2007 Global Demilitarization Symposium & Exhibition

Destruction of Old Chemical Bombs using DAVINCH™ at Kanda, Japan

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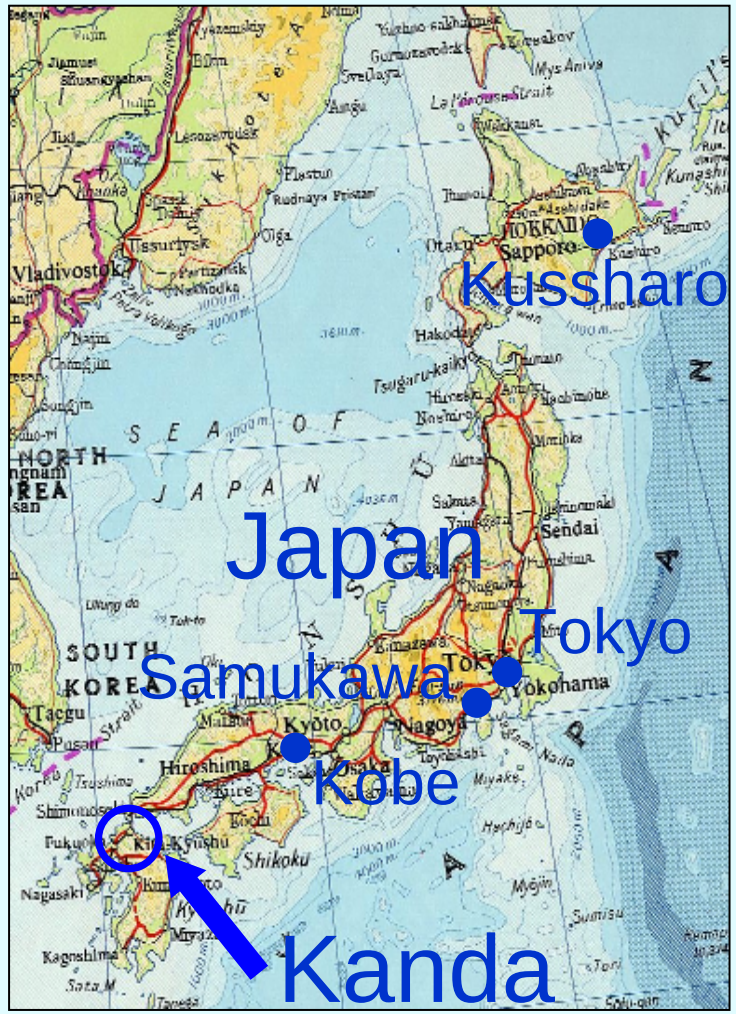
KOBELCO
KOBE STEEL GROUP

