the operational and physical custody of the DOD worldwide. The number of weapons peaked at approximately 31,255 in 1967, reduced to 19,008 by the end of the Cold War era in 1991.

While performing their primary duties, NWTs were exposed to dangerous ionizing radiation[1] from weapon surfaces and components–without their knowledge or consent. Despite overwhelming evidence, the VA continues to deny the reality of their radiation exposure, as demonstrated by the rejections of veterans' claims and appeals for benefits. The VA does not recognize NWT duties as a "Radiation-Risk Activity," nor are they classified as a "Radiation-Exposed Veteran" under U.S. Code Title 38, Veterans' Benefits.

- **Electromagnetic Radiation:** Energy that travels as particles or waves, spreading out as it goes. Radiation can be categorized into two types: non-ionizing and ionizing.
- **Non-Ionizing Radiation:** Radio waves, microwaves, and infrared radiation are non-ionizing. Non-ionizing radiation doesn't usually cause serious injury to humans. However, it can cause thermal damage, like skin burns. Ultraviolet radiation can cause skin cancers, sunburn, and other eye and skin issues.
- **Ionizing Radiation:** "Electromagnetic radiation (gamma rays or X-rays) or particulate radiation (alpha particles, beta particles, neutrons, etc.) capable of producing ions, i.e., electrically charged particles, directly or indirectly, in its passage through matter."[2] Ionizing radiation (IRAD) impacts the immune system, damages DNA cells in our body, and kills cells. IRAD damages structures inside cells such as DNA and proteins, can cause mutations to occur, and those mutations can result in cancers and other diseases or illnesses. Mutated DNA can be passed to offspring through the reproductive process, potentially leading to genetic disorders, congenital defects, and/or cancer.

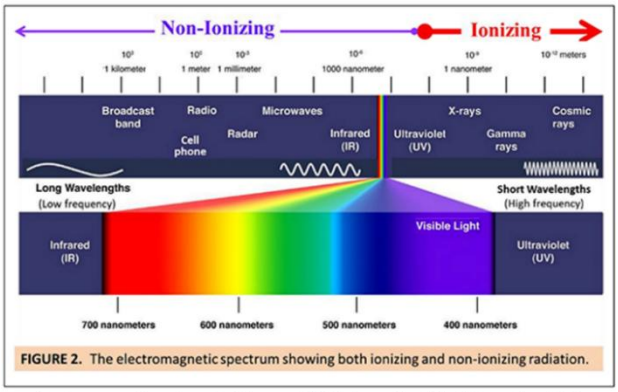

FIGURE 2. The electromagnetic spectrum showing both ionizing and non-ionizing radiation.

Chart source: Department of Energy, EHSS Information Brief, December 2017

[1] Ionizing radiation: Electromagnetic radiation (gamma rays or X-rays) or particulate radiation (alpha particles, beta particles, neutrons, etc.) capable of producing ions directly or indirectly in its passage through, or interaction with, matter. https://www.acq.osd.mil/ncbdp/nm/NMHB2020rev/docs/NMHB2020rev.pdf *Ionizing radiation:* https://www.osha.gov/ionizing-radiation/background; *DOE Openness: Human Radiation Experiments*. https://ehss.energy.gov/ohre/roadmap/achre/intro_9_1.html

[2] Ibid.; DOE-DTRA TP 4-1 IC 1-1 Glossary of Nuclear Weapons Materiel and Related Terms, July 30, 2016

Introduction

During the Cold War era, U.S. military Nuclear Weapons Technicians (NWTs)—synonymous with related Army Military Occupational Specialty (MOS) codes, Navy Rates, Marine Corps MOS codes, Air Force Specialty Codes (AFSC), and other titles—conducted the disassembly, component replacement, reassembly, modification, repair, maintenance, transport, and storage of all nuclear weapons in DOD custody worldwide. In this document, the term "nuclear weapons" may include warheads, bombs, atomic demolition munitions, missiles, rockets, torpedoes, depth bombs, reentry vehicles, artillery fired atomic projectiles, and others. Note: While some exceptions may exist, the term "generally" is implied for statements throughout this document.

