SUSTAINABLE MANAGEMENT OF THE BALTIC SEA AND FRESHWATER RESOURCES

RPAS services required for the pollution prevention in Finland
1.11.2016, Kuopio, Finland

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SYKE

Photo: Panu Hänninen

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- SEKE's vision
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RPAS as a support tool for Emergency and Response Services

Call for Papers for Proposed Session Themes

International workshop
Organised by
Finnish Environment Institute (SYKE)
Kuopio, November 1 – 2
Finland

Please, check the free registration and propose your paper at:
https://goo.gl/forms/LwGjK5K2W4pMgWBQ2



SYKE

Workshop organisers
Finnish Environment Institute

Pelastusopisto

Workshop hosted by the The Emergency Services College of Kuopio
Addresse: Hulkontie 83 Kuopio Finland

Day 1 Tuesday, 1 November 2016	Day 2 Wednesday, 2 November 2016
9:30 Opening of the seminar	8:30 Session III: "Case Studies and Lessons Learned"
10:00 Session I: "*Technical & Operational Demands*"	
12:30 – 13:30 lunch	12:00 – 13:00 Lunch
14:00 Session II: "*Sensors and Data Handling & Transmission*"	13:00 - 15:00 RPAS Demos at the Testing field of the College: Fire, SAR, chemical response
17:00 Closing of the Day	
19:00 Dinner in Kuopio	15:00 Transport to the City/Airport

Proposed *Papers* /Registration (free of charge) :
https://goo.gl/forms/LwGjK5K2W4pMgWBQ2

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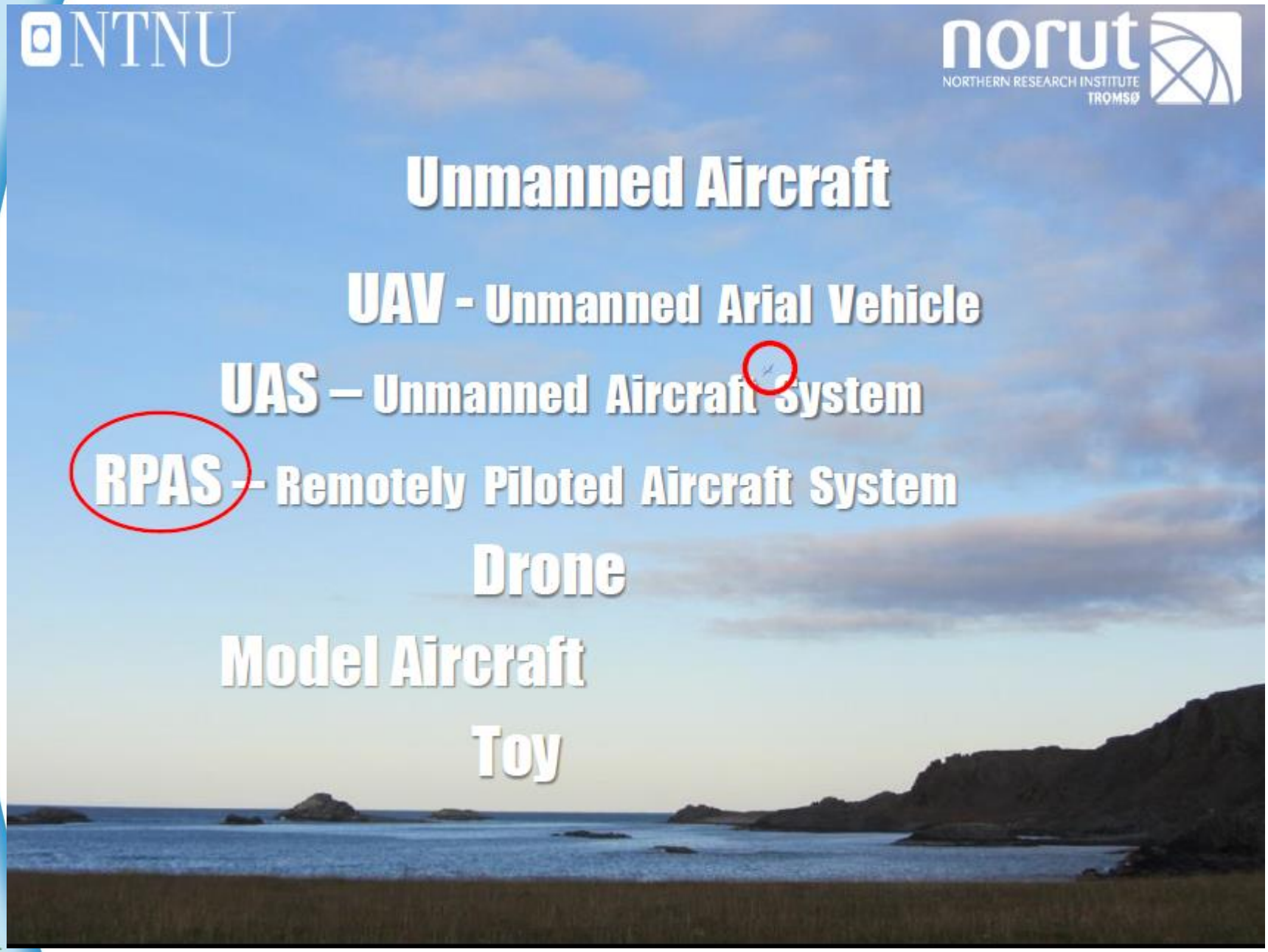
SYKE