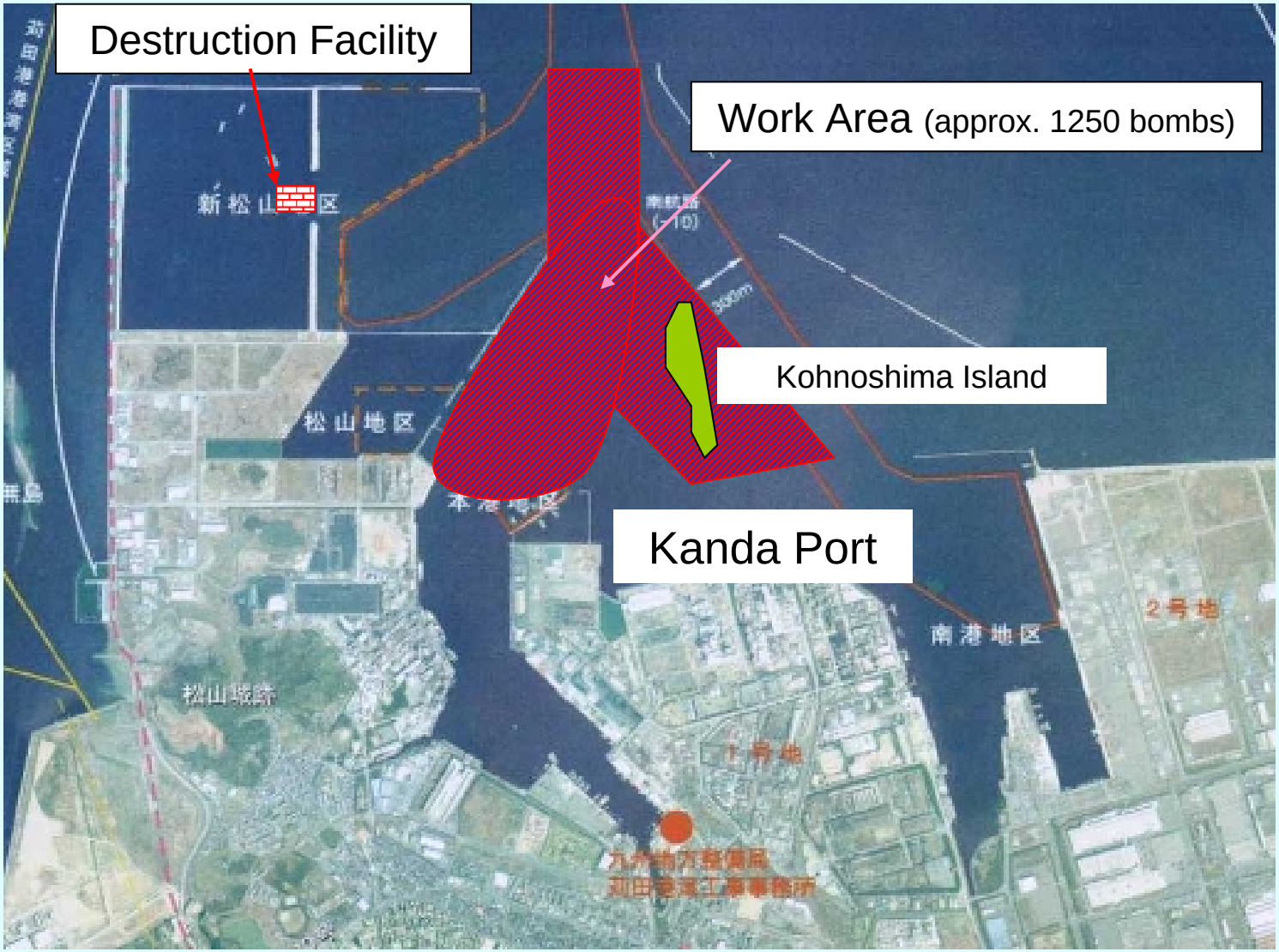
Operations at Kanda

Chemical Bombs from WW2 on the sea bed in Kanda Port

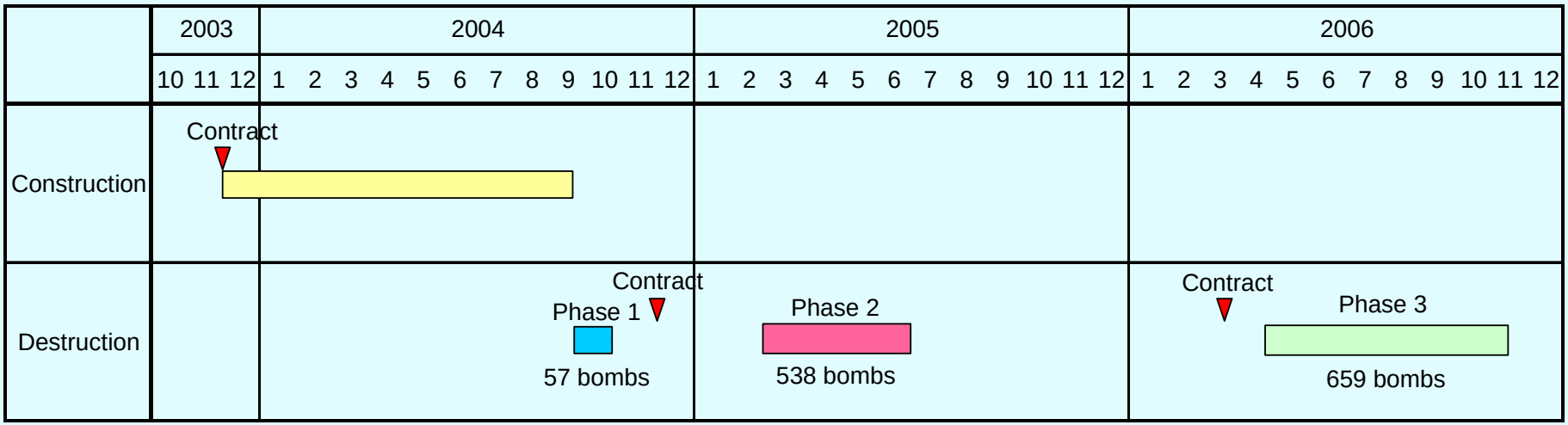
- Locate Suspicious OCWs
- Recovery of OCWs
- Destruction of OCWs



