The Sound of Silence Project™

Fighting for Cold War Veteran Nuclear Weapons Technicians

Cold War-Era Nuclear Weapons Technicians
Exposure to Toxic Chemicals/Substances (MOS-related toxins)

Purpose and Introduction

The purpose of this document is to provide specific facts to members of the U.S. Congress, the Department of Veterans Affairs (VA), the Department of Defense (DOD), family members, and others regarding some of the routine duties of Cold War-era military veteran Nuclear Weapons Technicians. It describes facts related to our handling, use, and related occupational exposures to toxic and carcinogenic chemicals, and other substances. The terms “chemical” or “chemicals” in this document shall be considered to include all such chemicals and substances used.

During the Cold War era, veteran 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. NWTs’ duties required use of chemicals during those nuclear weapons tasks as well as during maintenance and repair of associated nuclear weapons test, handling, and support equipment. The term “nuclear weapons” may include warheads, bombs, atomic demolition munitions, missiles, rockets, torpedoes, depth bombs, reentry vehicles, artillery fired atomic projectiles, and others.

The document describes many of the similar conditions faced by veteran Nuclear Weapons Technicians (NWTs) during the Cold War era. While individual experiences with the maintenance of equipment varied—depending on nuclear weapon types, deployment platforms, location, and mission—the underlying issues were consistent. Note: While some exceptions may exist, the term “generally” is implied for statements throughout this document.

U.S. Code Title 38, Veterans’ Benefits, excludes NWTs’ duties as a “Toxic Exposure Risk Activity”. As a result, we are not considered a “Toxic Exposed Veteran”, in direct contradiction to our duties performed since the end of World War II.

The DOD’s decades-old secrecy requirements related to nuclear weapons tasks continue to obstruct the documentation and acknowledgment of NWTs’ specific activities, including their exposure to toxic chemicals during nuclear weapons and related equipment maintenance. Denying veterans’ claims based on the absence of absolute proof—when such proof was systematically restricted or erased by DOD procedures, classification policies, and secrecy mandates—is fundamentally unjust and immoral

Exposures and absence of safety requirements or oversight

During the Cold War era, Nuclear Weapons Technicians performed critical duties involving the maintenance and handling of the nation’s nuclear weapons stockpile under conditions that posed significant risks due to toxic chemical and ionizing radiation exposure. Typical exposures to toxic chemicals and other substances are described here.

Nuclear Weapons Technicians (NWTs), in general, worked without adequate ventilation, respiratory, and other personal protection from toxic and carcinogenic chemicals, organic solvents, compounds, and metals during nuclear weapons and associated equipment maintenance. Engineering controls or other workplace controls were not in place.

A retired veteran Nuclear Weapons Technician recently wrote: *"There were no fume hoods at any place I worked. Any installed exhaust fans certainly were not intended to filter hazardous fumes. We now know that most of the chemicals and substances that I (and the other NWTs) used were carcinogens; harmful to the central and peripheral nervous systems, and other organs; toxicologically synergistic with other chemicals and solvents, and with ionizing radiation; and may cause other health problems, diseases, debilitating medical conditions, or death."*

NWTs used "splash cans" to place parts on a spring-loaded metal screen, push the screen down into the chemicals/solvents with a gloved hand, immersing the parts (and fingers/hands) in the solution. In minutes, the latex or "surgical" gloves broke down during nuclear weapons maintenance operations, exposing fingers and hands to toxic chemicals. Bulky/thick rubber gloves were seldom used during nuclear weapons operations due to dexterity problems. Their use could easily result in dropping (on or inside a live nuclear weapon), losing or damaging fasteners, connectors, straps, hardware, etc.; damaging limited life components; and essentially rendering the live nuclear weapon unusable, unreliable, and/or unsafe.

			
Over 35 different toxic and carcinogenic chemicals, solvents, and substances Required/authorized use on live nuclear weapons, internal parts, hardware, and related equipment.	**55-gallon drum and 5-gallon can for chemicals** Chemicals were transferred from drums to the 5-gallon cans used in the maintenance bay, then poured into a splash can.	**Benchtop "splash can" with spring-loaded screen** Items were placed on the screen, the screen pushed down to submerge parts, and held in place to clean thoroughly for installation.	**Chemical mask with filter** Generally, not available or required. Use could also cause communications and visibility problems.

AFI 91-101, Air Force Nuclear Weapons Surety Program, prohibited—during peacetime—the wearing of *"…cumbersome gloves (to ensure weapons are not inadvertently damaged)".* [1] That practice extended through the Navy, Army, and Marine Corps.