These tasks required direct physical contact, placing hands and arms inside the weapon, face and head near or inside the openings, and legs and torsos pressed against weapon exteriors. These tasks exposed us to intrinsic radiation (INRAD)—ionizing radiation emitted through weapon surfaces or from exposed components.[3] While exposures varied depending on weapon type, task, location, and mission; numerous key issues regarding exposures were common to all NWTs:

- **Exposed to Ionizing Radiation:** NWTs were unaware of their continuous INRAD exposure while working in direct proximity to nuclear weapons, leaving them unable to decline or take protective measures.
- **Lack of Protective Measures:** We routinely worked near ionizing radiation sources without the protection afforded by modern-day safety standards such as "As Low As Reasonably Achievable" (ALARA)[4] and INRAD safety programs. Operations were conducted without restrictions in regard to time, distance, and shielding near radiation sources.
- **Inadequate Monitoring:** Few film badges or other personal dosimeters (devices used to measure absorbed dose of ionizing radiation) were issued for work on nuclear weapons. Any exposure monitoring programs that existed were generally inadequate or otherwise limited. Consequently, comprehensive ionizing radiation exposure records do not exist for most.
- **No Formal Radiation Dose Limits:** In the absence of radiation exposure measurement and management programs, we worked on live nuclear weapons without established benchmarks for safe exposure levels.

Types of Ionizing Radiation Exposures

- Alpha particles have the least penetrating power and can be stopped by a sheet of paper or human skin. However, if inhaled, ingested, or introduced into the body through a scrape or cut, alpha particles become extremely dangerous. In these situations, they can damage sensitive living tissue and cause severe harm to cells and DNA. The biological damage caused by alpha particles is as much as 20 times greater weighting factor (Wr), or relative biological effectiveness (RBE) than that caused by gamma and beta radiation.[5]

  The inhaled or swallowed radioactive alpha particles imbedded in the respiratory tract or the gastrointestinal tract, respectively, or that enter through an open wound, continue to irradiate the tissues and organs until all the radioactive material has decayed or been eliminated.

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[3] Intrinsic Radiation (INRAD): "*Ionizing radiation emitted through the weapon surface or directly from exposed weapon components.*" DOE-DTRA TP 4-1, IC1 July 30, 2016, Glossary of Nuclear Weapons Material.

[4] ALARA (As Low As Reasonably Achievable) via time, distance, and shielding from ionizing radiation "*A Guide to Reducing Radiation Exposure to As Low As Reasonably Achievable (ALARA)*", April 1980, DOE. https://www.osti.gov/servlets/purl/5370687

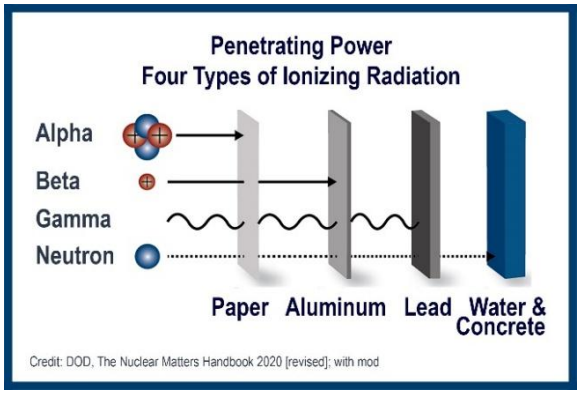
[5] *Learning from Fukushima: Nuclear power in East Asia,* 2017, Ch 8, p. 222 https://press-files.anu.edu.au/downloads/press/n3873/pdf/book.pdf

Alpha Particle Facts Unknown to Most Cold War Veteran Nuclear Weapons Technicians

> *"Plutonium predominantly emits alpha particles—a type of radiation that is easily stopped with a short range—and also neutrons, beta particles, and gamma rays. The alpha radiation makes it a serious internal hazard, made worse by its immobility in the body where it can remain for decades—as much as 80% of any amount absorbed will remain 50 years later. Just a few micrograms distributed through the lungs, liver, or bones can statistically increase the likelihood of cancer. This has contributed to its reputation as one of the most toxic substances known— the Department of Energy's limit of occupational concentration in air is about a million times lower than for lead..."* [6]

Many Nuclear Weapons Technicians (NWTs) often had to rub off radioactive material that separated ("spalled") from the surface of uranium or plutonium components as a result of the normal radioactive decay process. This spalling material contained alpha particles—unseen by the human eye—that subsequently became airborne, contaminating clothing and possibly being inhaled or ingested. Significant portions of these radioactive particles ended up (undetected) on the uniforms of the Technicians, making it easy for the dangerous particles to be transported to their barracks, homes, and family members.

- Gamma rays possess immense penetrating power, requiring several inches of dense material like lead or a few feet of concrete to stop them.
- Neutron radiation is not effectively blocked by lead. It is absorbed by materials rich in hydrogen, like water, specially formulated concrete, or borated polyethylene.
- X-rays are emitted by nuclear explosions (not applicable to NWTs). Medical x-ray imaging devices generally produce ionizing radiation that is less penetrating than gamma rays and are more easily controlled. The risk of developing cancer from medical imaging is generally small. X-ray equipment is closely controlled and has an "on/off switch" which live nuclear weapons do not. [7] [8]



Cold War-Era Nuclear Weapons Technicians: Exposure and Safety Oversight

During the Cold War, the widespread and prolonged absence of radiation safety policies left Nuclear Weapons Technicians (NWTs) exposed to ionizing radiation without adequate protection—an omission seemingly too systematic to be mere oversight. Key military regulations, manuals, and procedures illustrate the lack of comprehensive safety measures specific to intrinsic radiation (INRAD) from live nuclear weapons.