NTNU
norut
NORTHERN RESEARCH INSTITUTE
TROMSØ
Unmanned Aircraft
UAV - Unmanned Arial Vehicle
UAS – Unmanned Aircraft System
RPAS – Remotely Piloted Aircraft System
Drone
Model Aircraft
Toy

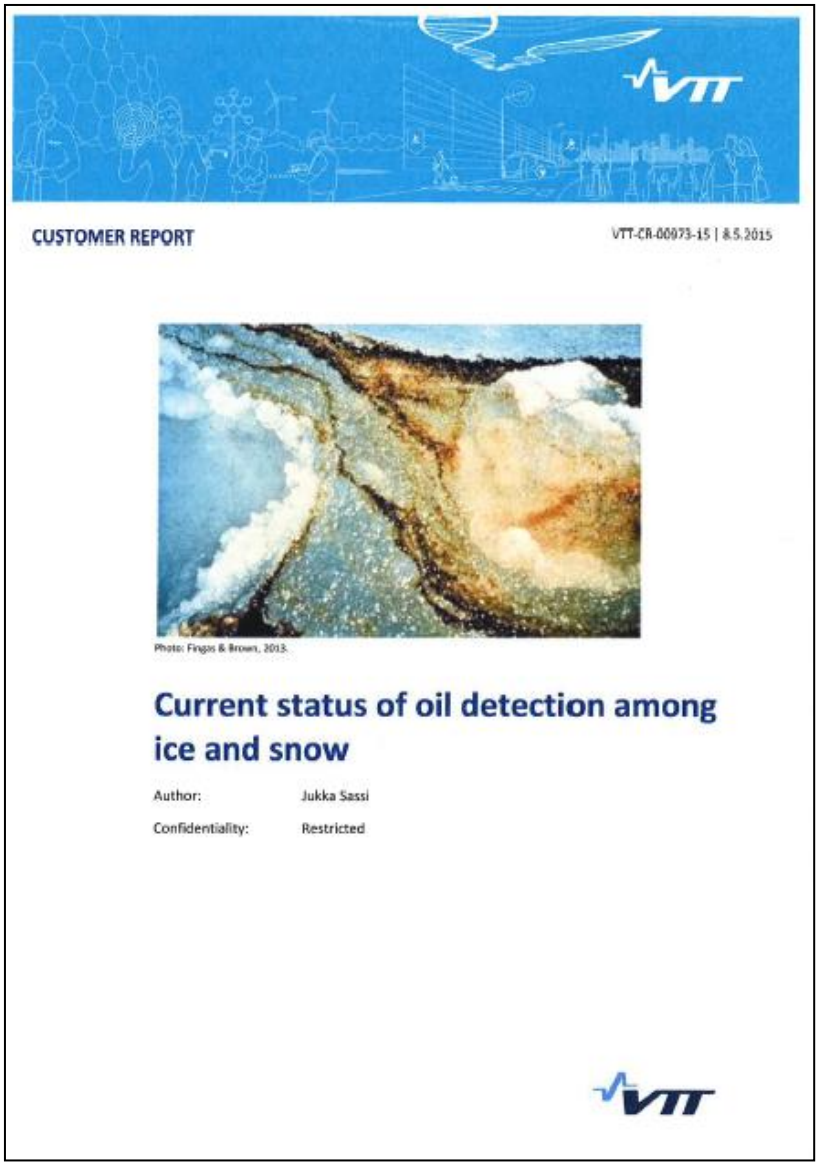
UAV –ARCTIC 2016 - Kemi Arctic 2015 Full Scale Exercises and Trials

https://www.youtube.com/watch?v=C_W5iw3XAbQ

https://www.youtube.com/watch?v=96P72qPedTo

Kemi Arctic 2015

- Kemi Arctic 2015 was a start up for UAV Arctic project:
- Selected systems and sensors were demonstrated during the full-scale trial
- Special session on monitoring was arranged
- Report was made on the status quo of the sensors for oil detection among ice and snow.



http://www.ymparisto.fi/en-US/Sea/Environmental_emergency_response_in_Finland/Oil_spill_response_exercises/KEMI_ARCTIC_2015(38029)

