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MAJOR OIL SPILL NEARSOURCE CONTAINMENT & Regional Co-operation Experience

COAN

PETROLEUM ASSOCIATION OF JAPAN 14 February 2020 - Oil Spill Workshop



Oil Spill Combat Team (OSCT) Indonesia is an Oil Spill Combat Centre with Headquarters is located in West Java with six bases across Indonesia and base of operations in Thailand and India. OSCT has over 25,000 m of oil boom, 60 skimmers and 200 trained responders in Indonesia.



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. Our most recent major oil spill is offshore spill at West Java near Jakarta.



The Thousand Islands (officially Kepulauan Seribu) are a chain of islands to the north of Jakarta's coast near West Java. It consists of a string of 342 islands stretching 45 km (28 mi) and is a popular tourist area and protected wildlife.

Major Oil Spill Incident at West Java



Sedari (Day 7-found spilled



The incident occurred on 15 July 2019 at Karawang, West Java, OSCT activated on the same day and tracked spill using trajectory modelling and radar satellite to respond to oil spill before it impacted shorelines.

Oil Spill Contingency Plan and Response Preparedness

OIL SPILL CONTINGENCY PLAN





PERTAMINA PHE ONWJ as Offshore North West Java Block Operator were incident occurred has valid comprehensive Oil Spill Contingency Plan (OSCP) that have been approved and certified by Government of Indonesia, and PHE ONWJ has oil spill response equipment and personnel on site according to OSCP and if more resources are required on call arrangement from surrounding area and OSCT Indonesia.

Oil Spill Combat Timeline

© Picture from PERTAMINA Website

Day 1

Day 12-13

© Picture from News Outlet

Gas bubbles appears around platform while drilling activity is ongoing and dynamic boom deployed using "J" configuration with two vessels Day 5

Oil boom deployed to protect shoreline area at Karawang

© Picture from News Outlet

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© Picture from PERTAMINA Website

Static boom installation with skimmer implemented and jack up rig for relief well arrived on-site Day 17

Relief well drilled obliquely. Drilling is carried out to a certain depth of Platform by compressing heavy mud from new well

© Picture from PERTAMINA Website



Near-Source Response Strategy

(National Power Plant Facility)

OSCT Indonesia implemented near source containment strategy using 2 layers of offshore boom connected with mooring buoys to contain oil spill that comes out continuously from the source. Mechanical brush/steel disc skimmers was used to recover contained emulsified oil. This strategy can also be used for large tanker or vessel incident

Mooring E

Oil boom:

Boom & Skimmer Containment Calculation

			*	•
	 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 CalculationCircle Wide: $\pi \times r^2 = \frac{1}{4} \pi \times D^2$ Circumference: $2 \times \pi \times r = \pi \times D$ Diameter Circle = π /CircumferenceD = diameter = Swath Width of Oil BoomOil Boom = $\frac{1}{2}$ Keliling Lingkaran = 400 m400= $\pi^* \times D^*/2$ D= "400 x 2" /3.14D= 225		
Swath Width: 255 m	Parameter	Encounter Rate (ER)	Skimmer Recovery rate*	Potential Oil Recovered**
Buoy	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	1 skimmer 100 m ^{3/} hour	600 m ^{3/} day
		m/s) = 320 m³/hour	3 skimmer 300 m ^{3/} hour	1,800 m ^{3/} day
Bin Marie /	Skimmer Performance Calculation * The Skimmer recovery rate effective is 100 m³/hour ** Assuming 6 hours response period in a day.			
400 m	Oil volume analysis based on aerial, the oil is 2 Therefore 1 configuration of oil boom with capacity can sufficiently recover 64 m ³ /hour of :	0% (at 09.00) of 1 skimmer sys spilled oil.	f the configuratio tem of 100 m ³ /	n (64 m ³ /hour) /hour recovery
	Assume the oil volume fully trapped in boom	configuration (3	20 m ³ /hour), 1 c	configuration of

One configuration of near source Static Oil Boom requires offshore boom ± 400 meters connected to two

oil boom with 3 skimmer system of 300 m³/hour recovery capacity can recover 320 m³/hour of

mooring buoys and large skimmers that can recover contained oil to prevent oil from escaping

This is the actual implementation of near source containment using two layers of 9,150 meters static and dynamic boom with spare 2,000 meters of boom as backup mirror/maintenance

Double layer protection (second layer static boom) was implemented to fully contain the oil if some leaked through the gap in between mooring buoys. In addition, dynamic boom on standby to contain in-case oil leaked from second layer static boom, hence total of 3 layers of near source containment.

Trained Responders for Near-Source Containment

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© photos by OSCT Indonesia

To increase effectiveness & efficiency of near source containment, each deployment/skimmer vessel has 3 responders and 1 supervisor accredited OPRC IMO 1 and 2 by Nautical Institute that supervise equipment deployment safely and to avoid boom & skimmer damage for over 2 months 24/7 operations

Increasing Effectiveness of Near-Source Containment and Recovery

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© Pictures from PERTAMINA PHE website

The oil was emulsified, hence dispersant was not effective but can be contained effectively with oil boom and recovered during day time with brush/steel disc type skimmer assisted with vessel water pump flushing. Oil was pumped to IBC tanks onboard skimmer vessel and transported daily to barges via crane

