

Updated Operation and Maintenance Activities of DAVINCH System

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Outline of the presentation

1. Introduction
2. OCW destruction, decontamination and dismantling work at Kanda Weapons Destruction Facility
3. Destruction of ACWs at three sites in China
4. Destruction of OCW'S and conventional ammunition and maintenance of DAVINCH facility in Poelkapelle, Belgium

1.Intoroduction

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Chemical Weapons Destruction by Kobe Steel in JAPAN



Lake Kussharo (2000)

- 26 50kg-yellow bombs (Lewisite/Mustard)
- Dismantling + neutralizing CWM + detonating bursters

Samukawa (2003)

- 806 CWM-filled bottles – neutralized
- Approx. 8,000m³ of contaminated soil - heat treated

Kanda(2004-)

- 2,968 OCWs, destroyed by DAVINCH

DAVINCH[®] system

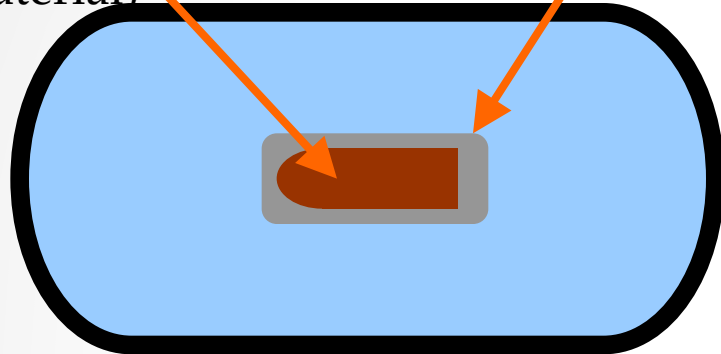
- DAVINCH[®] = **D**etonation of **A**mmunition in a **V**acuum **I**ntegrated **C**hamber
- A controlled detonation system developed by Kobe Steel to destroy chemical ammunition



How does it work ?

ammunition
(chemical agent, energetic material)

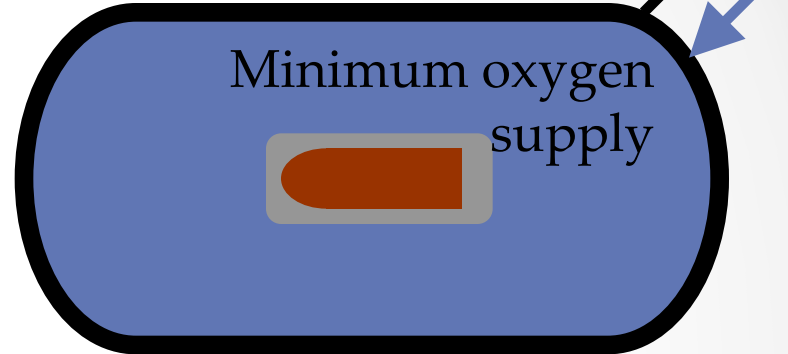
Donor charge



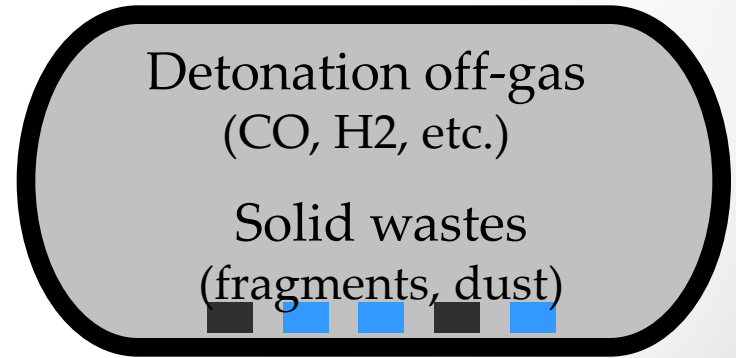
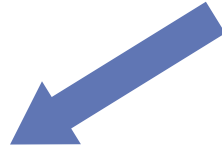
DAVINCH detonation chamber



