



RASR The Regional Approach to Stockpile Reduction

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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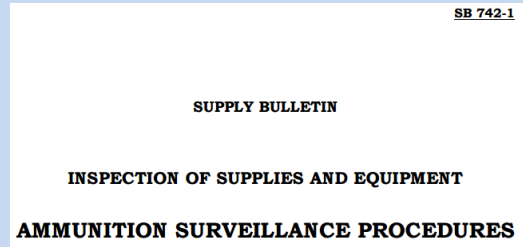
Agenda

- 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

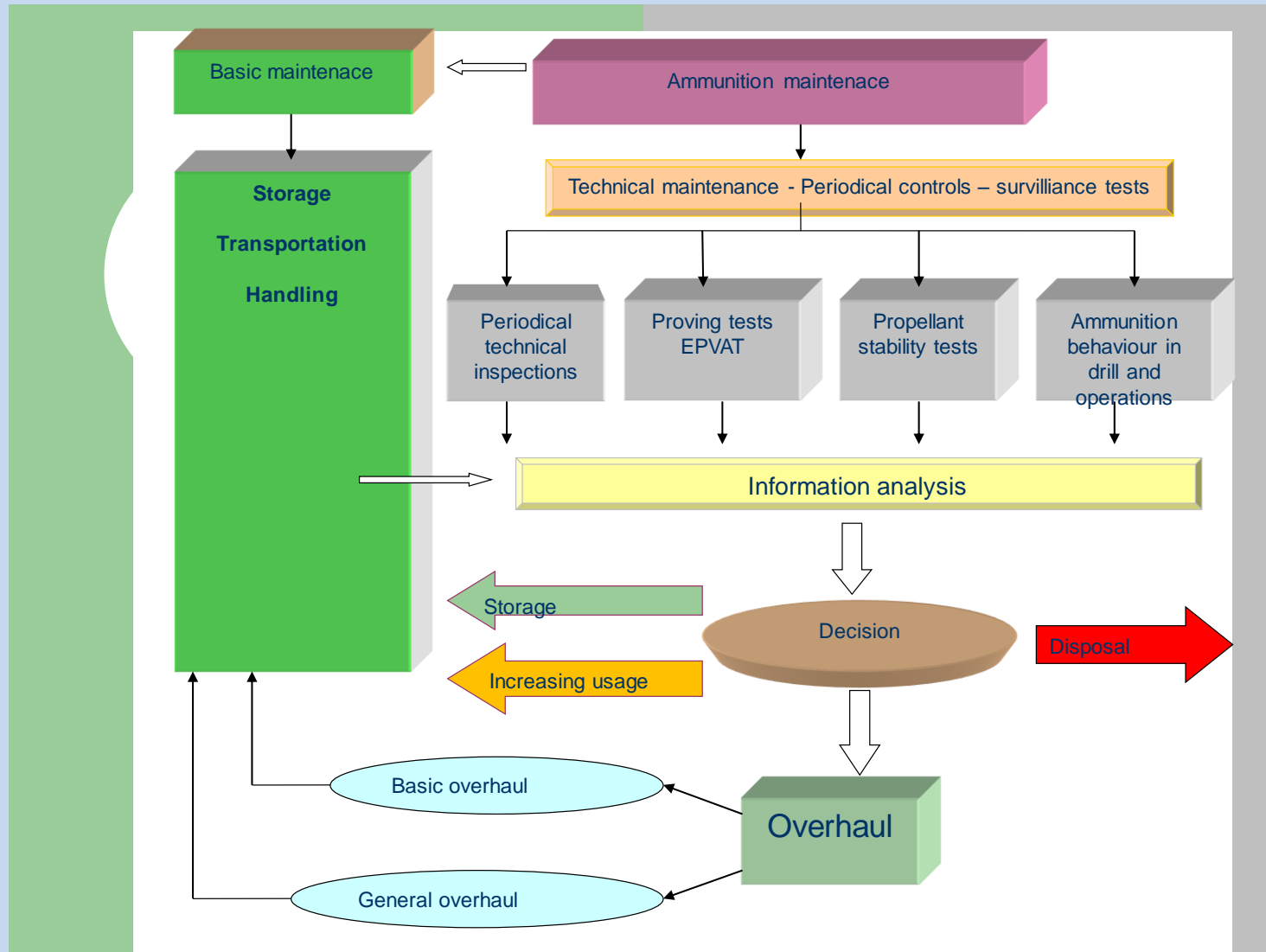


Ammunition management