Kemi 2015 - Session III: Short and Long Range Monitoring and Survaillance

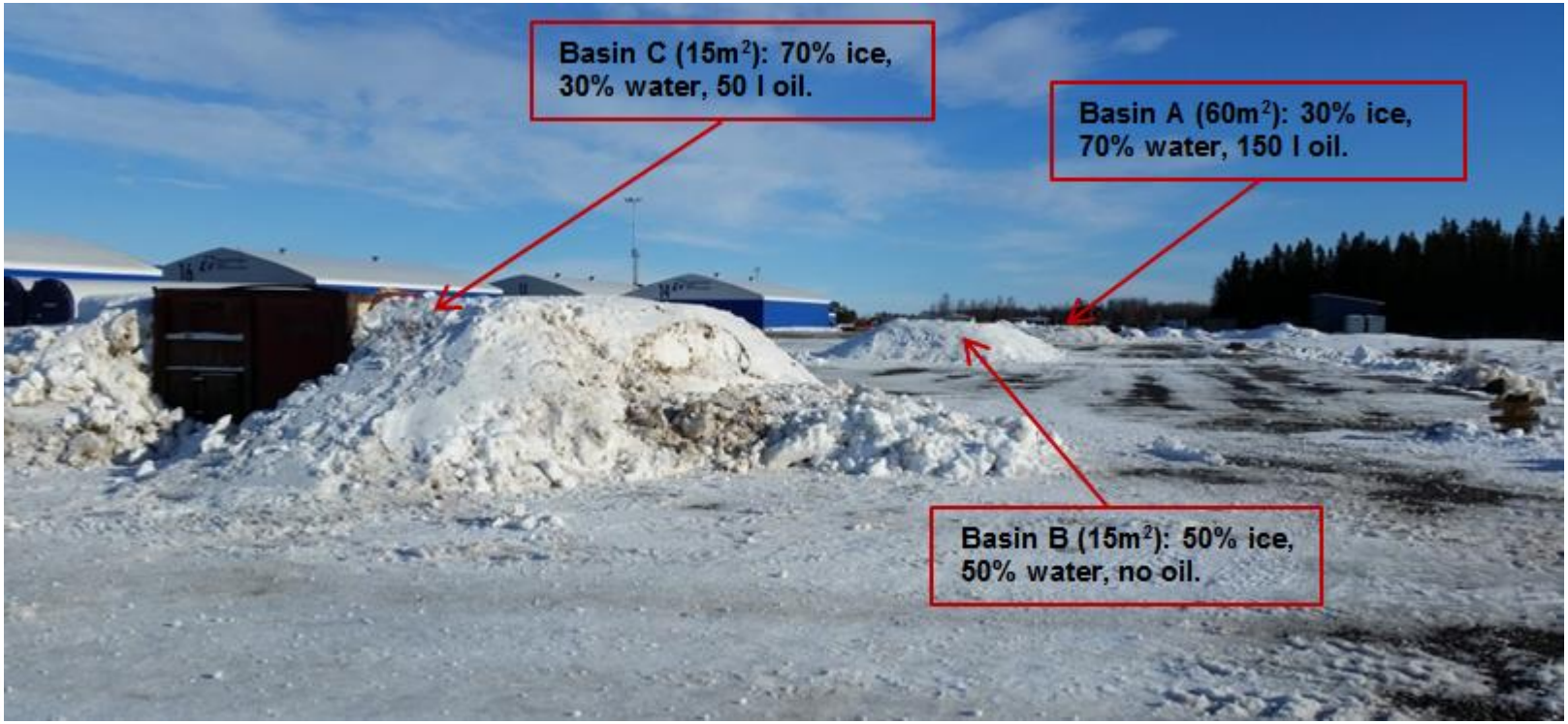
- • Oil Detection among Ice and Snow Lessons learned, Sassi Rytkönen (pdf, 2581 kB)
- • Oil spill early warning systems in aquatic environment, S Taurian (pdf, 1233 kB)
- • Arctic Seas now and in the future, L Kaiponen (pdf, 866 kB)
- • Create the Common Operating Picture for increased oil recovery, R Pearns (pdf, 3830 kB)
- • UAVs for Environmental Monitoring in Finland, S Ehnqvist (pdf, 847 kB)
- • Oil spill detection radar and system integration-experiences and challenges, T Airissalo (pdf, 1713 kB)
- • Oil detection in icy and open waters with HLIF LiDar, S Babichenko (pdf, 5974 kB)
- • Modern Electronic Tools for Oil Spill Preparedness and Response in the Arctic, K Kumenius (pdf, 3679 kB)
- • Rikola Hyperspectral Camera New Sensor for UAVs, J Soukkamäki (pdf, 2056 kB)

UAV ARCTIC

- Airborne Monitoring Tools for Arctic and Baltic Sea Environment
- Especially sensors and oil/chemical detection methods for cold environment
- Project is supported by the IBA funding instrument
- Execution period: 2/2016 – 2/2017


Harbour office
Kalajoen Satama Oy
Main gate to the port
Helicopter's place – close to the main gate
Address: Kalajoen satama, Satamatie
Fence
Test area & basins