Evacuate

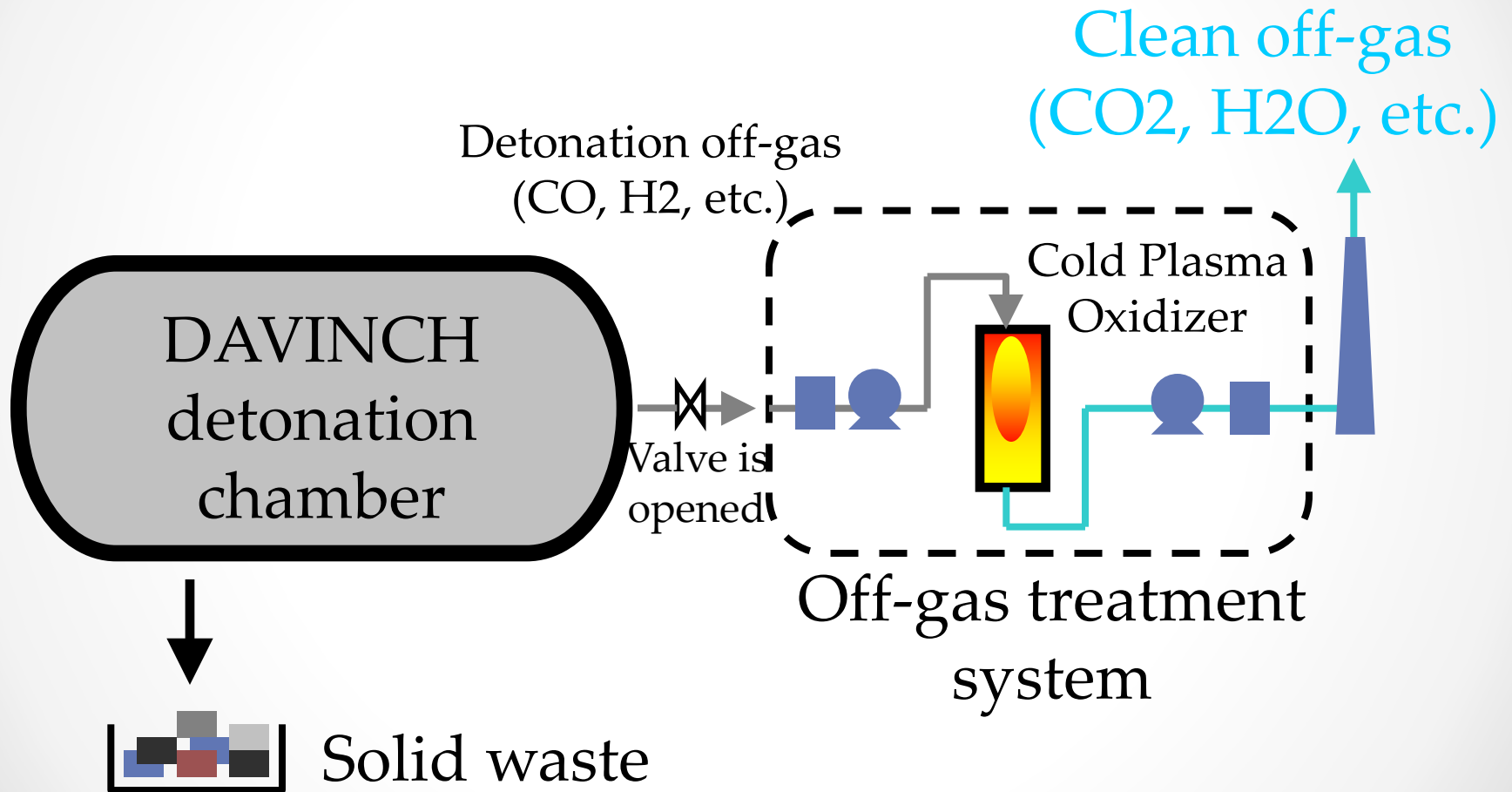


All valves are closed to isolate the chamber

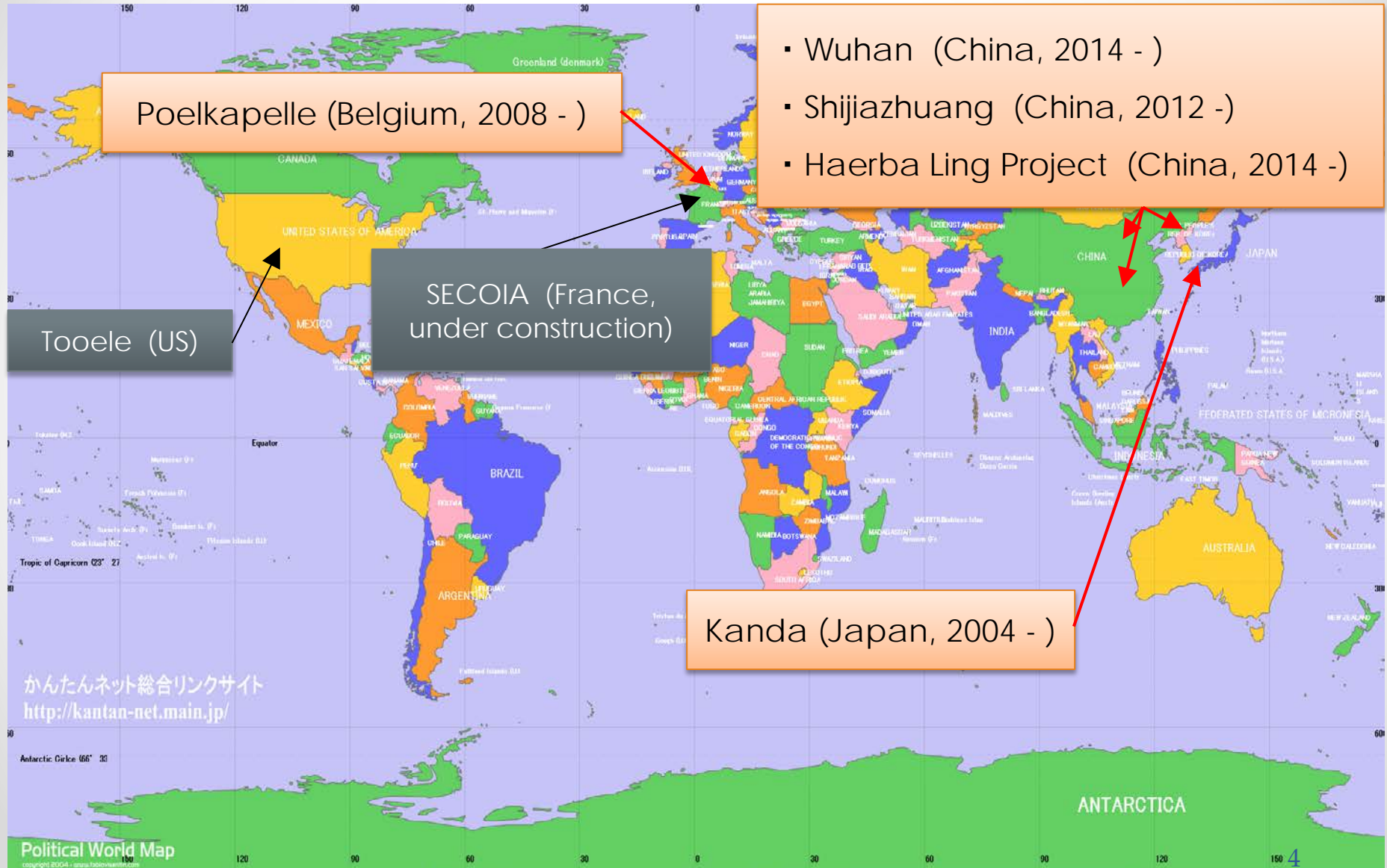


Ammunition (chemical and energetic material) are destroyed 7

How does it work ?



DAVINCH system in the world



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<http://kantan-net.main.jp/>

2. OCW destruction, decontamination and dismantling work at Kanda Weapons Destruction Facility

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Overview of Kanda Weapons Destruction Facility



■ Ammunition

- Underwater WW2 Japanese chemical ammunition in Kanda Port sea area

■ Activities

- Magnetometer detection
- Recovery
- Transportation
- Identification
- Destruction by DAVINCH

Overview of Kanda Weapons Destruction Facility

- Destruction record (2004 -)
 - 2,968 OCWs were destroyed
 - Red bombs(DA/DC): 2,225
 - Yellow bombs(L/HD): 743



15kg Red Bomb

(1.3kg of High Explosive, 368g of DA/DC)



50kg Yellow Bomb

(2.3kg of High Explosive, 18L of HD/L)

Decontamination and Dismantling

Decontamination was carried out by below method.

- Wet Decontamination
Exhaust piping
- Heat treatment by electrical furnace
Most process equipment,
piping, ducts, etc.



Decontamination and Dismantling

- Surface cleaning by sand blast and pneumatic chisels, Inside of detonation chamber



- Final wipe with a damp cloth or mop, with or without a decontamination chemical, inside surface of tent and surface of equipment



After contamination level was confirmed to be below criteria, dismantled equipment and wastes were shipped to industrial waste management company.

