10th RASR Workshop of Regional Approach to Stockpile Reduction (RASR) of Conventional Weapons and Munitions
9-11 October 2018,
Tirana/Albania

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Agenda

• Introduction to ammunition maintenance /surveillance system in SAF
  – Storage system,
  – Surveillance system
  – Ammunition information system SKEV
• Weapons and ammunition surplus
• Procurement of new ammunition
• Accident
• Military range & environmental control
• New initiatives and projects
• Priorities and identification needs
Ammunition management

• Engineering (Logistic brigade) is responsible for:
  – Planning surveillance tests,
  – Attending initial – acceptance QC at manufacture site (base line for ammunition life extension),
  – Determine type of tests and period,
  – In-house testing and outsourcing,
  – Supervise, maintain and validate surveillance result,
  – Assign ammunition condition code(ACC) - determine usability,
  – Shelf life extension or disposal,

• Guidelines: SB 742-1
Ammunition maintenance /surveillance system in SAF

Periodical technical inspections
Proving tests EPVAT
Propellant stability tests
Ammunition behaviour in drill and operations

Technical maintenance - Periodical controls – surveillance tests

Information analysis

Decision

Disposal

Storage
Increasing usage
Basic maintainance
Ammunition maintainance

Basic overhaul
General overhaul

Overhaul

Periodical technical inspections
Proving tests EPVAT
Propellant stability tests
Ammunition behaviour in drill and operations
Ammunition storage facility

source: https://www.delo.si/druzba/panorama/skladisce-orozja-podstrmec-pri-borovnici.html

• All storage buildings are equipped with
  – temperature and humidity control
• Some buildings are equipped with
  – temperature and humidity maintenance system
• Temperature and humidity data base
Temperature and humidity TH control & TH maintenance

Storage facility

In bunkers
Ammunition storage facility
Inner gate & fence
Periodical technical inspections

• Periodical technical inspections are conducting in accordance to the Order and SOPs.
• Performed by unit responsible for ammunition maintenance.
  – Monitor storage condition,
  – Ammunition technical condition,
  – Check-in ammunition when return from field activities,
  – Basic maintenance,
  – Expertise,
  – Sampling,
  – Limited disposal capabilities.
Chemical laboratory “Fizikalno kemijski laboratorij”
Main task: Propellant stability test

- Develop analytical methods
- Maintain propellant master samples
- Sampling propellants from ammunition (small arms & artillery),
- Propellant stability tests
- Assign category of stability to individual lot.
- State of the art equipment and updated procedures.
- Cooperation with NATO laboratories, MOD Serbia - TRZ Kragujevac, MOD Croatia, MOD BiH & MOD FYR Macedonia.
Chemical laboratory “Fizikalno kemijski laboratorij”

**Equipment**

**Instrumental methods:**
- **SPEKTROSCOPIC** (UV-VIS SPECTROPHOTOMETRY, FTIR SPECTROSCOPY)
- **SEPARATION** (HPTLC, HPLC UV-VIS, HPLC-DAD, GC-FID, GC-TCD)
- **ELEKTRO ANALYTICAL** (KARL FICHER, POTENTIOMETRY)

**Thermal method:**
- DSC
- TGA
- HFC
- CALORIMETER
- classical methods (METHIL VIOLET, THERMAL TEST on 100 °C, ABEL TEST, WEIGH LOSS TEST,...)

**Visual method:**
- **STEREO MIKROSKOP**

**Sensitivity:**
- BAM FALL HAMMER
- BAM FRICTION TEST.

**Internal ballistic:**
- **MANOMETRIC BOMB.**

**Detonation velocity:**
- **TRIO CHRONOS** (optical, electrical and piezo sensors)
Chemical laboratory
Additional activities

• Synthesis of energetic materials: NG, TATP,...
• Challenge chemical detectors on live explosives.
• Editing library for Raman spectroscopy with new energetic compounds.
• Maintain explosives for training dogs K-9.
• Preparation and maintenance colorimetric agent for field detection.
• Sensitivity on shock and friction determination
• Interpretation of results from outsourcing laboratory
  — Energy dispersive X-ray Analysis EDX on scanning electron microscope (SEM).
• Expertise & consultancies
Proving tests and activations