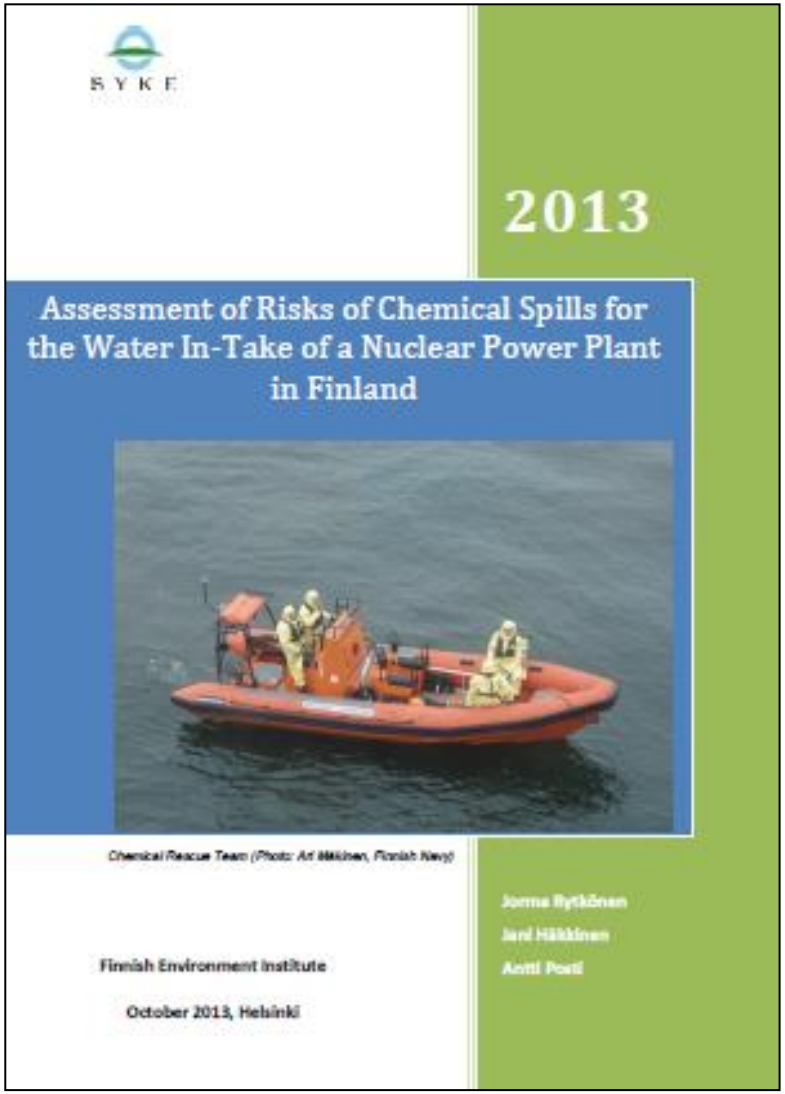

Syke
VTT


Basin C (15m²): 70% ice, 30% water, 50 l oil.
Basin A (60m²): 30% ice, 70% water, 150 l oil.
Basin B (15m²): 50% ice, 50% water, no oil.


SDMO

Case: chemical tanker grounding

- Services of MAR-ICE network were tested by SYKE at 23rd September 2013
- Scenario was based on grounding of a chemical tanker some 15 miles off the Porvoo oil terminal
- Accident took place 11.35am local time
- A set of chemicals leaked out of the ruptured tanks. Additionally 50 tons of bunker heavy fuel oil leaked.