Toxic chemicals, metals, organic solvents, volatile organic compounds (VOC), paint strippers, primers, etc. were specifically authorized and required by the Atomic Energy Commission (AEC) and the Defense Atomic Support Agency (DASA), later renamed Department of Energy (DOE) and Defense Nuclear Agency (DNA), respectively, for use on nuclear weapons and nuclear weapons-related equipment. Each had an AEC or DOE part number and/or MILSPEC.

The chemicals and other substances were listed in one of two Joint Nuclear Weapons Publication System (JNWPS) manuals, required for use with nuclear weapons:

- AEC/DOE-DASA/DNA TP 35-51, Army TM 39-35-51, Navy SWOP (Special Weapons Operations Procedures) 35-51, Air Force T.O. 11N-35-51, "*Technical Manual, General Instructions for Cleaning, Preservation, Packaging and Identification Marking*."

[1] Air Force Instruction 91-101, Air Force Nuclear Weapons Surety Program, 1 March 1997, Section A, 3.3.2.

- AEC-DASA (later DNA) TP 40-54, et. al., "*Technical Manual, General Maintenance Instructions*".

Detailed procedures for use on specific nuclear weapon series may be referenced in related classified JNWPS, Navy, Army, and Air Force technical procedures. Additional technical publications were used for maintenance of nuclear weapons handling equipment, e.g. bomb clip-in assemblies, air launched missile/rocket pylons, racks, man-portable containers, etc.

Based on the types of assigned weapon systems, numerous toxic chemicals and other substances were stocked for daily use during nuclear weapons and related equipment maintenance operations/evolutions. At many locations, it was normal practice to maintain twenty to thirty or more different chemicals, solvents, and other substances for routine use. Over the course of assignments in the U.S. and worldwide, many NWTs used most of the substances on the list that follows, and more that are not included. Their use varied depending on the type of warheads, bombs, missiles, rockets, and other nuclear weapons/atomic munitions maintained. Additionally, the specific chemicals and substances used, or otherwise handled, were influenced by the type of bomb, rocket, or missile rack; weapons clip-in assembly; rotary launcher; other launching system, etc.; and the type and complexity of storage/shipping containers; all of which were determined by location and mission requirements.

Toxic chemicals and other substances required for use on nuclear weapons and related equipment – Includes related MSDS/SDS information

Note: The actual list of items used at many locations, or in combination with multiple station assignments, may be substantially longer than the one provided here. AEC-DNA TP 35-51 with change 6, may be accessed at: https://tsosproject.com/docs.html

- **Acetone, Technical (Dimethyl ketone), Atomic Energy Commission Spec O-A-0051e:** Volatile organic compound (VOC). Toxicity: dermal, eyes, inhalation. Target organs: Central nervous system, kidney, liver, spleen, blood. Toxicologically synergistic with 1,1,2-Trichloroethane, Trichloroethylene, Carbon Tetrachloride, Chloroform, Bromodichloromethane, Dibromochloromethane, N-nitroso dimethylamine, 2.5 Hexanedione, 1,2-Dichlorobenzene.
- **Alodine, Aluminum Coating Compound, MIL-C-5541/A:** Contains Chromium Trioxide (a carcinogen), Hydrofluoric Acid, and Nitric Acid (all listed below). Iridite is a similar product.
- **Asbestos, Fiber, Atomic Energy Commission Spec 803144-00:** Carcinogen Cat 1A, lung cancer, possible genetic defects, skin/respiratory irritation. Used for component packaging.
- **Benzene:** [2] Aromatic hydrocarbon, VOC. Carcinogen with risk of acute myelogenous leukemia, chromosome aberrations, lymphatic and hematopoietic cancers, neurotoxin, germ cell mutagenicity, bone marrow aplastic anemia, immune system damage.
- **Beryllium:** Carcinogen Cat 1, chronic granulomatous lung disease, cancer by inhalation, chronic beryllium disease or berylliosis. Inflammation and scarring of the respiratory tract. Acute toxicity, oral and inhalation; reproductive toxicity (fertility and unborn child). Skin

[2] Benzene, Tetrachloroethylene [perchloroethylene] (PCE or PERC), and Trichloroethylene (TCE) were major contaminants listed in the Camp Lejeune toxic water contamination case, recognized by VA as a "presumptive service connection" for certain diseases. Review 2-25-23.

irritation and serious eye irritation. Toxic dust or residue result of sanding or filing, and cleaning with solvents.