• Small arms ammunition EPVAT (for NATO):
  – Outsourcing (local and abroad),
  – Working on own capabilities

• Engineering ammunition:
  – Technical activation

• Medium and large caliber ammunition:
  – Working on own capabilities,
  – Limited capabilities, lack of proving ground and specialized equipment
SKEV – information system
Security network & different levels

Ammunition database:
- Quantity and quality (including elements)
- Accountability
- Surveillance and proving tests (planning)
- Ammunition condition codes
- Shelf live extension
- Disposal
SKEV — information system
Editing data into information system - database

- **Ammunition data:**
  - Ammunition identification
  - Lot/batch number or serial number;
  - Category and status: ammunition condition code - ACC, priority for use, restrictions, disposal, waiting for testing, reparation, demilitarization etc.
  - Ammunition elements (type, lot, technical data, quality, category)
  - Ammunition technical data: weight of items, weight of micro-package & macro-package, dimensions, NEW, UN hazard classification code HCC: HD & CG, UN #, date of manufacture, first-next date for technical control
SKEV – information system
SKEV – information system
SKEV – information system
SKEV – information system support accountability system
SKEV – information system
Weapons and ammunitions surplus on sale

- 27 x Tank M-55S (105 mm main gun)
- Associated ammunitions:
  - HESH
  - HEAT
  - Screening smoke grenade
  - ERA (Explosives Reactive armor)
### Weapons and ammunitions surplus on sale

Javno zbiranje ponudb za prodajo protioklepnih sistemov in opreme Factoria, Fagot, Metis ter raket Factoria 9M111M

Nuber: 478-14/2016-16, Date: 6. 7. 2017

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<th>Item</th>
<th>Quantity</th>
<th>Minimum price EUR/pct.</th>
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<td>Missile, 9M111M &quot;FACTORIA&quot;, LOT 02-95</td>
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<td>Control equipment KPA 9V812MB-1</td>
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<td>Indicator optic FAGOT 120 mm</td>
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<td>Other parts</td>
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Weapons and ammunitions surplus to replace/exchange old for new

- 120 mm HE mortar ammunition PM114 5000 pct.
- 120 mm HE mortar ammunition PM 114P 5000 pct.

Tenderer - to take old ammunition and to deliver new for mortar MN9

Tender MORS 159/2018-ON-PSPs
• At a meeting of NATO Defence Ministers in June 2017, 11 Allies and Finland launched this project by signing a Letter of Intent. Today’s agreement is an important step forward, as it creates the necessary legal basis for participants to jointly acquire and warehouse a wide array of land munitions.

• Deputy Secretary General Rose Gottemoeller praised the initiative, saying: “it will increase our ability to share our munitions and work more smoothly and effectively in the field.” She added that “over time, this initiative will help our troops to increase their interoperability and effectiveness where it is needed most” and “help to reduce costs, enabling our rising defence budgets to go even further.”

• Following today’s signature, the participants will begin work on an initial round of multinational acquisition.

1. Belgium, Denmark, Estonia, Germany, France, Italy, Latvia, Lithuania, Montenegro, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, and Spain

2. Turkey recognizes the Republic of Macedonia with its constitutional name.
Procurement of new ammunition

• 9 x 19 mm, 5.56 x 45 mm, 7.62 x 51 mm, 12.7 x 99 mm; Ball
• Gun fire imitation “Topovski udar” M81.
• 40 x 46 mm & 40 x 53 mm practice
• 12.7 x 99 (0.50 cal.) mm practice
• Hand grenade
• The SPIKE is a family of multi-mission, precise, electro-optical missiles. SPIKE missiles have been supplied to 29 countries around the world. These countries include Germany, Italy, Holland, Spain, Latvia, Lithuania, Slovenia, the UK, the Czech Republic, Poland, Romania, Peru, Chile, Colombia, Singapore, the Philippines, South Korea and more.
Environmental control
Military range - Poček