DOD Instruction 6055.8, *Occupational Radiation Protection Program*, issued on March 31, 1989, provided general guidance on ionizing radiation, personnel dosimetry, bioassay, and ALARA principles. However, it was not specific to nuclear weapons and did not address INRAD. This

[6] Shining light on a dark element, A History of Plutonium, Owen Summerscales, Actinide Research Quarterly, First Quarter 2022, p. 42, Los Alamos National Laboratory. https://cdn.lanl.gov/arq-2022-1_874d9.pdf
[7] Radiation Basics, EPA. https://www.epa.gov/radiation/radiation-basics#ioniandnonioni
[8] Low dose IR effects on the immune system.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8784945/pdf/nihms-1768466.pdf

omission left NWTs without targeted safety protocols, even as other radiation-related activities in the military were better regulated.

Albeit too late for Cold War era NWTs, the Air Force acknowledged the existence of ionizing radiation emitted through the surfaces of live nuclear weapons with the introduction of the Air Force Nuclear Weapons Intrinsic Radiation Safety Program, AFR 122-28, October 29, 1990.[9] This regulation defined INRAD and established ALARA principles for NWTs, introducing specific safety requirements to limit exposure.

Routine method of moving nuclear weapons on ships.
Credit: Sandia National Lab video "Early Nuclear Safety", 2010

The Army and Navy issued radiation safety documents that were often general in scope. Comprehensive policies integrating ALARA principles, INRAD education, and INRAD-specific protections for NWTs were not widely promulgated. Navy radiation safety requirements generally focused on nuclear propulsion and the management of general radioactive materials, with oversight from the DOE Naval Reactors program and the Nuclear Regulatory Commission.

Navy dosimetry programs for nuclear weapons were limited and intermittent. Monitoring did not always cover all potential types of ionizing radiation exposures. The exposure monitoring programs, such as those in W-Divisions on aircraft carriers, were arguably influenced by criteria associated with nuclear propulsion—e.g. the exposure monitoring and management requirements.

An ionizing radiation “safety” policy is included in Army Field Manual FM 55-204, Air Transport of M454 (155mm) Atomic Projectile by US Army Aircraft, November 1980, IC 2 January 24,1988:

> **"*NOTE - Personnel dosimetry (film badge) is not required for personnel engaged in operations prescribed in this manual nor do the operations require keeping a record of exposure times. However, do not stay within 1 meter of the* M454 *projectile any longer than is needed to accomplish each operation.*"** [emphasis added]
> [After the note] “*The M467 container… will be carried by four persons*.”

This policy reflects the antithesis of INRAD safety and radiation exposure management principles, while vaguely disguising the true intrinsic radiation dangers during key operations. Such incomprehensible and dangerous “guidance” typified broad systemic failures in radiation safety for NWTs, leaving technicians unprotected and without records to substantiate our exposures.

Actual Ionizing Radiation Exposures

Few Cold War era veteran Nuclear Weapons Technicians (NWTs) were aware of their exposures to intrinsic radiation (INRAD): “*Ionizing radiation emitted through the weapon surface or directly from exposed weapon components.”* [10] Each time NWTs worked on, handled, leaned

[9] AFR 122-28, Air Force Nuclear Weapons Intrinsic Radiation (INRAD) Safety Program, October 29, 1990. Implemented INRAD safety, including ALARA.

[10] Ibid.; Intrinsic Radiation (INRAD): “*Ionizing radiation emitted through the weapon surface or directly from exposed weapon components*.” DOE-DTRA TP 4-1, IC1 July 30, 2016, Glossary of Nuclear Weapons Material.

over, reached into, or were otherwise in direct physical proximity to a live nuclear weapon, our entire bodies were exposed to INRAD.

Beginning in late 1990, then active duty Cold War era NWTs may have learned of INRAD through new or revised DOD or DOE publications. Arguably, most NWT veterans who may now be aware of their exposures, learned of INRAD beginning in 2023 as a result of extensive research and outreach by The Sound of Silence Project volunteers. The information is provided to thousands of members of formal and ad hoc NWT organizations and via related NWT public and private online social organizations dedicated to veteran NWTs and other related military job titles, as mentioned in the introduction. The information was not promulgated to veteran NWTs by the DOD, though opportunities to do so existed for several decades. "We faithfully trusted our health, safety, and lives to the DOD—perhaps naively.