3. Destruction of ACWs at three sites in China

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Overview of DAVINCH system in China

The government of Japan selected the DAVINCH technology to eliminate the Japanese ACWs in China, 3 DAVINCH systems have been deployed and operating in China.

- Nanjing(2010-2012)
 - First DAVINCH system in China (2 detonation chambers)
 - 35,681 ACWs were destroyed.
 - Decontaminated, dismantled and moved to Wuhan.

- Wuhan
 - Mobile DAVINCH systems were moved from Nanjing.
 - Destruction is completed. Decontamination process is on going.

- Shijiazhuang
 - Mobile DAVINCH system was installed in 2012.
 - Under operation since 2012.

- Haerbaling
 - Haerbaling is the largest burial site of ACWs.
 - A DAVINCH system was installed and is operating as one of the test destruction facilities.

ACW destruction facility in Wuhan

- DAVINCH system was installed in 2013.
- 264 ACWs were destroyed from December 2014 to May 2015.
- Destruction is completed and the facility is being decontaminated and will be dismantled.



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Wuhan Site

ACW destruction facility in Shijiazhuang

- Mobile DAVINCH system was installed in 2012.
- The mobile DAVINCH system has been operating since December 2012.
- 1,692 ACWs have been destroyed.



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Shijiazhuang Site

ACW destruction facility in Haerbaling

- DAVINCH system was installed in 2014.
- DAVINCH was operated from November 2014.
- Operation was suspended during severe winter season and the facility resumed operating in the end of April 2015.
90 ACWs have been destructed. (As of 13 May 2015)



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Haerbaling Site

Destruction record of ACWs in China

The Table below shows the quantity of ammunition destroyed in the destruction sites in China.

		Nanjing	Wuhan	Shijiazhuang	Haerbaling
Projectiles	Yellow shells (L/HD)	14	22	235	
	Red shells (DA/DC)	58	145	124	90
	Blue-white shells (CG/trichloroarsin)		1		
	Ohters		14	17	
Aerial bombs	15kg Red Bomb (DA/DC)			1	
	50kg Yellow Bomb (L/HD)			2	
Canisters (toxic smoke pots)		35,601	79	1,259	
Drum can containing yellow agent (L/HD)		7			
Others		1	3	54	
(as of)		Complete	07 May 2015	11 Nov 2014	13 May 2015



Red canister



90mm Yellow shell



150mm Yellow shell

4. Destruction of OCW'S and
conventional ammunition and
maintenance of DAVINCH
facility in Poelkapelle, Belgium

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Overview of DAVINCH System in Belgium

- DV50 (explosive capacity of 50kgTNTeq)
- Constructed in 2007 in military site in Poelkapelle
- Owned and operated by Ministry of Defense Belgium since 2008
- More than 7,500 OCW's and conventional ammunition were destroyed
 - Clark (DC/DA) ammunition (7.7cm – 21cm) etc.
 - High explosive shells containing arsenic smoke agent etc.



Examples of Ammunition

Destroyed by DAVINCH in Poelkapelle

- Chemical ammunition



(3 x 10.5cm Clark shells) x 2 packages/shot



1 x 21cm Clark shell / shot

- Conventional ammunition



(7 x 7.7cm shells) x 2 packages/shot



(15cm shell + 2 x 10.5cm shells) / shot

Replacement of Inner Chamber

- Old inner chamber was approaching the end of life in 2014.
 - It had been used for more than 1,700 shots
 - A large number of large conventional munitions were recently destroyed
 - Fragments from those large conventional shells damaged the inner chamber, resulting the decrease of wall thickness at the proximity of the ammunition mounting position
 - Inner chamber had started to deform at its thinnest part
- New inner chamber was manufactured in Japan in 2014 and transported to Poelkapelle from February to April 2015.

Replacement of Inner Chamber

- Inner chamber was replaced in April 2015



Summary

- DAVINCH system has been operated safely in Japan, China and Belgium.
- More than 47,000 items (chemical and conventional weapons) have been destroyed by DAVINCH world wide.
- DAVINCH Facilities have been successfully decontaminated, dismantled and moved.
- DAVINCH system is kept operational by proper maintenance including inner chamber replacement, as shown in Poelkapelle, Belgium.
- Kobe steel, Ltd will keep on operating, maintaining and improving DAVINCH system to support chemical weapons destruction efforts.