- 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,
 - ACC fourteen groups: A1, B2, C2, D2, E3,F3, G3, H3, J3, K2, L3, M3, N3, P3
- Guidelines: SB 742-1



Ammunition maintenance /surveillance system in SAF



Ammunition storage facility

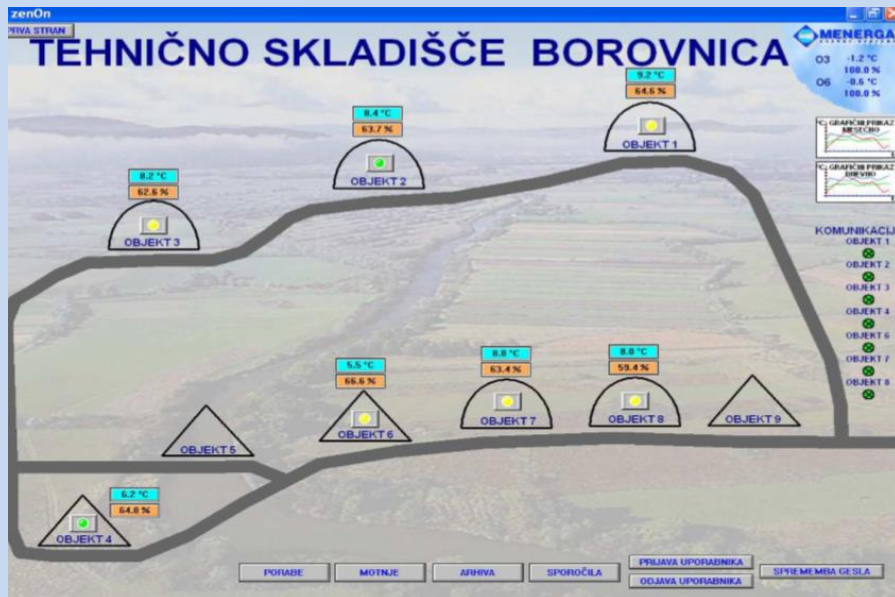
source: <https://www.delo.si/druzba/panorama/skladisce-orozja-podstrmec-pri-borovnici.html>

