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OFFSHORE OIL COMBAT OPERATIONS DURING COVID-19 PANDEMIC

PETROLEUM
ASSOCIATION
OF JAPAN

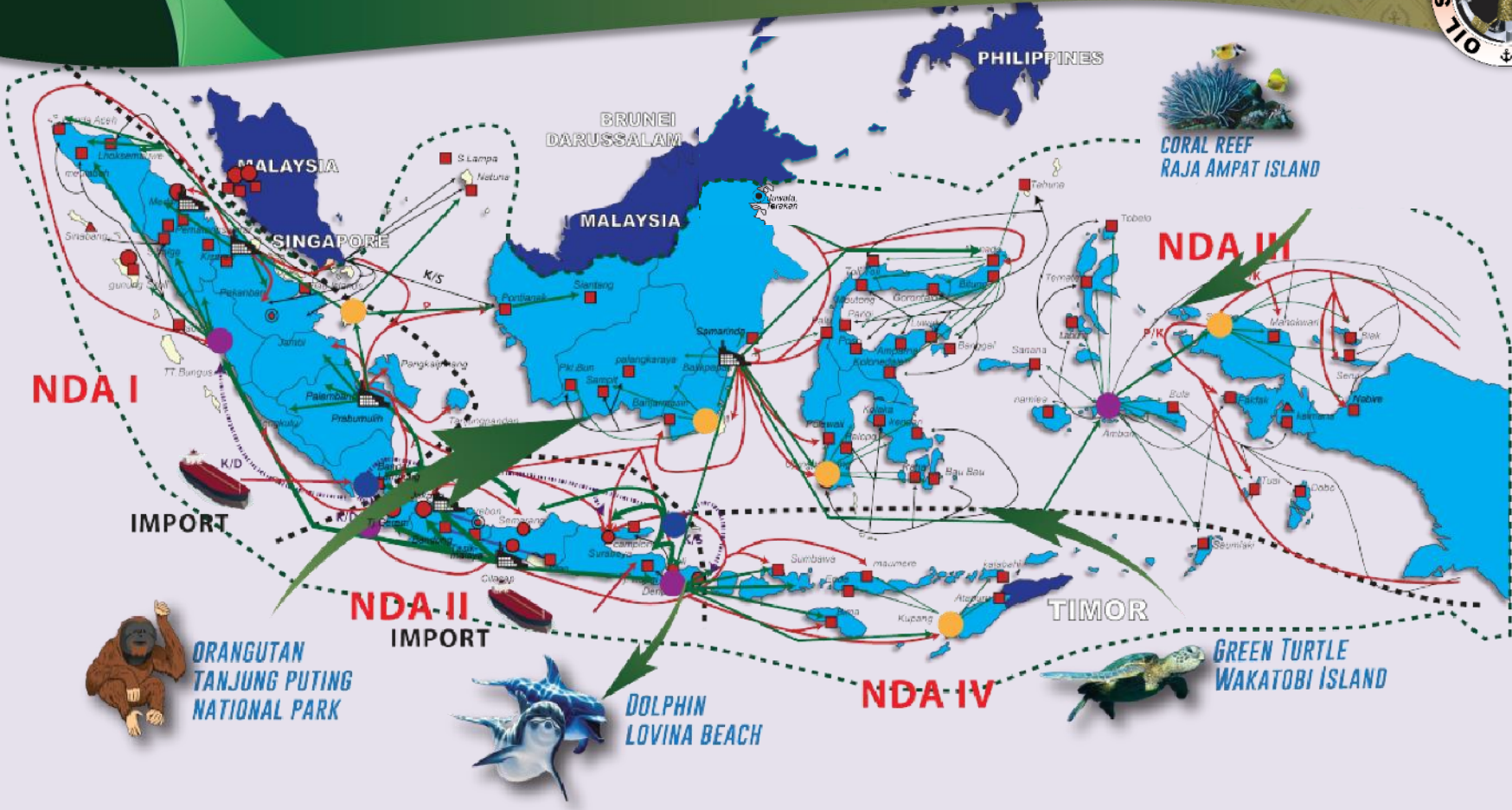
February 2022 - Oil Spill Workshop





Map Legend	
	= OSCT INDONESIA HEADQUARTERS
	= OSCT STOCKPILE
	= Indonesia Border
	= By Vessel
	= By Boeing 737
	= Airport for Boeing 737

Oil Spill Combat Team (OSCT) Indonesia is an Oil Spill Combat Centre with Headquarters located in West Java with six bases across Indonesia and base of operations in Thailand and India. OSCT has over 44,000 meter of oil boom, 122 skimmers and 170 trained responders in Indonesia.