Air Force Nuclear Weapons Team completing a limited life component exchange operation on a B-61 Nuclear Weapon (or training weapon)
Photo credit (assumed): Sandia National Laboratory, DOE

Simulated radiation exposure © 2024 rjw

A Cold War-era veteran Nuclear Weapons Technician, recalled:

> *During my career working on nuclear weapons and managing nuclear weapons maintenance operations, I was unaware that ionizing radiation emitted through the weapon surfaces as "intrinsic radiation". During a period of nearly three years as the senior Nuclear Weapons Technical Inspector for the Field Command, Defense Nuclear Agency—tasked with inspecting all nuclear-capable units worldwide—my fellow Nuclear Weapons Technical Inspectors from the Army, Navy, Marine Corps, and I, remained uninformed about intrinsic radiation dangers.*

When multiple nuclear weapons were positioned close together, the resulting compounded ionizing radiation exposures were unavoidable. Despite "now-known" facts—given the indisputable reality of our exposures—this oversight represents a profound failure to acknowledge the risks we faced and demonstrates willful and wanton negligence on the part of administrators and other officials.

Recent research by Cold War-era veteran NWTs began to uncover the reality of those exposures, though the full extent remains unknowable. Only a small percentage of veteran NWTs now fully understand the dangers we faced. Through ongoing outreach and education, veteran NWTs are gradually learning about the presence and dangers of intrinsic radiation exposure, including exposures while working in small compartments and also sleeping near live nuclear weapons aboard ships and submarines.

Additionally (as also discussed later in this document), a "plutonium hazard," referenced in the then-classified Carter-Reagan Transition Team Briefing Book (December 1980)[11], prepared by the Defense Nuclear Agency, referred to a violation of plutonium storage limits (nuclear criticality risks) for weapons in DOD custody. The briefing book also documented a July 1977 decision by the Military Liaison Committee (MLC) to increase plutonium storage limits [nearly 300%][12] without authorization under Joint Nuclear Weapon Publication System Technical Publication (TP) 20-7, Nuclear Safety Criteria (classified). These violations significantly increased the INRAD exposure to NWTs. The DOE did not agree to, nor otherwise approve, the changes.

Technicians working near multiple nuclear weapons—whether in maintenance facilities, storage structures, aboard ships or aircraft, or in submarines—were subjected to compounded exposure from two-dimensional and three-dimensional ionizing radiation fields. This exposure significantly increased the risk of cumulative biological damage.

The materials in these weapons included highly radioactive isotopes such as Plutonium-239 (**^{239}Pu**), Plutonium-240 (**^{240}Pu**), and highly-enriched Uranium-235 (**^{235}U**), the latter being substantially more radioactive than the uranium used in nuclear power plants. [13]

B83 bombs and Air Launched Cruise Missiles In an Integrated Maintenance Facility (IMF)
Photo: Paul Shambroom, 2009 https://spectrum.ieee.org

Typical 3D Ionizing Radiation Exposure Zone B61 bombs in a storage structure "igloo"
Photo: fas.org via https://www.military.com, retrieved 3-31-23

Ionizing Radiation and Cancer Induction

The following U.S. Department of Health & Human Services (HHS) statement confirms that **any increment of ionizing radiation increases the likelihood of cancer induction**. This principle is directly relevant to Nuclear Weapons Technicians (NWTs), who faced prolonged and repeated exposure during our service. Given that **radiation-induced cancers are indistinguishable from those that occur spontaneously**, it is fundamentally unjust and immoral to deny claims based on the absence of absolute proof due to DOD procedures, restrictions, and secrecy requirements.

> *"For cancer induction, increasing the radiation dose does not necessarily increase the severity of the cancer; instead, it increases the chance of cancer induction. In the case of*

[11] Defense Nuclear Agency, Carter-Reagan Transition Briefing Book, December 1980 https://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Other/Carter_Reagan_Transition-6.pdf

[12] *The Origins and Evolution of S2C at Sandia National Laboratories*: 1949 to 1996, SAND99-1308, internal memorandum, September 2001, declassified/redacted copy. Author: William L. Stevens, Director, Surety Assessment Center, Sandia National Laboratories, Albuquerque, NM https://nsarchive.gwu.edu/document/29457-document-2-william-l-stevens-origins-and-evolution-s2c-sandia-national-laboratories

[13] Military Warheads as a Source of Nuclear Fuel, February 18, 2017, World Nuclear Association https://world-nuclear.org/information-library/nuclear-fuel-cycle/uranium-resources/military-warheads-as-a-source-of-nuclear-fuel