- 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

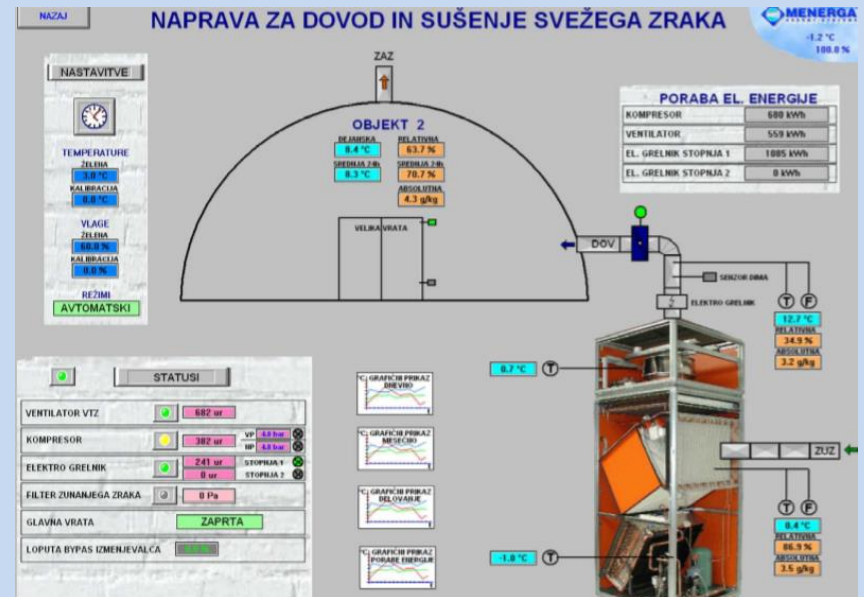


Temperature and humidity TH control & TH maintenance

Storage facility



In bunkers



Ammunition storage facility

Inner gate & fence



Periodical technical inspections

- Periodical technical inspections are conducted 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 FISCHER, POTENTIOMETRY)

Thermal method:

- DSC
- TGA
- HFC
- CALORIMETER
- classical methods (METHYL 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:

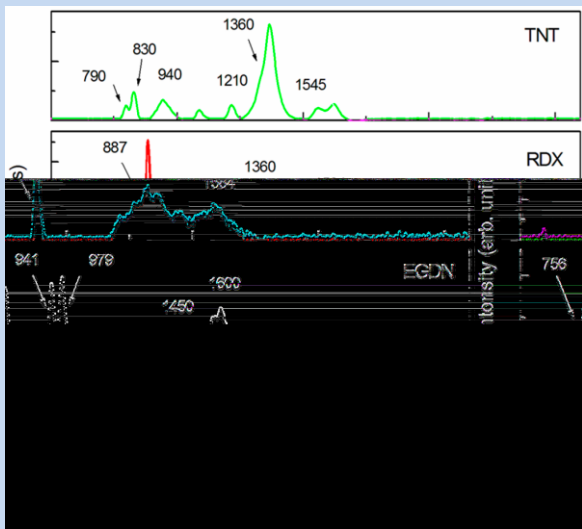
- TRIO CHRONOS (optical, electrical and piezo sensors)



Chemical laboratory

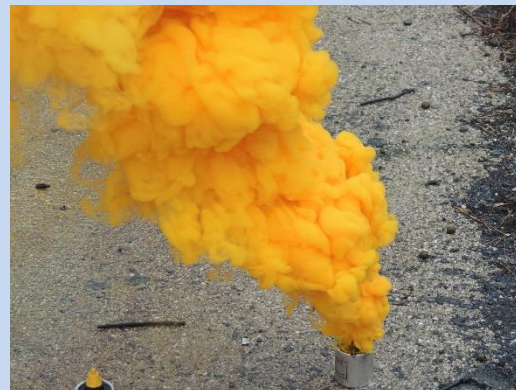
Additional activities

- 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 – MODUL SMES

Dostop do modula SMES v SKEV

Izpis SMES
Skladiščno stanje SMES s številkami po delovod., podrobno
Skladiščno stanje SMES s številkami po delovod., strnjeno
Skladiščno stanje SMES s številkami po lotih, podrobno
Skladiščno stanje SMES s številkami po lotih, strnjeno

ADR

Izpisi

Izpisi skladanja

Prešaržiranje EMES (136)

Lista kartic materiala po identu
Lista kartic materiala pa lokaciji

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

Izvedi Uredi pOlje Zapis Poizvedba poMoč Window

Republika Slovenija
Ministrstvo za obrambo

SKEV PROD V. 4.13

Sortiraj po:
 Naraščajoče Padajoče

Šifra šarže	Lot ID	Šifra MS *	Kat. upo. *	Dat. nasl. pregleda *	Akt.	Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
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						Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica

Osnovni podatki

Naziv MS *

Naziv lota *

Opomba

Vzorčenje

Šifra zapisnika KTP/DZVS	Mikrolokacija	Šifra vzorca KTP/DZVS	Namen testiranja	Šifra vzorca FKL	Dat. nasl. preg. vzorca	Poročilo o preskusu	Šifra PSS	Datum posega	Uporabnik posega

Specifikacije ADR Pakiranje

Začetna hitrost (m/s) NSN number

Čas zakasnitve (s) NCAGE

Naziv SMES original Part number

Proizvajalec Posebnost

NARC

Tip eksplozivne polnitve Serijska št.