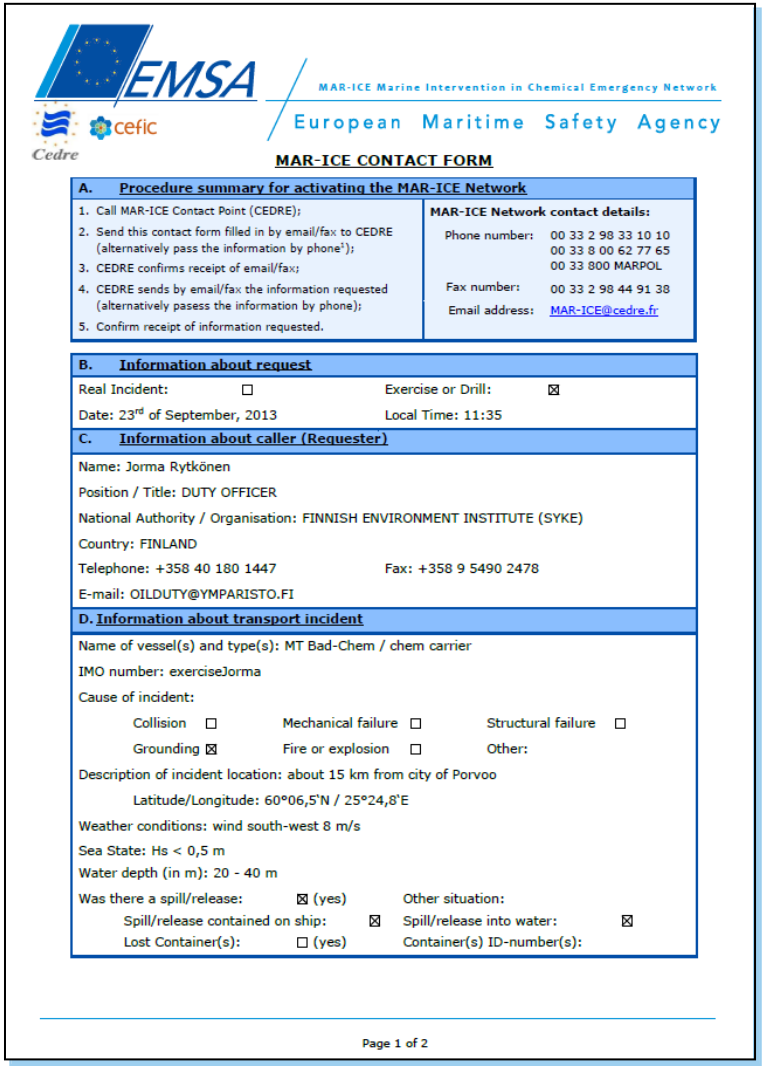
Chemicals causing threat for nuclear power plant ??

Chemical	Finnish ports in the Gulf of Bothnia and in the Archipelago Sea	Finnish ports in the Gulf of Finland	Finnish ports total
Methanol	0	746 141	746 141
Sodiumhydroxidesolution	233 703	146 628	380 331
Pentanes	0	315 978	315 978
Xylanes	0	161 894	161 894
Methyl tert-butyl ether (MTBE)	3 158	156 502	159 660
Aromatic free solvents (e.g. white spirit and NESSOL)	155 363	0	155 363
Ethanol and ethanolsolutions	27 650	94 369	122 018
Paraffines	0	111 079	111 079
Phosphoricacid	91 797	0	91 797
Phenol	0	87 359	87 359
Propane	78 392	5 634	84 027

Out-flowed oil type	Tank size/remaining onboard the ship [m3]	Estimated out flow to the sea [m3]
vegetable oil, 8002-13-9	200 m3, float stopped	5 m3
phosphoric acid, 7664-38-2	200m3, still floating out	50 m3
sodium hydroxide, 1310-73-2	200 m3, still flowing out	5 m3
ethanol, 64-17-5	200 m3	200m3
phenol gas oil, 108-95-2	1000 m3	200m3
heavy fuel oil HFO-380	500 ton	50 ton

Exercise Scenario

- Coast Guard and Rescue Services were on the site, crew was evacuated and two officials with chemical suits stayed onboard the damaged ship and followed the development of the situation
- Alert to MAR-ICE service was made at 1.50pm local time by e-mail and fax using the MAR-ICE Contact Form and annex giving more detailed information on the case.
- Prior the alert telephone discussions were carried out between Syke and MAR-ICE regarding the alert exercise's character



EMSA
MAR-ICE Marine Intervention in Chemical Emergency Network
European Maritime Safety Agency
cefic
Cedre

MAR-ICE CONTACT FORM

A. Procedure summary for activating the MAR-ICE Network

1. Call MAR-ICE Contact Point (CEDRE);
2. Send this contact form filled in by email/fax to CEDRE (alternatively pass the information by phone[1]);
3. CEDRE confirms receipt of email/fax;
4. CEDRE sends by email/fax the information requested (alternatively pasess the information by phone);
5. Confirm receipt of information requested.

MAR-ICE Network contact details:
Phone number: 00 33 2 98 33 10 10
00 33 8 00 62 77 65
00 33 800 MARPOL
Fax number: 00 33 2 98 44 91 38
Email address: MAR-ICE@cedre.fr

B. Information about request

Real Incident: ☐ Exercise or Drill: ☒
Date: 23rd of September, 2013 Local Time: 11:35

C. Information about caller (Requester)

Name: Jorma Rytkönen
Position / Title: DUTY OFFICER
National Authority / Organisation: FINNISH ENVIRONMENT INSTITUTE (SYKE)
Country: FINLAND
Telephone: +358 40 180 1447 Fax: +358 9 5490 2478
E-mail: OILDUTY@YMPARISTO.FI

