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# ESB

## EXPLOSIVES SAFETY BULLETIN

### **Army Establishes Criteria for Underwater Detonations**

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## Department of the Army Approves Explosives Safety Criteria for Underwater Detonations

Up until the end of 1967 the world wide approved method for disposal of military ammunition was burial or “dumping at sea”. Certain precautions were taken to make these items safe when buried. As we know military ammunition is inherently dangerous, and making sure that it stays in the right hands is critical to the safeguard of the country. Those items dumped in the oceans or in deep fresh water lakes were often thought to be “Out of sight and out of mind”, and never to pose a threat to life and limb again. With improvements in technology, it has become possible to extract these buried and sea-dumped military munitions and properly dispose of them in a manner that completely removes the hazard. The Department of Defense Range Rule addresses closed, transferred, and transferring Ranges containing Military Munitions or Munitions Debris (DoD, Federal Register Vol. 62, No. 187). The Range Rule proposes a process for evaluating and selecting appropriate response actions at these military ranges. The Rule was proposed in response to the Environmental Protection Agency (EPA) Military Munitions Rule and addresses the management of areas not addressed in the EPA's Military Munitions Rule. With the recovery of any military munitions, the possibility exists that the item may accidentally detonate or be unsafe to move. Therefore detonation in place is the remediation that poses the least threat. For waterborne munitions, the Department of Defense had never established thresholds (i.e., injury levels) for public or for peacetime operational exposure (intentional or otherwise) for underwater detonations involved in the clean-up and recovery of the sites.

Without standard policy, all Military Components developed individual criteria to handle Explosives Safety concerns for underwater detonations. In late 2011, information surfaced indicating the United States Army Technical Center for Explosives Safety (USATCES) had developed recommended distances based on 1947 Navy Dive Charts. These criteria had not been accepted by Department of Army Safety. The criteria were not scientifically based and less conservative than current explosives safety doctrine.

The Munitions and Explosives of Concern (MEC) and Recovered Chemical Warfare Materiel (RCWM) team at USATCES took to task rectification of this oversight and to staff a new policy with Department of Army Safety. Two major concerns immediately surfaced, the first concern was that DOD still did not have an underwater criteria policy for accidental or intentional detonations. Secondly, contracts for clean-up actions had been let based on the criteria from the 1947 Navy Dive Charts. If these operations were shut down and placed on hold, it would cost the Army and taxpayers millions of dollars. Subsequently the goal was development of Army interim underwater criteria, based on up-to-date data, that would allow current contracts to continue, and provide appropriate safety to the public, workers, and the environment.

Detonations in water are unforgiving. Criteria designating protection to the public is one standard, whether unintentional and intentional detonations. Exposure of workers for unintentional detonations is based on Army's willingness to accept risk for workers that had to handle and recover these obsolete munitions, exposed to the deterioration effects of lying at the bottom of a lake or in the ocean. Exposure for workers for intentional detonations is the same as for unrelated personnel.

By working with the Naval Sea (NAVSEA) Systems Command, the Office of Naval Ordnance Safety and Security Activity (NOSSA), the USATCES team found the Navy had executed recent efforts to better understand safe



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swimmer distance from underwater explosions. Studies conducted by the US Navy indicate injury correlates to impulse, not peak pressure, and identifies the critical role depth of burst (DOB) plays in determining safe swimmer distances. It was found that "Peak Pressure" is a function of the distance to the explosives charge alone and is not influenced by depth. The "Total Impulse" received by a person in the water and the resulting severity of injury is heavily influenced by water depth, charge depth, and diver depth. NOSSA observed that "Surface Reflections" are inverted and become negative blast pressures that may reduce the impulse on the diver. "Bottom Reflections" on the other hand depended on bottom conditions and are reflected as positive pressures and may increase impulse on the diver. Threshold distances based on peak pressure alone would not completely address the hazard to the diver and depth and the resulting total impulse are also required to define threshold distances for injury. This new research supported a two pound per square inch - millisecond (psi-ms) impulse, as a safe level for swimmers. The USATCES team recommended to the Office of the Assistant Secretary of the Army, Installations, Energy and Environment (SAIE-ESOH) the formula " $S=15[DOB * W^{1/5}] +300$ " to calculate safe swimmer distance (S), in yards, as a function of swimmer depth/water column/DOB, determined in feet, and TNT explosive charge weight (W), determined in pounds, that provides an impulse of 2 psi-ms. On 16 September 2013 the Deputy Assistant Secretary of the Army signed a memorandum accepting this formula until the Department of Defense issues their criteria for underwater detonations. The Army will use this formula as the basis for calculating the required safe separation distance for personnel and assets in the water.

As a result, USATCES has drafted a charter for the Department of Defense Explosives Safety Board (DDESB) to establish a working group to research and evaluate underwater detonation criteria for inclusion into the DOD 6055.09M. Both the DDESB and the Navy have agreed to act as the co-chairs for this working group. Normal explosives safety criteria for personnel and assets out of the water will continue to be applied during operations both for intentional and unintentional detonations. A copy of the SAIE-ESOH Memorandum, Subject: Munitions Response Actions - Minimum Separation Distances (Relative to Impulse Water Pressure) from Underwater Detonations, dated 16 September 2013 is available from USATCES upon request.

# Grounding and Bonding MILVAN/ISO Containers Under a Catenary or Mast Lightning Protection System

Suppose you have a catenary lightning protection system (LPS) protecting an open storage pad. Further suppose you have munitions laden containers under the “100 ft zone of protection” afforded by that LPS and the required side flash distances from the poles and overhead lines are met. Do you need to electrically ground those containers? And since you have containers positioned next to each other do you need to bond those containers?

If you want a single word answer then the answer is, “No.”



If the MILVAN/ISO container was not under an LPS then the answer would be different and you would ground them and bond adjacent containers. But in this case the ammunition laden containers are protected by an LPS that meets criteria, so we expect any lightning strike to be intercepted by the catenary (or mast) LPS. If we never expect the containers to be energized by lightning current, why ground them and why bond them together?

There has been a belief within the explosives safety community that grounding and bonding of MILVANs/ISO containers is required in all situations, but there is no hard written requirement to do so in the National Fire Protection Association (NFPA) 780 or in the explosives safety standards. That belief may have started by viewing a diagram (figure 7.3.2.7.1 of NFPA 780) which shows protected structures under a catenary to be grounded, however chapter 7 of the NFPA does not apply to explosives.



So, in summary:

Ammunition and explosives laden MILVAN/ISO containers that are under the 100 ft rolling ball zone of protection provided by a mast or catenary LPS, and provided such containers have the necessary side flash distances, then those containers do not require grounding and bonding.

Ammunition and explosives laden MILVAN/ISO containers that are not protected from a lightning strike or do not have required side flash separations do require grounding and bonding.

This interpretation was agreed to by Army and Department of Defense Explosive Safety Board (DDESB) LP experts.

# Returning to Garrison Life

Returning from deployment and adjusting to life in Garrison can be challenging. The risk assumed in theater will often times not be assumed in stateside Garrisons due to the risk not outweighing the benefit. However, one Director of Safety from a division recently returning from theater has noted an increased awareness of explosive safety requirements amongst Soldiers. The awareness of risk in a contingency environment, and targeted training, has enhanced overall explosives safety knowledge within Officer, Non-Commissioned Officer (NCO) and Civilian Safety Professionals' ranks.

During periodic safety visits within the division, the safety department found that Officers and NCOs have an in-depth knowledge of segregation, compatibility and storage of ammunition and explosives (A&E) within their Ammunition Holding Areas (AHA). They are familiar with fire fighting requirements (when or when not to fight a fire), requirements for types of fire extinguishers, non use of electronic equipment within the AHA or Ammunition Supply Point (ASP), security concerns and documentation requirements. Further, personnel operating arms rooms are conducting a more thorough risk assessment (RA) minimizing the types and amounts of ammunition, coordinating with Quality Assurance Specialist (Ammunition Surveillance) (QASAS) for periodic inspection and rotating ammunition issued to security personnel. Their Standard Operating Procedures (SOPs) also reflect controls identified in the RA.

It is encouraging to see explosives safety successes highlighted above, but it is important to remember that the regulations governing explosives safety are stricter for Garrison storage/operations than they are for Contingency storage/operations. Things to check as you resume Garrison life are:

- Review risk assessments:
  - Identify the hazard.
  - Assess the hazard.
  - Make risk decisions.
  - Implement controls.
  - Watch for changes (Supervise).
- Assure SOPs reflect current operations and contain controls highlighted in the RA.
- Store A&E in original packaging until required for use.
- Maintain lot number integrity for A&E.
- Check ammunition for serviceability (ask a QASAS).
- Review segregation, packaging and marking requirements.
- Contact physical security personnel to review facility security.
- Document shortfalls and steps taken to correct them.

Bottom line, daily first-hand A&E operations in theater have enhanced explosives safety. Remember, accept risk when benefits outweigh the cost; accept no unnecessary risk; anticipate and manage risk by planning. Finally, make risk decisions at the appropriate level.



# Personally Owned Gun Safety

Many people own personal guns for a variety of reasons, from collecting as a hobby, home and self-defense, hunting or recreational shooting. Regardless the type of gun, or the reason for owning, gun safety must be enforced to prevent any unwanted mishaps to the owner or others.

Many of us may have been taught from an early age about gun safety and soldiers have gun safety rules drilled into their heads from the beginning of basic training. However, friends and family may not have an understanding of the safety rules and should be made aware, or reminded of, them any time guns are present. Whether a seasoned gun handler or a beginner, always practice the following basic gun safety rules:

1. Treat every gun as if it were loaded.
2. Never point the gun at anything you do not intend to shoot.
3. Keep the gun on safe until ready to fire.
4. Keep your finger straight and off the trigger until you intend to fire.
5. Handle every gun with care.
6. Always identify your target before firing.

These rules don't always prevent accidents and too often soldiers are involved in accidents caused by the negligent discharge of a privately owned gun. These accidents are caused by, or in combination with, improper maintenance procedures, clearing of the gun, horseplay, alcohol, lack of training, or being complacent in handling the gun. Most accidents happen when the soldier thinks the gun is clear and pulls the trigger expecting to hear a click but instead there is a load bang. This is when they realize they were wrong and they wish they could take that fired round back, but they can't.

