

# Robert C Morhard

## **Explosives Expert:**

Technical experiences over the past 41 years in explosives, propellants and pyrotechnics in all areas of safety, formulation, manufacturing, processing, handling, storage, application and disposal.

Experienced in planning, designing, and managing construction and startup of new or upgraded explosives manufacturing facilities and expansion projects in 97 countries worldwide within more than 600 explosive, propellant and pyrotechnic manufacturing plants.

Designated as a 'Special Expert' status by the National Fire Protection Association (NFPA) serving on the Technical Committee for Explosives Materials Code (NFPA 495) and Safe Havens for Vehicles Containing Explosives (NFPA 498) from 2000 to present date. The NFPA publishes standard and model regulations, the basis for most US States, the US Government (OSHA, MSHA, and ATF), as well as more than 100 countries worldwide.

Participated in the development and implementation of more than 50 internal plant and external plant emergency action and safety plans for explosives, propellants and pyrotechnics facilities.

Extensive regulatory interface involving energetic materials in United Kingdom, Ireland, China, Europe, USA, Canada, Russia, Germany, Australia, Spain, Vietnam, Brazil, Panama, India and New Zealand.

Since 1979, participated on many technical committees within the Institute of Makers of Explosives, United Nations, SAFEX International, Mine Safety and Health

Administration and many US and global regulatory groups dealing with explosives, propellants and pyrotechnics.

Provided design engineering, technology, permitting, construction, commissioning, operator training, process hazards analysis, and start-up technical support for:

- 67 explosive production facilities (40 million mT manufactured (estimated))
- 3 TNT/PETN (Pentolite) cast explosives manufacturing facilities
- 2 electronic detonator assembly lines
- 1 electric detonator manufacturing line
- 5 non-electric detonator assembly lines
- 4 non-electric detonator shock tube extrusion manufacturing lines
- 3 emulsion explosive emulsifier plants (2 PIBSA and 1 SMO)
- 5 pyrotechnic delay element manufacturing and loading lines
- 2 large rocket motor (ICBM) propellant wash-out lines
- 2 emulsion explosive bulk truck assembly lines
- 11 explosives ordnance demilitarization lines (350,000 mT safely processed)
- 1 commercial explosives waste incinerator
- 1 automotive airbag initiators and propellant manufacturing plant
- 30 + new explosives storage / magazine sites

Experienced process hazard analysis (PHA), hazards analysis and operability studies (HAZOP), quantitative risk assessment (QRA) related to explosives, propellants and pyrotechnic and ordnance processing, operations, handling, use and disposal. As a trained HAZOP leader, I was on teams that conducted more than seventy-five (75) PHA, HAZOP and QRA studies.

Trained in and use the *USA Department of Defense Contractors Safety Manual for Ammunition and Explosives* (DoD 4145.26-M), US Department of Defense (DOD), US Occupational Health and Safety (OSHA), US Alcohol, Tobacco, Firearms and Explosives (ATF), US Department of Transportation (DOT) and US Department of Energy (DOE) regulations and guidelines concerning explosives, propellant and pyrotechnic manufacture, handling and use.

Prepared applications for UN Hazards Classification and performance packaging designs for more than forty (40+) new unknown explosives substances and articles in accordance with the United Nations standards: "The Recommendations on the Transport of Dangerous Goods" and "Manual of Tests and Criteria". Developed performance packaging and obtained Hazards Material Classification Certificates for the US Army and US Navy.

Provided briefings and subject matter expertise on explosives to the US Department of Defense, US Army, US Navy, US Air force, US agencies including the FBI, ATF, EPA, OSHA and Transportation Security Agency and the Department of Homeland Security.

Provided briefings and subject matter expertise on explosives and testified in front of the US House of Representatives committee on governmental reform and the US House of Representatives subcommittee on national security.

Provided briefings and subject matter expertise on explosives to select members of the white house staff on homeland security, select members of the US Senate (Senators Spector, Clinton, and Santorum), select members of the US House of Representatives (Congressman Shays, Weldon, Lantos, Simmons, and Dent), and the Democratic National Committee (Chairman Howard Dean).