Location of Destruction Facility and Work Area



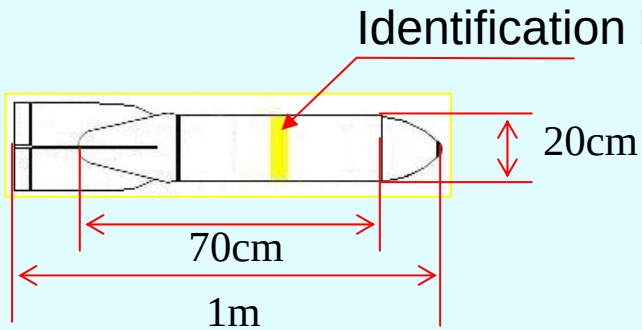
Overall Schedule

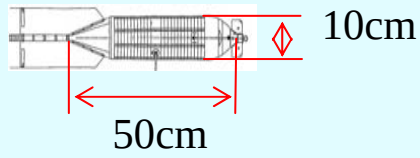


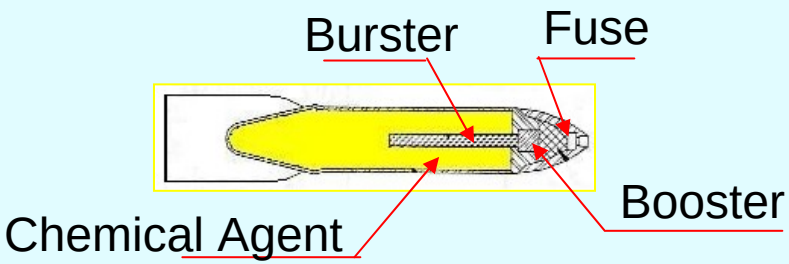
Old Chemical Bombs Destructed at Kanda, Japan

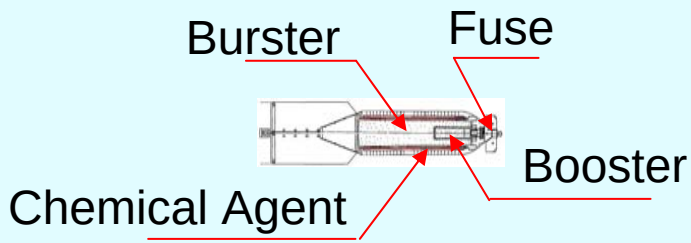
Phase 1	(2004)	57 bombs
Phase 2	(2005)	538 bombs
Phase 3	(2006)	659 bombs
	total	1,254 bombs

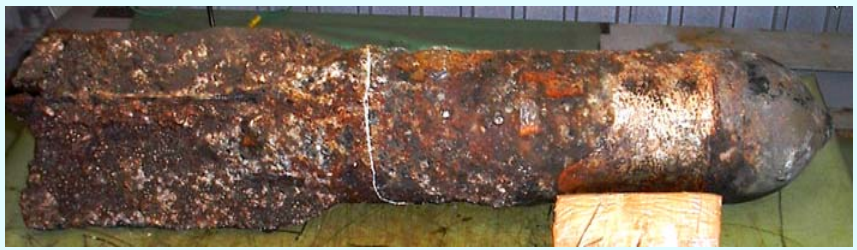
Old Chemical Weapons recovered from Kanda Port



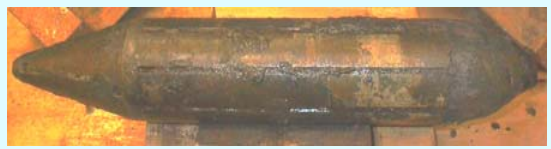








<u>50kg Yellow Bomb</u>
(2.3kg of High Explosive , 18 L of CA)



<u>15kg Red Bomb</u>
(1.3kg of High Explosive , 368 g of CA)