• Central range “OSVAD Poček’
  – Post firing check
  – Regular bi-annular check (UXO)
  – Environmental monitoring – comprehensive plan
    • Sampling and analysis
    – Cartridge collection

• Outdoor shooting ranges
  - Cartridge collection
OSVAD Poček - Military range
Environmental monitoring comprehensive plan

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<td>Forest report</td>
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Environmental aspects - good practice
almost all cartridges from small arms ammunition are collected after firing
Ammunition Accident

• Two solders were injured due to primer activation on 76 mm saluting ammunition on March 3rd 2018.

• Investigation is in the progress.
Bilateral cooperation Slovenian MOD/SAF & ITF BiH & FYR Macedonia

• Projects supported by Slovenian MFA
  – Initial visit of Slovenian representatives to beneficial county (assessment needs)
  – Lecture preparation and delivery
  – Visit to the Slovenian national laboratory for propellant stability (FKL), ammunition storage and maintenance facility
  – Continuation and expanding cooperation in near future (Mil to Mil)

• Cooperation with: Croatia, Serbia,

• SAF is open for cooperation
# Bilateral cooperation
**BiH & FYR Macedonia**

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<tr>
<th>Topic:</th>
<th>Day 1</th>
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<tr>
<td>Day 1</td>
<td>Introduction to international support-cooperation</td>
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<td>Introduction to International Ammunition Technical Guidelines IATG</td>
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<td>IATG: implementation tools and applications</td>
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<td>Energetic materials</td>
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<td>Propellants</td>
<td>Ageing processes</td>
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<td>Introduction to ammunition information system/ dana base SKEV-SMES</td>
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<tr>
<td>Ammunition database</td>
<td>Editing initial data into information system/database</td>
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<tr>
<td>a) Open new item in database</td>
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<td>b) Editing data for ammunitions and elements</td>
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<p>| Day 2                                           |                                                                 |
| Ammunition database                             |                                                                 |
| Editing initial data into information system/database |                                                                 |
| b) Editing data for ammunitions and elements     |                                                                 |
| Quality control in ammunition life cycle – information system: |                                                                 |
| a) Surveillance plan for ammunitions            |                                                                 |
| b) Editing data for technical control – KTP &amp; propellant stability |                                                                 |
| c) Data for next control &amp; Ammunition Condition Code - ACC |                                                                 |
| Stability tests                                 |                                                                 |
| Methods and requirements                        |                                                                 |
| Standardization                                 |                                                                 |
| NATO - STANAGs &amp; AOP, Intern standards          |                                                                 |
| Ammunition ageing process                       |                                                                 |
| Introduction to IATG 07.20                      |                                                                 |
| Surveillance and in-service proof                |                                                                 |</p>
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<tr>
<td>Ammunition life cycle</td>
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<td>Introduction to SB742-Ammunition Surveillance Procedures</td>
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<td>Propellant Methods of analysis</td>
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<td>Propellant Stability Result assessment/evaluation</td>
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<td>Ammunition accountability – information system</td>
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<td>a) Accounting management</td>
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<td>b) Ammunition documents</td>
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<tr>
<td>Conclusion</td>
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<td>Discussion and evaluation</td>
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R &D
Drone: termovision recognition of non-natural objects (UXO)
R&D
Drone: high optical zoom - identification of suspicious objects (UXO)
Drone: 3D mapping (print screen)

Drones have promising future in:

- UXO surveillance.
- Range cleaning operation.
- BAC/ERW surveillance & cleaning.
- UEMS initial assessment & cleaning operations.
- Before and post OB/OD range check.
- Mine field clearance.
- HAZMAT operation.

More field tests are needed to examine real performance and reliability.
Gaps and needs

• Training capabilities (all levels)
• Appropriate organization structure & national authority
• Lack of qualified personnel involved in EA business (procurement, codification, standardization, surveillance, ...)
• Harmonization of national legislation with NATO standards and IATG guidelines
• Proving ground – range and ballistic equipment
Thank you for your attention