> *carcinogens generally, whether chemical or radiological, safety standards are based on a postulated zero threshold (i.e., any increment of carcinogen, no matter how small, is assumed to carry with it a corresponding increase in the chance of causing cancer). Increasing the size of the dose increases the probability of inducing a cancer with that carcinogen.* ***Cancers that are, in fact, caused by radiation are completely indistinguishable from those that seem to occur spontaneously or are caused by other known or suspected carcinogens."*** [14]

This authoritative statement underscores that **whenever ionizing radiation is a potential cause of cancer, no one can definitively disprove a link between a Nuclear Weapons Technician's cancer and their exposure**. The VA has a moral and ethical obligation to grant all relevant presumptions in favor of veteran NWTs who can provide written or oral statements—or other direct, circumstantial, compiled, and/or sworn evidence—testifying to or otherwise demonstrating their direct involvement in maintenance and handling of nuclear weapons in DOD custody.

Weapons in DOD Custody—Validating Concerns of DOD's Failure to Prioritize Ionizing Radiation Safety for Veteran Military Nuclear Weapons Technicians

The December 1980, Defense Nuclear Agency, Carter-Reagan Transition Briefing Book, documented a 1977 decision by the Military Liaison Committee (MLC) to **increase plutonium storage limits (nearly 300%) without authorization** under Joint Nuclear Weapon Publication System, Technical Publication (TP) 20-7, "Nuclear Safety Criteria" (classified), and without Department of Energy concurrence.[15] The changes to TP 20-7 could not be made without concurrence from DOE, which objected to the changes. Political infighting ensued between the DOE and DOD. The Army's Safety Action Officer (a retired Colonel) was an "*open, avowed opponent of any legitimacy to DOE's involvement, particularly DOE/ALO [Army Liaison Officer] or Sandia, in matters concerning nuclear weapons in DoD custody*". [16]

The dangerous and deadly 1977 unauthorized storage limit increase (which also involved the amount of plutonium transported by military aircraft, ship, and rail) apparently necessitated the INRAD study to address escalating nuclear safety risks and regulatory failures. Such storage limit violations significantly multiplied the true ionizing radiation exposure to NWTs, particularly in regard to what was previously described in this document as two dimensional and three dimensional exposures.

Accurate Reconstruction of Individual Radiation Exposure Dose During the Cold War Era is Impossible – Reasonable Maximum Limits Were Exceeded

The concept of "*As Low As Reasonably Achievable (ALARA)*" was developed by DOE in 1980—a modification of their earlier "*As Low As Practicable (ALAP)*" philosophy—for DOE staff and contractors, for cost-benefit analysis of person-rem dose reduction and to achieve internal risk-reward goals of cost reduction while considering "*perception and acceptance of risk by individuals*

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[14] Toxicological Profile for Ionizing Radiation, Section 3.2, p. 84, DHHS, September 1999, https://www.atsdr.cdc.gov/toxprofiles/tp149.pdf ; https://www.ncbi.nlm.nih.gov/books/NBK597567/

[15] *The Origins and Evolution of S2C at Sandia National Laboratories*: 1949 to 1996, SAND99-1308, internal memorandum, September 2001, p. 125, declassified/redacted copy. Author: William L. Stevens, Director, Surety Assessment Center, Sandia National Laboratories, Albuquerque, NM. https://nsarchive.gwu.edu/document/29457-document-2-william-l-stevens-origins-and-evolution-s2c-sandia-national-laboratories

[16] Ibid.; *The Origins and Evolution of S2C at Sandia National Laboratories*...

and society".[17] ALARA and INRAD safety programs are now cornerstones of modern radiation safety, focusing on minimizing exposure through time, distance, shielding, monitoring, and management. However, **during most of the Cold War era, such principles were essentially nonexistent throughout the DOD nuclear weapons community**.

DOE/DOD Workshop, March 24-26, 1981 – Failures, Challenges, Lessons Learned

The related January 25, 1983, DOE summary report: "*Intrinsic Radiation Intercomparison Workshop*," [18] revealed critical failures during the 1981 joint DOE/DOD workshop held at the Lawrence Livermore National Laboratory. This report **highlighted over 20 years of unreliable radiation measurements**, and numerous problems with workshop participants even under carefully controlled laboratory conditions. The workshop was apparently intended to prepare participants to conduct field studies with live nuclear weapons at operational DOD nuclear weapons units in selected locations throughout the world.