Guns are a serious matter and so is gun safety. If someone has never owned a gun and is considering purchasing one, they should be encouraged to take a gun handling class, or if they are new to hunting, they should take a hunter's safety class.

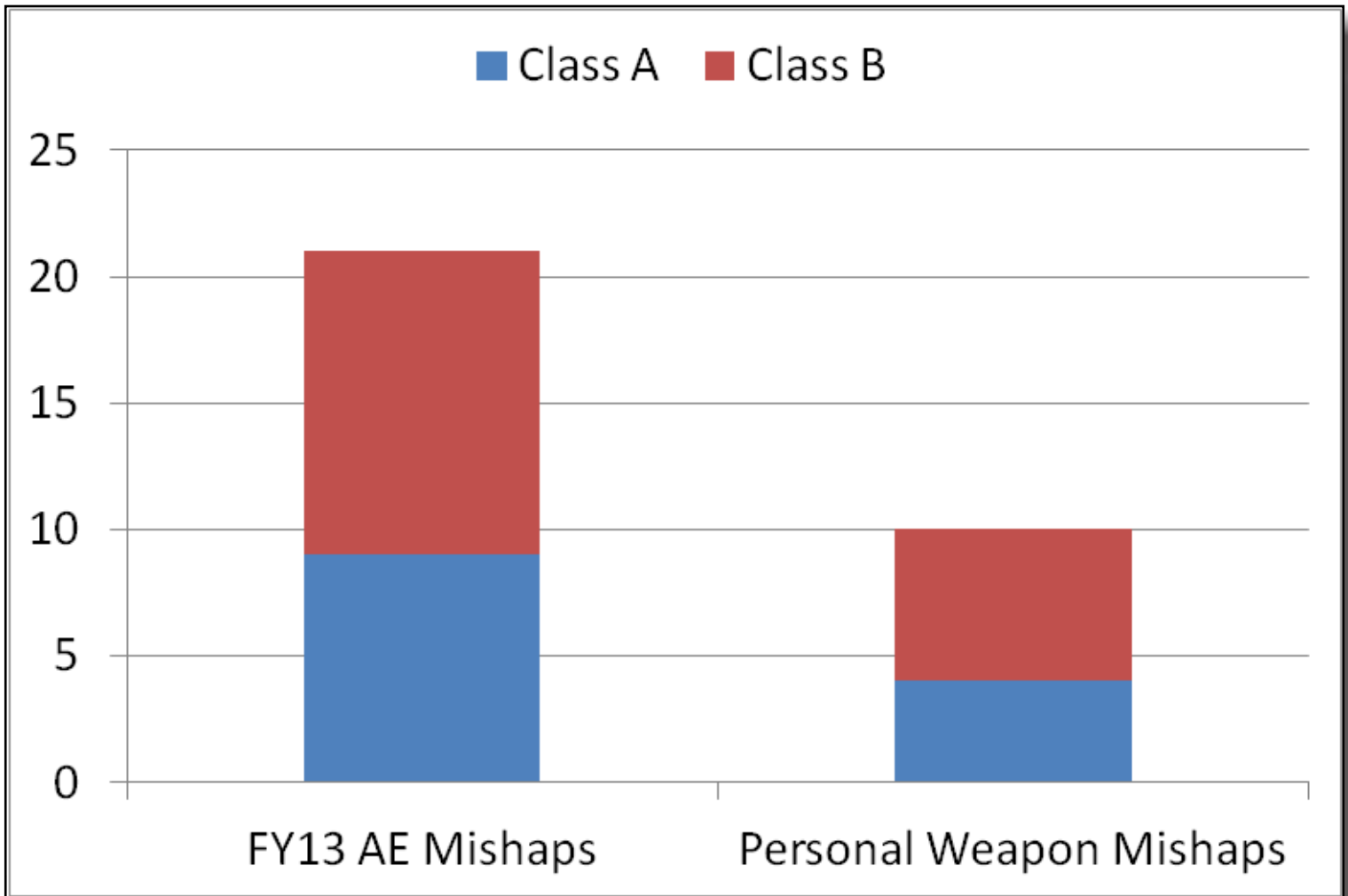
Remember when a negligent discharge of a gun occurs, whether an injury is involved or not, it affects the soldier, their family, and operational readiness. Gun safety is not only the responsibility of the person handling the gun but everyone in the area to ensure the safety of all when guns are present. Know and enforce gun safety rules.

**AR 190-11, Physical Security of Arms, Ammunition and Explosives,**  
revision dated September 05, 2013 is available at:

[https://armypubs.us.army.mil/epubs/DR\\_pubs/DR\\_B/pdf/r190\\_11.pdf](https://armypubs.us.army.mil/epubs/DR_pubs/DR_B/pdf/r190_11.pdf)

# FY13 Mishap Trend Analysis

FY13 mishap trend analysis indicates an issue with personal weapons. Of the 9 class A mishaps, 4 were from personal weapons and 3 from combat. Of the 12 class B mishaps, half were from personal weapons. With 44% of class A and 50% of class B mishaps resulting from personal weapons, this should serve as a warning to gun owners that mishandling any weapon may result in death or permanent disability. Why take the chance? Think weapons safety anytime a weapon is involved.





# Global Harmonized System (GHS)

Bottom Line Up Front (BLUF) - Globally Harmonized System (GHS) safety data sheets (SDS) will replace material safety data sheets (MSDS) completely by June 1 2016. By December 1, 2013, all Army employees including Soldiers, Army civilians, and embedded contractors must complete initial GHS training. Additional GHS information and training may be found at: <https://safety.army.mil/soh/OCCUPATIONALHEALTH/GloballyHarmonizedSystemGHS/tabid/2389/Default.aspx>

The Occupational Safety and Health Administration (OSHA) revised its Hazard Communication Standard (HCS) to align with the United Nations' Globally Harmonized System of Classification and Labeling of Chemicals (GHS) and published it in the Federal Register in March 2012 (77 FR 1754). Two significant changes contained in the revised standard require the use of new labeling elements and a standardized format for Safety Data Sheets (SDSs), formerly known as, Material Safety Data Sheets (MSDSs). The new label elements and SDS requirements will improve worker understanding of the hazards associated with the chemicals in their workplace.

OSHA, by adopting GHS, is simplifying Hazard Communication. GHS has categorized hazards into three broad categories—Physical, Health and Environmental. SDS will be in a standardized format making it easier to locate required information about hazardous chemicals. The labeling system under GHS has also been simplified with specific and standardized hazard warnings.

OSHA is phasing in the GHS specific requirements over several years (December 1, 2013 to June 1, 2016).

- By December 1, 2013, all employees including Soldiers, Army civilians, and embedded contractors must be trained on the new label elements and SDS format.
- By June 1, 2015 all chemical manufacturers, importers, distributors, and employers must comply with GHS provisions except distributors may ship products labeled by manufacturers under the old system until December 1, 2015.
- By June 1, 2016 full compliance with GHS, update alternative workplace labeling and hazard communication program as necessary, and provide additional employee training for newly identified physical or health hazards.

## Army Safety Net Closed on 30 Sep 2013

To talk about explosives safety or ammunition go to: <https://acc.dau.mil/ammo>. Login and click, "Ask a Question".

For questions requiring regulatory guidance go to AmmoHelp at: [https://mhp.redstone.army.mil/MODULES/AMMO\\_HELP/ASKQUESTION.ASPX](https://mhp.redstone.army.mil/MODULES/AMMO_HELP/ASKQUESTION.ASPX)

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Material Safety Data Sheet



Ethanol, Denatured, 95%

Revised: 02/20/2012  
 Replaces: 02/14/2012  
 Printed: 08/31/2012

**Carolina Biological Supply Company**

**CAROLINA**  
 www.carolina.com

2700 York Rd | Burlington, NC 27215 • to order: 800.334.5551 • for support: 800.227.1150

**Section 1 - Product Description**

**Product Name:** Ethanol, 95%  
**Product Code(s):** 15-4708A, 15-4708CA, 15-4724A, 89-2301, 892305, 19-1184, 19-1176, 15-4725, 19-1177, 76-6200, 86-1281, 86-1283, 86-1285, 84-1135, 10-1026, 10-1036, 84-0887, 84-0528, C70188, C71555  
**Size:** 1 oz, 75 mL, 350 mL, 500 mL, 4 L, 20 L, various  
**Chemical Name:** Ethanol, 95%  
**CAS Number:** See Section 3  
**Formula:** See Section 3  
**Synonym:** Alcohol, Ethyl alcohol  
**Distributor:** Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215  
**Chemical Information:** 800-227-1150 (8am-5pm (ET) M-F) Chemtree 800-424-9300 (Transportation Spill Response 24 hours)

**Section 2 - Hazard Identification**

**Emergency Overview:** WARNING - Highly flammable. Harmful by inhalation and if swallowed.  
**Potential Health Effects:**  
**Eyes:** May cause irritation.  
**Ingestion:** May cause gastrointestinal discomfort.  
**Skin:** May cause irritation to skin.  
**Inhalation:** May cause irritation to resp.

**Section 3 - Composition / Information on Ingredients**

**Principal Hazardous Components:** Ethyl Alcohol (CAS # 64-17-5) 85.5%; Denaturant: Isopropyl Alcohol 5.0%; Denaturant: Methyl Alcohol (CAS # ) 4.5%  
**ILV unit:** Ethyl alcohol: ACGIH-ILV 1000 ppm (TWA)  
**PEL unit:** Ethyl alcohol: OSHA-PEL 1000 ppm (TWA)

**Section 4 - First Aid Measures**

**Emergency and First Aid Procedures:**  
**Eyes:** - In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
**Skin:** - After contact with skin, take off immediately all contaminated clothing, and wash immediately with.  
**Ingestion:** - If swallowed, do not induce vomiting; seek medical advice immediately and show this container.  
**Inhalation:** - In case of accident by inhalation: remove casualty to fresh air and keep at rest.

