



SUBMARINERS' ADVOCACY GROUP®

Submariners Helping Submariners

Abstract: The Unseen Burden

The Unseen Burden: Toxic Exposures and Health Impacts on U.S. Navy Submariners

Despite their critical role in national defense, generations of U.S. Navy Submariners have endured an invisible and unacknowledged health crisis. The Unseen Burden reveals a decades-long public health failure in which thousands of Sailors have suffered from a wide spectrum of chronic illnesses — **rare cancers, blood disorders, cardiovascular diseases, and respiratory conditions** directly tied to continuous exposure to a uniquely toxic submarine atmosphere.

These exposures, combined with a longstanding lack of scientific study, have led to the systemic denial of veteran benefits and medical care. The report concludes that these conditions are not coincidental, but the predictable result of sustained toxic exposure in an enclosed operating environment.

The Unique and Hazardous Operating Environment

Submarine duty, characterized by its rigorous demands and inherent secrecy, involves continuous exposure to airborne hazards **24 hours a day, 7 days a week, for weeks or months at a time** — a stark contrast to the intermittent exposures studied in civilian industrial settings. The sealed environment ensures that all personnel share equal risk of exposure to a “toxic cocktail” of between 130 and 200 contaminants recirculated by the boat’s ventilation system.

Submarine duty subjects Sailors to continuous, round-the-clock exposure to airborne contaminants for months at a time — conditions unmatched in any civilian workplace. Within the sealed hull, between 130 and 200 identified toxic substances circulate through the atmosphere. Key hazards include:

- **Hypoxia:** Submarine atmospheres are maintained at or below 19% oxygen (OSHA defines <19.5% as oxygen-deficient and immediately dangerous to life and health), resulting in measurable impacts on respiratory, cardiovascular, and central nervous system function.
- **Carbon Dioxide:** Chronic CO₂ levels reach approximately 0.8%—20 times higher than normal air. Prolonged exposure induces hyperventilation and increases the uptake of other airborne toxins.
- **Monoethanolamine (MEA):** A key component in CO₂ scrubbers, MEA is a known irritant and systemic toxin affecting the liver, kidneys, and respiratory tract. Despite 67 years of continuous use and widespread anecdotal illnesses, the VA has yet to establish a service connection.
- **Benzene:** A Group 1 carcinogen linked to Acute Myeloid Leukemia and other hematologic cancers, historically introduced through solvents and tobacco smoke, with new evidence of heightened gender-specific risk.

- **Other Contaminants:** Additional hazards include 2190 TEP lubricant oil and its toxic byproduct DBNP (a mitochondrial uncoupler), ozone from electrical systems, asbestos, and ionizing radiation.

Scientific and Policy Failures

The current body of research is fundamentally inadequate to characterize the hazards faced by Submariners, thereby enabling systemic denial of claims.

1. **Failure to Study Chemical Mixtures:** The National Research Council acknowledged the need to study how multiple contaminants interact synergistically, yet no such studies have been conducted.
2. **Misapplied Exposure Definitions:** Existing standards rely on industrial models that fail to reflect the 24/7 exposure realities of submarine life.
3. **Flawed Physiological Assumptions:** Research has conflated normobaric (sea-level) and hypobaric (altitude) hypoxia, despite evidence that these conditions trigger fundamentally different biological responses.

The Human Cost and Systemic Injustice

The absence of sound science has left veterans carrying an insurmountable burden of proof. As a result, Submariners are disproportionately denied healthcare and disability benefits under the PACT Act, which does not explicitly recognize submarine toxic exposure. This failure represents not only a public health crisis but also a breach of faith with those who served in silence, trusting that their sacrifices were acknowledged and their safety assured.

Policy and Legislative Imperatives: A Call to Action

The Submariners' Advocacy Group calls upon Congress, the Department of the Navy, and the Department of Veterans Affairs to take immediate, corrective action:

1. **Expand PACT Act Eligibility:** Amend the PACT Act to explicitly include all Submariners who served from 1947 to the present as a presumptive toxic exposure group.
2. **Commission Independent Scientific Studies:** Fund rigorous, transparent research to:
 - Fully characterize the submarine atmosphere in real time across all operational classes.
 - Determine the cumulative and synergistic health impacts of full-spectrum chemical exposure.
3. **Reform VA Claims Processing:** Simplify and expedite the claims process for Submariners, providing Veteran Service Representatives with standardized, data-driven guidance on submarine-specific exposures.

Conclusion

The suffering of these Sailors is the unseen burden of national defense — a silent cost borne beneath the waves. The time for inaction has passed. The Unseen Burden demands that the nation uphold its commitment to those who served by delivering the scientific validation, policy recognition, and care they have earned.