Masa naboja (kg)

Masa eksplozivne polnitve (kg) * Interval periodičnih pregledov (mesec) *

Masa smodniške polnitve (kg) * Temperatura hrambe (°C)

Masa eksploziva v naboju (kg) * Rel. vlažnost hrambe (%)

Osn. vrsta smodnika Tip in model vžigalnika

Osn. serija smodnika Lot vžigalnika

Dod. vrsta smodnika Tip in model inicialne kapice

Dod. serija smodnika Lot inicialne kapice

Tip projektila Lot inicialnega dela

Lot projektila Polnitev inicialnega dela

Težinska oznaka projektila

23.07.2015 Zoran Savič ZORAN.S@SKEV MP_SME\$_SARZA

SKEV – information system

Izvedi Uredi pOlje Zapis Poizvedba poMoč Window

Republika Slovenija
Ministrstvo za obrambo

SKEV PROD V. 4.13

Sortiraj po: Naraščajoče Padajoče

Sprememba kat. upo. ali dat. nas. preg. Izpis obremenitev Kartica SIMES

Šifra šarže	Lot ID	Šifra MS *	Kat. upo. *	Dat. nasi. pregleda *	Akt.	Stanje	Kartica
						Stanje	Kartica
						Stanje	Kartica
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						Stanje	Kartica
						Stanje	Kartica

Osnovni podatki

Naziv MS *

Naziv lota *

Opomba

Vzorčenje

Šifra zapisnika KTP/DZVS	Mikrolokacija	Šifra vzorca KTP/DZVS	Namen testiranja	Šifra vzorca FKL	Dat. nasi. preg. vzorca	Poročilo o preskusu	Šifra PSS	Datum posega	Uporabnik posega

Specifikacije ADR Pakiranje

Šifrant pakiranje

Število enot v notranji embalaži * Dolžina (mm) Širina (mm) Višina (mm)

Model notranje embalaže *

Bruto masa notranje embalaže (kg)

Število enot v zaboju * Dolžina (mm) Širina (mm) Višina (mm)

Model zaboja *

Bruto masa zaboja (kg) *

Število zabojev na paleti * Dolžina (mm) Širina (mm) Višina (mm)

Model palete

Bruto masa palete (kg)

Maksimalna višina skladanja

Število palet v kotejnerju Dolžina (mm) Širina (mm) Višina (mm)

Model kotejnerja

Bruto masa kotejnerja (kg)

SKEV – information system support accountability system

ZAPISNIK O PREGLEDU št.	132-DZVS-07-2015	ML 40607000220				
Dokument prevzema						
Dokument LOGBR	Ukaz za vzdrževanje SIMES v LOGBR					
Številka dokumenta	216-2/2014-421	Datum izvedbe	22. 7. 2015			
		Prevezto iz/datum	EPROT/22.7. 2015			
		Objekt številka				
Vremenski pogoji	/					
Zunanja temp.	/	Temp.v skladišču	/			
Vlažnost zunanja	/	Vlažnost v skladišču	/			
IDENT	51503					
DODATEK PREVZEM	/	DODATEK DOLOČEN V VVSMR	20002724			
NAZIV SREDSTVA	SALVA TOPOVSKAm98, ZA GORSKI TOP 76 MM M48B1					
LOT	12-AX-13	KATEGORIJA UPORABNOSTI	ACA1			
SMODNIK		VRSTA	SERIJA	OPOMBA		
	1.					
	2.					
	3.					
VRSTA VŽIGALNIKA IN LOT						
INICIALNA KAPICA IN LOT						
KOLIČINA NA LOKACIJI – kos	2	ŠTEVILO kos (v osn. pakiranju)	6			
PREGLEDANA KOLIČINA-kos	2	IZVZETO kos ZA ANALIZO/DODATEK	/			
ZA UNICENJE – kos	2	PREDLAGANA KATEGORIJA UPORABNOSTI/DODATEK	ACH3 /20019334			
ZA UPORABO – kos	/		/			
ZAČASNA PREPOVED - kos	/		/			
ŠTEVILO ODKRITIH NAPAK	KRITICNIH		VECJIH		MANJSIH	
	Strelivo	1	Strelivo	/	Strelivo	/
	Embalaža	/	Embalaža	/	Embalaža	/

