



SAFETY SERVICES ORGANISATION



Session 4.1

Control of Ammunition Storage Facilities

**IATG Foundation Course:
Ammunition Storage & Operations Module**



Lesson Objectives

By the end of this lesson, you should be able to:

- Apply the procedural controls that facilitate safety and security at ammunition storage facilities
- Describe the conditions of employment for personnel in an explosives facility
- Describe the main aspects of the security controls to be implemented
- Describe and apply the main estate management tasks
- Describe and apply the main controls for the maintenance of a PES and the operations that may be undertaken within the PES



Introduction

- The specific hazards of ammunition and explosives require a high level of control at facilities used to store, handle and process them.
- Control is not only about access but includes control of the activities carried out and of the environment around the facility

Personnel Employed in an Explosives Facility

- There is a set of basic requirements for personnel employed in an explosives facility, including the requirement for security clearance to minimize the potential for members of criminal or terrorist organisations to gain access to the ammunition stockpile

Personnel Employed in an Explosives Facility

- **Fundamental elements of training are necessary, including:**
 - Explosives hazards and Safe Systems of Work
 - Fire safety
 - Security
- **Training programmes should be approved at national level and include refresher and upgrading training, along with “on the job” supervision while gaining experience**

Personnel Employed in an Explosives Facility

- There are additional special conditions of employment for an individual to be allowed to work in an explosives facility
- Note that disabled personnel may be permitted, as long as the head of the establishment is content that the nature of their disability does not present an unacceptable risk to themselves or others

Security

- Certain procedural aspects can easily enhance security in ammunition and explosives facilities at a relatively low cost
- These are principally aimed at preventing unauthorised personnel and unauthorised items being introduced to the explosives area, to minimise safety hazards and the risk of diversion
- National regulations should be applied for Patrolling and Guarding. The facility should be patrolled to detect breaches in the perimeter fence or other physical security features

Security

- Access points should be limited and guarded to prevent unauthorised access
- Security personnel shall prevent unauthorised personnel from gaining access and should conduct regular, random searches of personnel and vehicles, on both entry and exit, for contraband items
- The Access Control system shall include procedures for accounting for the number of personnel inside the explosives area. This is important both for security – to ensure that unauthorised access is prevented – and for safety purposes, so that all personnel can be accounted for in the event of an incident

Security

- Certain items are prohibited from explosives areas completely and others must be controlled
- These items are known as “Contraband” and the access control procedures should include checks to ensure that contraband items are not carried into the explosives area
- Controlled contraband items are those that present a hazard to the explosives, to the people employed in the facility and/or the infrastructure, but are necessary for the completion of a task
- Such items must meet identified standards and be authorised for a specific purpose and a given time period



Estate Management

- The principles of good estate management promotes safety and security by ensuring that PES and other important infrastructure is maintained in a serviceable and functional condition
- Responsibilities for estate management should be clearly identified and individuals held accountable where appropriate
- Each ammunition and explosives facility shall have a site plan, identifying all PES and other key infrastructure facilities. This forms the basis of the estate management function and is used to support fire-fighting activities if required

Estate Management

- **The main elements to be addressed in estate management procedures:**
 - Maintenance plans and procedures for PES and supporting infrastructure including traverses, roads, railway lines (where present), drainage etc
 - Control of vermin and other pests
 - Control of vegetation, trees & shrubs
 - Control of agriculture, including livestock, and agricultural chemicals

Vermin control

- **Rabbits and other burrowing animals damage buildings, traverses, munitions, packaging**
 - Legislation protecting endangered or protected species
- **Control measures to eliminate**
 - Regular inspection for signs of damage
 - Controlled shooting
 - Geogrid under soil
 - Pesticides embedded in soil during construction or temporarily in buildings



Control of vegetation, trees & shrubs

- **Uncontrolled growth presents a major fire risk**
- **Possibility of undermining foundations, blocking drains**
- **3-Area Plan:**
 - 1 – No vegetation within 1m of PES (except grass on igloos etd)
 - 2 – No vegetation >50mm from 1-6m
 - 3 - >6m – iaw local risk assessment
- **Trees & Shrubs**
 - Conifers & Spruce $\geq$ 30m
 - Others $\geq$ 15m
- **Remove cut vegetation on day of cutting**



Agriculture, agricultural chemicals and livestock

- **Permitted with a formal contract of conditions:**
 - No of personnel must be minimum required & subject to search
 - Agricultural personnel protected as contractors
 - Agricultural operations within IBD duration minimised
 - Crops shall not present significant fire risk
 - When agricultural operations cease, return ground to short grass
 - Chemicals chlorate-free and pose minimal fire risk
- **Grazing of livestock discouraged due to time of access required**
 - Possible with HoE risk assessment

Estate Management

- Fire fighting equipment and first aid kits shall be provided throughout the explosives area.
- Although not strictly “estate management” their presence will aid safe operations.

