



# Use of AP Mine alternatives for Training in Switzerland

SPIEZ, JUNE 2024



# Agenda

- The path towards APMBC Compliance.
- The Swiss EOD Center.
- Humanitarian Mine Action training at the Swiss EOD Center.
- Use of training aids in Manual Mine Clearance training.
- Further consideration over the use of Mines in training and R&D activities

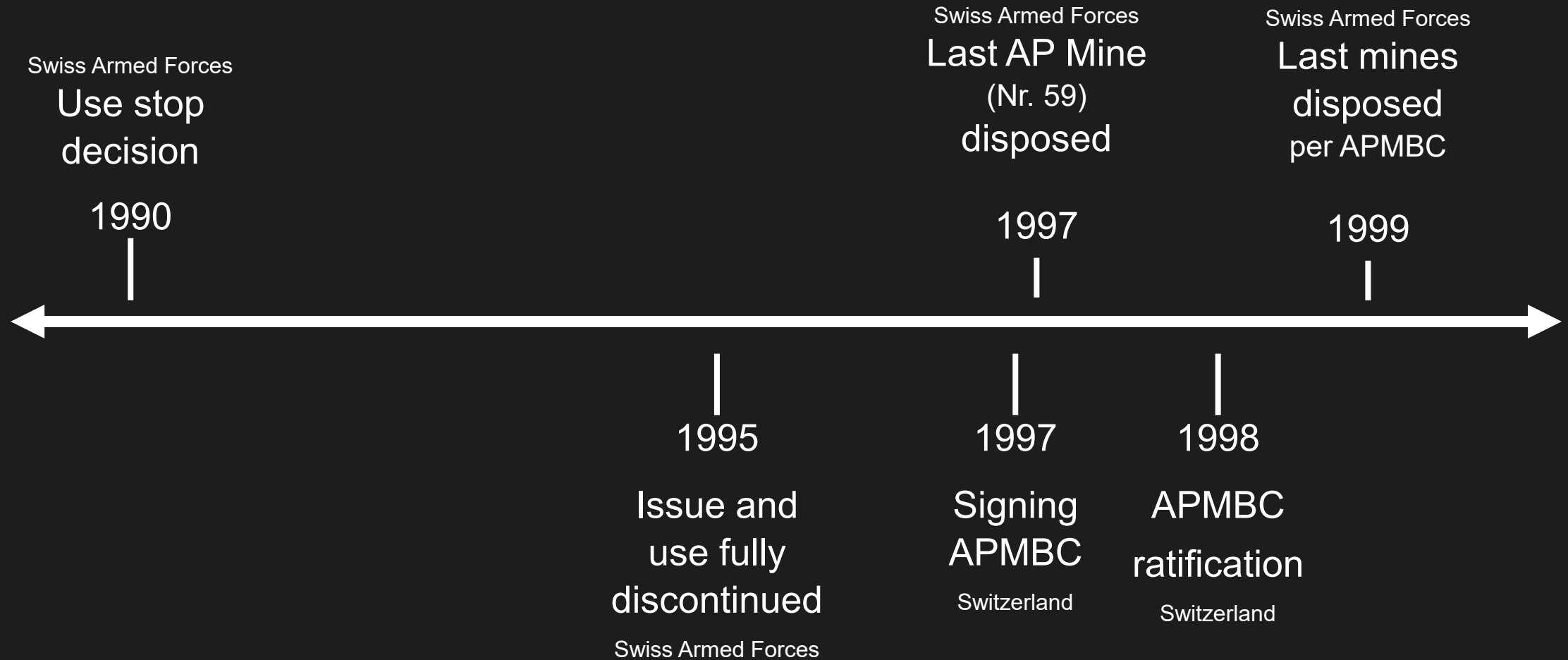
# «Disposal of AP Mines towards compliance with APMBC»