Several issues were reported, including:

- "*A review of **over 20 years of data showed that, in general, measurements made at different times on any particular weapon type could differ significantly**…"*
- *"…**all the causes underlying the measurement diversity are not yet clearly understood**…."*
- "*…**an unknown portion of the measurement-range variability results in the various ways in which*** [gamma] ***source energies and intensities are translated into dose rates**."*
- Regarding neutron sources: *"It is difficult to judge instrument quality because **the same type of instrument in the hands of different participants performed differently**. Without resolving the questions raised above, it is impossible to decide whether better or poorer performance is due to the instrument or to the procedures and calibration techniques used… "*
- *"**The range of results was excessive for warhead measurements**."*
- *"Relative to the **calculated dose rate…; the gamma spectrometer system deviation is the greatest at 50%**." Although **the "true" measured value is unknown**, the close grouping of conventional dose-measuring instrument results is gratifying… "* [Note: The exact text in the DOE document did not clarify whether 50% is an error margin or a measurement limit.]
- *"**Gamma measurements from the various instruments diverged widely** when used with lower energy sources."*
- *"The **deviations for the plutonium spheres were different even though the energy spectra were identical**."*
- *"**We should expect variability in field measurements made at different times to be about 20%**. An added variability can be expected to result from round-to-round differences and to changes in the physical surroundings and environment between measurements."*
- *"The Services should measure the gamma energy spectra in a selected set of INRAD-related environments to assess if substantial, error-creating low-energy gamma fluxes occur."*
- *"This workshop was seen as a first step in quantifying the measurement variability, identifying its probable causes where possible, and, where not, outlining the future work needed…"*

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[17] A Guide to ALARA, DOE/EV/1830-T5, April 1980, Department of Energy. https://digital.library.unt.edu/ark:/67531/metadc1069855/m2/1/high_res_d/5370687.pdf

[18] *Intrinsic Radiation Intercomparison Workshop*. *DOE LLNL* (1983). Holt, J. et. al. https://www.osti.gov/biblio/6195704

Improper Reliance on Failed DOE/DOD Intrinsic Radiation (INRAD) Study

The VA improperly relied on and cited the 1981–1983 INRAD study to deny claims and appeals, despite the study's well-documented deficiencies. A 1996 VA appeal decision (denial) stated:

> *"The dose assessment was based on the results of a 2-year study (1981-1983) in which the various services and the Department of Energy conducted **exhaustive measurements** of ionizing radiation emanating from storing, handling, and maintaining nuclear weapons, excluding radiation exposure from detonation or accident. This ionizing radiation from nuclear weapons was otherwise known as the intrinsic radiation (INRAD) program. **This program also included extensive time motion studies and direct personnel monitoring** as a part of their assessment of personnel exposures for the most hazardous of these systems."*

The assessments were based on a program that included limited observations during nuclear weapons maintenance and improper measurement techniques by personnel not necessarily proficient in the measurement equipment. Few if any had related operational field experience as NWTs and the assessments were not comprehensive. Those failures led to fundamental gaps in data collection and unrealistic analysis.

The field-level study was certainly not "exhausting" as stated above, "time motion studies" were not extensive by any reliable measure, and "direct personnel monitoring" was extremely limited at best. Subsequently, intrinsic radiation exposure estimates provided to the VA are unreliable. Generally, the DOE/DOD-level participants did not engage in two-way communication with assigned NWTs. Answers to typical questions included: "It's above your pay grade". After the unexplained field "visit", management in one location ordered NWTs to never enter an area containing nuclear weapons while in possession of any radiation-detection device, under threat of severe punishment including imprisonment.

Arguably, the above statement provided by the VA is a misrepresentation of the facts, and at best, inaccurate and misleading. Veteran NWTs and their families were significantly harmed—in regard to VA benefits—as a direct result of any related use of the statement.

The 1981–1983 study followed an earlier agreement to comprehensively investigate the "plutonium hazard," as referenced in the then-classified Carter-Reagan Transition Team Briefing Book (December 1980)[19], prepared by the Defense Nuclear Agency.

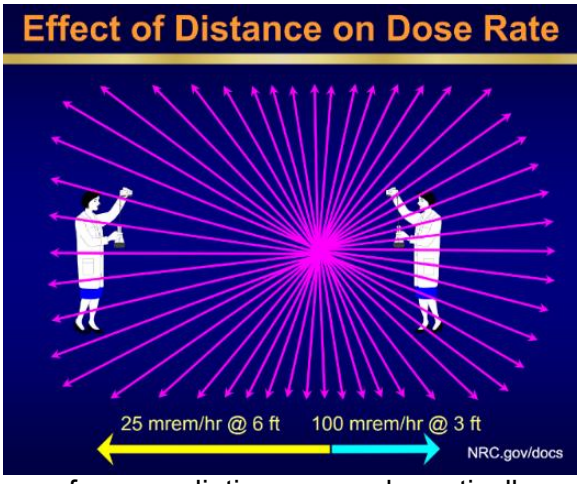
Due to the routine and prolonged physical contact with live nuclear warheads and the lack of dosimeter monitoring or time and distance restrictions, it is impossible to determine or accurately reconstruct individual radiation exposure doses. **The methodologies cited by the VA in denied claims and appeals, such as theoretical DOE/DOD time-motion studies, failed to faithfully account for the variety and nature of technicians' tasks**, **compounded exposures from multiple weapons and weapon types, and the absence of monitoring and related data.**