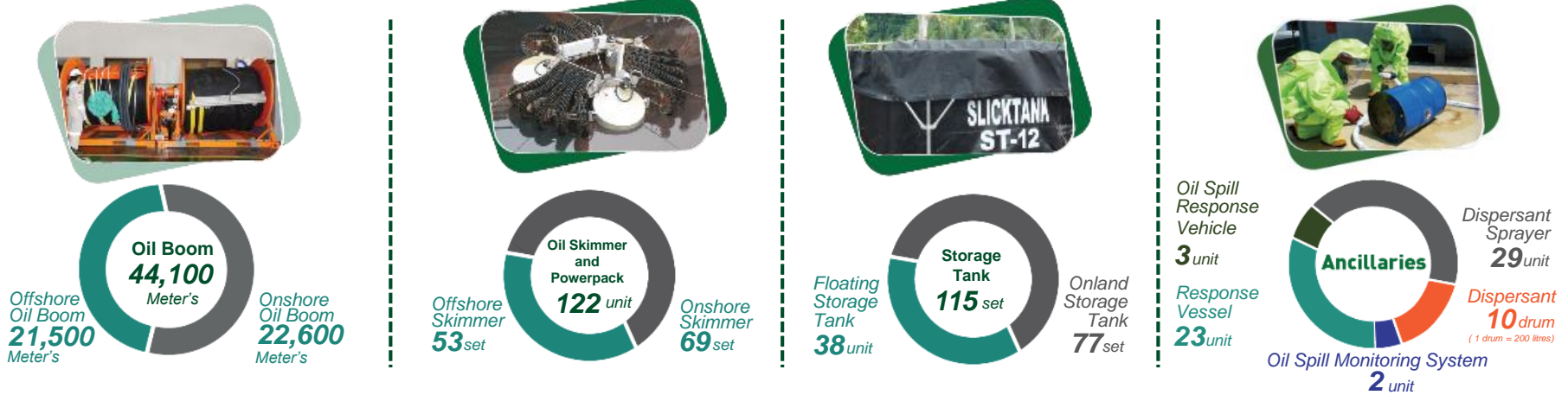


Map Legend					
■ = FUEL DEPOT	= REFINERY UNIT	→ = CRUDE OIL DISTRIBUTION CHANNELS	▲ = JOBBER	 = Indonesia Border	NDA = NATIONAL DISTRIBUTION AREA
● = TT/INSTALLATION	● = FLOATING STORAGE	→ = REFINE OIL PRODUCT DISTRIBUTION CHANNELS	● = TRANSIT TERMINAL	● = BACKLOADING TERMINAL	P: PETROL K: KEROSENE D: DIESEL

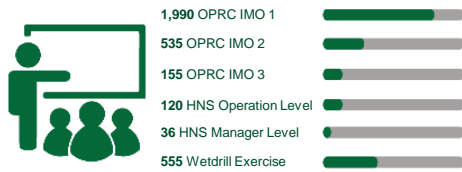
To support the Indonesian Government target towards oil production 1 million barrel per day, our mission is to protect Indonesia's & World's natural environment as Indonesia's largest spill combat center & one of the largest in the world. With 85% of its territory is ocean, Indonesia has big risk of spill pollution from oil & gas operation which can pollute sensitive areas & world heritage sites.



Oil & Chemical Spill Combat Equipment



Training



Experts



Oil Spill Contingency Plan



Clients and Members

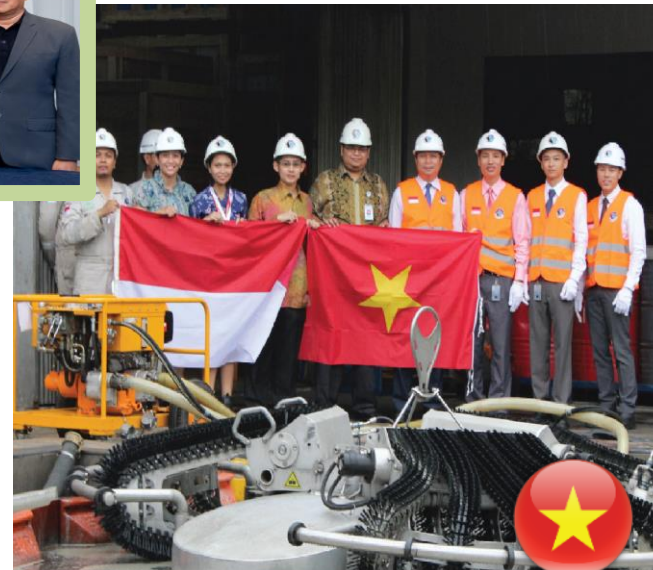


Certification



OSCT capability as National Oil Spill Response Center is approved by Ministry of Transportation, Ministry of Energy & Mineral Resources & Internationally Certified by Nautical Institute According to IMO Standards.

Mutual Cooperation



Currently OSCT Indonesia has signed International Cooperation MOU with international OSRO in 7 countries for mutual cooperation and assistance to deliver an effective and efficient response.

Mutual Cooperation



OSCT Indonesia able to mobilize OSRE from Asia-Pacific region including Thailand, Vietnam, South Korea, Malaysia, Singapore, Hongkong, Japan and China in case of major international oil spill and to support our member who have drilling and production activity near country border.