SKEV – information system

The screenshot displays the SKEV information system interface. On the left, a menu bar includes 'Izvedi', 'Uredi', 'pOlje', and 'Zapis'. Below it, a blue banner reads 'Republika SI' and 'Min'. A central window titled 'Parametrična forma' is open, showing a form for 'Lista skladanja SMES'. The form contains three input fields: 'Delovodnik', 'OD mikrolok.', and 'DO mikrolok.'. Below these fields are two buttons: 'Poženi' and 'Zapri'. To the right of the form, a banner features a horse illustration, the SKEV logo, and the text 'PROD V. 4.13'. Below the main interface, three buttons are visible: 'Lista skladanja SMES', 'Karton SMES za objekt', and 'Karton SMES za kompleks'. On the bottom right, a photograph shows a long, well-lit warehouse aisle with high ceilings and stacks of goods on pallets.

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

Item	Quantity	Minimum price EUR/pct.
Missile, 9M111M "FACTORIA", LOT 01-95	6	100
Missile, 9M111M "FACTORIA", LOT 02-95	52	100
Missile, 9M111M "FACTORIA", LOT 02-98	233	100
Launcher 120 mm "FAGOT" 9P135M	47	200
Launcher 120 mm "METIS" 9P151	16	200
Launcher 120 mm "FACTORIA" 9P135M-1	30	200
Box for FAGOT	2	2
Cover for FAGOT	5	2
Control equipment KPA 9V812MB-1	1	20
Indicator optic FAGOT 120 mm	10	10
Other parts		



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



Multinational Cooperation for the Provision of Land Battle Decisive Munitions (LBDM)

https://www.nato.int/cps/en/natohq/news_156841.htm?selectedLocale=en



- 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



15th Annual Conference of the SPIKE Missile Users Club

<https://defence-blog.com/army/netherlands-army-team-won-spike-missile-challenge-fired-30000th-missile.html>

- 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



Environmental aspects - good practice

almost all cartridges from small arms ammunition are collected after firing



Ammunition Accident

- Two soldiers 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

Topic:
Day 1
Introduction to international support-cooperation
Introduction to International Ammunition Technical Guidelines IATG
IATG: implementation tools and applications
Energetic materials
Propellants
Propellants
Ageing processes
Introduction to ammunition information system/dana base SKEV-SMES
Ammunition database Editing initial data into information system/database a) Open new item in database b) Editing data for ammunitions and elements