- **Cadmium/Cadmium dust and residue:** Carcinogen 1B. Genotoxin [3]. Germ cell mutagenicity, acute toxicity from inhalation Cat 2, reproductive toxicity Cat 2. Repeated exposure, target organ toxicity Cat 1. Causes mutations and chromosomal deletions. May be fatal if inhaled. Causes skeletal demineralization, inhibits collagen production leading to Osteoporosis. Toxic dust or residue result of sanding or filing rough/chipped edges, and cleaning with solvents. Used in corrosion-resistant alloys, coating, and pigments. Extensive use as plating for hardware and hand tools. Plated surfaces of tools often became chipped or flaked off, creating sharp, jagged toxic surfaces.
- **Carbon Tetrachloride (Tetrachloromethane):** A Chlorinated Hydrocarbon solvent. Genetic carcinogen acts directly on DNA, liver cancer (per DOE). Inhalation Cat 1 – liver, kidney.
- **Chromium Trioxide, Technical, O-C-303c (Chromic Acid, Chromium Hexavalent Compound, Chromic Anhydride):** Used to repair magnesium parts and cadmium and zinc-plated parts, also an Alodine component. Carcinogen Cat 1A, paranasal sinus and nasal cavity cancer, lung cancer, germ cell mutagenicity Cat 1B, reproductive toxicity Cat 2, serious eye damage, damages gastrointestinal tract. Targets: respiratory system, liver, kidney, blood. Causes lung ulcerations, pneumonia, kidney failure. Can be fatal in contact with skin or if inhaled.
- **Cleaning Compound, Phosphoric acid based, MIL-C-5410B Type 1:** Skin corrosion Cat 1B. Burns by all exposure routes, Target organs: respiratory system, gastrointestinal system, eyes, skin. Irreversible eye damage Cat 1.
- **Coating Compound, Thermal Resistant, MIL-C-27227A** (35-51): Contains Butyl Acetate, Hexane, 1,5-Disocyananato, Homopolymer, Xylenes, Mixed Isomers.
- **Corrosion Preventive Compound, Solvent-Cutback, MIL-C-16173D Grade I:** Aspiration toxicity Cat 1, Carcinogen 2B, eye irritation Cat 2A, skin irritation Cat 2, respiratory Cat 3.
- **Dry Cleaning Solvent, Stoddard, Type I (P-D-680):** Aspiration toxicity Cat 1, organ kidney toxicity Cat 1, skin corrosion Cat 2, serious eye damage Cat 2A. VOC.
- **Epoxy and Vinyl Resins, 837994-00:** Carcinogen Cat 2, skin sensitization Cat 1.
- **Ethylbenzene:** Carcinogen Cat 2. Neurotoxin - central nervous system; ototoxicant. [4] Volatile organic compound. Component of Naptha.
- **Hydrofluoric acid (Alodine component):** Dermal Cat 1, serious eye damage Cat 1.
- **Insulation, Thermal, 839827-00** (fiberglass)**.** Carcinogenicity Cat 1B. See Silica fiber.

[3] A genotoxin is a chemical or agent that can cause DNA or chromosomal damage. Genotoxicity: damage to DNA and its consequences. https://pubmed.ncbi.nlm.nih.gov/19157059/ Reviewed 6-15-24

[4] Ototoxicant: "Exposure to certain chemicals at work can cause damage to different parts of the ear. These chemicals are called ototoxicants or 'ototoxic chemicals.' Exposure to ototoxic chemicals can cause hearing loss… Examples of chemicals that damage hearing: Solvents (e.g., toluene, styrene, xylene, ethylbenzene, and trichloroethylene)… Exposure limits for many chemicals were set without specifically considering ototoxicity. Some exposures may create a hearing risk at levels below existing guidance, especially when combined with noise exposures." Sources: Chemicals and Hearing Loss | Noise and Hearing Loss | CDC "The risk of hearing loss is increased when workers are exposed to these chemicals while working around elevated noise levels." Includes n-hexane and p-xylene. https://www.cdc.gov/niosh/docs/2018-124/pdfs/2018-124.pdf Accessed 10-25-24.