THAILAND

CHINA

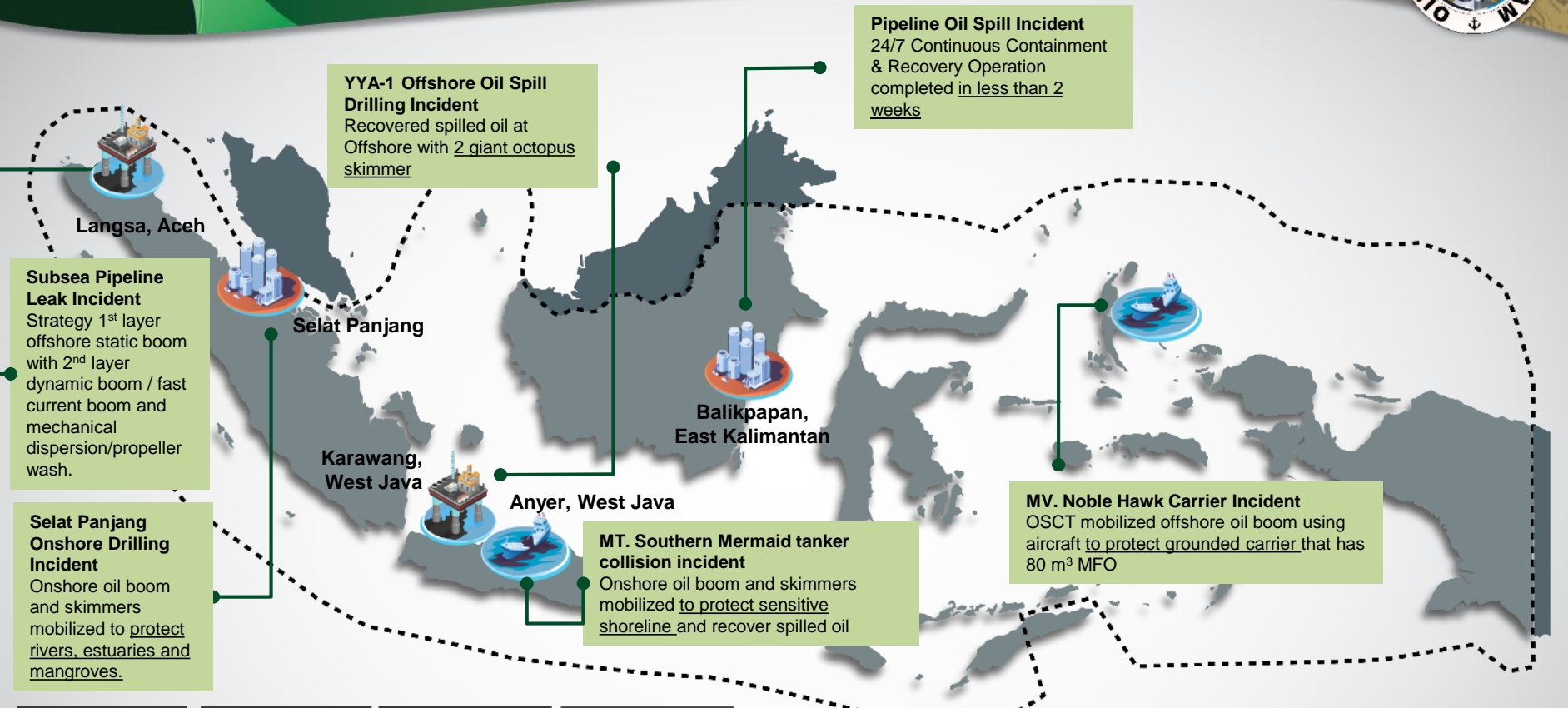
QATAR

TIMOR



Map Legend

OSCT Indonesia have combated more than 60 oil & chemical spills in Indonesia and around the world including China, Qatar and Thailand supported by response experts that have more than 36 years of experience. Recently, we experienced in handling offshore oil spills due to subsea pipeline leak in Langsa, Aceh Province, Indonesia



MALAYSIA	THAILAND	CHINA	QATAR

Legend

Offshore Oil Spill	Tanker Incident	Onshore Oil Spill	HNS Incident

OSCT experiences in combating oil spill incident related to oil and gas operation such as in Selat Panjang – Onshore Drilling Incident, Balikpapan – Pipeline Oil Spill Incident, Anyer – Tanker Collision Incident, and Buli – Carrier Grounding Incident, major oil spill is offshore spill at West Java near Jakarta and recent offshore oil spill incident in Langsa Waters, Aceh Province – Subsea Pipeline Leak



BPSPL PADANG
DIREKTORAT JENDERAL PENGELOLAAN RUANG LAUT
KEMENTERIAN KELAUTAN DAN PERIKANAN

KAWASAN KONSERVASI PESISIR
DAN PULAU-PULAU KECIL

PETA PENCADANGAN
KAWASAN KONSERVASI PERAIRAN
KABUPATEN ACEH TAMIANG

Lembar : 01



Sistem Koordinat: UTM
Sistem Grid: UTM
Datum: WGS 84

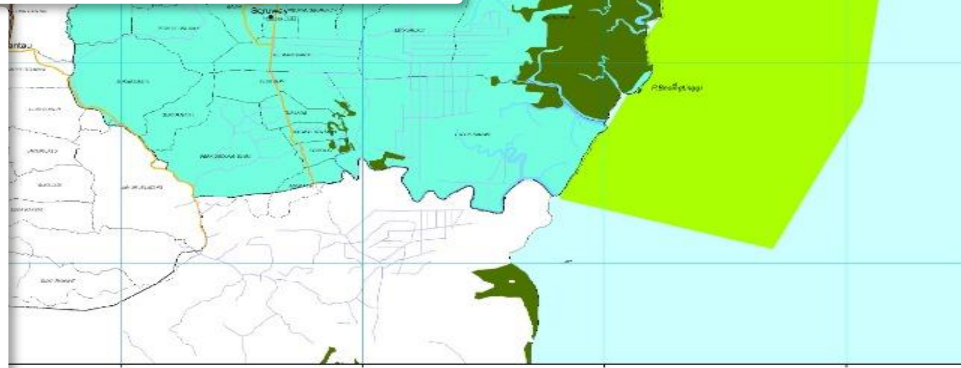


LEGENDA

- Bataske Perairan-terapan
 - Bataske Kotamadya
 - Bataske Kecamatan
 - Bataske Kelurahan
- Batas Administrasi
 - Batas Teritorial RI
 - Batas Kabupaten/Kota
 - Batas Kecamatan
 - Batas Kelurahan/Desa
- Sistem Jaringan Perairan
 - Jalan Arteri
 - Jalan Kolektor
 - Jalan Lokal
 - Jalan Lingkungan
 - Ruteng Bandar
- Perairan
 - Galis Pantai
 - Sungai
 - Danau
- BANDA MULIA
 - BENDAHARA
 - MANYAK PAYED
 - IDIRAYEUK
- MANGROVE
 - KKPD ACEH TAMIANG

