

Chapter 15 – Blast Overpressure (BOP)

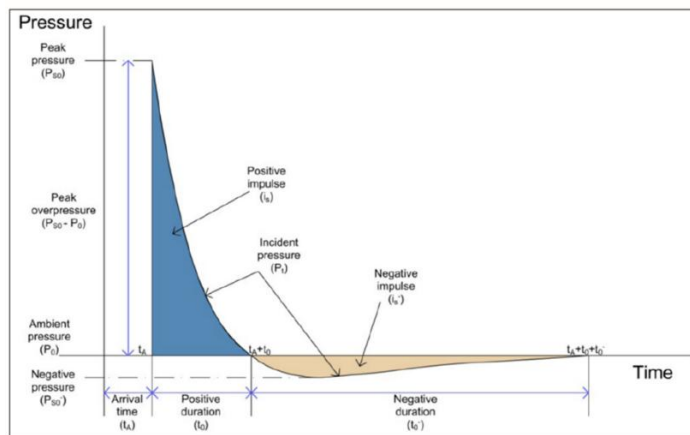
1. General

BOP is defined as the sharp, instantaneous rise in ambient atmospheric pressure resulting from an explosive detonation or the weapon system firing. Exposure to BOP can result in a blast injury and adversely affect the brain and hollow organs of the body (lungs, intestines, ears). Department of Defense (DoD) personnel in operational environments demonstrate possible adverse effects from acute and repetitive exposures to BOP on brain health and cognitive performance (e.g., headache, ringing in ears, slow reaction time, poor concentration). Although brain health effects from BOP exposures are not yet fully characterized, adverse health and cognitive performance impacts have been reported for exposures to BOP above four pounds per square inch (4 psi).

a. Terms and Definitions

- Peak pressure (P): The sharp rise on the graph indicates the peak pressure of the blast, typically measured in psi.
- Positive impulse (I): The net force of the positive phase duration is the positive impulse, typically measured in psi-milliseconds (ms), also referred to as the “area under the curve”.
- Positive phase duration (t): The time (t) in ms from P to ambient pressure.

b. A graphical representation of a BOP wave is presented below.



Filice, A.; Mynarz, M.; Zimno, R. Experimental and Empirical Study for Prediction of Blast Loads. Appl. Sci. 2022, 12, 2691. <https://doi.org/10.3390/app12052691>

2. Centralized Navy BOP Program

Acquisition Technical Support (ATS) Division within the NMCFHPC Industrial Hygiene (IH) Department serves as the Subject Matter Experts and cognizant technical authority regarding the Industrial Hygiene aspects of Blast Overpressure Hazard through systems lifecycle.

Currently, the Department of Defense (DOD) policy titled “Department of Defense (DoD) Requirements for Managing Brain Health Risks from Blast Overpressure”, reference (15-1) includes the following requirements:

- a. Identify and track personnel who are potentially exposed to BOP in the Defense Occupational and Environmental Health Readiness System-Industrial Hygiene, prioritizing those personnel who possess an occupational specialty that, by nature of operational activities, regularly places them at increased risk of BOP exposures.”
- b. Develop an exposure assessment strategy that supports Component-unique operational environments and prioritize efforts to collect BOP exposure data.

The strategy detailed in this document will assist the Department of the Navy in complying with reference (15-1) through (15-3).

ATS will coordinate project management, centrally from NMCFHPC, to oversee the early adoption and continuity of the Navy BOP exposure monitoring strategy to implement exposure assessment methods that will be included in the industrial hygiene surveys, and evaluate work conducted by the industrial hygiene program offices for quality assurance (e.g., sampling, analysis, reporting, recordkeeping).

3. Technical Guidance for Process Identification and Inclusion in DOEHRS-IH

Using the information in reference (15-4), the IHPO will identify commands, processes, and personnel that utilize Tier 1 weapons and other BOP producing weapons of concern. Weapon systems, BOP hazard, control measures, and processing personnel information will be documented in Defense Occupational and Environmental Health Readiness System Industrial Hygiene (DOEHRS-IH).

4. Technical Guidance for Exposure Monitoring

Using the process in Reference (15-5), the DON IHPO will be enabled to collect BOP exposure data on high-risk populations. NMCFHPC will perform data analysis, draft reports and notification letters and distribute final reports to the IHPO for distribution to the command. NMCFHPC will serve as the central repository for BOP exposure monitoring data. NMCFHPC will also store sample sheets and data files created from exposure monitoring in a centralized location. When the capability arises, NMCFHPC IH Program Support Division personnel will enter BOP exposure monitoring data into DOEHRS-IH.

A standardized BOP sample survey form can be found at

[https://www.med.navy.mil/Portals/62/Documents/NMFA/NMCPHC/root/Industrial%20Hygiene/Appendix N 260115-1245.pdf?ver=i09Oo-k5u6BPzXz7UckEtA%3d%3d](https://www.med.navy.mil/Portals/62/Documents/NMFA/NMCPHC/root/Industrial%20Hygiene/Appendix%20N%20260115-1245.pdf?ver=i09Oo-k5u6BPzXz7UckEtA%3d%3d)

5. Additional Information

Technical guidance, to include references (15-4) through (15-8) can be found on NMCFHPC's BOP Website: <https://www.med.navy.mil/Navy-and-Marine-Corps-Force-Health-Protection-Command/Environmental-Health/Industrial-Hygiene/Acquisition-Technical-Support/Blast-Overpressure-BOP/>. For more information, contact NMCFHPC ATS Division at usn.hampton-roads.navmcpubhlthcenpors.list.nmcphe-ATSBOPsupport@health.mil.

6. References

- 15-1. Department of Defense Requirements for Managing Brain Health Risks from Blast Overpressure of 8 Aug 24
- 15-2. DoD Warfighter Brain Health Initiative Strategy and Action Plan of 8 June 22
- 15-3. Department of Defense Implementation Guidance for Managing Brain Health Risks from Blast Overpressure of 12 Dec 24
- 15-4. Industrial Hygiene Field Guide for Blast Overpressure Process Identification and Hazards not in DOEHS 7.10.25.
- 15-5. Industrial Hygiene Field Guide for Blast Overpressure Exposure Monitoring of 23 May 25
- 15-6. DON Industrial Hygiene Weapon Use Survey for BOP 6.6.24.
- 15-7. Navy Standardized IH Survey Report BOP Example 6.6.24.
- 15-8. Blast Overpressure Weapon System Picklist for DOEHS-IH 7.1.25.