- **Kerosine, VV-K-211d:** Contains hydrocarbons. Carcinogen Cat 1A, aspiration toxicity Cat 1, germ cell mutagenicity Cat 1B, neurotoxin. Genetic defects, renal tubular acidosis, hypokalemic paralysis. Reversible dermal toxicity.
- **Magnesium-Thorium Alloy/Magnesium parts, TP35-51:** Toxic by inhalation or ingestion. Radioactive. Carcinogen.
- **Methanol, ACS, Technical Grade:** Poison. Nervous system depression. Organ toxicity: eyes Cat 1, central nervous system Cat 1.
- **Methyl Ethyl Ketone (MEK), Technical, TT-M-261b** (**Methyl isobutyl Ketone and Isobutyl Methyl Ketone):** Carcinogen Cat 2. Toxicity: reproductive, developmental effects, central nervous system Cat 3, developmental effects, endocrine disrupter.
- **Methyl Isobutyl Ketone, TT-M-268b:** Carcinogen Cat 2, Toxicity Central nervous system Cat 3. Mixed 1-to-1 with toluene for a thinner.
- **Naptha, Aliphatic Type II, TT-N-95b:** Carcinogen, ototoxicant. May cause reproduction or birth defects. Contains N-Hexane, Xylene, Toluene, Cyclohexane, Pentane, Heptane, Ethylbenzene, Benzene, and 1,2,4-Trimethylbenzene Sulfur. Possible Chronic lymphocytic leukemia risk.
- **N-Hexane:** Neurotoxin, reproductive toxicity, specific organ toxicity; ototoxicant.[5] Naptha component. VOC.
- **Nitric Acid (Alodine component):** Serious eye damage Cat 1, severe skin burns Cat 1A, inhalation toxicity Cat 3.
- **Nitric Oxide (compressed gas):** Acute toxicity, inhalation Cat 1, serious eye damage Cat 1, may be fatal if inhaled. Also known as Nitrogen Monoxide, Nitrosyl Radical, and Amidogen.
- **Resin-Acid, MIL-P-15328C:** Carcinogen Cat 1A, toxic to reproduction/unborn child Cat 2.
- **Sealer, Surface, Phenolic, 837818-00:** Corrosive Cat 1B skin burns/eye damage. Mutagenic Cat 2. Target organ toxicity Cat 2, May cause organ damage through prolonged or repeated exposure.
- **Silica Fiber, Insulation, Thermal, 839827-00:** May include glass fiber or wool. Carcinogenicity Cat 1B, cancer by inhalation. Chronic respiratory, eye and skin irritation.
- **Tetrachloroethylene [6] (Perchloroethylene, technical) (PCE, PEC or PERC), 830264-00:** Carcinogen. Toxic to the nervous system, liver, kidneys, reproductive system, unborn. Bladder cancer, multiple myeloma, non-Hodgkin's lymphoma, and Parkinson's disease. Germ cell mutagenicity Cat 2, narcotic effects. Also known as Perchloroethylene, Perchloro, Tetrachloroethene. Associated occupational diseases per NIH.gov: Kidney cancer, acute toxic poisoning, toxic encephalopathy/chronic poisoning. Latency: years to decades.
- **Tetrahydrofuran (THF), 825639-00:** Carcinogen Cat 2. Neurotoxin. Target organ toxicity Cat 3. Targets liver, kidneys, central nervous system. Compounded with vinyl resin adhesive, listed below. (TP 40-54). Common name: Oxolane.
- **Thinner, Dope and Lacquer, Acrylic/Nitrocellulose:** Target organ toxicity, respiratory tract irritation, narcosis, Cat 2; skin sensitization Cat 1; skin corrosion Cat 2.

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[5] Ibid: Ototoxicant

[6] Tetrachloroethylene [perchloroethylene] (PCE or PERC), Trichloroethylene (TCE) and Benzene were listed in the Camp Lejeune toxic water contamination case, recognized by VA as a "presumptive service connection" for certain diseases. Review 2-25-23.