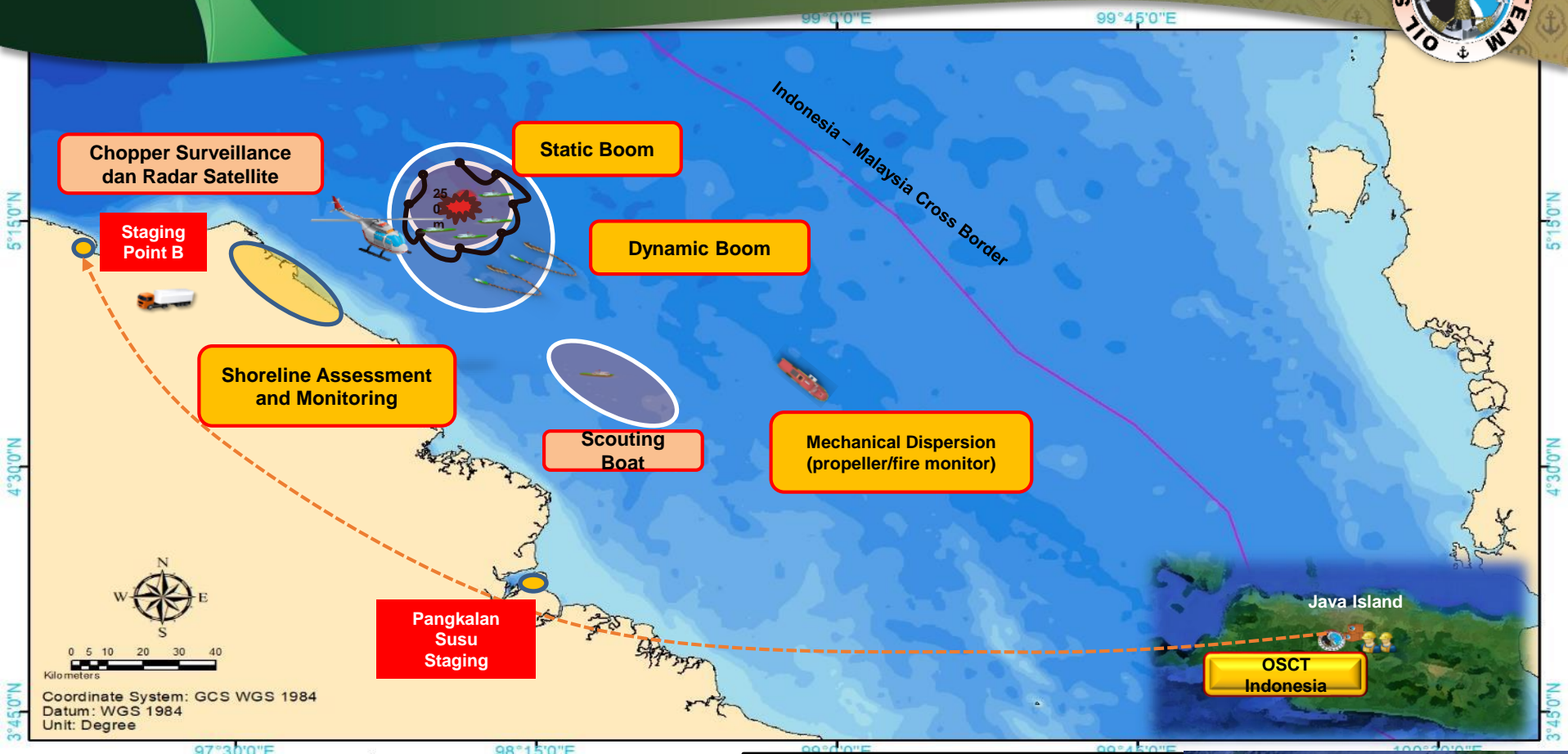
KETERANGAN RIWAYAT & SUMBER PETA
1. Peta RIS 1:50.000 BIG tahun 2016
2. FGD dan Konsultasi Publik Pencadangan Kawasan Konservasi Perairan Daerah, 7 September 2018

USULAN KKPD ACEH TAMIANG
Meliputi Kec. Seruway, Bendahara,
Banda Mulia dan Manyak Payed
TOTAL LUAS : 28.115,95 Hektar

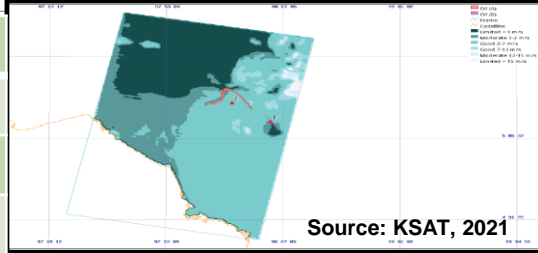


The coastlines closest to the source of the spill are Idi Rayeuk, Peureulak and Kuala Langsa with a profile of tourist beaches, settlements, river, estuary, mangroves and ponds. Sandy beaches dominate the type of beach on the west coast of Aceh. There is a Kuala Langsa Mangrove Tourism Forest, wherein 22 types of mangroves and animals found in that area.

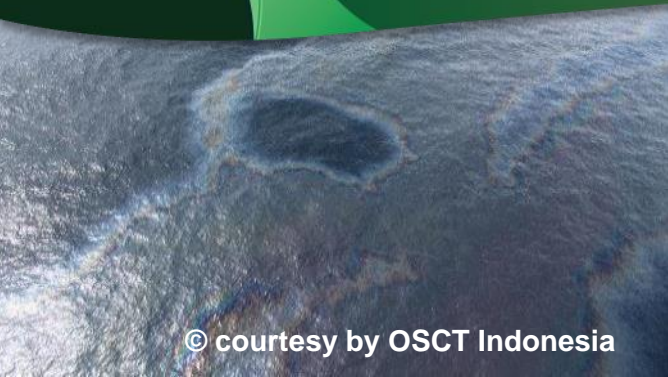
Major Offshore Subsea Pipeline Leak – Langsa



Spill Source	H-4 Well
Location	Langsa. Aceh Province
Time	August 8, 2021
Oil Characteristics	Very Light Crude Oil (API 41,8)



The incident occurred on August 8, 2021 in Langsa, Aceh. OSCT activated on August 8, 2021 and conducted oil spill modelling and radar satellite to predict the oil spill movement and recommend response strategies before it impacted shorelines



© courtesy by OSCT Indonesia



© courtesy by OSCT Indonesia



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8 August

Notification Gas bubbles appear in Offshore Waters. Physical Breakup strategy is used as a first step to overcome. Aerial surveillance and satellite radar to monitor the movement of oil spills

13 August

Dynamic Boom strategy using 2 supply vessels was carried out. Comes with Buoy installation for Static Boom



© courtesy by OSCT Indonesia



© courtesy by OSCT Indonesia

29 August

Implementation of the Static Boom strategy, using the Offshore Boom gradually by considering the direction of the flow and entry of ships to the configuration.