**Section 5 - Firefighting Procedures**

Product Name: Ethanol, Denatured, 95% Page 1 of 3

Safety Data Sheet

Ethanol, Denatured, 95%

**CAROLINA**  
 www.carolina.com

**Section 1 - Product Description**

**Product Name:** Ethanol, Denatured, 95%  
**Recommended Use:** Science education applications  
**Synonyms:** Alcohol, Ethyl alcohol  
**Distributor:** Carolina Biological Supply Company, 2700 York Road, Burlington, NC 27215-3398  
**Chemical Information:** 800-227-1150 (8am-5pm (ET) M-F)  
**Chemtree:** 800-424-9300 (Transportation Spill Response 24 hours)

**Section 2 - Hazard Identification**

Classification of the chemical in accordance with paragraph (d) of §1910.1200:

DANGER



Highly flammable liquid and vapor. May cause damage to organs.

**GHS Classification:**  
 Flammable Liquid Category 2, Specific Target Organ Systemic Toxicity (STOT) - Single Exposure Category 2

**Other Safety Precautions:** IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.

**Acute Toxicity Dermal Contains:** 90.975 % of the mixture consists of ingredient(s) of unknown toxicity

**Section 3 - Composition / Information on Ingredients**

Chemical Name	CAS #	%
Ethanol	64-17-5	85.08
Water	7732-18-5	5
2-Propanol	67-63-0	4.75
Methanol	67-56-1	4.28

**Section 4 - First Aid Measures**

**Emergency and First Aid Procedures:**  
**Inhalation:** In case of accident by inhalation: remove casualty to fresh air and keep at rest.  
**Eyes:** In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.  
**Skin Contact:** After contact with skin, wash immediately with plenty of water.  
**Ingestion:** If swallowed, do not induce vomiting; seek medical advice immediately and show this container or label.

**Section 5 - Firefighting Procedures**

**Extinguishing Media:** Use dry chemical, CO2 or appropriate foam.  
**Fire Fighting Methods and Protection:** Firefighters should wear full protective equipment and NIOSH approved self-contained breathing apparatus.  
**Fire and/or Explosion Hazards:** Vapors may travel back to ignition source. Closed Containers exposed to heat may explode. Extremely flammable.  
**Hazardous Combustion Products:** Carbon dioxide, Carbon monoxide

**Section 6 - Spill or Leak Procedures**

**Steps to Take in Case Material Is Released or Spilled:** No health effects expected from the clean-up of this material if contact can be avoided. Follow personal protective equipment recommendations found in Section 8 of this MSDS. Ventilate the contaminated area.

Ethanol, Denatured, 95%

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Flash Point (Method Used): 12.8 °C (CC) (Ethanol)  
 NFPA Rating:  
 Health: 3  
 Fire: 3  
 Reactivity: 0  
 Extinguisher Media: Use dry chemical, CO<sub>2</sub> or appropriate foam.  
 Flammable Limit in Air % by Volume: (Ethanol) LFL: 3.3% UFL: 19%  
 Autoignition Temperature: (Ethanol) 363 °C  
 Special Fire-fighting Procedures: Firefighters should wear full protective equipment and NIOSH-approved self-contained breathing apparatus.  
 Unusual Fire and Explosion Hazards: Vapours may travel back to ignition source. Closed Containers exposed to heat may explode.  
 Extremely flammable.

**Section 6 - Spill or Leak Procedures**

Steps to Take in Case Material is Released or Spilled: Ventilate area of spill. Eliminate all sources of ignition. Remove all non-essential personnel from area. Clean-up personnel should wear proper protective equipment and clothing. Absorb material with suitable absorbent and containers for disposal.

**Section 7 - Special Precautions**

Precautions to Take in Handling or Storing: Keep container tightly closed in a cool, well-ventilated place. Keep away from oxidizing materials and strong acids.

**Section 8 - Protection Information**

Respiratory Protection (Specify Type): None needed under normal conditions of use with adequate ventilation. A NIOSH/MSHA chemical cartridge respirator should be worn if PEL or TLV is exceeded.

Ventilation:  
 Local Exhaust: Yes  
 Mechanical/General: Yes  
 Special: No  
 Other: No

Protective Gloves: Natural rubber, Neoprene, PVC or equivalent.

Eye Protection: Splash proof chemical safety goggles should be worn.

Other Protective Clothing or Equipment: Lab coat, apron, eye wash, safety shower.

**Section 9 - Physical Data**

Molecular Weight: (Ethanol) 46.07  
 Boiling Point: (Ethanol) 78.5 °C  
 Vapor Density (Air=1): (Ethanol) 1.59  
 Percent Volatile by Volume: 100%  
 Solubility in Water: Soluble  
 Melting Point: (Ethanol) -114.1 °C  
 Vapor Pressure: (Ethanol) 93 mmHg at 25°C  
 Specific Gravity (H<sub>2</sub>O=1): (Ethanol) 0.789 at 20 °C  
 Evaporation Rate (BuAc=1): 3.3  
 Appearance and Odor: Clear, colorless liquid. Alcohol odor.

**Section 10 - Reactivity Data**

Stability: Stable  
 Conditions to Avoid: Heat and sources of ignition.  
 Incompatibility (Materials to Avoid): Oxidizers,  
 Hazardous Decomposition Products: CO<sub>2</sub>  
 Hazardous Polymerization: Will not occur

**Section 11 - Toxicity Data**

Toxicity Data: (Ethanol) oral-rat LD50 7060 mg/kg; inh-rat LC10 30000 ppm/10H

Product Name: Ethanol, Denatured, 95%

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Effects of Overexposure:  
 Acute: See Section 2  
 Chronic: Not listed as a carcinogen by IARC, NTP or OSHA. Mutation data cited. Reproductive data cited. Tumorigenic data cited.  
 Conditions Aggravated by Overexposure: Skin disorders, Eye disorders, Respiratory disorders, Liver disorders.  
 Target Organs: Eyes, Liver, Kidneys, Central Nervous System.  
 Primary Route(s) of Entry: Inhalation and ingestion.

**Section 12 - Ecological Data**

EPA Waste Numbers: Ethanol (D001)

**Section 13 - Disposal Information**

Waste Disposal Methods: Dispose in accordance with all applicable Federal, State and Local regulations. Always contact a permitted waste disposer (TSD) to ensure compliance.

**Section 14 - Transport Information**

DOT Proper Shipping Name: UN1170, Ethanol, 3, II

**Section 15 - Regulatory Information**

EPA TSCA Status: On TSCA Inventory  
 Hazard Category for SARA Section 311/312 Reporting: Acute Fire

Name List: Ethanol - No  
 Chemical Category: Ethanol - No

CERCLA Section 103 RQ(lb.): Ethanol - No  
 RCRA Section 261.33: Ethanol - No

**Section 16 - Additional Information**

The information provided in this Material Safety Data Sheet represents a compilation of data drawn directly from various sources available to us. Carolina Biological Supply makes no representation or guarantee as to the suitability of this information to a particular application of the substance covered in the Material Safety Data Sheet. Any employer must carefully assess the applicability of any information contained herein in regards to the particular use to which the employer puts the material.

Glossary  
 ACGIH American Conference of Governmental Industrial Hygienists  
 CAS Number Chemical Services Abstract Number  
 CERCLA Comprehensive Environmental Response, Compensation, and Liability Act  
 DOT U.S. Department of Transportation  
 IARC International Agency of Research on Cancer  
 N/A Not Available  
 NTP National Toxicology Program  
 OSHA Occupational Safety and Health Administration  
 PEL Permissible Exposure Limit  
 ppm Parts per million  
 RCRA Resource Conservation and Recovery Act  
 SARA Superfund Amendments and Reauthorization Act  
 TLV Threshold Limit Value  
 TSCA Toxic Substances Control Act

Product Name: Ethanol, Denatured, 95%

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**Safety Data Sheet**

Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section 8 at a minimum. Work with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

**Section 7 - Handling and Storage**

Handling: Keep away from heat/sparks/open flames/hot surfaces. No smoking. Keep container tightly closed. Ground/bond container and receiving equipment. Use explosion-proof electrical/ventilating/lighting/ equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Do not breathe dust/fume/gas/mist/vapors/spray. Wash thoroughly after handling. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection.  
 Storage: Keep container tightly closed. Store in a well-ventilated place. Keep cool. Store locked up.  
 Storage Code: Red - Flammables. Store in approved flammable containers. Store away from oxidizing materials.

**Section 8 - Protection Information**

Chemical Name	ACGIH		OSHA PEL	
	(TWA)	(STEL)	(TWA)	(STEL)
Ethanol	N/A	1000 ppm STEL	1000 ppm TWA; 1000 mg/m <sup>3</sup> TWA	N/A
2-Propanol	200 ppm TWA	400 ppm STEL	400 ppm TWA; 950 mg/m <sup>3</sup> TWA	N/A
Methanol	200 ppm TWA	250 ppm STEL	200 ppm TWA; 260 mg/m <sup>3</sup> TWA	N/A

Control Parameters  
 Engineering Measures: Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.  
 Personal Protective Equipment (PPE): Lab coat, apron, eye wash, safety shower.  
 Respiratory Protection: No respiratory protection required under normal conditions of use. Provide general room exhaust ventilation if symptoms of overexposure occur as explained Section 11. A respirator is not normally required.  
 Respiration Type(s): None required where adequate ventilation is provided. If airborne concentrations are above the applicable exposure limits, use NIOSH/MSHA approved respiratory protection.  
 Eye Protection: Wear chemical splash goggles when handling this product. Have an eye wash station available.  
 Skin Protection: Wear protective gloves. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work.  
 Gloves: N/A

