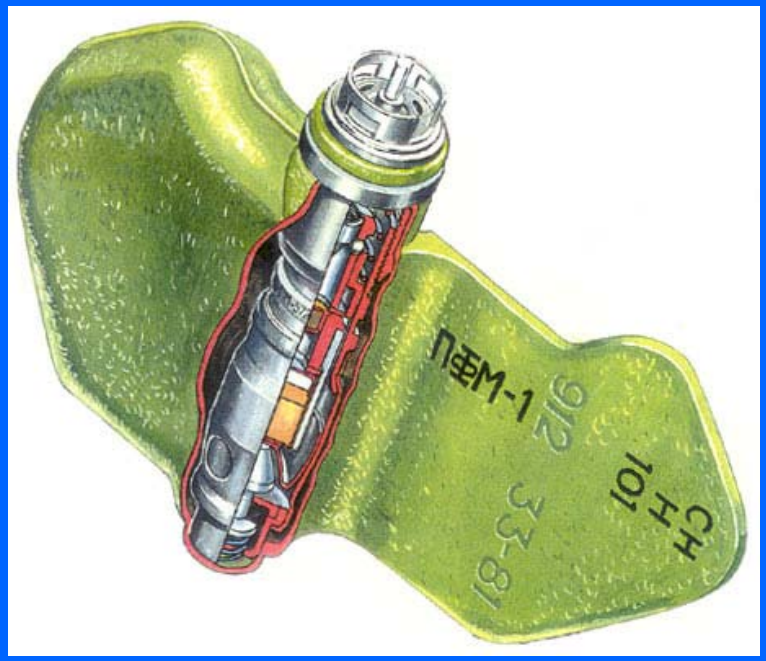
Evaluating Destruction Techniques for PFM APM



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UXO and Stockpile Destruction