## Background

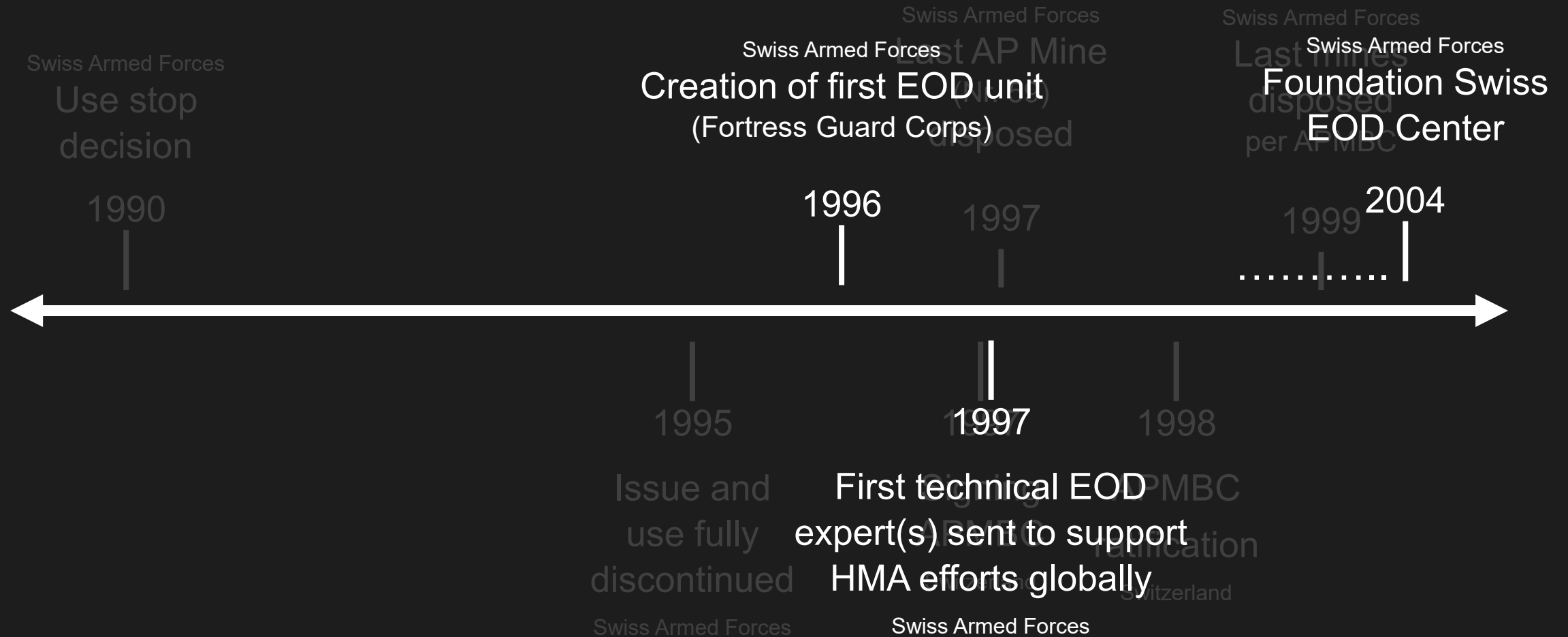


- Political traction due to **Switzerland's Humanitarian Tradition.**
- At time of AP Mines disposal per APMBC, Swiss specialists were only trained on disposal of commonly found UXO / A XO ordnance.
- Early disposition of the Swiss Armed Forces to stop issuing and using certain types of mines

# «Timeline»



# «Timeline»





# The Swiss EOD Center

# «The Swiss EOD Center»

## Main areas of work



<b>Explosive Ordnance Disposal Switzerland</b>	<b>Range &amp; Area Clearance Switzerland</b>
<ul style="list-style-type: none"><li>▪ EOD over land &amp; underwater</li><li>▪ Management of the National UXO Center</li><li>▪ UXO / IEDD support of civilian authorities (as requested)</li></ul>	<ul style="list-style-type: none"><li>▪ Searching, investigating &amp; clearing areas contaminated with UXO</li><li>▪ Renaturation of former shooting ranges</li></ul>
<b>Peace Support</b>	<b>Capability Maintenance &amp; Development</b>
<ul style="list-style-type: none"><li>▪ CMD, IEDD support within Peace Support Ops.</li><li>▪ Physical Security &amp; Stockpile Management (PSSM) support</li><li>▪ <b>Humanitarian Mine Action (HMA)</b></li></ul>	<ul style="list-style-type: none"><li>▪ Doctrine &amp; Terminology</li><li>▪ Development &amp; Training of own personnel and third parties</li><li>▪ Information &amp; Documentation Centre</li></ul>