**Section 9 - Physical Data**

Formula: See Section 3  
 Molecular Weight: (Ethanol) 46.07  
 Appearance: Colorless Liquid  
 Odor: Moderate Alcohol Odor  
 Odor Threshold: No data available  
 pH: No data available  
 Melting Point: 114 °C  
 Boiling Point: 79 °C  
 Flash Point: 17 °C  
 Flammable Limits in Air: (Ethanol) LEL: 3.3% UEL: 19%  
 Vapor Pressure: 67.3 kPa at 20°C  
 Evaporation Rate (BuAc=1): 3.3  
 Vapor Density (Air=1): 1.5  
 Specific Gravity: (Ethanol) 0.789 at 20 °C  
 Solubility in Water: Soluble  
 Log Pow (octanol/water): -0.37  
 Autoignition Temperature: 363 °C  
 Decomposition Temperature: No data available  
 Viscosity: No data available  
 Percent Volatile by Volume: 95%

**Section 10 - Reactivity Data**

Reactivity: Not generally reactive under normal conditions.  
 Chemical Stability: Stable under normal conditions.  
 Conditions to Avoid: Temperatures above the high flash point of this combustible material in combination with sparks, open flames, or other sources of ignition.  
 Incompatible Materials: Organic Peroxides, Strong acids, Oxidizing materials, Water-reactive materials.  
 Hazardous Decomposition Products: Carbon dioxide  
 Hazardous Polymerization: Will not occur

**Section 11 - Toxicity Data**

Ethanol, Denatured, 95%

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**Safety Data Sheet**

Routes of Entry: Inhalation and ingestion.  
 Symptoms (Acute): Respiratory Irritation, Dermatitis, Central Nervous System Depression  
 Delayed Effects: Liver disorders

Acute Toxicity Chemical Name	CAS Number	Oral LD50 (rat) (mg/kg)	Dermal LD50 (rat) (mg/kg)	Inhalation LC50 (rat) (ppm/4H) (mg/L/4H)
Ethanol	64-17-5	7060 mg/kg		1747 mg/L
Water				
2-Propanol	67-63-2	Not applicable	Dermal LD50 Rat 17600 mg/kg Dermal LD50 Rabbit 12970 mg/kg	INHALATION LC50-4H Rat 83.2 MG/L
Methanol	67-58-1	Oral LD50 Rat 5028 mg/kg	Dermal LD50 Rabbit 15600 mg/kg	INHALATION LC50-4H Rat 83.2 MG/L

Carcinogenicity: Chemical Name	CAS Number	IARC	NTP	OSHA
Ethanol	64-17-5	Listed	Listed	Listed
2-Propanol	67-63-2	Listed	Not listed	Not listed
Methanol	67-58-1	Not listed	Not listed	Not listed

Chronic Effects:  
 Mutagenicity: No evidence of a mutagenic effect.  
 Teratogenicity: No evidence of a teratogenic effect (birth defect).  
 Sensitization: No evidence of a sensitization effect.  
 Reproductive: No evidence of negative reproductive effects.  
 Target Organ Effects:  
 Acute: Central Nervous System, Eyes  
 Chronic: Eyes

**Section 12 - Ecological Data**

Overview: Slight ecological hazard. In high concentrations, this product may be dangerous to plants and/or wildlife.  
 Mobility: This material is expected to have moderate mobility in soil. It absorbs to most soil types.  
 Persistence: Biodegradation is expected to be a major fate process for this material.  
 Bioaccumulation: Bioconcentration is not expected to occur.  
 Degradability: Biodegrades quickly.  
 Other Adverse Effects: No data

Chemical Name	CAS Number	Eco Toxicity
Ethanol	64-17-5	96 HR LC50 FIMEPHALES PROMELAS > 100 MG/L [STATIC]
Water		No data available
2-Propanol	67-63-2	96 HR LC50 LEPIDOMYS MARCHORCHINUS > 140000 µg/L
Methanol	67-58-1	90 HR LC50 FIMEPHALES PROMELAS 11130 MG/L [STATIC] 48 HR EC50 DAPHNIA MAGNA 2 MG/L [STATIC] 74 HR EC50 DAPHNIA MAGNA 10800 MG/L 48 HR LC50 DAPHNIA MAGNA 6260 - 14221 MG/L 48 HR EC50 DAPHNIA MAGNA 13399 MG/L 72 HR EC50 DESMIDEMUS SUBSPICATUS > 1000 MG/L 96 HR EC50 DESMIDEMUS SUBSPICATUS > 1000 MG/L

**Section 13 - Disposal Information**

Disposal Methods: Dispose in accordance with all applicable Federal, State and Local regulations. Always contact a permitted waste disposer (TSD) to ensure compliance.  
 Waste Disposal Code(s): If discarded, this product is considered a RCRA ignitable waste, D001.

Ethanol, Denatured, 95%

Page 2 of 4



# Fires Involving Explosives

Rule of thumb: The lower the hazard class/division number, the more dangerous the explosive.

## Prevention

The best approach to fire safety is to learn to prevent them from happening; i.e., do not allow combustible material to accumulate. For ammunition operations, always assess the risk, clearly state how to report fires, ensure fire symbols are posted on buildings or at the ends of rows, placards are used on vehicles and an evacuation plan is well known by conducting fire drills. Smoking areas are designated and include a housekeeping plan, hot work permits must be required for heat-producing devices and fire inspections conducted by fire-fighting personnel.

## Fires

Explosives are generally divided between those which detonate (i.e., explode) and those which deflagrate (i.e., burn violently). However it **MUST NOT** be assumed that because the explosives have deflagrated rather than detonated that the fire can be fought.

The potential for a transition from deflagration to detonation is present at all fires involving explosives, especially when there is an element of confinement. The same explosives may behave very differently when confined because of the build-up of pressure, which can lead to a mass explosion or a fireball.

## Fire Department

There is one exception where Fire-fighting personnel can fight an explosives fire, that being, when only hazard class/division **1.4S** munitions are involved, and only from a reasonable distance. Always provide the installation fire department with a list of the hazards contained in each structure and update it periodically. It is vital for the fire department to know if a fire in an ammunition structure can or should be fought.

## Know your evacuation distances:

Building – 4000 ft or  $\frac{3}{4}$  mile (1500ft for 1.4 munitions)

Rail Car – 5000 ft or 1 mile (1500ft for 1.4 munitions)

Tractor Trailer – 5000 ft or 1 mile (1500ft for 1.4 munitions)

A review, by the National Institute for Occupational Safety and Health (NIOSHA), of recent accidents involving explosives, concluded that most incidents involved a delay between time the accident occurred, the initiation of fire and the following explosion. Using this time to evacuate rather than to fight the fire involving explosives can significantly reduce fatalities and injuries.

## References:

Explosives Safety Bulletin – Special Edition – June 1995  
DA Pam 385-64, Para 6-2  
AMC-R 385-100, Para 11-6  
FM 5-415, Chapter 10  
FM 4-30-13, Chapter 8  
DOT Emergency Guidebook



# SAFETY ALERT

**DO NOT TRY TO  
FIGHT A FIRE  
INVOLVING  
AMMUNITION &  
EXPLOSIVES**

**SOUND THE  
ALARM  
&  
RETREAT**

USFOR-A Safety Kabul DSN 318-449-4827

# SAFETY ALERT

SAFETY ALERT

SAFETY ALERT

RED

SAFETY ALERT

SAFETY ALERT

RED

# DA Pam 385-64, Lightning Protection Supremacy Clause

What if there is a situation in which the criteria in the National Fire Protection Association (NFPA) 780, (Standard for the Installation of Lightning Protection Systems) is in conflict with the explosives safety regulations in DA Pam 385-64? Which criteria would you use?

This was a serious concern, until recently. At the 39<sup>th</sup> Department of the Army Explosives Safety Council (DAESC) meeting (March 2013) the Army adopted a supremacy clause similar to clauses already used by the Department of Defense (DOD) and the Navy. The accepted wording is:

17-16e “National Fire Protection Association (NFPA) 780 (current edition), “Standard for the Installation of Lightning Protection Systems,” will be the basis of lightning protection systems employed to protect ammunition facilities. **In situations where the guidance contained in the NFPA 780 and the guidance in the DA Pam 385-64 conflict, the requirements of the DA Pam 385-64 will take precedence.**”

This new paragraph will appear in the next change to the DA Pam 385-64.

## Army Explosives Safety Knowledge Network (AESKN)

The Defense Ammunition Center announces the Army Explosives Safety Knowledge Network (AESKN). AESKN provides a single portal for the explosives safety community, providing tools, training, information and resources. Use your CAC to access the Army Explosives Safety Knowledge Network at:

<https://www.us.army.mil/suite/page/683804>



# The Yellow Book

The Defense Ammunition Center (DAC), Logistics Review and Technical Assistance Office (LRTAO) has developed several useful field guides over the years, providing consolidated ammunition logistics and explosives safety regulatory information. The “Hazard Classification of United States Military Explosives and Munitions”, commonly known as the "Yellow Book", is one of the most heavily used reference documents by military and civilian ammunition professionals. The first edition of this pocket-sized publication, distinguished by its yellow cover, was published in November 1994. The current edition, revision 15, was published in June 2012, with a distribution of approximately 20,000 copies to the U.S. military services and civilian organizations. Ammunition and explosives (AE) identified in the YB are listed in DODIC order; providing a brief item description, hazard classification/division/compatibility group, security classification and explosive weights.

DAC serves as the Army’s Hazard Classifier, coordinating actions with other service components, Department of Defense Explosives Safety Board (DDESB) and Department of Transportation (DOT). DAC operates and maintains the Joint Hazard Classification System (JHCS) on behalf of the DOD.

The “Yellow Book” is a guide, designed for quick reference when working in the field. The Joint Hazard Classification System (JHCS) is the official DOD database for final hazard classification of AE. Joint Hazard Classifiers at DAC continually review test data to ensure appropriate hazard classification assignments, and make changes to the JHCS as needed. Since the last YB revision in June 2012, explosive classifications for several items have been adjusted, with changes to be reflected in the next YB revision. Storage and transportation of ammunition can be complex operations, and requires the most accurate and up-to-date information available. It’s for this reason that all final decisions regarding ammunition storage, transportation, issue and receipt, requires follow-up research action with official, real-time, JHCS information.