Characteristics of Old Chemical Weapons recovered from Kanda Port

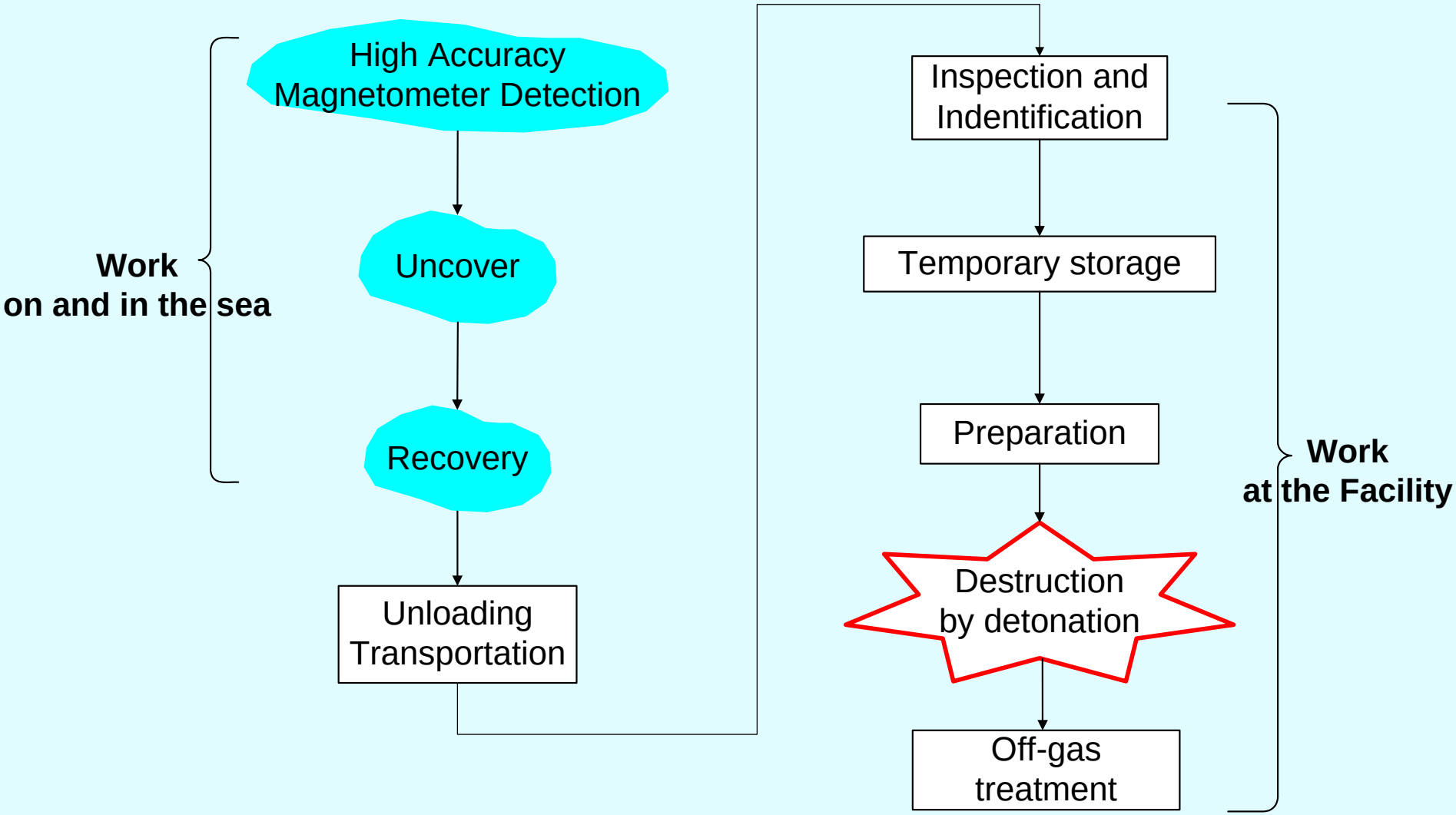
① Contain As,

② Heavily deteriorated, deformed and corroded,

③ Covered with shellfish

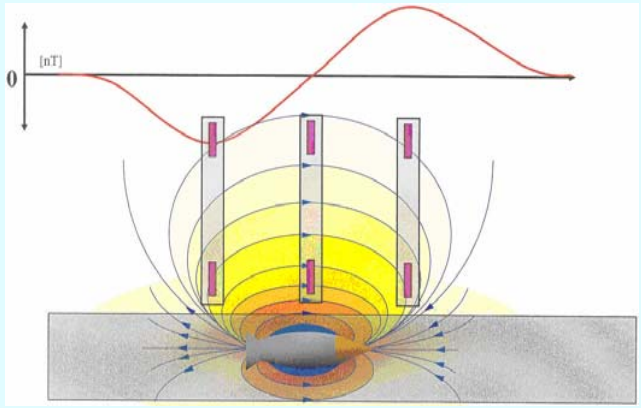
	Chemical Agent	Explosive
Yellow Bombs	**Mustard + Lewisite**	**Picric Acid + TNT**
Red Bombs	**DA, DC (similar to Clark I, II)**	**Picric Acid + TNT**