D. Information about transport incident

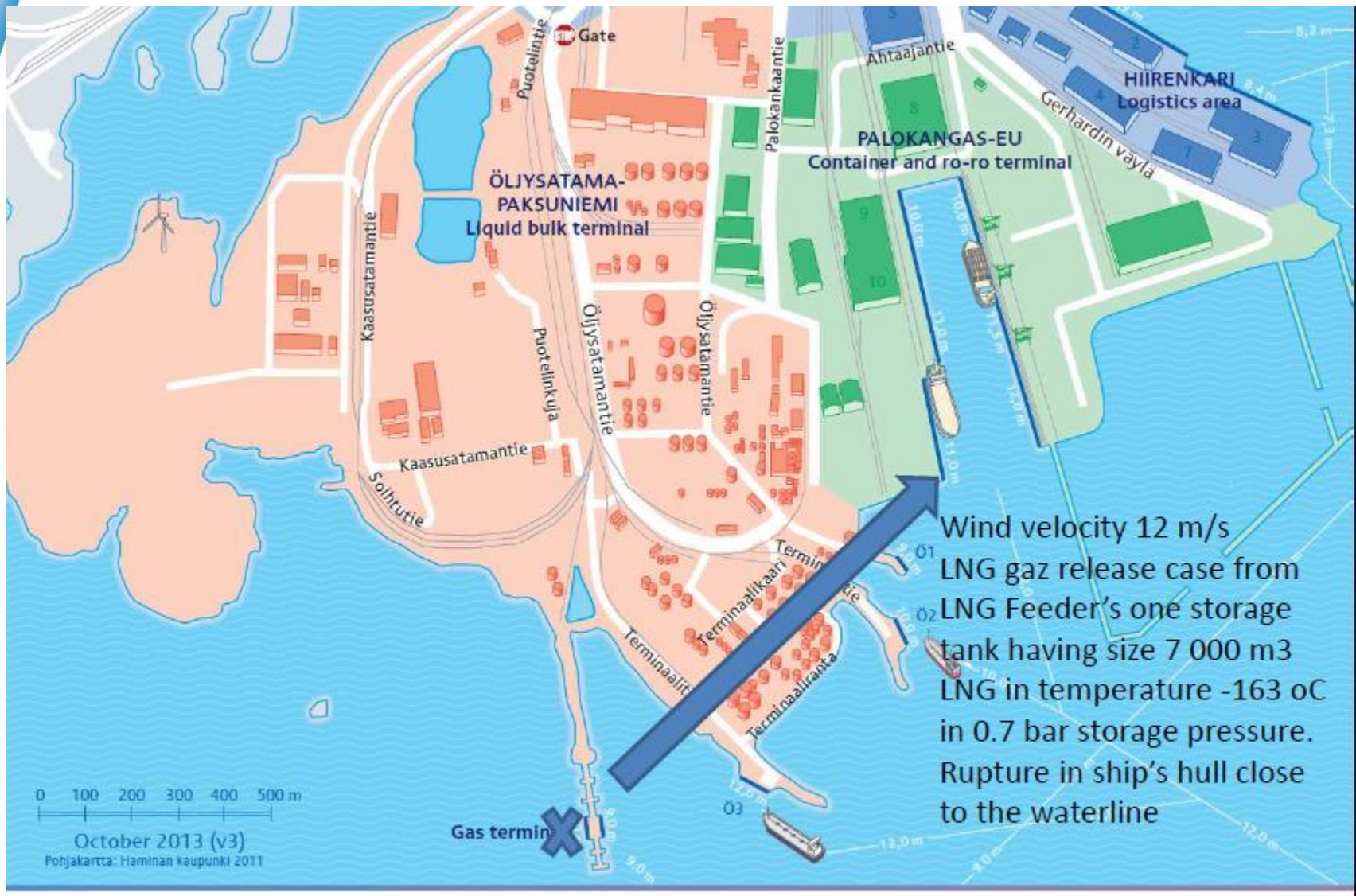
Name of vessel(s) and type(s): MT Bad-Chem / chem carrier
IMO number: exerciseJorma
Cause of incident:
Collision ☐ Mechanical failure ☐ Structural failure ☐
Grounding ☒ Fire or explosion ☐ Other:
Description of incident location: about 15 km from city of Porvoo
Latitude/Longitude: 60°06,5'N / 25°24,8'E
Weather conditions: wind south-west 8 m/s
Sea State: Hs < 0,5 m
Water depth (in m): 20 - 40 m
Was there a spill/release: ☒ (yes) Other situation:
Spill/release contained on ship: ☒ Spill/release into water: ☒
Lost Container(s): ☐ (yes) Container(s) ID-number(s):

Page 1 of 2

Test Scenario of LNG release in Hamina 2015

- In order to illustrate possible danger of the LNG outflow a scenario was formed where LNG coastal carrier will run with too heavy speed into the existing LPG pier of the HaminaKotka's terminal in Hamina.
- As a result one of the three LNG tanks, each 7 000 m3, will get a rupture and the instant LNG gas outflow.
- The rupture is above the waterline in the mid-section of the ship
- During the accident the south-western wind speed is 12 m/s and the prevailing temperature close to +1 oC.
- See the following map/illustration of the accident site