The “Yellow Book” app, along other explosives safety related apps, can be found here:

<b>Mobile APP</b>	<b>App Store/Google Play</b>	<b>Search Words</b>
ESQD Mobile	<a href="http://itunes.apple.com">http://itunes.apple.com</a>	ESQD
Ammo SCG	<a href="http://itunes.apple.com">http://itunes.apple.com</a>	Ammo SCG
Yellow Book	<a href="http://itunes.apple.com">http://itunes.apple.com</a>	Yellow Book, Ammunition
Yellow Book	<a href="https://play.google.com/store/">https://play.google.com/store/</a>	Yellow Book, Ammunition
Soldier Safety	<a href="http://itunes.apple.com">http://itunes.apple.com</a>	Soldier Safety, Ammunition
Soldier Safety	<a href="https://play.google.com/store/">https://play.google.com/store/</a>	Soldier Safety, Ammunition

The latest version of AR 385-10, The Army Safety Program,  
is available at the following link:

[http://armypubs.army.mil/epubs/pdf/r385\\_10.pdf](http://armypubs.army.mil/epubs/pdf/r385_10.pdf)

**Recognize**  
**Retreat**  
**Report**

**Coloring Books**

**Bookmarks**

**Posters**

**Not every bomb...  
looks like  
a bomb**

**If you see anything on the ground  
that looks strange, be sure to stay away.  
Tell a grownup to call 911 and report it.**

**Unexploded Ordnance  
Don't touch!**

**Recognize  
Retreat  
Report**

AR 385-63 paragraph 1-9.a.(8) and DA Pam 385-64, paragraph 2-16.a. requires the installation commander to Provide UXO safety education training or information (such as, FY13 Review Guide 13 brochures) to people living on the installation or formerly used defense sites (FUDS) or that work on or use the property. Such training will be based on and incorporate the Army's 3Rs (Recognize, Retreat, Report) message and safety education material (available at <https://www.denix.osd.mil/uxosafety>). Such training will also be offered to schools on or in close proximity to the installation or FUDS on a periodic basis.



UNCLASSIFIED//FOUO



## CJTF Paladin GREEN HASH

### Range Safety and UXO Reporting



#### **Be AWARE when Training with Pyrotechnics, Grenades, or Munitions**

- **Always ensure down-range area is clear of personnel and equipment during the entire training iteration. Only firers and range safeties will be on the firing line. Follow range safety SOPs for the weapon system being used.**
- **When firing weapon systems (M203, MK19, AT-4, etc); range safety observers need to verify each round detonation is counted.**
- **Always ensure all pins and safeties are removed before throwing hand grenades and account for all detonations. Only ONE thrower at a time.**
- **Range supervision by qualified OIC/RSO/safety observers and have qualified ammunition handlers on site.**
- **Emplice measures to identify range (siren, signs) and limit access (fence).**

1. If a detonation is not observed; log the event and call for EOD clearance support. If a hand grenade does not detonate, cease operations in that area until EOD disposes of it.
2. For misfired ordnance, follow proper misfire procedures for that weapon system. Place the ordnance or weapon system in a safe area away from personnel and report it.
3. For misfired flares, remove the firing cap from the primer end of the flare to prevent the primer from being accidentally struck and report it.
4. Properly package any unused/unfired munitions back into their proper shipping container/configuration and turn-in to the ASP.
5. When using a range that is not always secured or monitored, treat the range as a potential vulnerable area until sweeps are conducted to check for IEDs and UXOs.



UNCLASSIFIED//FOUO

AWARENESS REPORT

AWARENESS REPORT

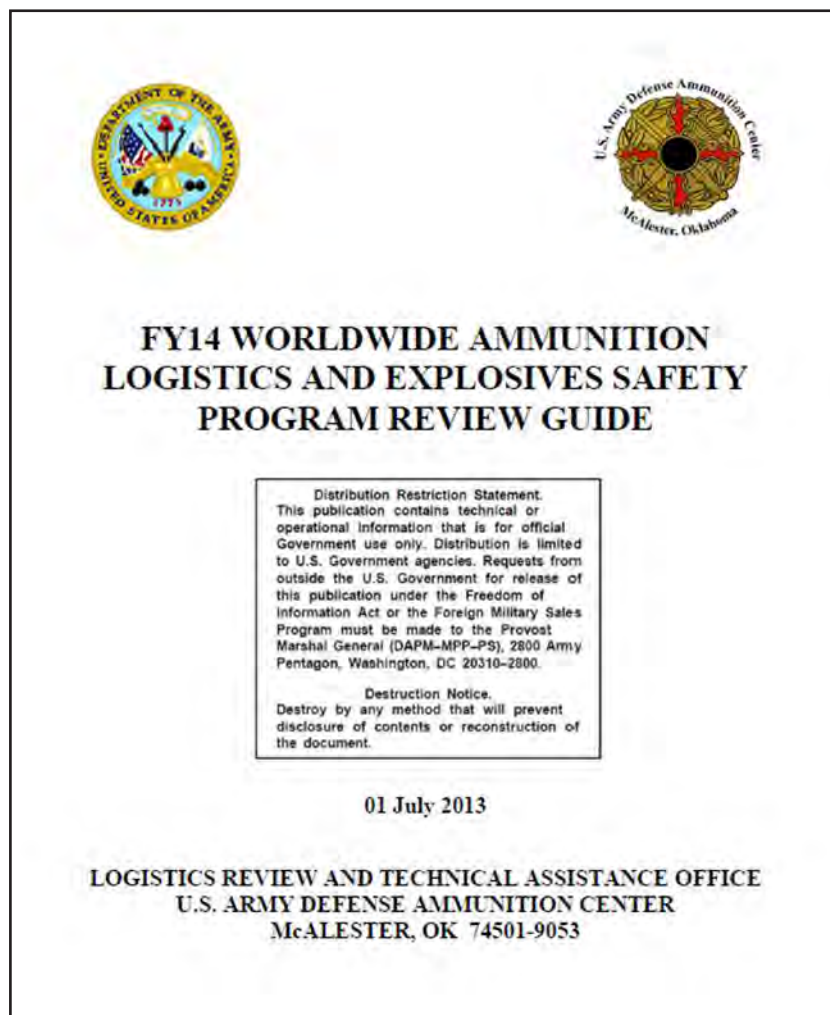


# FY14 Worldwide Ammunition Logistics and Explosives Safety Program Review Guide

The Worldwide Ammunition Review and Technical Assistance Program is accomplished through ammunition logistics and explosives safety reviews performed by the Logistics Review and Technical Assistance Office (LRTAO) of the U.S. Army Defense Ammunition Center (DAC) under the provisions of Army Regulation (AR) 700-13. In addition to periodically scheduled ammunition reviews, AR 700-13 establishes a technical assistance program.

The guide is provided to aid installations in performing self-assessment of ammunition logistics, ammunition surveillance, and explosives safety functions. This document is not intended to supersede, contravene, replace, or modify the publications referenced herein or any other Department of Defense (DOD), Department of the Army (DA), Army Command (ACOM), Army Service Component Command (ASCC) or Direct Reporting Unit (DRU) criteria.

Guide is available on AKO at: <https://www.us.army.mil/suite/doc/40672441>



# The ISO Container Munitions Environmental Monitoring System Story

The U.S. Army Ammunition Research, Design and Engineering Center (ARDEC) at Picatinny Arsenal funded a research project that is investigating the environmental effects which occur when ammunition items experience long term thermal exposure during real world storage conditions. ARDEC wanted to collect temperature data from ammunition items in order to generate and validate long term thermal exposure numerical models that reflect real world conditions which will provide guidance for developers and logisticians. This project is formally called the Thermal Pallet Characterization Study.

Approximately a year after the ARDEC project began Mr. Daryl Sieczkowski of the Defense Ammunition Center (DAC) Explosives Safety Engineering division (ESE) proposed to the Ammunition Logistics Research & Development board (ALR&D) an environmental monitoring system for ammunition items. The intent of this environmental monitoring system is to provide the capability of measuring the temperature of ammunition items that are being stored in ISO containers along with other environmental measurements at locations that typically experience extreme weather conditions. In order to reduce project risk and costs it was proposed to develop and locate three systems in the North American hemisphere. The three locations proposed for this study are the arctic cold system in Alaska, the desert hot system in the Mojave Desert of California and the tropical humid system in Puerto Rico. Each of these three systems was designed to reside basically unattended at their locations for two to four years. This proposed project was called ISO Container Munitions Environmental Monitoring System (ISO CMEMS).

During the ALR&D proposal review it was determined that the ARDEC project and the DAC proposed project could be combined, leading to better outcome effectiveness and cost savings. DAC was given the responsibility of designing, developing, fielding and operating the ISO CMEMS while ARDEC provided the initial functional and ammunition item requirements and program oversight. DAC was able to construct and field the three systems on time and under budget and has verified the performance and measurement accuracy of all three systems during scheduled site audits. Each ISO CMEMS makes over 24.5 million measurements over the course of one year producing sufficient data resolution to properly feed the thermal exposure numerical models.

Everyday each ISO CMEMS automatically transmits the data which was collected the previous day to a base station PC located at DAC. Each workday one of the DAC-ESE personnel performs a data validity check, system status check and data formatting before uploading the data to an account on AKO. The data on AKO is archived and is also available to the people at ARDEC at all times. The partnership between ARDEC and DAC, along with our on-site sponsors at Ft. Greely, AK, Naval Air Weapons Station China Lake, CA and Camp Santiago, PR, has proven extremely successful, each team complimenting the other while producing the desired outcome, providing an accurate source of data that helps in the future planning of munitions storage.

## **CP-12 Explosives Safety Level 1 Certificate Confusion**

Over the past several years there have been articles in the Explosives Safety Bulletin on the Career Program 12 Safety Program and the Explosives Safety Level 1 certificate. There has been a lot of confusion on what training is required to be eligible for the certificate.

Several years ago the safety community conducted an explosives safety training and competency survey and the results were eye opening. The survey established that most safety careerists lacked sufficient explosives safety training and did not feel qualified to manage an explosives safety program. As a result of the survey, the Explosives Safety Training Working Group (ESTWG) was established to create a program to provide explosives safety training, and other tools and resources, for safety professionals. The ESTWG is developing a two-tier explosives safety training and certificate program. Tier one is a basic level of explosives safety training. Tier two is advanced training in general and specialized explosives safety. The ESTWG continues to develop courses and training for the tier two certificate program for safety professionals to increase their knowledge of explosives safety.