18 August

The spill source closure strategy was successful

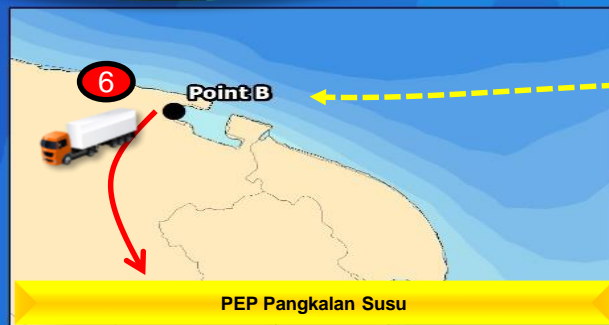
OSCT was activated on 8th August 2021 and carried out trajectory modeling and satellite radar to see oil movement and parallel support operations on site, the team arrived on 9th August 2021 with a physical breakup / mechanical dispersion countermeasure strategy, and started a dynamic / static boom on 13th August 2021 (waiting for supply vessel/AHTS as mother vessel) and installation will be completed on 29th August 2021. On 18th October 2021 the spill source has been successfully closed.





98°15'0"E

*Gambar tidak berdasarkan skala



Radar Satellite Detection

Mechanical Dispersion/propeller wash
2 Boat @ 8 Sept 2021

Fast Current Boom

1 Dynamic Boom

© courtesy by OSCT Indonesia

2 Static Boom & Skimmer

© courtesy by OSCT Indonesia

3 Mechanical Dispersant

© courtesy by OSCT Indonesia

4 Current buster

© courtesy by OSCT Indonesia

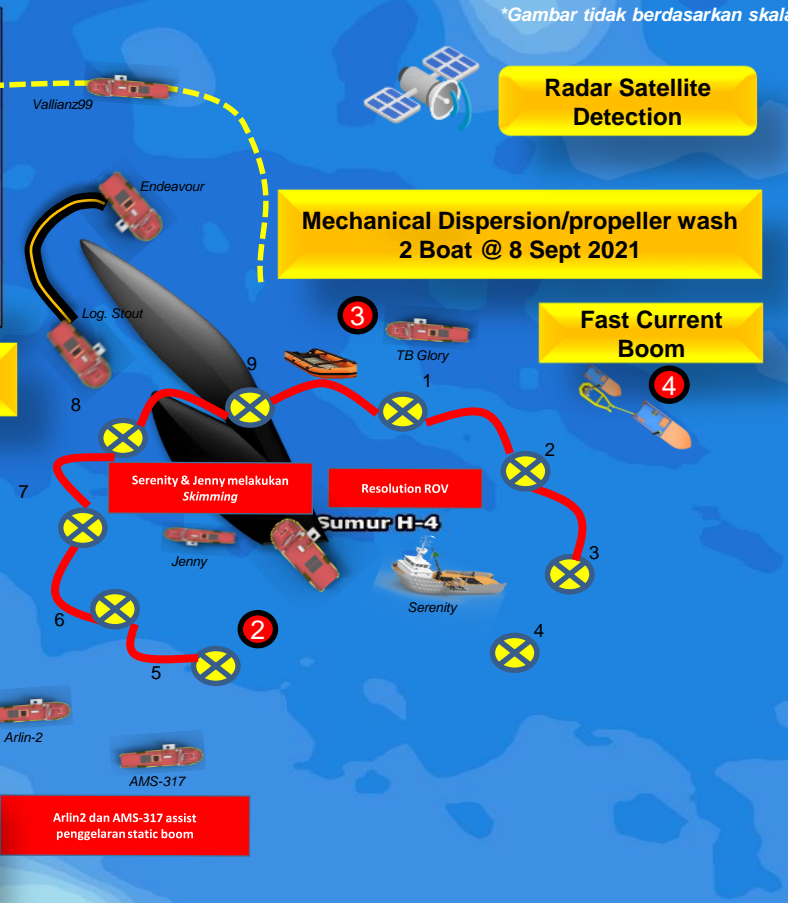
Dynamic Boom

Aerial Surveillance

Drone Surveillance

Shoreline Assessment and Protection (Vessel Surveillance and Shoreline Boom)

0 2.5 5 10 15 20
Kilometers
Coordinate System: GCS WGS 1984



4800 m Static Boom, 800 m Dynamic Oil Boom, 2025m onshore boom, 1 unit Fast Current Boom

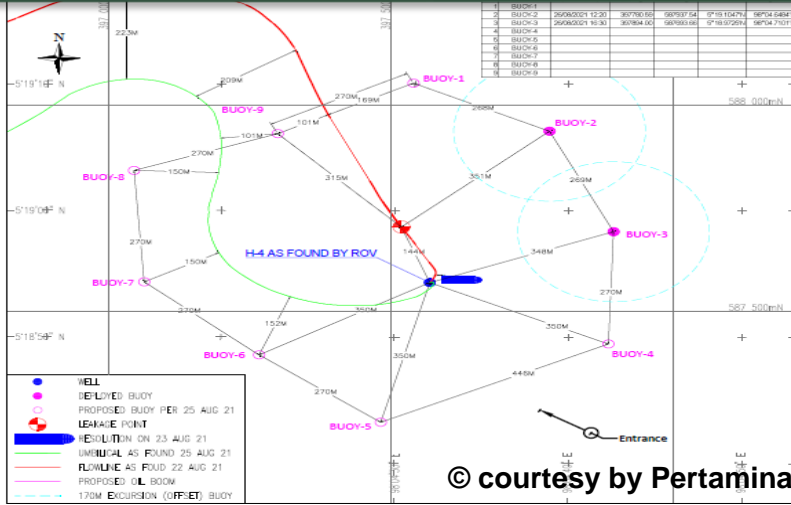
5 unit Offshore Oil Skimmer dan 4 unit shoreline skimmer

13 Vessels

Offshore oil spill response using containment & recovery strategy consisting of 1st layer offshore static boom to hold oil continuously with 2nd layer dynamic boom / fast current boom. Recover spilled oil by offshore skimmer and the rest is handled with mechanical dispersion/propeller wash. If oil spill leads to shoreline, response team will deploy a boom to protect sensitive areas



Static Boom Required



Encounter Rate:
The rate at which oil and/or emulsion is encountered by the skimmer

Encounter Rate (m³/hour):
Swath Width (m) x Thickness (mm) x speed (m/s)

Oil Boom Swath Width:
Circumference (C) = π D

Skimmer Recovery rate:
The rate at which a skimmer recovers oil

Oil Boom Swath Width Calculation

Circle Wide : $\pi \times r^2 = \frac{1}{4} \pi \times D^2$
 Circumference : $2 \times \pi \times r = \pi \times D$