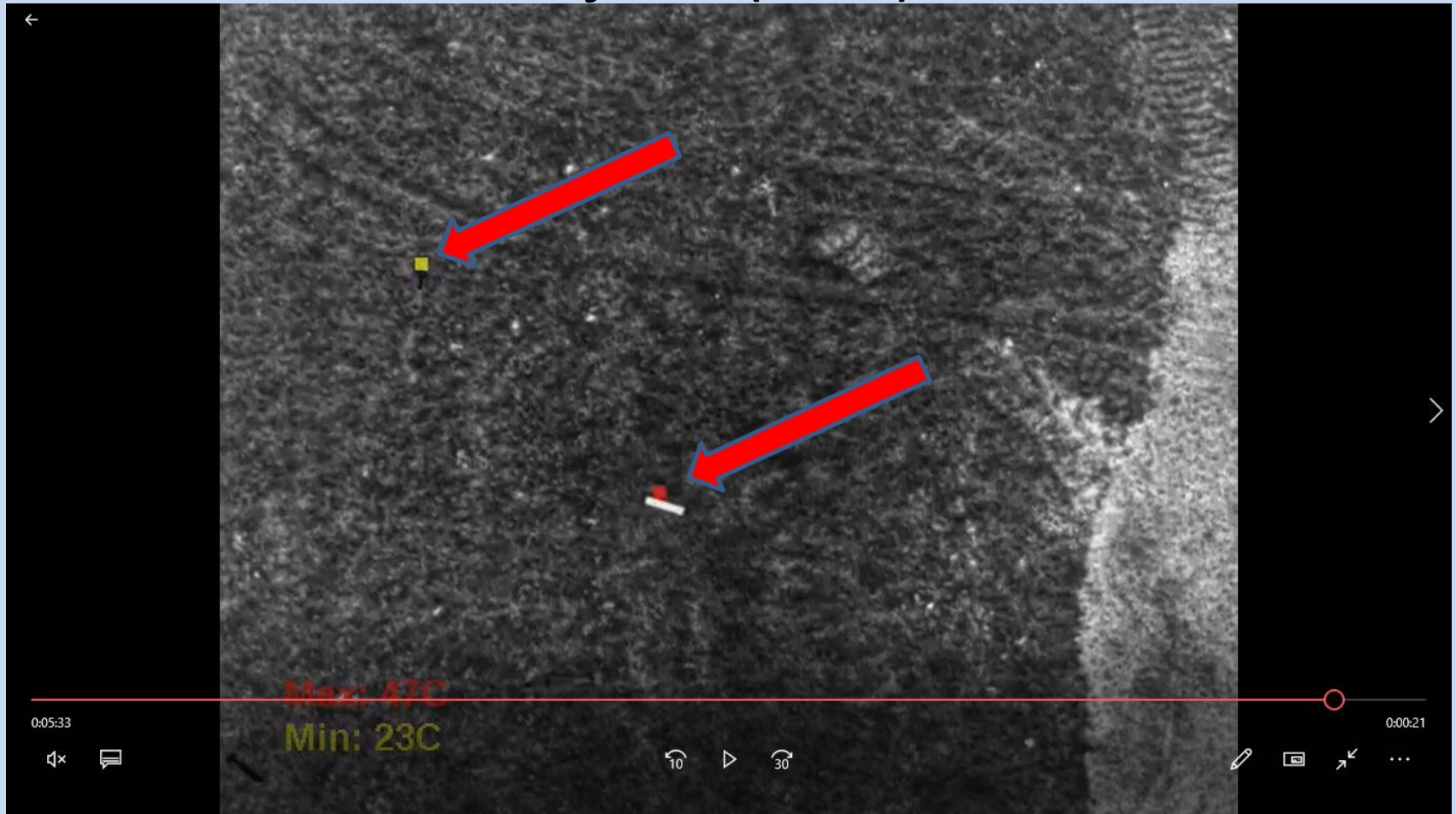
Day 2
Ammunition database Editing initial data into information system/database b) Editing data for ammunitions and elements
Quality control in ammunition life cycle – information system: a) Surveillance plan for ammunitions b) Editing data for technical control – KTP & propellant stability c) Data for next control & Ammunition Condition Code - ACC
Stability tests Methods and requirements
Standardization NATO - STANAGs & AOP, Intern standards
Ammunition ageing process
Introduction to IATG 07.20 Surveillance and in-service proof

Bilateral cooperation BiH & FYR Macedonia 2

Day 3
Ammunition life cycle
Introduction to SB742-Ammunition Surveillance Procedures
Propellant Methods of analysis
Propellant Stability Result assessment/evaluation
Ammunition accountability – information system a) Accounting management
b) Ammunition documents Conclusion
Discussion and evaluation

R & D

Drone: termovision recognition of non-natural objects (UXO)



R&D

Drone: high optical zoom - identification of suspicious objects (UXO)



R & D

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