The purpose of the tier one certificate is to recognize CP-12 Safety Professionals possessing the general knowledge/understanding of basic explosives safety principles and requirements. All CP-12 Safety and Occupational Health Professionals are eligible for the CP-12 Explosives Safety Professional Certificate - Level 1. This certificate can be awarded to safety and occupational health specialists (0018) who have received the American National Standards Institute (ANSI) Accredited CP-12 Safety and Occupational Health Professional Certificate and also completed the Ammo-45, -63, -78 and -107 courses. For CP-12 Safety Professionals in the 0081 (Fire Protection and Prevention Specialist), 0690 (Industrial Hygienist), 0803 (Safety Engineer) or 1306 (Health Physicist) job series, there are job-specific requirements they must meet in addition to completing Ammo-45, -63, -78 and -107.

So, for all of us outside the CP-12 program, to be eligible for the Level 1 Explosives Safety Certificate, we have to meet the training requirements established by the CP-12 program to become a CP-12 Safety and Occupational Health Specialist and also complete Ammo-45, -63, -78 and -107. There are no alibis or grandfather clauses for us old QASAS and ammo managers on meeting the standards so if you are interested in the level 1 certificate, you need to get busy. There are 33 courses that need to be taken along with the 4 ammo courses to meet the training requirements.

If you need more information on either the CP-12 or the explosives level 1 certificate program, contact the CP-12 Program Manager/Functional Chief Representative (FCR) cell at the US Army Combat Readiness/Safety Center at DSN 558-0258 or the CRC/SC explosives safety advisor at DSN 558-9863.



# HAZMAT Training

**HAZMAT Training.** The Defense Ammunition Center (DAC) is a prime source for DOD hazardous materials transportation certification. As one of only three DOD schools authorized to teach HAZMAT certification, DAC is a one-stop shop for all your HAZMAT training needs. Whether you require initial certification or are an "old hand" who needs to re-certify, DAC has the solution. We offer two courses for your convenience: AMMO-62 Technical Transportation of Hazardous Materials and AMMO-37-DL General Transportation of Hazardous Materials Refresher.

## **AMMO-62 Technical Transportation of Hazardous Materials**

**Description:** This course provides all service personnel detailed technical information pertaining to all phases of transportation for hazardous materials, it satisfies the mandatory training for persons who certify hazardous materials and conduct function-specific training for subordinate personnel as specified in the Defense Transportation Regulation (DOD 4500.9-R). Course content regulations governing the transportation of hazardous materials by all modes (i.e. land, vessel, and commercial/military air). International regulations covered include the International Maritime Dangerous Goods Code and the International Commercial Air Transport Associations Dangerous Goods Regulations. United States regulations covered include the Department of Transportation (DOT) 49 Code of Federal Regulations (CFR) and U.S. military regulations. Course materials include emphasis on shipping papers, marking, labelling, placarding, packaging, compatibility, and emergency response information.

**Length:** 2 Weeks

**Audience:** Personnel who perform duties in some phase of transportation of hazardous materials. These phases include any functions performed in shipment planning, equipment selection and inspection, shipment receiving or release, documentation, or any other aspect of traffic management.

**College Credit:** Students who complete this course may be able to receive college-level credit as recommended by ACE. ACEs recommendations for college credit for this course include credit in the lower division baccalaureate/associate degree category, 4 semester hours in Hazardous Materials Transportation. **ACE Course Number:** USAM-0002. For more information on ACE and applying for college-level credit for this course, visit <http://www.acenet.edu/acecredit>.

**Prerequisites:** Basic familiarity with federal and military regulations pertaining to the transportation of hazardous materials.

**Security Clearance:** None required.

**Navy Course Identification Number (CIN):** A-4E-3008

**Course Data Processing Code (CDP):** 02RR

**Availability:** If you are affiliated with the Navy or the Marine Corps, request quotas via the [Navy Training](#) page of this website. For all other students, admission to a course is by nomination from the prospective student's

Continued from page 20

command. If the nominating command has access to ATRRS, the submission must be made via ATRRS.

### **AMMO-37-DL General Transportation of Hazardous Materials Refresher**

**Description:** This course provides all service personnel with updated information and constitutes refresher training for persons who certify hazardous materials for transportation. The course satisfies the mandatory refresher training specified in Chapter 204 of DOD 4500.9-R, Defence Transportation Regulation. Course content includes review of changes to the 49 Code of Federal Regulations, International Maritime Dangerous Goods (IMDG) Code, the International Air Transport Association (IATA) Dangerous Goods Regulation and the Air Force Manual 24-204\_IP. Course includes emphasis on shipping papers, marking, labelling, placarding, packaging, compatibility, and emergency response information.

**Audience:** All service personnel who perform work in any phase of transportation of hazardous materials. These phases include functions performed in shipment planning, shipment receiving or release, documentation, and/or any aspect of traffic management.

**Prerequisites:** Satisfactory completion of a previous 80 hour hazardous materials transportation certification course as required by Air Force Manual 24-204\_IP and the DOD 4500.9-R. Personnel taking this course should be familiar with the DOT Hazardous Materials Regulations as published in appropriate titles of Code of Federal Regulations or tariffs issued by the transportation industry, and have a basic knowledge of military regulations and programs pertaining to transportation of hazardous materials.

It is highly recommended that if a person has not certified hazardous materials shipments on a regular basis since completing a previous prerequisite 80-hour course (or a subsequent refresher), that they consider taking the prerequisite course.

**Security Clearance:** None required.

**Navy Course Identification Number (CIN):** A-4E-3004

**Course Data Processing Code (CDP):** 02RL

Each course schedule and registration information is available at: <http://ammo.okstate.edu>.



The latest version of the Department of the Army Pamphlet 385-64, Ammunition and Explosives Safety Standards, is available at:

[http://armypubs.army.mil/epubs/pdf/p385\\_64.pdf](http://armypubs.army.mil/epubs/pdf/p385_64.pdf)

## **DOT-SP 15448**

Q: DOT-SP 15448 expires 30 November 2013. Is there a plan?

A: The US Army Military Surface Deployment and Distribution Command (SDDC) submitted the application for renewal on 6 September. SDDC reports the renewal and modification process may take a long time and possibly may go past its expiration date of 30 November 2013. The Department of Transportation (DOT), specifically PHMSA, will issue a letter of timely filing (filed within 60 days of expiration) which will allow shippers to use the Special Permit after its expiration date. Additionally, SDDC states both copies of the extension letter and Special Permit must accompany the shipment if used after expiration date. Once SDDC receives the "extension" letter, they will post it on SafetyNet and we plan to make it available in IHCS.

## **UXO Training Videos**

The DoD Environment, Safety and Occupational Health Network and Information Exchange (DENIX) has UXO training videos available at:

<http://www.denix.osd.mil/uxo/EducationalResources/Videos.cfm>



# Knowledge Nugget



Army Projectile Color Codes from 1895

From [www.uxoinfo.com](http://www.uxoinfo.com)  
 Archival Article by [Rhonda Crowley](#),  
 Research Associate, UXOInfo.com.

The National Archives in Washington, D.C. is a treasure trove of information including detailed information related to UXO. This month we examine an Army policy document from 1895 pertaining to the color codes of Army projectiles. The policy issued by the Office of the Chief of Ordnance outlines the various color codes for the paint based upon the type of shell to include shrapnel, iron shot, canisters and steel shells. The guidance also includes the recipe for mixing the various paint colors including lead based ingredients.

APPENDIX 39

PAINTS FOR PROJECTILES.  
(1 plate.)

OFFICE OF THE CHIEF OF ORDNANCE, U. S. ARMY,  
 Washington, February 14, 1895.

The exterior of projectiles, except band and fuses, will be coated with a thin, hard, and smooth paint, colored as shown on the accompanying plate dated Ordnance Office, United States Army, February 2, 1894, viz:

*Shrapnel, with point charge.*—Body, inclusive of base of head, black; head, vermilion.

*Shrapnel, with base charge.*—Body from band forward, to include three-fifths of length of head, black; body in rear of band and two-fifths of length of head next fuse, vermilion.

*Canister.*—Wholly black.

*Cast-iron shell.*—Body, inclusive of one-half the length of head, black; one-half the length of head next point, vermilion.

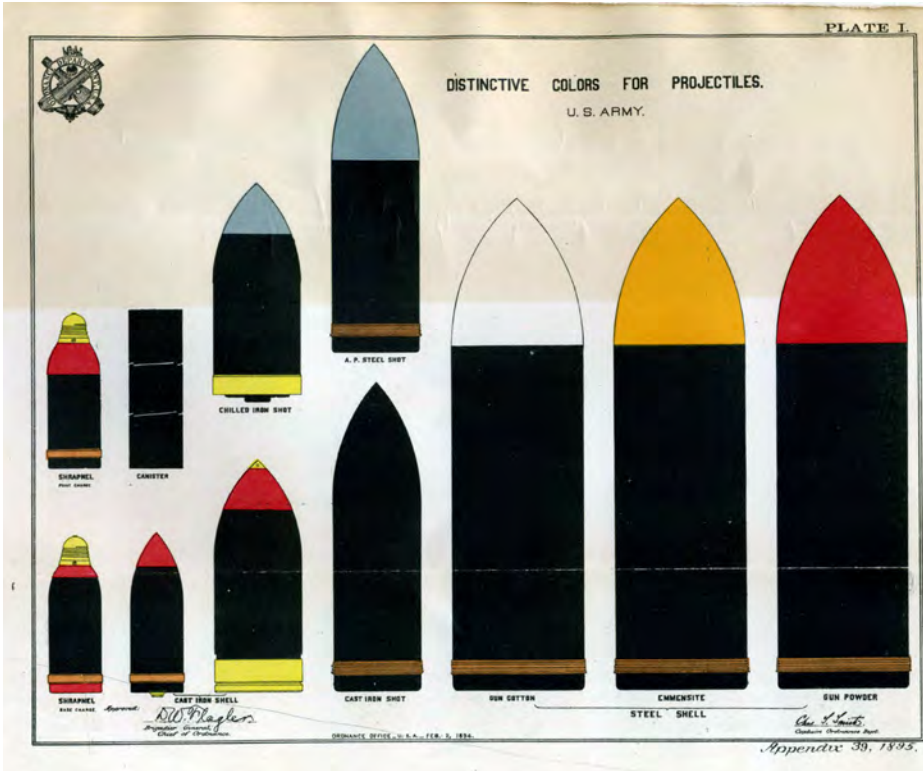
*Chilled-iron shot.*—Body, inclusive of one-half the length of head, black; one-half the length of head next point, slate.