Diameter Circle = $\pi / \text{Circumference}$
 D = diameter = Swath Width of Oil Boom

Oil Boom = $\frac{1}{2}$ Keliling Lingkaran = 400 m
 400 = $\pi \times D \times \frac{1}{2}$
 D = "400 x 2" / 3.14
 D = 225

Parameter	Encounter Rate (ER)	Skimmer Recovery rate*	Potential Oil Recovered**
Static boom configuration with brush/steel disc octopus skimmer. Swath width of 255 m for 400 m oil boom. Oil slick thickness is assuming 1 mm for crude oil (black to orange). Speed of 0.35 m/s (0.7 knots).	(255 m) x (1 mm) x (0.35 m/s) = 320 m ³ /hour	1 skimmer 100 m ³ /hour	600 m ³ /day
		3 skimmer 300 m ³ /hour	1,800 m ³ /day

Skimmer Performance Calculation

* The Skimmer recovery rate effective is 100 m³/hour
 ** Assuming 6 hours response period in a day.

Oil volume analysis based on aerial, the oil is 20% (at 09.00) of the configuration (64 m³/hour)
 Therefore 1 configuration of oil boom with 1 skimmer system of 100 m³/hour recovery capacity can sufficiently recover 64 m³/hour of spilled oil.

Assume the oil volume fully trapped in boom configuration (320 m³/hour), 1 configuration of oil boom with 3 skimmer system of 300 m³/hour recovery capacity can recover 320 m³/hour of spilled oil.

Parameter	Quantity
Radius (dari H-4 Langsa Well)	500-550 m
Distance of buoy mooring	250 m
Oil boom each of configuration	300-400 m
Required Mooring Buoy	10 Configurations
Mooring Buoy	11 pcs (spare 9 buoy)
Total Required Oil Boom	4.000 m (@400 m)
Safe distance from the well	500 m
Length of water depths	3 x water depth H-4 Well ± 100 m

The containment static boom localizes about 20% of the total 350-400 m oil boom, requiring a minimum of 1-2 skimmers to operate with a capacity of 64-100 m³/hour.



Static Boom and Skimmer Configuration



© courtesy by OSCT Indonesia



© courtesy by OSCT Indonesia

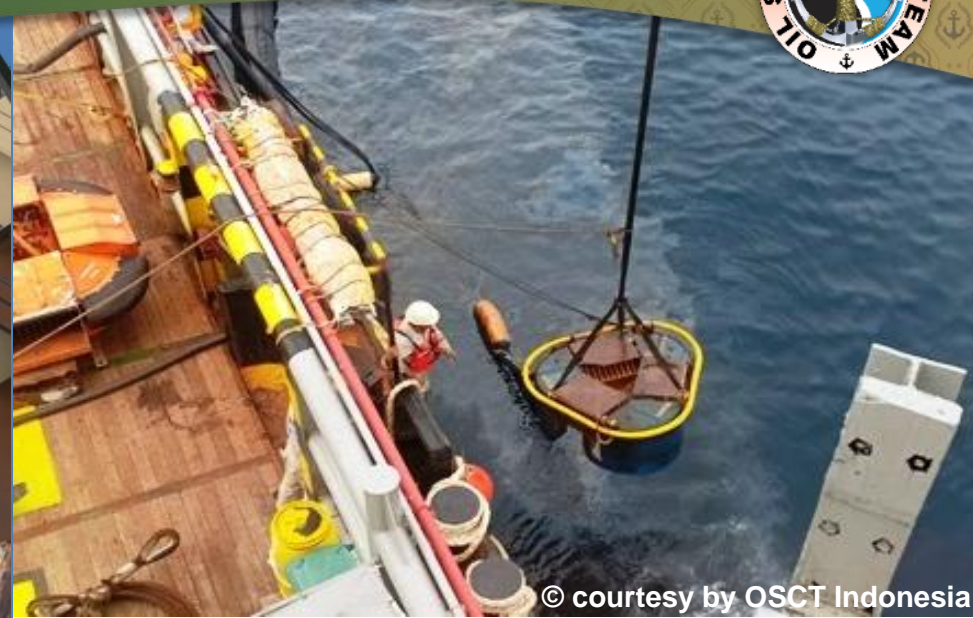
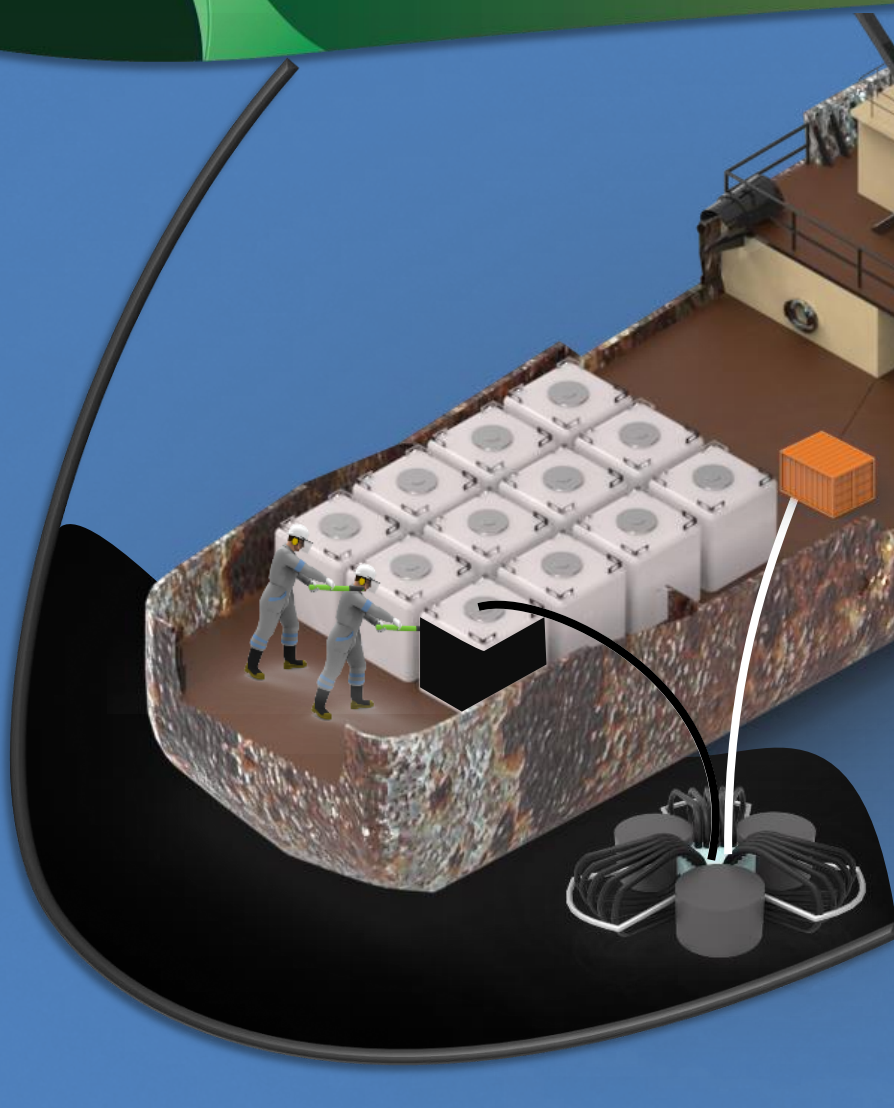


