DAVINCH operations updates 2016

Ayumu Kuriyama*
Osamu Shimoda

CWD Project Department
Nuclear & CWD Division
Kobe Steel, Ltd.
Outline of the presentation

1. Introduction
2. Destruction of OCWs at Kanda, Japan
3. Destruction of ACWs in China
4. Destruction of OCWs in Poelkapelle, Belgium
5. DAVINCH installation in France
Lake Kussharo (2000)
- 26 of 50kg-Yellow bombs (Lewisite/Mustard)
  - Disassembly + Neutralization + Detonation

Samukawa (2003)
- 806 CWM filled bottles
  - Neutralization
- Approx. 8,000m³ of contaminated soil
  - Heat treatment

Kanda (2004-)
- 2,968 Sea-dumped OCWs
  - Destruction by DAVINCH
DAVINCH®

● DAVINCH® = Detonation of Ammunition in a Vacuum INtegrated CHamber

A controlled detonation system developed by Kobe Steel to destroy chemical and a variety of conventional ammunitions
How does DAVINCH work?

Munitions (chemical agent, energetic material)

Donor charge

Evacuation

Minimum oxygen supply

All valves are closed to isolate the chamber

Detonation off-gas (CO, H2, etc.)

Solid wastes (fragments, dust)

Destructed!

Detonation

DAVINCH detonation chamber
How does DAVINCH work?

**DAVINCH** detonation chamber

Detonation off-gas (CO, H2, etc.)

Valve is opened

Solid waste

**Clean off-gas** (CO2, H2O, etc.)

**Off-gas treatment system**

Cold Plasma Oxidizer
DAVINCH systems applied all over the world

Poelkapelle (Belgium, 2008 - )

SECOIA (France, under construction)

Nanjing (China, 2010 – 2012)
Wuhan (China, 2014 – 2015)
Shijiazhuang (China, 2012 - )
Haerbaling (China, 2014 - )

Kanda (Japan, 2004 – 2014)
Outline of the presentation

1. Introduction

2. Destruction of OCWs at Kanda, Japan

3. Destruction of ACWs in China

4. Destruction of OCWs in Poelkapelle, Belgium

5. DAVINCH installation at SECOIA, France
Overview of Kanda Weapons Destruction Facility

- **Ammunition**
  - Underwater WW2 Japanese chemical ammunition in Kanda Port sea area

- **Activities**
  - Magnetometer detection
  - Recovery
  - Transportation
  - Identification (acquisition of data)
  - Destruction by DAVINCH

---

Map of Japan with Kanda Port highlighted.
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)
Outline of the presentation

1. Introduction

2. Destruction of OCWs at Kanda, Japan

3. Destruction of ACWs in China

4. Destruction of OCWs in Poelkapelle, Belgium

5. DAVINCH installation at SECOIA, France
Overview of DAVINCH system in China
ACW destruction facility in Nanjing

- 35,681 ACWs were destroyed from 2010 to 2012.
- After completion of destruction, the facility was decontaminated, dismantled and transported to Wuhan.

Dismantlement at Nanjing

Nanjing Site (January, 2015)
ACW destruction facility in Wuhan

- DAVINCH system was installed in 2013.
- 264 ACWs were destroyed from December 2014 to May 2015.
- After completion of destruction, the facility was decontaminated, dismantled and transported to Japan.
Dismantlement of the Facility in Wuhan

- Dismantlement of the DAVINCH in 2015.
- Transported to Japan in 2016, and currently, overhaul and modification are on-going.
ACW destruction facility in Shijiazhuang

- Transportable DAVINCH system was installed in 2012, and it has been operating since December 2012.
- Severe winter season suspend operation, however, 2,301 ACWs have been destroyed (May 1st 2016).

DAVINCH

Shijiazhuang Site
ACW destruction facility in Shijiazhuang

- In 2015, Blue-White (CG/Trichloroarsin) Shells were destroyed.