#### US Patents:

- US 5,397,176 System on and Method For Explosives Disposal
- US 7,277,015 System and Method for Explosives Detecting, Tracking, Monitoring and Identifying Explosives Materials

#### Major Publications:

- Explosives and Rock Blasting (Morhard)(645 pgs. 30,000 copies)
- Handbook of Electric Blasting (Morhard) (98 pgs. 15,000 copies)

- Laboratory Analysis of Aluminized ANFO and Aluminized Emulsion Explosives Journal of The International Society of Explosives Engineers\_(Morhard) (1985)
- Recycling and Disposal of Explosives from the Demilitarization of Conventional Ammunition in Russia Joint US and Russian Government Program (Morhard) (430 pgs.) (1993)
- 25 + Technical Papers at various explosives and propellant conferences

Chosen by the US Government's Defense Threat Reduction Agency and Alliant Tech Systems, Inc. to provide technical solutions for recycling former Soviet Union SS-24 and SS-19 ICBM propellant into emulsion explosives under USA and Russian SALT III demilitarization agreements in Ukraine.

Extensive US military technical training in explosives, propellants, pyrotechnics, military ordnance from design, manufacturing, handling, storage, use, disposal and the donor/receptor relationships to inhabited buildings, roads and personnel:

- US Navy Explosive Ordnance Disposal (EOD) School (Honors #1 in class)
- US Army Missile Maintenance School (Honors #1 in class)
- US Army Chemical and Biological Weapons Disposal School (#1 in class)
- US Air Force Nuclear Weapons Disposal School (Honors)
- US Navy Explosives Safety School (Honors #1 in class)
- US Navy Propellant Manufacturing School (Honors)
- US Air Force Explosives Safety School (Honors)
- US Air Force Weapons Mechanic School (Honors)

US Air Force Educational Achievement Medal, US Air Force Presidential Unit Medal

Explosives Ordnance Disposal (EOD) Technician EOD technicians are responsible for the identification, disarmament, handling and disposal of US and foreign improvised explosives devices (IED) conventional, nuclear, biological and chemical munitions. Hands on experience with live IED's , live chemical agents, live nuclear weapons, disarming and rendering safe live US and Foreign ordnance (bombs, mines, missiles

and grenades), disarming and rendering safe live explosives articles (ejection seats, propellant actuated devices, flares, munitions dispensers, aircraft bomb racks, aircraft and artillery guns, rocket and missile motors), and performing bombing range clearances with up to 50 year old live ordnance.

Program director for a technical study funded by the US Trade and Development Agency in cooperation with the US Department of defense to study the feasibility of Identifying and re-cycling conventional ammunition in the USSR. Mr. Morhard has extensive travel only two months after the breakup of the USSR in 1991. Reported to Les Aspin, US Secretary of Defense.

Founder and Managing Partner of Zukovich, Morhard & Wade, LLC (sold in Feb 2013) [www.exploenergy.com](http://www.exploenergy.com) ZMW designed, permitted, fabricated, installed, commissioned and provided ongoing technical support for new or upgraded explosives and propellant manufacturing facilities. ZMW provided technical services for explosives materials manufacturing and safety for eight of the top ten multinational explosives producers, the world's largest propellant manufacturer, the world's largest ammunition and ordnance manufacturer and the top three largest multinational mining companies.

Mr. Morhard was the Program manager for the ICI Explosives – DIEHL (German) joint venture company recycling rocket propellant and conventional ammunition into industrial explosives operating in former East Germany at a USSR ammunition plant. Designed 122 mm rocket demilitarization system. Started up and operated an RDX re-crystallizer. Assisted in cleanup of scud missile fuel spills by retreating soviet rocket forces. Extensive site work started within one week after Berlin wall fell.

Demilitarization, handling and disposal experiences with the following:

- US Standard Missile 3 (SM-3) MK 70 Booster propellant trim
- USSR SS-24 and SS-19 ICBM
- Minuteman ICBM
- US Maverick AGM – 65

- US Sidewinder AIM – 9
- US Multiple Launch Rocket Systems (MLRS)
- 70 mm Hydra rocket
- USSR 122 mm rocket
- US 5” HVAR rockets
- USSR 100 mm and 125 mm HE and HEAT rounds
- US 105 mm, 155 mm, 8 in. HE and HEAT rounds
- USSR 10 kg tank mine
- US 20 mm, 25 mm, 40 mm ammunition
- Martin Baker and various other aircraft ejection seat and egress motors
- Recycle of Single, Double and Triple Base propellant
- Ballistic spreader guns, Propellant Actuated Devices (PAD)
- Nerve Agents (GB and VX) Wet-Eye, 10 kg tank mine and 8 in. projectiles
- Chemical weapons (Nerve, Blood, Choking Agents, Mustard and Blister Agents)

## **Professional Experience**

### **ExploConsult, LLC.** Founder, 2014 - Present

ExploConsult, LLC is only Bob Morhard. I provide explosives technology and support to Western Explosives (Canada) and Newmont Mining (Suriname). I provide expert witness testimony and legal support involving explosives, propellants, pyrotechnics, explosives safety and accident claims, or criminal cases involving explosives.