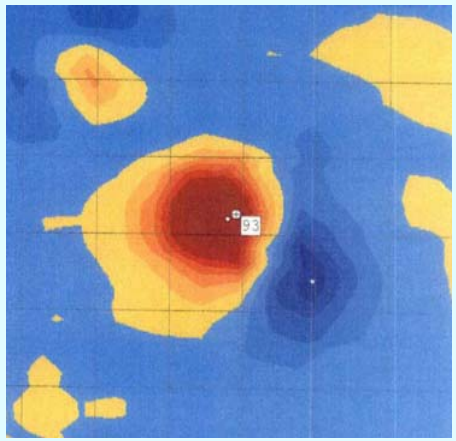
Work Procedure at Kanda



Locate Suspicious OCWs
(High Accuracy Magnetometer Detection)

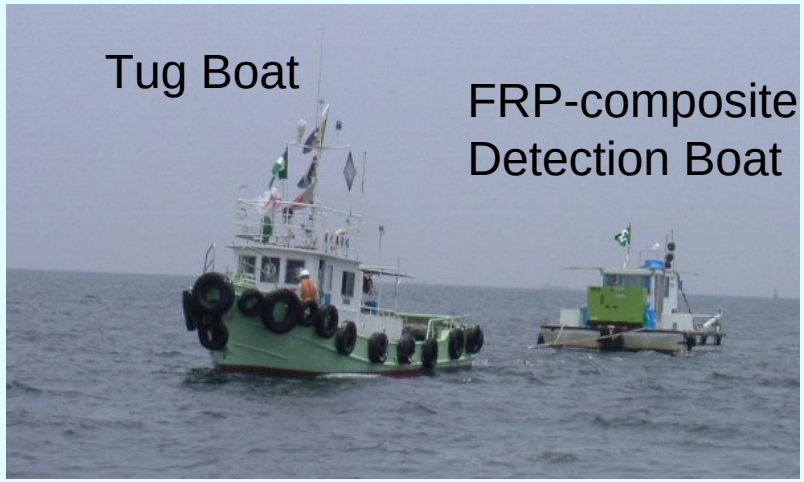
Magnetometer Detection Probe





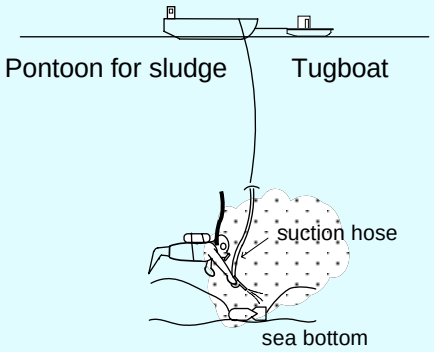
Magnetic Anomaly Map

Data Recorder

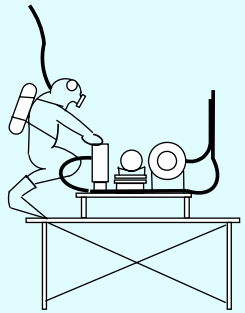


Detection Operation

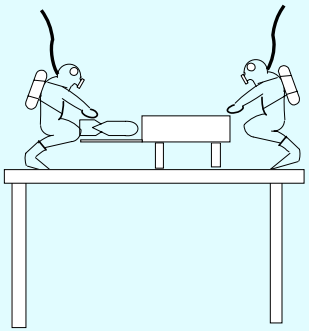
Uncovering / Recovery of OCWs

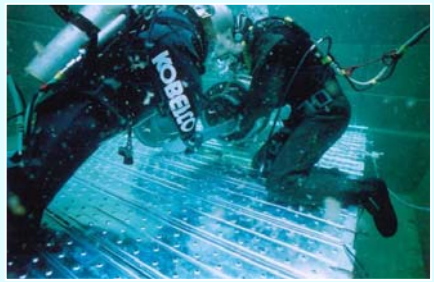


①Uncover objects

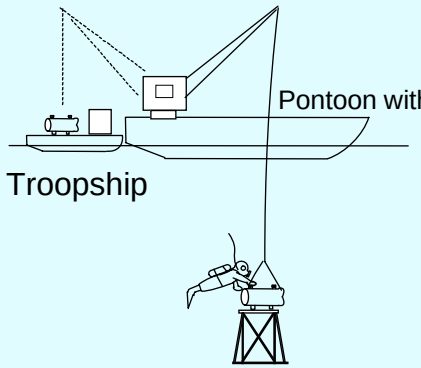


②Take X-rayed picture in the sea