Setting Donor charge on a Blue-White shell.
ACW destruction facility in Haerbaling

- The Largest burial site of ACWs in China.
- DAVINCH system was installed in 2014.
- DAVINCH has been operating since November 2014.
- Severe winter season suspend operation, however, 445 ACWs have been destroyed (May 1st 2016).
Destruction record of ACWs in China

The Table below shows the quantity of ammunition destroyed by DAVINCH in China.

<table>
<thead>
<tr>
<th>Projectiles</th>
<th>Nanjing</th>
<th>Wuhan</th>
<th>Shijiazhuang</th>
<th>Haerbaling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow shells (L/HD)</td>
<td>14</td>
<td>22</td>
<td>384</td>
<td>96</td>
</tr>
<tr>
<td>Red shells (DA/DC)</td>
<td>58</td>
<td>145</td>
<td>463</td>
<td>339</td>
</tr>
<tr>
<td>Blue-white shells (CG/trichloroarsin)</td>
<td>1</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>14</td>
<td></td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Aerial bombs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15kg Red Bomb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50kg Yellow Bomb</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canisters (toxic smoke pots)</td>
<td>35,601</td>
<td>79</td>
<td>1,285</td>
<td></td>
</tr>
<tr>
<td>Drum can containing yellow agent (L/HD)</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>1</td>
<td>3</td>
<td>126</td>
<td>10</td>
</tr>
<tr>
<td>(as of)</td>
<td>Complete</td>
<td>Complete</td>
<td>May 1st 2016</td>
<td>May 1st 2016</td>
</tr>
</tbody>
</table>

(Pictures from http://www.a.cao.go.jp/acw/heiki.html#sec1)
Outline of the presentation

1. Introduction

2. Destruction of OCWs at Kanda, Japan

3. Destruction of ACWs in China

4. Destruction of OCWs in Poelkapelle, Belgium

5. DAVINCH installation at SECOIA, France
Overview of DAVINCH System in Belgium

- Constructed in 2007 in military site in Poelkapelle
- Owned and operated by Ministry of Defense Belgium since 2008
- 10,409 OCW’s and conventional munitions were destroyed by DAVINCH (as of May 11th, 2016).
  - Clark (DC/DA) munitions (7.7cm – 21cm) etc. (3931)
  - High explosive shells containing arsenic smoke agent etc. (6478)
Examples of Ammunition Destroyed by DAVINCH in Poelkapelle

- **Chemical ammunition**
  
  (3 x 10.5cm Clark shells) x 2 packages/shot

- **Conventional ammunition**
  
  (7 x 7.7cm shells) x 2 packages/shot
  
  (15cm shell + 2 x 10.5cm shells) / shot
Outline of the presentation

1. Introduction
2. Destruction of OCWs at Kanda, Japan
3. Destruction of ACWs in China
4. Destruction of OCWs in Poelkapelle, Belgium
5. DAVINCH installation at SECOIA, France
SECOIA Project in France

- SECOIA
  = Site d’Elimination des Chargements d’Objets Identifies Anciens
- Site is located at Mailly-le-Camp, France
- Currently, the new DAVINCH is under installation.
New DANVINCH Installation

- November 2015
Summary

- DAVINCH facilities have been operated safely in Japan, China and Belgium.

- More than 51,000 items (chemical and conventional weapons) have been destroyed by DAVINCH world wide.

- Decontamination, Dismantlement and Transportation were successfully operated at transportable DAVINCH.

- DAVINCH systems have been operated for 8 years with proper maintenance in Belgium.

- New DAVINCH is under installation in France.

- Kobe Steel will keep on operating, maintaining and improving DAVINCH systems to destroy chemical and other munitions and to support the efforts to make cleaner the world.
Our Technology make it Achievable

- Risk must be Acceptable
- Cost must be Agreeable

But these two points are always trade-off.

- Kobe Steel have brought solutions for the problems with achievable technology in many cases.
Thank you for your attention.

Any questions?