- **Toluene, Toluene-2,4-Diisocyanate, TT-Y-548c:** Carcinogen, aromatic hydrocarbon. Nerve damage, liver, kidney damage, cardiac arrest, reproductive toxicity, renal tubular acidosis, hypokalemic paralysis. Neurotoxin. Mixed 1-to-1 with Methyl Isobutyl Ketone (MIBK) to thin Zinc Chromate. Inhalation/dermal toxicity. VOC.
- **Trichloroethane, Technical, O-T-620c / 838385-00 (Methyl Chloroform):** VOC. Carcinogen. Toxicity: Oral, inhalation, dermal. Also known as Xythene.
- **Trichloroethylene (TCE) [7] Technical, O-T-634b, Type I, 833974-00, 802269-00, 802267-00:** A chlorinated hydrocarbon solvent. Carcinogen by all routes of exposure. Neurotoxin, ototoxicant.[8] Targets: central nervous system, heart, liver, lungs. Parkinson's Disease.
- **Trichlorotrifluoroethane, Freon, 268641-00 (TF), 268642-00 (PCA):** Potential dizziness, headaches, respiratory issues.
- **Triethylenetetramine, 837824-00:** Acute dermal toxicity Cat 4, inhalation toxicity Cat 2, severe skin burns and eye damage, pulmonary edema at high concentrations, asthma.
- **1,2,4-Trimethylbenzene Sulfur (component of Naptha):** Aspiration toxicity Cat 1, skin irritation Cat 2, serious eye damage Cat 2, organ toxicity Cat 3, acute toxicity (inh.) Cat 4.
- **Varnish, Phenolic Resin Base, TT-V-119b:** Contains Acetone, Methyl n-Amyl Ketone, Acetone, Naptha.
- **Vinyl Resin Adhesive (Vinyl Ester Resin):** Carcinogen Cat 2, skin corrosion Cat 2, eye damage Cat 2A.
- **Wadding, Bound Fiberglass, 945054-00:** Cancer risk. Skin and respiratory tract, lung irritation. Inhaling can create tiny cuts in organs and tissues.
- **Wadding, Bound Hair, PPP-C-1120, Type IV (firm),** Class A (water resistant, natural hair).
- **Xylene, Technical, TT-X-916b (Ethylbenzene 20-30%):** Carcinogen Cat 2; ototoxicant,[9] Skin/eyes Cat 2/2A. Toxic to reproduction; toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system, hearing organs; death from exposure in high doses; brain, lung, or other organ injury if inhaled/dermal. VOC.
- **Xythene**, **Solvent, Chlorinated, Atomic Energy Commission Spec O-T-620c. See Trichloroethane (Tech):** Carcinogen. Toxic to reproduction (fertility and unborn child), organ toxicity, liver Cat 2, eyes Cat 2, skin Cat 2.
- **Zinc Chromate Primer, MIL-P-8585A:** Major category: metals. Confirmed Human Carcinogen Cat 1. Semi-VOC, Reproduction toxicity Cat 1A, germ cell mutagenicity Cat 2, central nervous system depression, harms gastrointestinal tract, liver, kidneys, immune system, asthma, skin ulcers, lung cancer, chromium-chronic toxic effect, contact dermatitis/allergic. Severe skin burns, serious eye damage. Contains phenol formaldehyde polymer (20-25%), Xylenes (20-25%), Zinc Chromate (20-25%). Hexavalent Chromium compound. Also **Zinc Chromate Putty, AEC Part No. 870425-00.**
- **Zinc Potassium Chromate (commonly mistaken for and called Zinc Chromate):** Carcinogen. Can cause a hole in the septum. Irritation of nasal passages and respiratory tract, bronchitis. Eye and skin irritation. Irritation or corrosion of alimentary tract, circulatory collapse and toxic nephritis (kidney).

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[7] Ibid.: Tetrachloroethylene [perchloroethylene] (PCE or PERC), *Trichloroethylene (TCE)* and Benzene...

[8] Ibid: Ototoxicant.

[9] Ibid: Ototoxicant.

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, to establish Cold War Veteran Nuclear Weapons Technician Presumptive Service Connections related to Exposure to Ionizing Radiation and Toxic Chemicals. An early version of the proposed draft bill is available at https://tsosproject.com/docs.html. Changes are underway.

Department of Defense - Release from Secrecy Restrictions and Disclosure

We urgently request the Department of Defense to do the following:

Authorize all U.S. military veterans who served as Nuclear Weapons Technicians, as described in this document, to disclose information gained from military service during the Cold War period, September 2, 1945, through December 26, 1991, regarding:

- Their military job title(s), unit(s), duty stations, and locations of service;
- General descriptions of their responsibilities in maintaining, transporting, handling, and storing nuclear weapons;
- The presence of toxic and carcinogenic and other substances they handled; and their ionizing radiation exposure risks;
- The circumstances of their working conditions and related safety protocols, or lack thereof;
- Testimonial or documentary evidence before government bodies or advocacy organizations; and,
- Any other unclassified information needed to substantiate VA claims and related treatment as applicable.

Department of Veterans Affairs: The Truth Is Undeniable

Cold War-era Nuclear Weapons Technicians were routinely exposed to toxic and carcinogenic chemicals and other substances while maintaining, disassembling, replacing internal components, assembling, transporting, and storing live nuclear weapons; and during the maintenance of test, handling, and support equipment; in many locations throughout the world.

The VA has a moral and ethical obligation to grant all relevant presumptions in favor of veteran NWTs who may 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. 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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