© courtesy by OSCT Indonesia



© courtesy by OSCT Indonesia

4800 meter offshore boom used for offshore configuration, to locate oil spills near the source. Necessary to pay attention to durability, backup/mirror of equipment, compatibility and connectable oil boom used for continuous operation



Offshore oil spill response using Offshore Inflatable Boom for Dynamic Boom and Disc Skimmer for Light Crude Oil. And then the oily water accommodated in IBC tank on board the ship and mobilized to Shorebase and then immediately taken to the processing facility.



Absorbent at Static Boom



© courtesy by OSCT Indonesia



© courtesy by OSCT Indonesia



© courtesy by OSCT Indonesia

The absorbent boom is installed in a Static Boom configuration, as an absorbent material for the localized oil sheen in the apex of the oil boom.



Mechanical Dispersion

Propeller Wash



© courtesy by OSCT Indonesia

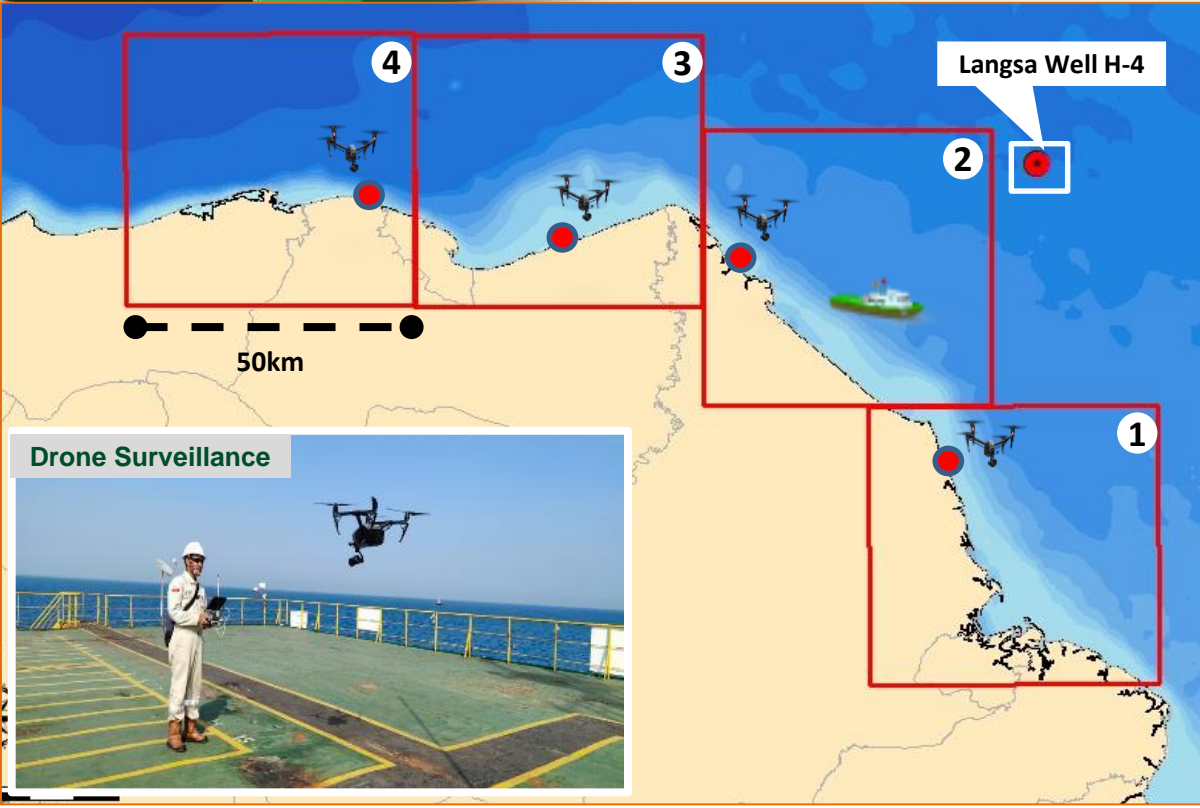
Fire Monitor



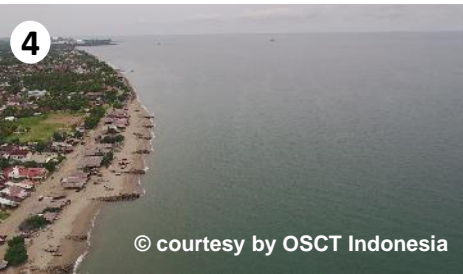
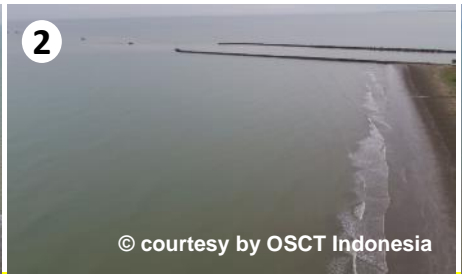
© courtesy by OSCT Indonesia

As a response strategy, mechanical dispersion in Langsa Spill quite effective for light oil types. Using the ship's propeller and fire monitor.