Based on today's well-established ionizing radiation safety standards and limits, it is a reasonable assumption that Cold War-era Nuclear Weapons Technicians exceeded maximum permissible radiation doses on a monthly, quarterly, annual, and/or lifetime basis. These standards underscore the stark contrast between modern radiation safety management and the systemic neglect experienced by Cold War-era NWTs, further demonstrating the impossibility of accurately reconstructing exposure records.

[19] Defense Nuclear Agency, Carter-Reagan Transition Briefing Book, December 1980
https://www.esd.whs.mil/Portals/54/Documents/FOID/Reading%20Room/Other/Carter_Reagan_Transition-6.pdf

Inverse Square Law Applied to Intrinsic Radiation Exposure

The significance of the information provided in the Intrinsic Radiation Intercomparison Workshop report, particularly the measurement data history and failures during the workshop, cannot easily be overstated. The report stated that measurements were taken one meter from the source and that dose rates were "calculated". When taking information based on the Inverse Square Law into serious consideration, errors and data shortcomings can mean the difference between maintaining safe exposure limits and exceeding them by factors of four to sixteen, or more, without knowing.



Understanding the inverse square law is essential to grasp the unseen dangers faced by tens of thousands of Cold War era Nuclear Weapons Technicians (NWTs).

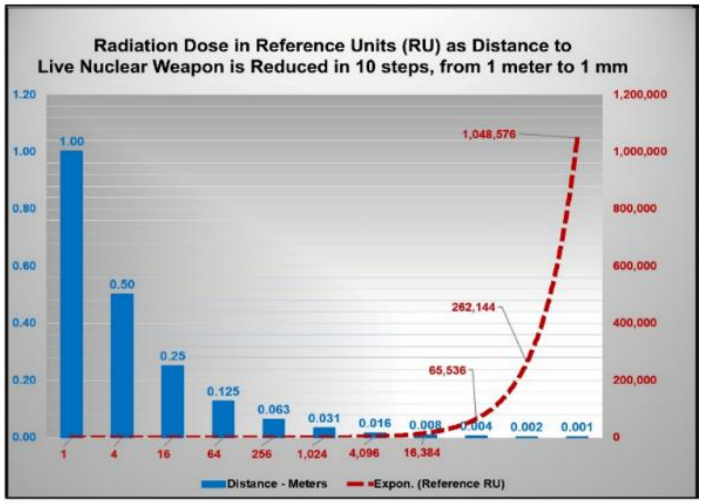
This fundamental principle in physics reveals how distance from a radiation source dramatically impacts exposure levels, offering critical insight into the extreme risks technicians faced while working with live nuclear weapons.

As described by the Department of Energy, Defense Threat Reduction Agency (former Defense Nuclear Agency), and Department of Defense, **the Inverse square law is**:

"The law which states that when radiation (thermal or nuclear) from a point source is emitted uniformly in all directions, the amount received per unit area at any given distance from the source, assuming no absorption, is inversely proportional to the square of that distance." [20]

To illustrate its importance, let's consider an example:

- At a distance of 1 meter from the surface of a weapon, the radiation level is 1 reference unit (1 RU).
- Doubling the distance to 2 meters reduces the radiation exposure to 1/4th of the initial value (0.25 RU).
- At 4 meters, the exposure drops to 1/16th of the original value (0.0625 RU). The relative amount of emitted radiation per unit area drops significantly after just a few meters.



Some numbers have been rounded to two decimal places for spacing and legibility on the chart.

Conversely, moving closer to the source dramatically increases radiation exposure:

- Halving the distance from 1 meter to 0.5 meters increases the exposure fourfold to 4 RU.
- At 0.25 meters, the exposure grows to 16 RU.
- Continuing closer—reducing the distance by half four more times to 0.02 meters (2 cm from the surface)—results in an increase of 4,096 times the original exposure (4,096 RU).

[20] DOE-DTRA TP 4-1/TM 39-4-1/SWOP 4-1/T.O. 11N-4-1, Glossary of Nuclear Weapons Material and Related Terms, 30 July 2016, IC 1-1 10 October 2018.