LNG concepts by Wärtsilä



EXERCISE - EXERCISE – EXERCISE – EXERCISE - EXERCISE

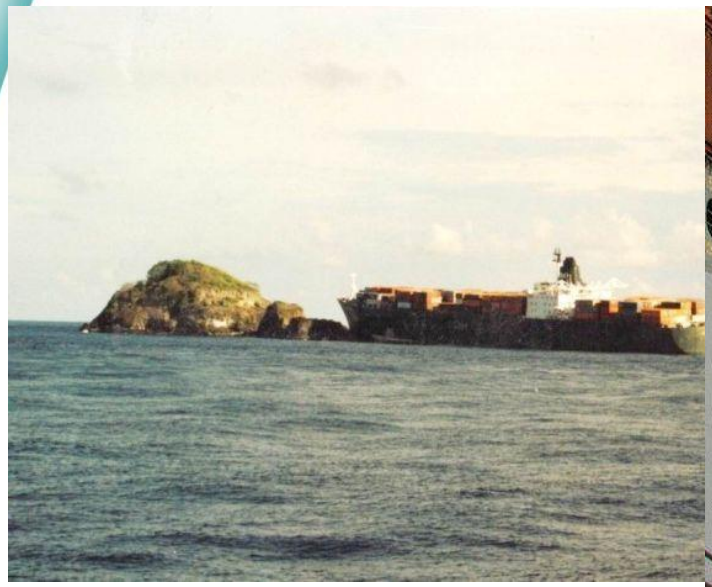
Lessons learned

- Three bodies were alerted in the Exercise: MARICE, FIOH and FMI.
- Response was rapid and first instructions were achieved in a short notice.
- Calculations using propane or gydrogen sulfide overestimated the plume drift. Methane gives perhapsmore realistic view (note however cryogenic character with LNG !)
- LNG is not included into MARICE & FMI modelling toolbox .
- Spill quantity affect significantly on the evaluation of the flammable zone. In a real situation the estimation of the quantity of the spill outflow may be difficult !
- Correct pool formation on the water surface and the real impact of the outdoor temperature need to studied later.

The scenario 2016

- A container vessel approaching Helsinki ”Vuosaari” harbour had a black-out and started to drift and eventually grounded Cargo was both hazardous and non-hazardous substances
- After the grounding a leakage of bunker oil (500 m3 of IFO 180)
- Due to the grounding there were problems with the stability of the containers: three containers fell to sea and some damaged containers were on the deck of the vessel.
- During the night following the accident the damaged containers had structural damages and started to leak unknown substances. The containers that fell to sea had sunk.

SYKE



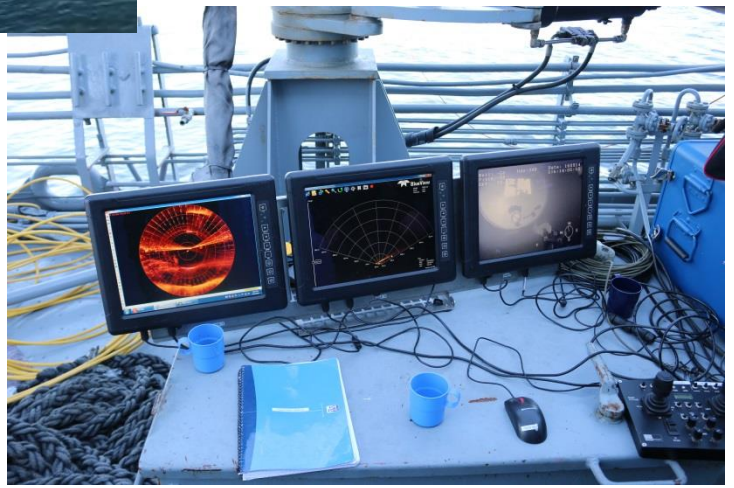

NYK
P&O Nedlloyd
COSCO
COCL

Chemical response

- Equipment: 2 recovery ships, 1 tug boat, 1 target ship, containers, barrels, helicopter
- MIRG group and chemical divers from Helsinki Rescue Department. Chemical experts.
- Finnish Meteorological Institute, MAR-ICE, the Centre of Excellence for Serious Chemical Threats. Chemical experts onsite
- Tasks:
  - Helicopter winching of MIRG-group to casualty
  - Helicopter transfer of chemical divers to vessel Turva
  - Boat transfer of chemical divers to casualty
  - Identifying the chemicals – providing chemical divers information on required protection level and response means
  - Recovery vessels: setup decontamination stations, using the gas sensors, using protective water spray, dropping the chemical cloud, using the closed air circuit, working in chemical protection suits

Chemical scenario

- Ammonia anhydrous 20 000L on the deck; leaked instantaneously 3500L. Pool formation on the deck, cloud.
- Chemicals on containers that had sunk: ethylenedichloride, styrene and phenol (molten). In exercise we used 200 L barrels (to enable testing of the operation of that KART)
- Chemicals inside the damaged containers on the deck: epichlorohydrine (small leak), benzene (small leak later on) and acrylonitrile. Volumes of the containments were 200-1000L. Chemical divers stop the leak