*Cast-iron shot.*—Wholly black.

*Armor-piercing steel shot.*—Body, inclusive of base of head, black; head, slate.

*Steel shell.*—Body, inclusive of base of head, black; head white for gun-cotton, yellow for emmensite, and vermilion for gunpowder, bursting charge.

The paints must be evenly applied, particularly on parts of projectiles required to fit the bore closely, and on these parts the junction of two colors, which would be apt to produce inequalities of thickness, must be avoided. The thickness of the coating generally will be limited to the least amount required to produce the color, and must in no case be so great as to prevent the passage of the maximum ring gauge over the projectile.



A full copy of the document can be found at:

<http://64.78.11.86/uxofiles/enclosures/Color-Coding-Army-Projos-1895.pdf>



# Challenges to Disposal of Ammunition in Theater

Over the last decade of war, QASAS/LARs and Explosives Safety (ES) personnel, along with our Soldiers, Sailors, Marines and Airmen, have been assigned to many Combat Outposts (COPs) and Forward Operating Bases (FOBs), enduring hardships due to an assortment of dedicated reasons that impact both explosives safety and ammunition operations. We've seen the good, the bad and the ugly in dealing with Class V. We've met and worked with great, and not so great, personnel both in our own and in the coalition forces; but always we've worked, as a team, with the mindset that we are here to support the forces' combat sustainability mission. The concentration of efforts for the last decade has been on the sustainment of this mission and providing a survivability factor to potentially catastrophic situations. It is our role to continue advising commanders on how to best mitigate that potential. Now we are faced with even a greater challenge; the safe removal and DEMIL of Class V from the theater.

To begin to understand the complexities facing commanders and Class V managers, we need to understand some underlying factors and history. Ammunition management in the Afghanistan theater has never succeeded in obtaining the levels of efficiency and effectiveness consistently observed within the U.S.

The Army is really good at producing Ammunition & Explosives (A&E), but is lacking the same technological advances and efficiency in disposal and destruction capabilities. Why, you might ask? Some might say, it's all about the money. That is considered one of the symptoms to this problem, but is only one of many overreaching problems facing leadership.

History has shown the Army has relied too heavily on outsourcing to contractors for operating its ammunition supply points (ASPs) within the U.S. This has left few Soldiers who have actual hands-on experience in operating an ASP or performing detailed scopes of work involving A&E operations. Bear in mind, the CONUS ammunition storage sites are PERMANENT sites with permanently assigned experienced QASAS/LARs and ES personnel. However, active duty personnel at theater ammunition storage facilities rotate in and out of theater with little or no changeover during the Relief in Place/Transfer of Authority (RIP/TOA's). Many times, at the smaller outposts and FOBs the people handling the A&E mission are personnel placed into an additional duty role. They, in some cases, have little to "NO" training.

In dealing with the complexities of theater Class V demil it becomes apparent that one scenario is not the golden BB for all DEMIL scenarios. What is considered to be a text book operation in one location is not always conducive to accomplishing the mission safely in another location. Therefore, leadership has to rely on the subject matter experts (SME) and the integration of their experience and risk management guidelines to aid and guide command staff in making reliable decisions.

We have to think outside the box in many of these cases. Commanders across the theater are heads on with challenges such as:

Continued from page 25

- Where do I put this operation with little to no real estate? This is one of the most challenging aspects of any Class V operation within the theater.
- Where do we safely store this incoming Class V when our storage sites are near capacity already?
- What happens when we exceed those levels?
- Where do I get qualified people to perform these operations?
- The big one: Who is funding this? Where is the money coming from?
- Ranges: How do I secure these ranges or is it even possible?
- Where and whom do I get security from to escort DEMIL teams to and from the ranges and perform demil operations safely?

Ranges over the last several years have become a major concern for leadership. This is due in part to the loss of civilians, including children, which in most cases are forced by parents or insurgents to enter the range areas to collect what they believe to be harmless scrap, all for the chance to make some money!

Demilitarization is a key tool in Class V stockpile management. However, the monies for this program are entirely insufficient. In fact, more than one-third of the ammunition stockpile is now awaiting disposal. Commanders at all levels are facing the challenges of shrinking budgets and personnel cuts when considering how to safely and efficiently perform these operations. There are many initiatives being considered and worked at all levels of the ammunition community. Unfortunately, some of those will require long term programming, design, and scheduling of workload whether in the US or in the Afghanistan Theater.

The bottom line up front (BLUF) is this: The command leadership must rely heavily on their QASAS/LARs and ES personnel to act as their advisors and utilize them in every way possible to analyze and provide supporting advice in determining the safe and efficient execution of their Class V operations. Always consult with the QASAS/LARs and ES personnel to collectively and accurately apply prudent risk management application in the right place and right time. When preparing for deployment; commanders ensure you have those 89B's on your manning documents and the FOB Mayors have them in their hip pockets. Don't consider your 89Bs as a reduced mission asset because they are one of the most important and valuable resources you have at your reach for safe and efficient Class V sustainability and survivability.



# Black Tom Explosion

Reprinted with the kind permission of Carmela Karnoutsos and Patrick Shalhoub, Project Administrator. The original article can be found on the web site, "Jersey City: Past and Present", sponsored by, "New Jersey City University", at: [http://www.njcu.edu/programs/jchistory/pages/b\\_pages/black\\_tom\\_explosion.htm?goback=.gde\\_47685\\_member\\_262039888](http://www.njcu.edu/programs/jchistory/pages/b_pages/black_tom_explosion.htm?goback=.gde_47685_member_262039888)

On Sunday morning, July 30, 1916, at 2:08 a.m., Jersey City residents were awakened by a major explosion and a succession of explosions that lasted for several hours, sending shock waves as far as ninety miles away. The explosions occurred at Black Tom Island--a misnomer for a mile-long pier on landfill that connected the one-time island with the Jersey City waterfront near Greenville. The name "Black Tom" is said to come from a "dark skinned" fisherman who lived on the island for many years. Owned by the Lehigh Valley Railroad Company, it filled in the marshland between Black Tom and the mainland; it was then used as a work yard where the National Dock and Storage Company had warehouses.



Headline from the Jersey Journal, July 31, 1916 reporting on the Black Tom

Explosion. Courtesy, Liberty State Park

The pier stood opposite the Statue of Liberty in the New York Harbor in the Greenville section of Jersey City and today is along Morris Pesin Drive at Liberty State Park in the vicinity of the Park Administration Building and Flag Plaza.

Prior to American entry into World War I, war materiel manufactured in the northeastern states was sent to Black Tom for transport to the Allied Powers of England, France, Italy and Russia. The Allies were engaged in World War I against the Central Powers, Germany and Austria-Hungary. President Woodrow Wilson had declared neutrality, but American rights to "freedom of the seas" were affected by British naval control of the Atlantic seelanes. According to Jules Witcover in *Sabotage at Black Tom: Imperial Germany's Secret War in America, 1914-1917*, this situation resulted in the work of German saboteurs to prevent British receipt of munitions from the US (257, 266-267).

Black Tom was only one of a number of homeland attacks in retaliation to the British naval blockade of Germany. In New Jersey, on January 1, 1915, a fire took place at the Roebing Steel foundry in Trenton. And after the Black Tom incident, on January 11, 1917, a fire took place at the Canadian Car and Foundry plant in Kingsland. These facilities had contracts for goods being sent to the Allies. The US entered the war on the side of the Allies in April 1917, after numerous claims of German espionage and violations to American neutrality.

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Photograph (1916) of the aftermath of the Black Tom Explosion showing firemen on top of the debris. Courtesy, Liberty State Park

On the evening of the Black Tom incident, barges and freight cars at the depot were reportedly filled with over two million pounds of ammunition waiting to be shipped overseas. The munitions at the depot included shrapnel, black powder, TNT and dynamite. The Johnson Barge No.17, for example, held some one hundred thousand pounds of TNT. Given these incendiary devices, the Black Tom facility was not securely gated to safeguard the nearby civilian population from the potential of foul play.

Shortly after midnight on Sunday morning, small fires on the pier were discovered and the eight guards on duty gave flight. One of the guards, however, sounded the fire alarm alerting the Jersey City Fire Department. The fires gradually set off a succession of exploding shrapnel shells. After the terrifying 2:08 a.m. blast, the well-stocked arsenal was ablaze, even casting the barges at Black Tom afloat in New York Harbor. Pieces of metal from the explosion struck the Jersey Journal building clock tower at Journal Square, stopping the clock at 2:12 a.m.

During the explosion, Jersey City residents took to the streets and gathered at the waterfront to witness the ongoing fire works. Emergency vehicles in the city responded to alarms without full comprehension of the emergency and a disruption in telephone service created an information blackout. Witcover reports: "The blast jolted the Hudson Tubes [PATH system] under the river connecting Lower Manhattan with Hoboken and Jersey City . . . in the Bay View and New York Bay cemeteries monuments and tombstones toppled and some vaults were jolted askew" (13). A larger than usual number of worshippers had turned out for the six o'clock morning mass at the Mission of Our Lady of the Rosary (today Holy Rosary Church at Sixth Street).