### **Class One, LLC.** Founder, 2013 - Present

Class One, LLC provided technical and commercial technical support for a foreign explosives equipment manufacturer and expert witness testimony and legal support involving explosives, propellants, pyrotechnics, explosives safety and accident claims, or criminal cases involving explosives. Contract CEO for Zukovich, Morhard & Wade, LLC (ZMW) from Feb 2013 to Feb 2014.

### **Zukovich, Morhard & Wade, LLC.** Founder, 1999 – 2013

Zukovich, Morhard & Wade, LLC (ZMW) was a design and build engineering firm that specialized in technology transfer projects involving explosives, detonators and propellants. This consulting practice provided technical services for most of the world's multinational industrial explosives and detonator manufacturers with confidential outsourced technical support and technology transfer. Provided expert witness testimony and legal support involving explosives, propellants, pyrotechnics, explosives safety and accident claims, or criminal cases involving explosives.

### **ExploTrack, Inc.** Founder, 2005 – 2009

Provided explosives supply-chain and real-time explosives security solutions worldwide to manufacturers, distributors, and users of explosive, propellant, and pyrotechnic materials. Innovated RFID, GPS and 2-D barcode technologies compatible with electro-sensitive explosive devices.

**Explosives Technologies International, Inc.** (DuPont) President, 1995 – 1999

Directed explosives manufacturing, internal USA and international export distribution and sales of explosives and detonators. Managed surface and underground drill rigs as well as 'Rock on the Ground' programs. President, Southern Explosives Corp. a 57,000 mT/year bulk explosives business in Kentucky and Ohio (\$ 21 M revenue). President ETI Export, Inc., (\$18 M Revenue)

**ICI Explosives USA** Vice President Operations, 1990 –1995

Imperial Chemical Industries, plc. (ICI) was at this time was the world's largest explosives manufacturer. Directed explosives and detonator manufacturing operations, logistics, safety, health and environmental compliance. Conceived of ICI Explosives Environmental Company, and subsequently designed, patented and constructed the world's first commercial explosives and ordnance waste management facility, still in operation today. Automotive airbag initiators and propellant development and manufacturing.

**Atlas Power Company** 1984 – 1990

Corporate Safety Director

Product Manager (Detonators)

Product Manager (Bulk Emulsion)

Product Manager (Packaged Explosives)

Technical Training Manager

Technical Specialist

Directed explosives and occupational safety, health and environmental issues in two large plants, 22 subsidiaries and approximately 1,500 employees. Responsible for management for a global detonator and bulk emulsion product line. Integrated the transition of a major technology detonator technology upgrade from Dynamit Nobel (Germany) into the Atlas Powder Company initiation product line. Provided technical support for emulsion technology licensing. Provided direct technical support to end users and employees, prepared technical data sheets, blasting instructor in more than 50 seminars, presented papers at conferences, prepared many publications and



worked with early high-speed photography, seismic and blast modeling and computer technology.

**Trojan Explosives** 1979 – 1984

Technical Services Manager

Technical Representative

Sales Representative

Explosives and blasting application specialist in the 1 million mT per year explosives consuming area of the Kentucky and West Virginia Surface and underground coal mine market. Trojan sold bulk blasting agents, manufactured packaged explosives, cast boosters (later sold to Ensign Bickford and now part of Dyno Nobel)

**Explosives Services, Inc.** Founder, 1977 – 1979

Founder

Drill and blasting company operating in North Carolina and Virginia with two drills, a magazine site and four employees. Business and magazine site sold to Trojan Explosives.

**US Air Force**

Explosives Ordnance Disposal Technician, 1974 - 1978

EOD technicians are responsible for the identification, disarmament, handling and disposal of US and foreign improvised explosives devices (IED) conventional, nuclear, biological and chemical munitions. Hands on experience with live IED's , live chemical agents, live nuclear weapons, disarming and rendering safe live US and Foreign ordnance (bombs, mines, missiles and grenades), disarming and rendering safe live explosives articles (ejection seats, propellant actuated devices, flares, munitions dispensers, aircraft bomb racks, aircraft and artillery guns, rocket and missile motors), and performing bombing range clearances with up to 50 year old live ordnance.

ExploConsult LLC  
Southport, NC 28461 USA  
+ 1 610 306 4637  
bob@exploconsult.com  
www.exploconsult.com