This exponential increase in radiation exposure at close distances underscores the unique dangers faced by NWTs. Routine tasks such as leaning over, reaching in, and physically handling live nuclear weapons, placed technicians at the surface or just centimeters from potent radiation sources, dramatically amplifying our exposure. Despite this, NWTs were never informed of the inverse square law or its direct implications for our health. Without protective measures such as time and distance restrictions or adequate shielding (now known to be ineffective in many circumstances), we unknowingly absorbed ionizing radiation levels far exceeding today's well-established safety standards.

The inverse square law demonstrates that even minor decreases in distance dramatically increases radiation exposure. For NWTs who routinely worked in direct physical contact with live nuclear weapons, this principle exposes the severe risks we faced and strengthens the case for our designation as Radiation-Exposed Veterans.

The VA does not recognize Nuclear Weapons Technicians' Ionizing Radiation Exposures—Accepts inadequate "Estimated" Exposure Dose Data from the DOD

U.S. Code Title 38, Veterans' Benefits, does not classify the duties of NWTs as a "Radiation-Risk Activity." Consequently, we do not have formal recognition as a "Radiation-Exposed Veteran" despite our direct and prolonged exposure to ionizing radiation while maintaining the nation's operational nuclear arsenal since the end of World War II. As a direct result, we are excluded from radiation exposure presumptions and VA benefits. In comparison, civilian Department of Energy (DOE) employes and contractors enjoy such presumptions by other government organizations via Executive Order 13179 "Providing Compensation to America's Nuclear Weapons Workers" and a related Energy Employees Occupational Illness Compensation Program Act, 2000.

The VA routinely denies veteran Nuclear Weapons Technicians' (NWTs) claims and appeals, citing the absence of recorded radiation exposure history—including dosimeter data—in personnel records. During the Cold War, most NWTs seldom, if ever, wore dosimeters and participated in a relevant applicable radiation dose management program. Additionally, claims and appeals have been denied based on inaccurate radiation dose estimations provided by the DOD.

The DOD leveraged secrecy restrictions, oaths, and operational security to withhold information about ionizing radiation exposure from NWTs. Details about routine nuclear weapons duties, activities, and locations were generally omitted from personnel records, apparently to avoid revealing the presence or absence of nuclear weapons at specific locations. For example, in 1976, an emergency logistics movement of all nuclear weapons from a U.S. military base in Southeast Asia was required due to intelligence leaks that would have otherwise caused a major international incident and related violent protests against that nation's government.

Secrecy requirements, still not officially lifted, continue to obstruct acknowledgment and documentation of NWTs' exposures.

CALL TO ACTION

Congressional Support

We urge every member of Congress to proactively support our proposed draft bill: Short title: "***Cold War Veteran Nuclear Weapons Technician Ionizing Radiation and Toxic Exposure Act",*** or ***"Cold war Veteran Nuclear Weapons Technician Act."*** An act to amend Title 38, United States Code (U.S.C.), to establish Cold War Veteran Nuclear Weapons Technician Presumptive Service Connections related to Exposure to Ionizing Radiation and Toxic Chemicals.

The proposed draft bill is available at https://tsosproject.com/docs.html

Department of Veterans Affairs (VA) and Department of Defense (DOD)

The Department of Defense has a moral imperative to cease issuing incomplete and inaccurate radiation exposure "estimates" to the VA regarding Cold War-era Nuclear Weapons Technicians' (NWTs) claims and appeals. Rather, the DOD must acknowledge nuclear weapons maintenance and related tasks on or in the immediate vicinity of the weapons, providing due presumptions for occupational ionizing radiation exposure.

The VA must stop dismissing clear and compelling evidence of ionizing radiation exposure suffered by NWTs and apply sound and reasonable judgment in favor of these veterans. The refusal to recognize these exposures led to decades of wrongful denials, driven by flawed studies and DOD's suppression of accurate radiation data.

Despite VA's reliance on questionable, incomplete, or inaccurate radiation dose reconstructions, no scientifically rigorous epidemiological study has ever specifically examined Cold War-era NWTs. DOD's failure to monitor exposure levels and establish enforceable safety limits made it impossible to determine precise radiation doses retrospectively. Yet, the VA continues to deny claims based on incomplete, oversimplified, and incorrect data. The fault lies squarely with the DOD, the VA being complicit, not the veteran NWT.

The Truth Is Undeniable

Cold War-era Nuclear Weapons Technicians were routinely, unavoidably, and unknowingly exposed to ionizing radiation while maintaining, disassembling, replacing internal components, assembling, transporting, and storing live nuclear weapons in many locations throughout the world.

With many of these veterans already deceased over the decades, the opportunity for comprehensive epidemiological study has been permanently lost. It is unconscionable to place the burden of proof on these veterans or their surviving families.

The facts are known. The failures to veterans are undeniable.
The time for action is now.

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