SYKE

EUROPEAN COMMISSION
DIRECTORATE-GENERAL HUMANITARIAN AID AND CIVIL PROTECTION - ECHO

ECHO A - Strategy, Policy and International Co-operation
A/5 - Civil Protection Policy, Prevention, Preparedness and Disaster Risk Reduction

Remotely Piloted Aircraft Systems (RPAS) workshop for Civil Protection experts

Borschette Centre, Brussels - 21 – 22 January 2016

- EU Commission will support RPAS capasity building to support EUCP-operations. There are a lot of lessons learned in many fields
- A special pool will be formed. All national partners can inform their national prepareddes in orderEU can to form USAR type of groups for international missions.
- For example UK and France already have RPAS capacity as a normal procedure to support some SAR and rescue missions
- Finnish expert(s) joined the next meeting in the end of June (Brussels)

EMSA

- The objective is to provide surveillance services through Remotely Piloted Aircraft Systems (RPAS) for the maritime environment.
- They should have a high level of deployability and availability that should permit EMSA to offer operational capability and provide additional data streams to European Union Member States, Iceland, Norway, to the European Commission, to European Union Agencies and to governmental organisations.
- The RPAS services should be more cost effective compared to manned patrol aircraft and should be used as a complementary tool in the overall surveillance chain, including satellite imagery, vessel positioning information and surveillance by maritime patrol aircraft and vessels.
- http://www.emsa.europa.eu/work/procurement/calls.html

EMSA – focus

- Marine Pollution Monitoring
  - oil spill detection,
  - oil spill monitoring and support to response operations
- Emissions monitoring
- Vessel detection and identification
  - Vessel detection, monitoring and tracking
  - Vessel identification

OIL-ON-WATER 2015

NOFO (STARTPAGE)

Our operation

- Vision and goals
- Board of Directors
- Organisation chart
- NOFO resources
- Annual Report

Preparedness

- HSE handbook oilspill response

Technology

- Oil Spill Response 2010
- Oil Spill Response 2015

NOFO Oil-on-Water 2015 was carried out in the period 8 - 12 June.

Following arrival at the Frigg field, the various trials were carried out in accordance with the Norweg Environment Agency's discharge requirements.

The purpose of each trial has been stated in the application for a discharge permit.

The objective of Oil-on-Water 2015 was the following:

General

As part of the work of verifying, maintaining and continuous development of the national oil spill preparedne together with the Norwegian Coastal Administration, arranges an annual realistic exercise involving dischar an oil-on-water exercise, and documents implementation of this. Oil-on-water 2015 was carried out during th June.

Exercise area

The exercise was carried out in the Frigg field within 10 nm of position

59° 59'N 002° 27'E.

Chemical trial – Kuopio November 2016

- Main focus is to detect airborne chemical plumes /vapour using RPAS and sensors
- Identification
- Sample taking
- Support/tool for MIRG group
- Support/tool for rescue officials

- Partners: sensor manufacturers, RPAS companies, Army, Rescue centres etc.

- 2-day long event

Workshop – proposed for 1/2017

- A special workshop will be arranged in 2017 y SYKE
- The main focus will be directed to RPAS for the Arctic use
- Possibility to have demos will be studied
- The planned form will be two days long seminar
- H2020
- SYKE's R&D plan

MOSPA

- US facilitated MOSPA Table Top Exercise in June 8 in Montreal
- Finland will have the responsibility to facilitate the next MOSPA during the Finnish Presidency.
- Sensors, RPAS's, Meto services, SAR and Mechanical oil recovery tools for pollution prevention may form the baseline tools for that exercise
- Planning need to be started in November 2017
- Execution period 2/2018 in Gulf of Botnia jointly with Sweden and Finnish Border Guard (SAR) .

SYKE's needs for RPAS services

- Environmental monitoring (optical measures); algae blooming, turbidity, sea weed growth, Mining areas.
- Infrared services; oil dridt, animal calculations.
- Hypersptektrometrum – identifying habitats and vegetation, algae, trees, plant diseases, dangerous substances.
- Visible light – situational awareness views of disater areas and flooding areas.
- Laser – mapping, bathymetric studies, ice conditions
- SAR – synthetis aparture radar – ice conditions, oil slicks

SYKE's vision for future ?

- Fast and reliable situational awareness view – especially for oil and chemical response;
- Forest growth
- Cartography studies
- Ice data & mapping – ice pressure changes
- Sea bottom bathymetry
- Clorofyll & water quality measurements
- Fulfilling gabs of the satellite observations
- Replacing human efforts of sample taking and observations
- Taking care of emission measurements – EU sulphur directive / CO2 development ?
- Cutting down emission control costs (?)

More Information

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RPAS and case of Ammonium 31.10.2016/Kuopio tests. Sensor /Environics Oy