Witcover also writes that Frank Hague, the commissioner of public safety in Jersey City, was informed that Barge Johnson 17 "had tied up at Black Tom to avoid a twenty-five dollar towing charge--false economy, he noted . . ." (22). Hague and Hudson County prosecutor Robert S. Hudspeth agreed that the presidents of the Lehigh Valley Railroad Company and the Central Railroad of New Jersey had violated the twenty-four hour time limit for storing dynamite and for keeping railroad cars with explosives at the terminal. The conditions at Black Tom had placed the civilian population in Jersey City and elsewhere in immediate danger.



Photograph (1916) of the aftermath of the Black Tom Explosion  
Courtesy, Liberty State Park

Accounts of the total number of fatalities differ, but it is known that a policeman, a guard at Black Tom, and the barge



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captain of the Johnson Barge No.19 were killed; a ten-week old infant was thrown from his crib. Hundreds of individuals were injured. The reported property damage was over \$20 million. The Black Tom depot with its freight cars, warehouses, barges, tugboats and piers was completely destroyed. In the nearby harbor, the Statue of Liberty sustained \$100,000 in damages from the spray of shrapnel, and newly-arrived immigrants at Ellis Island had to be evacuated for processing at the Immigration Bureau at the Battery in New York City. Some five hundred people living on houseboats and barges in the harbor also required evacuation.



Photograph (1916) of the aftermath of the Black Tom Explosion

Courtesy, Liberty State Park

Across the river, windows blew out in lower Manhattan and windows panes shattered in the Times Square area. Repercussions from the explosions were reported along the Jersey shoreline from Hoboken to Bayonne and over to Staten Island and Brooklyn and from as far away as Philadelphia.

After World War I, the Lehigh Valley Railroad, who owned Black Tom, and others, brought charges of German sabotage before the Mixed Claims Commission under the 1921 Treaty of Berlin between the United States and Germany. The commission questioned the origins of the Black Tom explosion. Had the fire begun as a result of "spontaneous combustion," carelessness of one of the employees or guards, or German sabotage?



Photograph (1916) of the aftermath of the Black Tom Explosion

Courtesy, Liberty State Park

A suspect in the incident was Michael Kristoff, a 23-year old immigrant living with relatives in nearby Bayonne and a former employer at the Tidewater Oil Company. Kristoff is said to have started the fires at Black Tom with incendiary devices in exchange for five hundred dollars. Kristoff died in a Staten Island hospital in 1928. On one side, officials at Black Tom were charged with "criminal and gross negligence" and on the other, documentation was found regarding German espionage at the time, but no one was found guilty beyond a reasonable doubt. In 1939 after seventeen years of deliberation, the German-American Mixed Claims Commission

claimed Germany responsible of sabotage. Germany was ordered to pay reparations of \$50 million to all claimants, but the restitution was not paid due to the intervention of World War II. After the war, Germany agreed to settle on outstanding war claims that included those related to the Black Tom explosion and they were paid in 1979.



# Accidents and Incidents from Around the World

Some, or all, of this material on this page was provided by ility Engineering's journal Hazards Intelligence (HInt). Details of HInt, which covers general chemical accidents, HInt Explosive Materials Incidents, and HInt Refinery Incidents can be found on the website <http://www.saunalahti.fi/ility/> or by e-mail request to [ility@sci.fi](mailto:ility@sci.fi).

## 29 March 2013 - Thailand

Bang Saray. Naval ordnance experts were summoned when an unexploded World War II hand grenade was discovered at a Bang Saray construction site. Maj. Sorasak Rakthrong of the Royal Thai Navy's bomb disposal squad led a team of sailors to remove the MK 2 fragmentation grenade from the construction site of an hotel in Huay-tu on March 29. No one was injured. The grenade, phased out of use by the US military in the 1950s, had its pin pulled, but had failed to go off. Officers cordoned off the area until the bomb could be defused and secured.

Construction manager Wuthirattapakorn Kaewkuang said he discovered the explosive at the edge of the site during a routine inspection. Police believe a troublemaking youth may have thrown the bomb, and speculated there was no intent to harm anyone, as the area was deserted. Naval officers, meanwhile, will try to determine how such old munitions ended up in circulation.

## 6 April 2013 - Italy

Province of Udine, Osoppo municipality. An explosive device from the World War II was found at the foot of the hill of the fortress via Porto Carantanian, removed and blown up in the bed of the Tagliamento river, and everything went according to plan.

The core team of EOD specialists, led by Colonel Stefano Venuti of the Third Regiment Guastatori acted at the scene of the detonation, while another fifty members of the Army, Police, Civil Defence (present with men from nine teams of the municipality of Gemona), public health of Ass3, the Red Cross, and fire-fighters followed the operations and coordinated the evacuation of 400 families from the logistics base located at the headquarters of Civil Protection.

The operations team started at 08:30 with the first intervention by harnessing the bomb, which was then placed in a specially made hole dug next to the local authority. The riskiest part of the intervention was finished so much ahead of schedule that the bomb was ready at 11:15 and the alarm to citizens was cancelled. Subsequently, the device was taken to Tagliamento and blown up with dynamite inside of a hole at 13:45. At the same time, a bomb dating back to the World War I, weighing about 16 kg, was found on the banks of the Tagliamento by Venzone police, following a tip-off by a citizen.

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### **10 April 2013 - France**

Aisne (02), Cappy. Two men from the EOD centre in Amiens, aided by a colleague from Laon (Aisne), were called by the town hall of Cappy to investigate reports of munitions in the communal pond. The men spent four hours a day diving alongside the D197 road. To date, they had recovered over a tonne of shells dating from the First World War.

According to Michel Colling, deputy head of the Amiens bomb disposal centre, said: “These munitions appeared after the passage of a herd of wild boar. The animals came out of the neighbouring forest and crossed this arm of the River Somme. In climbing up the bank, their weight made the soil crumble and the shells appeared. The trained eyes of the experts identified them as weapons of the World War I, of several nationalities and calibres. Depending on their size, they were transported in a bucket pulled by a zip line, or placed on floats. Even though the EOD centre is called out several times a year, the amount of munitions recovered in this case was exceptional. M. Colling said the shells were well preserved because “in the mud there is no oxygen – hence no corrosion”. The munitions were removed in sand-filled boxes and taken to an Army camp at Sissonne (Aisne) for destruction.

### **11 April 2013 - USA**

MD, Sharpsburg. A Sharpsburg resident found an unexploded Union army shell while planting some trees in his garden. He told local media: “It looked like a torpedo without the fins. I said, ‘Oh my Lord, there’s another one.’” The man’s home is about a mile from the Antietam National Battlefield, site of the bloodiest single-day battle of the entire Civil War.

After examining the shell the Maryland State Fire Marshal’s office determined that it had not been fired, and that the fusing mechanism was still intact. He called the Washington County Sheriff’s office, which in turn called in US Army bomb disposal technicians from Fort Belvoir, who then took the shell to a nearby field and set it off.

### **21 April 2013 - USA**

TN, Morgan County. An Army EOD squad safely detonated several dozen World War II-era mortar rounds at a Morgan County junkyard, two days after they first were discovered during a fire on the property. Morgan County Sheriff Glen Freytag said Coalfield Elementary School, which is 2½ miles from the site, was locked down and homes within a half-mile radius were evacuated during the explosions.

An Army unit from Fort Campbell, Kentucky, counter-charged the two to three foot long mortars in three separate controlled explosions. Soldiers dug a hole in the ground, filled it with enough mortars to not crack nearby building foundations and then measured the right amount of explosives, said Michael Knight, a spokesman for the Bureau of Alcohol Tobacco, Firearms and Explosions. He said that the combined explosive weight of the shells was approximately 30 pounds.

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### **18 June 2013 - Russia**

Samara Region, Volga Federal Ammunition Testing Site. One person was killed, and over 100 people sought medical help, 11 were hospitalized and more than 6,500 local residents were evacuated from a village near an ammunition depot in central Russia where a fire caused explosions of stored artillery shells. Investigators said a wildfire could have spread to the testing range. More than 1,400 personnel and over 220 major pieces of fire-fighting equipment, including eight aircraft and two fire-fighting trains, were deployed to contain the fire and explosions. There were plans to use four helicopters. Emergencies Ministry spokesman Oleg Voronov said one man, a gas company employee who was carrying out work at the depot, died in the blaze, adding: "The circumstances of his death are unknown."



The Russian Emergencies Ministry said the fire at the Volga Federal Ammunition Testing Site in the Samara Region was followed by a series of explosions that continued to rock the area, sending shrapnel to a distance of up to a kilometre from the site. A ministry spokesman said the depot stored some 6,000 122-mm artillery shells as well as other ammunition and explosives, and, in the worst case scenario, the explosions could continue for two or three days. The Emergencies Ministry said there was no chemical threat to the population. The regional Investigative Committee later said the depot contained around 18 million shells.

Explosives experts made safe 12,000± unexploded shells, many of which were scattered on a nearby highway. Television footage showed blown-out glass and window frames and unexploded shells lying in Nagorny and on the nearby highway. Drivers whose cars were hit by shrapnel were those most seriously injured. Regional investigators launched a criminal investigation into a possible breach of safety regulations and President Vladimir Putin ordered payments of 10,000 rubles (\$300) to each of those evacuated.

On June 21, the emergencies ministry said more than 110 people had sought medical assistance since the incident occurred. More than 640 people received psychological assistance. Some 6,500 residents, including 800 children, were evacuated, but all residents had returned to their homes by that afternoon.

### **7 July 2013 - China**

Heilongjiang province, city of Qiqihar. Forty shells left by Japanese troops during the World War II were found at a construction site in the city of Qiqihar in Northeast China's Heilongjiang province. The shells were discovered when an excavator was being used at a construction site in the city's Jianhua district, according to the municipal public security bureau. The fuzes and bodies of the rusted shells were still intact and posed a safety risk. Police moved the shells and stored them safely in a special warehouse. Two Japanese chemical weapon units were once stationed in Qiqihar when the city was occupied by the invading Japanese troops in the 1930-40s. After the Japanese were defeated, large amounts of bombs, shells and mines were left behind. Undiscovered explosives still pose a threat to local residents.



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The latest version of the Department of the Army Regulation 75-1, Malfunctions Involving Ammunition and Explosives, is available at:

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