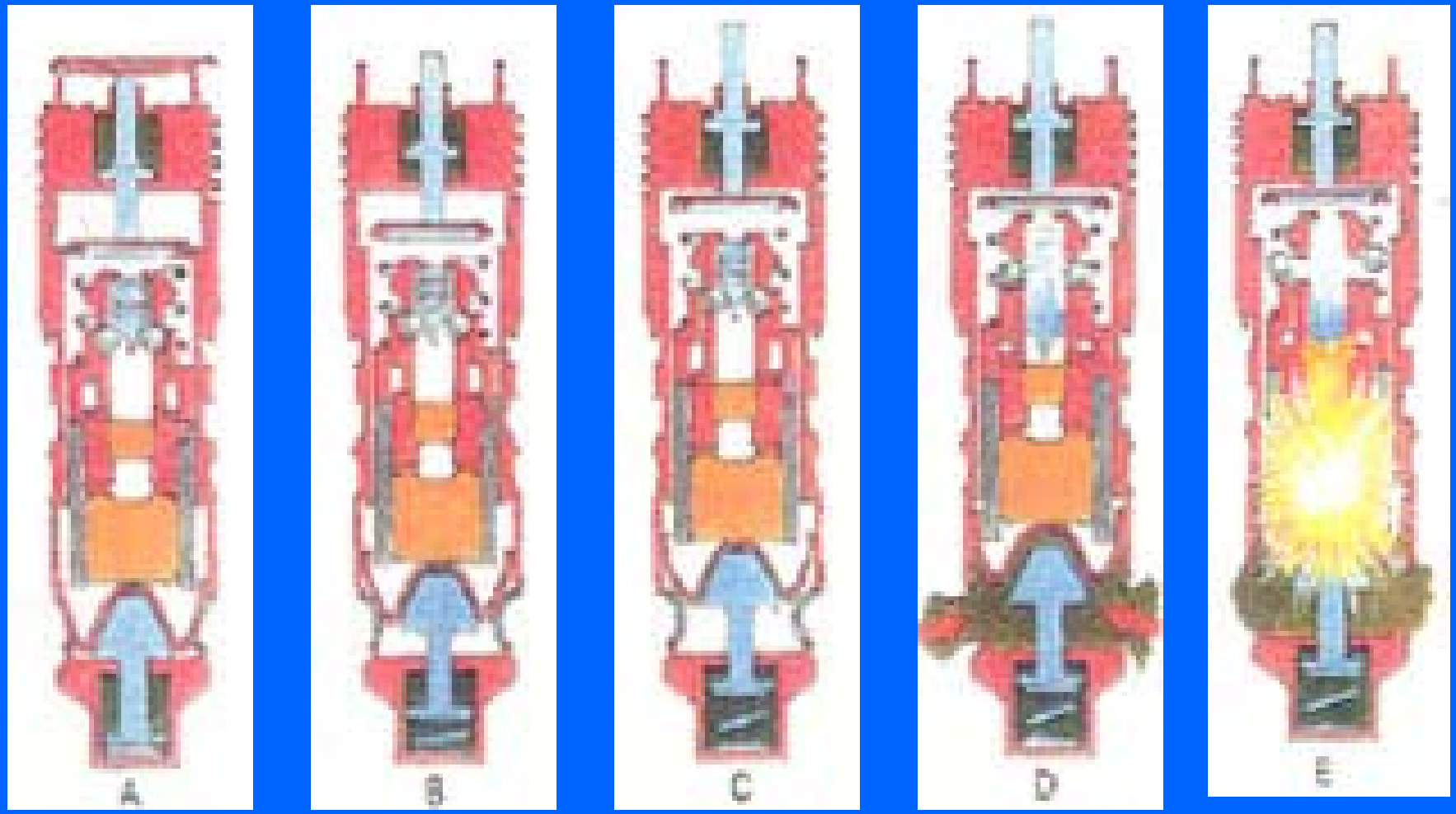
GICHD Study Group

Geneva International Centre for Humanitarian Demining, 2000

Information Requirements

- Technical specifications of fuze, main body and dispenser systems.
- Products of combustion and detonation.
- Knowledge of Commercial of the Shelf Systems (COTS) for demilitarization.
- Responsible and safe OBOD techniques.

FUZING SYSTEM



Fuze Arming

- On release from dispenser the Arming Plunger is released, and moved under the pressure of the Arming Spring.
- Pressure on Fuze Main Body transfers liquid explosive content through a rubber diaphragm and fluid inlet port into fuze.
- The inner fuze body moves under the influence of the movement of fluid.

Fuze Arming

- This movement rotates the detonator “into line” in the explosive chain.
- Progressive movement of the fuze inner body allows the Safety Ball to be released.
- The Striker Spring moves the Striker onto the Detonator.

Fuze Safety Summary

- Arming plunger held by dispenser frame.
- Ball prevents Striker movement until armed.
- Detonator is held rotated and out of line until the fuze is armed.
- Fuze safety can be confirmed by X Ray.

Demilitarization Hazards

- Explosive degradation.
- Products of combustion and detonation.
- Removal of the APM from the dispenser starts the arming process. (First of three Safety Components is removed).
- Additional pressure of 3.4 mm displacement on the mine body will then arm and fire the fuze.
- No neutralization RSP.

Destruction Process Requirements (1)

- Formal risk assessment required if process is to involve single mine destruction. (Not a recommended technique).
- For an industrial process, the system must be capable of resisting sustained detonations of 0.64 kg to 2.56 kg.

Destruction Process Requirements (2)

- For an industrial process, the Pollution control system must be designed to cope with results obtained from “live trials”.

Destruction Options

- Open Burning / Open Detonation
  - Only if supported by PFM Study results.
  - Use of ANFO to ensure intimate contact with all of the APM in dispenser.
  - Using Australian developed methodology.
- Industrial Processes
  - Safe system of work.
  - Risk As Low As is Reasonably Practicable (ALARP) principle to be followed.
  - “Transportable” NOT “Mobile”.

Cryofracture

- Could solve “single APM” safety problems if used in parallel to mechanical disassembly.
- Formal risk assessment required.
- Could mean use of existing incineration systems.
- Evolving technology with very limited practical experience for APM.

Drilling and Gravity Feed

- Risk of drill displacing more than 3.4mm, therefore mines should be kept in dispenser.
- Use of gravity feed to collect liquid explosive. (Similar to NG systems).
- Minimal explosive residual explosive hazard (remainder of filling, detonator and gaine) can then be incinerated easily with only small explosive events.

Drilling and Gravity Feed

- Full mine threat removed.
- Requirement for positive feed system for liquid explosive.
- Any detonation would cause significant damage to drilling machinery, therefore safe systems (including drill life) should be established.

Incineration

- No known incineration systems that can take repeated single explosive events of 0.64 kg to 2.56 kg.
- Rotary kiln limited to approx 40g per item, therefore could deal with single mines, but risky feed system etc.
- Plasma arc requires pre-processing BUT as detonator is “out of line” it MAY not propagate to main charge.

Contained Detonation

- A practical solution that MUST be used with an integrated PCS.
- Will allow detonation of complete dispenser packs.
- Production levels dictated by time to prepare donor charges. (ANFO ?)

Pollution Control System Requirements

- Capability to interface with the physical destruction system.
- Must remove or neutralize acid gases, Volatile Organic Compounds (VOC), particulates and heavy metals.
- Must prevent or reduce dioxin formation.
- Must meet agree environmental legislation or guidelines.

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