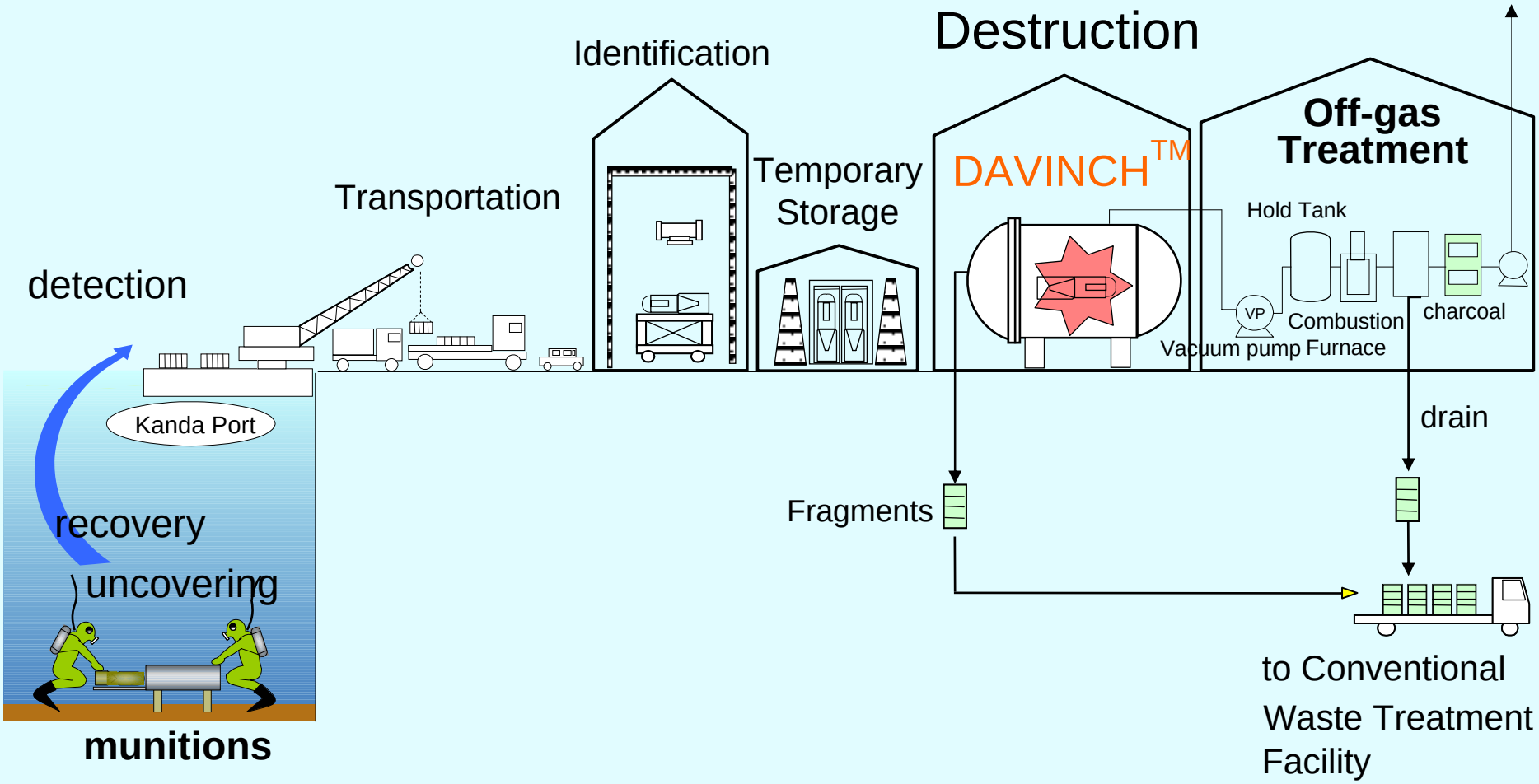


③Put into a cylinder



④Recovery

Schematic Flow of Kanda Chemical Weapons Destruction Facility



DAVINCH™

Detonation of Ammunition in Vacuum Integrated Chamber

Structural Characteristics

- Double-Shelled Cylinders (Outer & Inner Cylinders)
- Multi-layered Outer Cylinder (Pressurized container)
- Removable Inner Cylinder (Can be replaced if it is damaged)

Operational Characteristics

- Detonation in Vacuum
- Sequential Detonation
- Emulsion explosive as donor charge
- Implosion Process