PES

- **Having a set of basic procedures for the control of individual PES facilitates a culture which enhances safety and security at minimal financial cost**
- **There is a necessity for good standards of cleanliness in a PES:**
 - To prevent build-up of explosive dust, residues or contaminated waste, providing a direct hazard
 - Ensures that the performance of safety systems, such as electrostatic bonding, does not deteriorate

PES

- PES often need to be vacated before a task has been completed, such as for authorised breaks or at the end of the shift or working day
- **How can we minimise the hazards, but without losing excessive production time at the start and end of each session of work?**

PES

- **What are the variations that may be necessary if the PES has to be evacuated in an emergency?**

PES

- Explosives areas should be reserved solely for the storage, handling and processing of ammunition and explosives
- No material or items should be kept or used in the explosives area other than those required to carry out the task safely and efficiently
- A list of authorised tools and equipment should be maintained, including any special tools required for a particular task or type of ammunition

Operations in a PES

- **An ELL licenses a PES for a specific purpose**
- **Apart from activities such as routine cleaning, no activities are take place in a PES unless:**
 - Authorised by the ELL or
 - Specifically authorised following a risk assessment

Operations in a PES

- Some activities of a negligible hazard may be permitted in ESH and Open Bay storage
- Ammunition packaging shall not be opened inside and ESH, but in some circumstances may be permitted in the vicinity of the ESH



Ready-use ammunition

- **IF** use of process building not reasonably practical, **AND**
- Subject to written risk assessment by ESR for HoE, **AND**
- Authorised by National Authority,
- Ammunition of HD 1.3 and/or HD 1.4 may be opened in a PES.

Captured enemy ammunition and foreign explosives

- **Necessary in support of multinational operations, technical intelligence gathering, prosecution of terrorists and criminals**
- **Possibility of little technical information, so:**
 - HoE requests
 - foreign CAD or
 - Physical inspection by NA-approved technical specialist AND signed 'safe to store' certificate
 - ESH/PB inspections
 - Fire assets in place for all handling/processing
 - Not stored or processed in PES containing national assets
 - All activity overseen by SQEP authorised by ESR
- **NB. Munitions procured from a foreign country that has qualified the items using UN testing regime AND the items have aclassified correctly, shall be exempt from these restrictions**



Operations in a PES

- Ammunition Process Buildings (APB) are licensed to carry out work on ammunition and explosives
- Any limitations on what can or cannot be carried out in the APB will be detailed on the ELL

Operations in a PES

- **Some APBs may be designated as Receipt & Issue (R&I) facilities**
- **These are generally compartmentalised buildings with each compartment designated for a particular part of the task, including:**
 - Receipt of ammunition
 - Visual inspection
 - Fractioning of packages
 - Issue



Storage conditions – chemical stability

- **In general, sensitivity reduces with temperature**
- **Very low temperatures can cause cracking and fragmentation:**
 - explosives – affecting performance
 - Propellants – increased burning rate, possible DDT
- **NG**
 - Freezing point 13C -> Crystallisation
 - Reheating may cause leaching
 - High temp may lead to exudation, expansion or increased rate of decomposition
- **Nitrate ester- based propellants**
 - Decomposition increases rapidly >32C
 - Prolonged exposure .15C affects storage life



Storage conditions – temperature restrictions

- **Temperature Limits**

- If more than one temperature restriction, observe severest

- **Minimum temperature**

- NG, nitrate-ester based propellants $>5^{\circ}\text{C}$
- If $<5^{\circ}\text{C}$ for >30 days, install artificial heating

- **Maximum temperature**

- Classification and NA provide upper limit per item
- Consider ventilation, insulation, airconditioning



Additional Topics

Aircraft overflight:

- Airspace above PES should be designated by the national technical authority as avoidance zones, which should preclude aircraft from overflying at heights of less than 1000m above ground level
- Persistent incursions of these avoidance zones should be reported to the national technical authority
- Special arrangements may be agreed for military airfields with explosives facilities. Aircrew should be informed of the hazard and instructed to avoid the explosive facility whenever possible



Additional Topics

Aircraft overflight:

- Military helicopters may be permitted to overfly explosives facilities for training and exercises, following a detailed risk assessment and authorization by the head of the establishment
- There should be no direct overflight of any PES and explosives should not be moved during the time of the helicopter activity



Additional Topics

Underground Storage:

- The effects of blast overpressure in confined spaces requires additional considerations to be addressed when using underground storage
- There are some differences to and some supplementary regulations when storing ammunition and explosives underground
- Ensure that students understand the need to apply these regulations if they have to work in an underground facility

Questions?

Lesson Objectives

You should now be able to:

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