When the oilboom configuration has been deployed, mechanical dispersion is used to break up the oil that escapes the oilboom configuration. Dispersant is not effective for light oil



Division	Point	Coordinate
1	a	Kuala Beukah 4°51'45.26"N 97°54'49.23"E
	b	Ujung Pereulak 4°53'19.62"N 97°54'3.63"E
2	a	Idi Rayeuk 4°57'36.77"N 97°46'42.30"E
	b	Matang Kruet 5° 4'51.00"N 97°42'0.00"E
3	a	Muara Sungai 5°14'31.64"N 97°28'59.36"E
	b	Kuta Glumpang 5° 8'58.74"N 97°13'37.13"E
	c	Muara Sungai 5° 9'44.76"N 97° 8'32.83"E
4	a	Muara Sungai 5°15'2.01"N 96°54'37.38"E



Shoreline protection preparedness required when oil spill occurs offshore, as a preventive strategy before oil spills reach sensitive areas, carried out every day using ships and drones to get wider observations with a distance limit of 2-4 km. drones using geotagged photos and videos are prepared before an oil spill incident occurs so that the response process runs effectively and efficiently.



Spill Assessment, Detection & Surveillance

Containment and Recovery

Shoreline Monitoring & Sensitive shoreline protection

Mechanical Dispersion / Propeller Wash

Oil spill response strategy consists of 3 aspects, assessment/detection/surveillance, containment and recovery, mechanical dispersion/propeller wash sensitive shoreline assessment and protection



Offshore Boom	Offshore Skimmer	Onshore Boom	Onshore Skimmer	Dispersant
 <p>© courtesy by OSCT Indonesia 21,500 Meters</p>	 <p>© courtesy by OSCT Indonesia 53 Set(4 Giant Octopus)</p>	 <p>© courtesy by OSCT Indonesia 22,600 Meters</p>	 <p>© courtesy by OSCT Indonesia 69 Sets</p>	 <p>© courtesy by OSCT Indonesia 14,800 Liters</p>

There are 21 km offshore boom and 22 km shoreline boom available domestically for Tier-2/3 response. OSCT Indonesia resources can fulfill several oil spill incident response

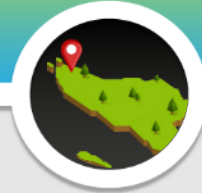


Covid-19 Protocols



- ❑ Comply with departure requirements in each worker's origin location and health protocols in designated workplace location

Medical Clearance



- ❑ Medical Clearance issued by Medical Team for each workers both from local and non-local of Lhokseumawe
- ❑ Local Workers :
 - 4 days quarantine
 - PCR on the 5th day, controlled quarantine
- ❑ Non-Local Workers :
 - 2 days quarantine, Antigen on 3rd day.

Response Location



- ❑ Inform Master Vessel about personnel fulfilled medical clearance requirements to duty on vessel
- ❑ Fit with note medical personnel have to follow up according to medical recommendation
- ❑ Personnel would replace duty rotation after passed medical clearance

Virtual Incident Command Post



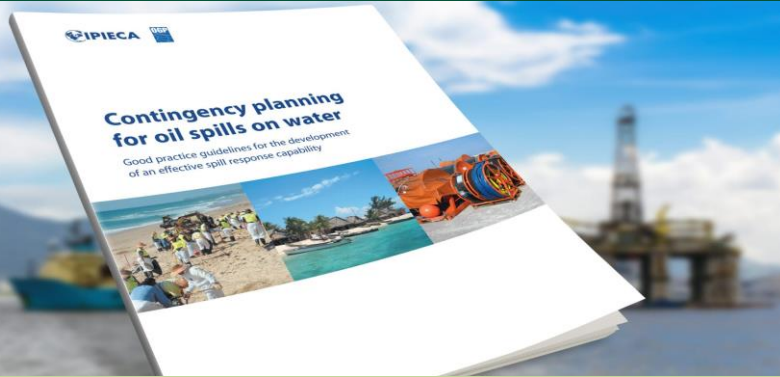
- ❑ Emergency response meeting conducted virtually and separate room with other section chiefs is quite challenging due to unfamiliar situation, in which could lead to miscommunication and miss data interpretation.

Oil spill response for Langsa Spill, is quite challenging due to occur in the pandemic Covid-19 situation, total personnel onboard about 252 for SERT must through screening test (PCR/Antigen) and quarantine for several days before on duty. In addition, technical meeting and situation report conducted by online/virtual mode which could lead to miscommunication and miss data interpretation.



OIL SPILL COMBAT PLAN & PREPAREDNESS

For oil & gas operation, it is important to have approved contingency planning complete with ESI & SCAT for effective & quick response.



EFFECTIVE RESPONSE STRATEGY

Static boom strategy effective for continuous spill, in which supported by live trajectory modelling with accountable data form BMKG (national agency for weather forecaster)/LAPAN BRIN Satellite Radar, verifying with actual conditions based on chopper/vessel surveillance. It requires also planning for resources mobilisation.



© courtesy by OSCT Indonesia

RESPONSE DURING COVID-19

In a COVID-19 pandemic situation, very important to have a Health Protocol which integrated with Incident Management Team (IMT) and Site Emergency Response Team (SERT) activities. IMT could activate and work online supported by virtual conference/software and Health Protocol onsite supported by the HSE team.

1

Health Protocol from Origin City



2

Quarantine & Screening Test



3

Medical Clearance



4

Assignment for Response



5

Virtual Incident Command Post





24 HOUR EMERGENCY CALL

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TERIMA KASIH

THANK YOU

ありがとう

ขอขอบคุณ

Cảm Ơn

고맙습니다

Спасибо

Kiitos

Merci

شكرا لك

Gracias

谢谢



**PREPAREDNESS IS KEY TO
A SUCCESSFUL RESPONSE**