Performance Characteristic

- High-DRE only by detonation

Double walled structure with removable inner chamber

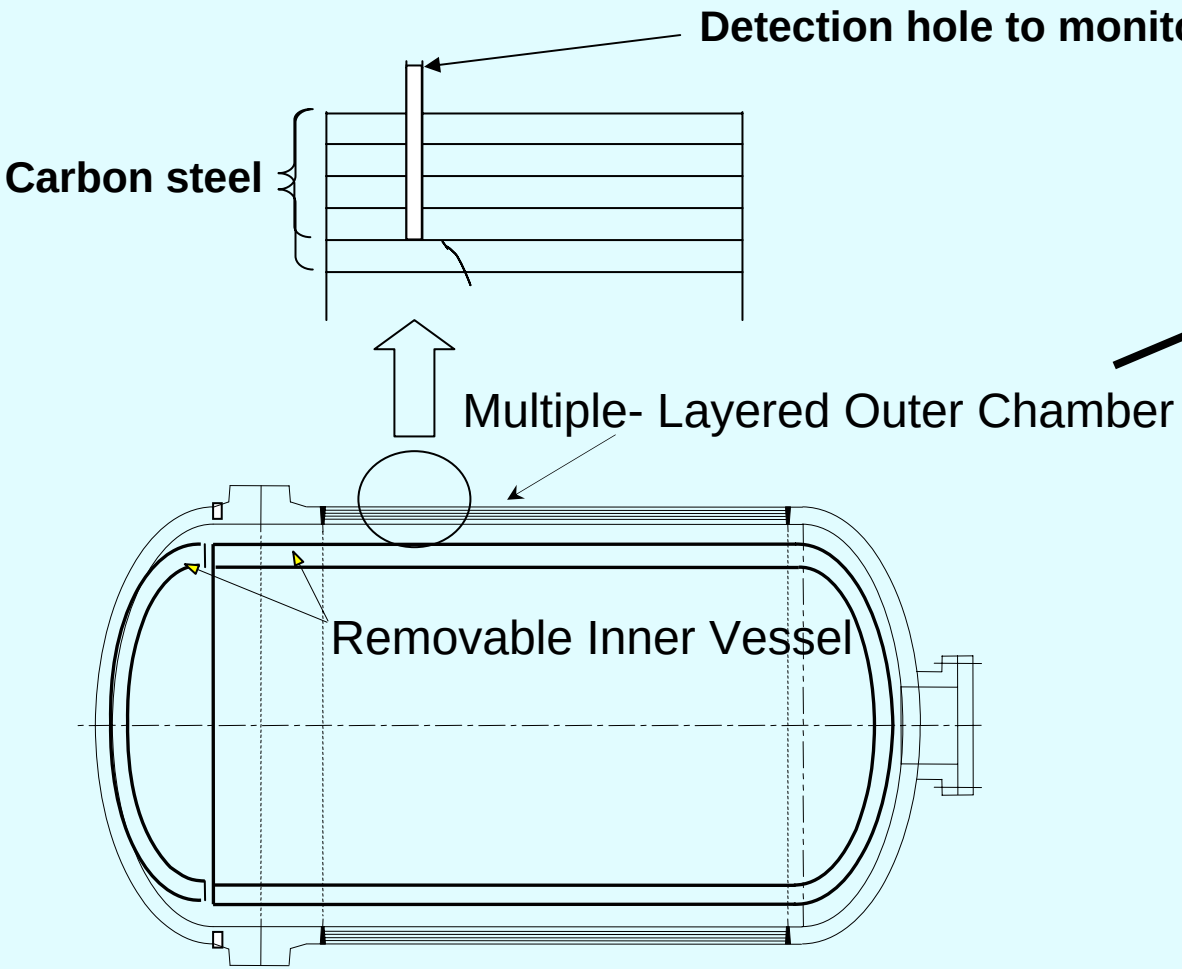
Inner chamber

Sacrificial chamber against fragments

Outer chamber

High-pressure vessel against impulsive pressure

Multi-layered Outer Chamber



DAVINCH™ in operation

Remote Operation

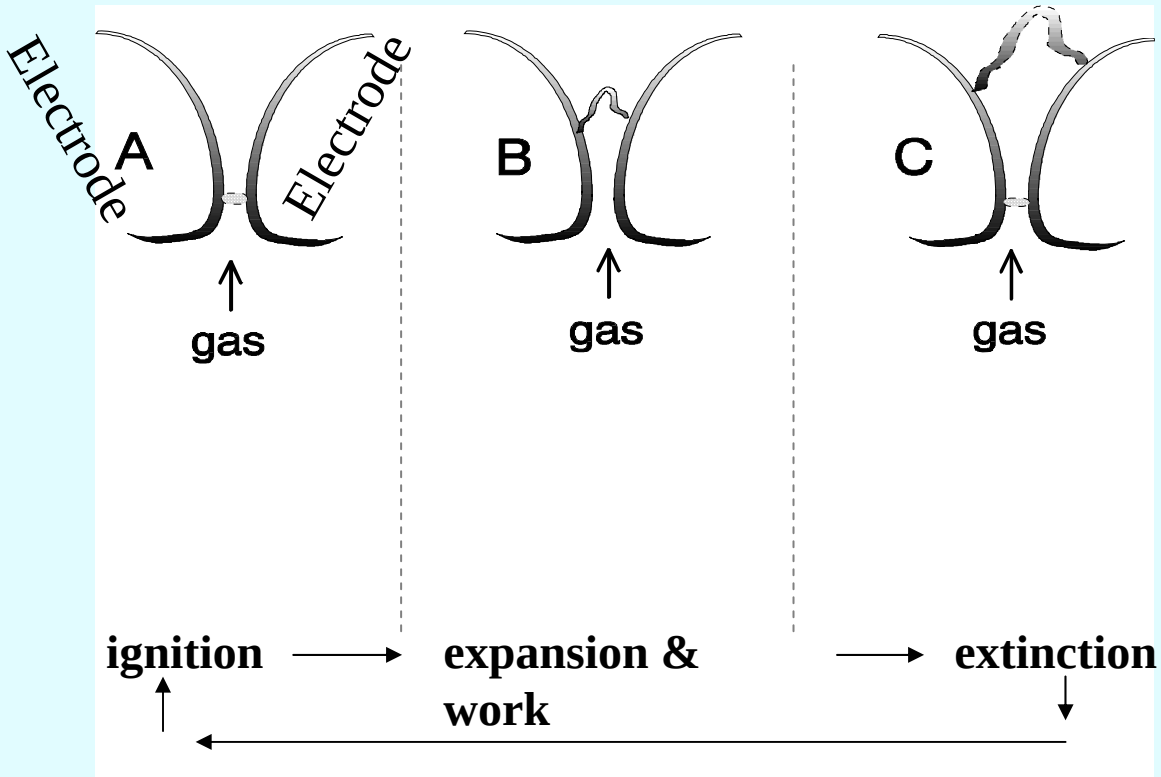
Examination & Improvement

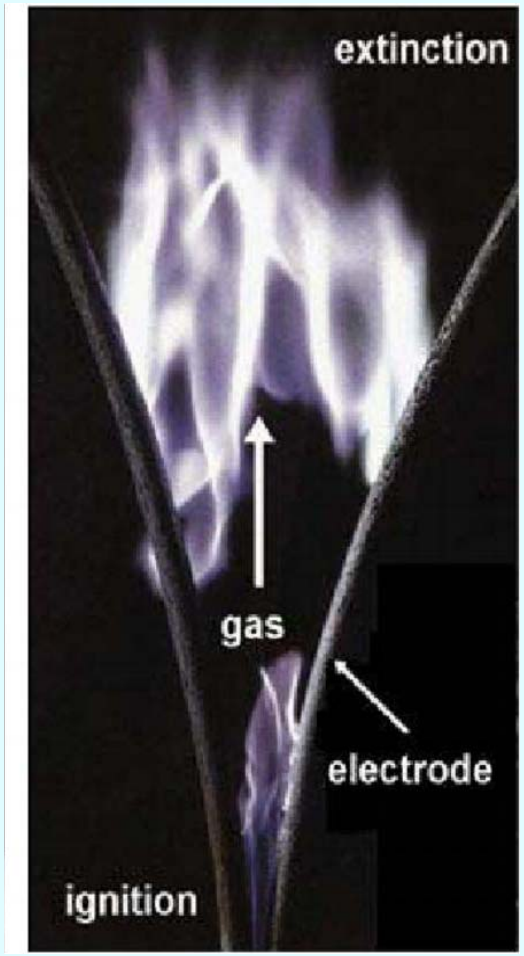
- Longer Chamber
- Minimize Amount of Explosives
- Improve Setting Method of Bombs
- Trace Arsenic Behavior
- Data acquisition of pressure, strain, composition of off-gas for further improvement
- Cleansing Shot
- Application of Cold Plasma

Cold Plasma

- Compact
- High efficiency burning
- Low power requirement
- Rapid start-up

Cold Plasma GlidArc Operating Principle





Thank you !

Hope we can be of service to you!!

a slide with my contact information

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