Recovery and destruction of sea-dumped chemical weapons, a relook into Kanda operations

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Outline of presentation

1. Introduction – Kanda project
2. History
3. Operation and technologies developed for operation
4. Clean-up summary
5. Lessons learned
6. Summary
Introduction – Kanda project

- Largest non-stockpile chemical weapons destruction in Japan
- Sea-dumped WW2 munitions were destroyed
Introduction – Kanda project

- Reported several times in CWD conferences
- No munitions were found in recent years but detection is still being carried out to check if there is no munitions left...

Kanda

Kanda Port

Photo from: Kanda Chamber of Commerce & Industry
http://www.kanda-cci.com/toshi.htm
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History

- Chemical munitions were dumped in the sea at the end of WW2
- Kanda coast area was developed as industrial zone after WW2
  - Land reclamation
  - Port was developed
  - Manmade island for new airport

Kanda port in 1947
photo from “Kiseki – Kanda no rekishi” Kanda Town 2005

Kanda port now
History

- Chemical munitions were found in 2000
  - 18 munitions were found in dredging in November, recovered and stored in Sasebo Base of Maritime Self Defense Force
  - 39 more were found later

- Defense Agency (Ministry of Defense) began studying clean-up process – start of the project
History

- 2004: destruction facility was constructed and started operation by order from Defense Agency (MOD)
- 2006: Ministry of Land, Infrastructure, Transport and Tourism took over project from Defense Agency
- Until 2013: 2,968 munitions were destroyed in total
- 2014: destruction facility was decontaminated and dismantled
- 2015 & 2016: magnetometer detection is still being conducted to check if there is no munition left
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Operation

- Detection, recovery, transportation and destruction
Detection

- Magnetometer detection
  - GPS utilization and data processing were improved for high accuracy
  - Identification system was developed to identify suspicious targets in magnetic anomalies

Detection on the sea
Detection boat with magnetometer probes
Recovery

- Diving with protection
  - Anti-chemical protective diving suit is developed
Recovery

- Underwater inspection
  - X-ray to identify fused/not fused

- Lifting munition in container

- Underwater X-ray unit
- X-ray image monitoring on pontoon

- Munition in double walled container
- Munitions in containers on pontoon
Recovery

- Double walled container
  - Water-tight to keep munition pressurized to prevent leakage during recovery and transportation
Transportation

- Munitions are transported in double walled container from quay to destruction facility by truck

- First batch of munitions stored in Sasebo Base were transported in transportation chambers by defense ship to Kanda port, then by truck

First batch from Sasebo Base
Destruction

- Destruction facility
  - Installed on steal structure on the sea
  - Temporary storage, identification, detonation chamber and off-gas treatment system in containment (tents)

- DAVINCH® system
  - DV60 (up to 60kg-TNTeq)
Destruction

- Munitions destroyed
  - 50kg yellow bombs and 15kg red bombs

50kg yellow bomb
chemical agent 18L, Mustard + Lewisite
2.3kg of High explosives

15kg Red Bomb
Chemical agent 368g, DA/DC
1.3kg of High explosives
Destruction

- Procedure (inspection, storage and destruction)

1. Munition is removed from container
2. Temporary storage
3. Dimension & weight inspection
4. X-ray inspection
5. Detonation preparation (donor charge setting)
6. Detonation
7. Munitions are loaded in Detonation Chamber
8. Off-gas treatment
9. Fragments etc. to waste storage and management
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Clean-up summary

- Area cleaned up in Kanda port and channels: 23 km² (2003 to 2015)
- Chemical munitions found and destroyed: 2,968 (2004 to 2013)
- Magnetometer detection is being carried out in 2016
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Lessons learned

- Consensus between stake holders is essential
  - Various local stake holders
- Consensus on balance between cost/effort and needs should be reached
- Technologies are necessary
  - To carry out detection, recovery, transportation and destruction
  - Also to help achieving public acceptance and balance between cost and needs
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Summary

- Clean-up operation has been conducted in Kanda port area
- Detection is being carried out now to make sure there is no munitions left
- Technologies were developed for Kanda operation – they may be useful for other water areas
Thank you for your attention

Any questions ?