# «The Swiss EOD Center»

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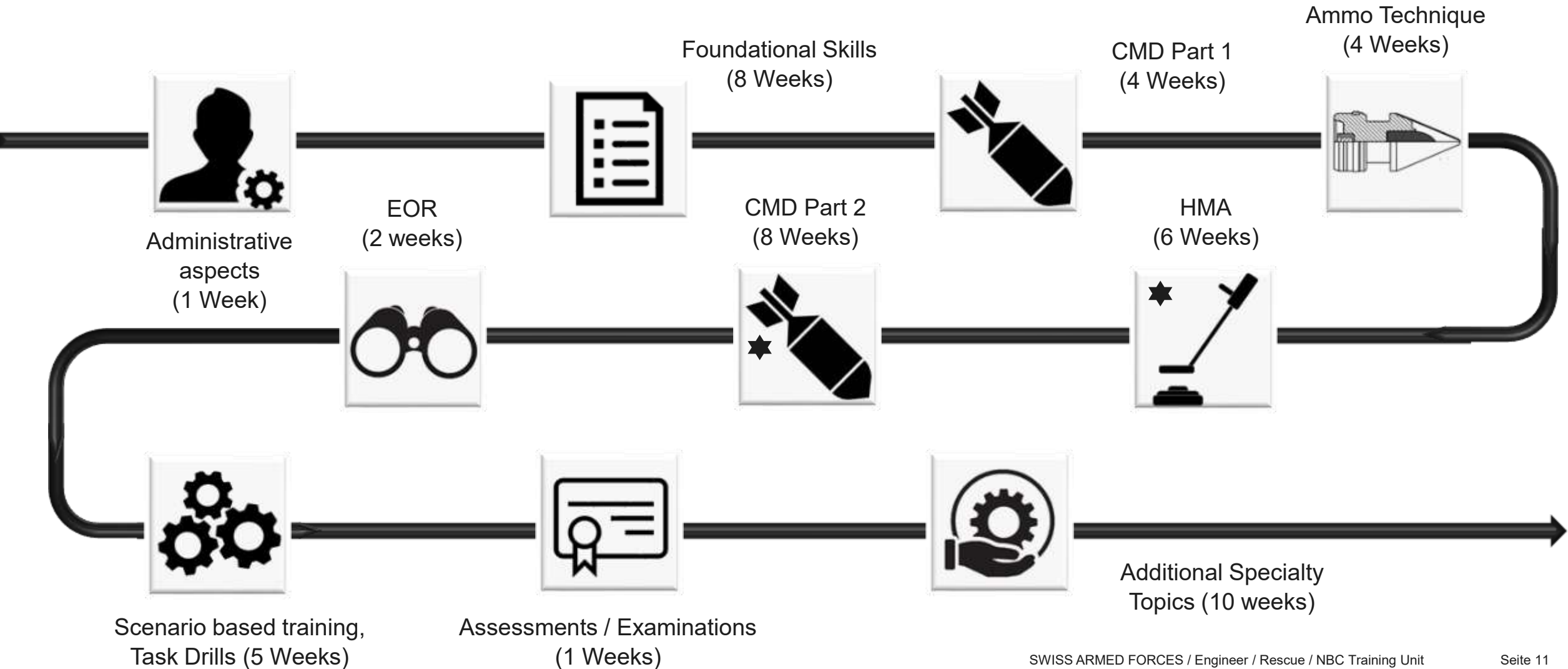
# «Swiss EOD Center Support» Supporting Mine Action efforts globally

- The Swiss EOD Center has a **long standing commitment** towards **supporting Humanitarian Mine Action** efforts **worldwide** (since 1997).
- The center **supports Mine Action organizations worldwide** by:
  - **Making its training premises available,**
  - **Providing technical personnel,**
  - **Providing technical training,**
  - **Other technical support on a case by case basis.**

# «Swiss EOD Center Support» Supporting Mine Action efforts globally



# «Specialist Explosive Hazard Mitigation Training» Overview of modules – Foundation training





SWISS EOD CENTER

# HMA Training



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training

Training of specialists and experts to **support MA operations** in the **capacity of:**

- Technical Advisor(s),
- Operations Officer(s),
- Quality Assurance Officer(s),
- **Technical Field Manager(s),**
- **Demining Worksite Supervisor(s),**





# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training

## General Training Characteristics:

- 6 Week duration
- Full EOD CMD qualification required
- Combination of both technical and general Mine Action subjects
- In alignment with IMAS T&EP 09.10/01/2023
- Upon completion (and in combination with previous EOD training), participants cover all topics required **for IMAS EOD L3 training.**
- **Certification** upon **successful completion** of a "**Ready for Deployment**" **assessment** (evaluated by group of experts both internal and external).



# «Specialist Explosive Hazard Mitigation Training» **Humanitarian Mine Action Training**

**Technical training components** (amongst others) include:

- Identification of ordnance including AT / AP Mines
- Technical aspects & hazards arising from common AT / AP Mines
- Manual Demining procedures (deminers drill incl. detection, pin-pointing, marking, excavation etc.)
- Render Safe Procedure Principles,
- Mine Disposal Procedures



# Training aids used for Manual Mine Clearance training



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

Training **Identification** of ordnance including AT / AP Mines



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



## Use of 3D printed Models vs FFE ordnance for IDENTIFICATION.

### Pros.

- Cost effective
- Easily replaceable
- "Conditions" as needed can be produced (UXO, AXO).
- "Difficult to find" items can be produced
- Safe

### Cons.

- In-house production time consuming.
- Requires technical sheets for drawing
- Parts / components, textures, materials, markings, colors, weight do not match.
- Some components are difficult to reproduce.

# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

**Training technical characteristics & hazards from common AT / AP Mines**



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

**Training technical characteristics & hazards from common AT / AP Mines**



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



## Suitability of 3D printed models for technical training.

### Pros.

- Cost effective and safe to use
- Facilitates education over complex inner component workings (limited).

### Cons.

- Very difficult and costly to produce
- Often only visual copies available off the shelf.

# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

Training manual demining procedures: **Detection / signal pin-pointing / marking...**



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



## Suitability of 3DP models for detection / pin-pointing / signal marking training

### Pros.

- Cost effective and safe to use
- Easy to produce large amounts of training aids
- Easily replaceable
- Also useable for RSP training.

### Cons.

- Some types of mine magnetic signatures are difficult to reproduceable.
- A specific training aid needs to be produced for each type of mine to be trained on.

# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

**Manual demining procedures practice (excavation)**





# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

**Manual demining procedures practice** (excavation, tripwire check etc.)



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

**Render Safe Procedure training**



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Technical training components (amongst others) include:

**Render Safe Procedure Principles,**



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Using AP-Mine alternatives for **RSP** training

## Pros.

- **Cost effective** and **safe** to use for drills practice.
- Easy to produce **large amounts** of training aids (**spares**)

## Cons.

- Some mine models can be more complex to produce

# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Using AP-Mine alternatives for **disposal procedures training**



# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



Using AP-Mine alternatives for **disposal procedures training**

## Pros.

- **Cost effective**
- Provides platform for **disposal procedure training & practice**
- Demolition **effects** are **reduced**.
- Easy to produce **large amounts** of training aids as required (**spares**)

## Cons.

- Learning effect on the relation: **Disposal method → final result & effects on environment** is not given.

# «Specialist Explosive Hazard Mitigation Training» Humanitarian Mine Action Training



## Limitations of using AP-Mine alternatives for disposal procedures Training

### Non-representative results regarding:

- **End result** (high or low order)
- **Crater building**
- Overall **blast effects**



- **Effect on hazardous components**
- **Metal contamination effects**
- Produced **fragmentation**



# «Instances where AP-Mine alternative are not as suitable»

## Disposal procedure development & testing

- Developing **safer, effective** and **efficient** disposal methodologies
- Establishing **disposal methods** for **newly adopted disposal means**
- **R&D testing** of new and **emerging disposal tools / technology**







# «Instances where AP-Mine alternative are not as suitable»

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"High-order"  
result



"Low-order"  
result



# «Instances where AP-Mine alternative are not as suitable» Disposal procedure development & testing



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# «Instances where AP-Mine alternative are not as suitable» **Disposal procedure development & testing**



# «Instances where AP-Mine alternative are not as suitable» Disposal procedure development & testing





# «Usage of permitted AP-Mine stockpiles for training & R&D» **Life Cycle Management integration**

- Ordnance has a limited **life span** (shelf life)
- **Storage risks increase** once stockpiles become **unserviceable** (UEMS)
- Storage and surveillance of EO incurs **high costs**.
  
- A "**use for training or dispose**" system can be implemented to gradually reduce stockpiles until the end of their estimated shelf life or per EO Surveillance System
  - **Scheduled use/disposal** based on estimated shelf life / Surveillance results.
  - Disposal **costs spread** across a longer period of time.
  - Disposal **costs "reduced"** against the training effects gained.





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