Offshore Skimmer Performance

OFFSHORE SKIMMER & NAME PLATE RECOVERY CAPACITY	PERFORMANCE	OFFSHORE SKIMMER & NAME PLATE RECOVERY CAPACITY	PERFORMANCE
Giant Octopus (Brush Skimmer) For a state of the state 	 High Recovery rate, for emulsified oil Brush getting stuck & cannot be operated. Since brush need to be removed and then replaced 	Weir Skimmer 500/800 (Brush Skimmer) Weier Skimmer Skim Skimmer Skim Skimmer Skim Skimmer Skimmer Skim Skim Sk	 Moderate recovery rate for emulsified oil Skimmer floatation arm can be damaged by vessel fender/body during continuous operation
SeaSkimmer 50 (Steel Disc)	 Moderate recovery rate for emulsified oil Skimmer not easily damaged due to steel disc construction 	Giant Brush LWS 1300 with Umbilical	 High Recovery rate, for emulsified oil Need Welding and installation to the vessel before operation
Multi Skimmer 140 (Brush Skimmer) The second state of the second s	 Moderate recovery rate for emulsified oil Skimmer head can be interchangeable between brush and steel disc for easy maintenance and operation 	Giant Brush Mechanical Transrec with Umbilical	 High Recovery rate, for emulsified oil Need Welding and installation to the vessel before operation

Standby Aerial Dispersant Spraying

© video by OSCT Indonesia

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Aerial Bucket Spraying was put on standby in case it is required, ready to disperse oil if oil spill escape configuration towards water depth more than 20 meters

Shoreline Protection Strategy

COMB

Overview Response Strategy & Planning

COMA

Oil Spill Shoreline Response Strategy consist of four primary aspects which is oil spill assessment/detection/surveillance, containment and recovery, sensitive shoreline protection, shoreline cleanup and monitoring

Shoreline Protection with Pre-SCAT & Drone/ UAV

Pre-SCAT

COMB

Indonesia

© Pictures From News Outlet

Pre-Shoreline Cleanup Assessment Technique (SCAT) using trained specialist, drone and Unmanned Aerial Vehicle (UAV) using geotag photo and video needs to be done before the incident occurred, in order to determine appropriate response strategy, amount of equipment and logistic mobilization in certain area.

For surveillance drone is easier to use but has distance of only 2 to 4 km, whereas UAV requires clear area to launch and land but with longer distance up to 20 to 40 km depending wind on condition. For offshore survey due to high wind helicopter is safest option.

Recovery Containment & Shoreline Protection

Protection Strategy

7 February 2020 21.05 6° 10' 54" S, 106° 50' 14" E Jalan Arief Rachman Hakim Menteng Jakarta Indonesia W E

© Pictures from News Outlet

Oil spills that is detected heading to shoreline is recovered using oil boom, vacuum skimmer and absorbent. To prevent oil from entering river/settlement area, protection booming is deployed as priority.

Shoreline Response Supervision and Training

For this response there are over 2,000 personnel consisting of local community, army and local boats. These personnel required daily supervision from 100 accredited IMO supervisor. Safety training and adequate PPE is required before operation and first priority is safe operation using equipment such as oil boom, vacuum skimmer, pressure washer and absorbents.

Offshore Response Chart

SKIMMER (UNIT)

Offshore Oil Boom and Vessels Chart

Source: PERTAMINA PHE Website

21-AUB

20-448

22-1418

1st layer of **4200** meters and 2nd layer of **400** meters offshore boom and 3 skimmers was deployed on 10th August 2019, 1st layer of **4150** meters and 2nd layer of **1300** meters offshore boom and 5 skimmers was deployed on 22nd August 2019. It can be seen oil recovered significantly from 400 KL/day on 10th August 2019 to 2000 KL/day on 22nd August 2019 since offshore boom installation increase over **1000** meters and 2 skimmers.

This shows as more static boom installed, more oil can be contained and recovered by skimmers.

Onshore Oil Boom and Responders Chart

On 10th August 2019 was deployed **2700** meters onshore boom with **2856** responders, On 22nd August 2019 was deployed **6525** meters onshore boom with **3985** responders. It can be seen that more deployment of onshore boom requires more responders and resources.

There are about 11 km of offshore boom and 12 km of shoreline boom for this West Java incident. OSCT Indonesia resources covers over 75% of the national oil spill response resources to respond to major oil spill incidents.

OSRE Resources from Regional Assistance

OSCT Indonesia mobilized OSRE from Asia-Pacific region including Thailand, Vietnam, South Korea, Malaysia and China. Our largest regional assistance came from Petroleum Association of Japan (PAJ) originated from Indonesia and Malaysia.

Inflatable Sea Boom with Single Point Inflation System HI-Sprint 1500 – 750 m Combination Skimmer – 1 Set Portable Tank cap. 9 tons – 16 Sets

Equipment from PAJ Base in Indonesia and Malaysia was mobilized to OSCT Indonesia Headquarters and then sent to offshore incident site immediately

Equipment Shipment Timeline

22 July 2019

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Equipment Request Form sent to PAJ OSR Team and Equipment picked up at the same day at PAJ Indonesia Base

25 July 2019

PAJ Offshore Boom and Powerpack sent to Offshore site

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29 Aug 2019

PAJ Equipment from Malaysia Base arrived at OSCT Headquarters 04 Sept 2019

PAJ Offshore Boom and Powerpack sent to Offshore site

Appreciation to PAJ

Oil Spill Combat Team Indonesia thank Petroleum Association of Japan for the assistance during this major oil spill incident.

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OSCT Indonesia イン ドネシアは、この大規 模な油流出事故の際 の支援について Petroleum Association of Japan に感謝します。

Time vs Depth

Relief Well was conducted safely and completed 1 week ahead of scheduled time

Well Killing Operations Phase (21st September 2019)

がようやくYYA-1に迎撃貫通を行った

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Summary Lesson Learnt

OSCP COMPLETE WITH ESI & SCAT

In major spill incident involving combined stakeholder coordination from private sector and government, important to have contingency planning complete with ESI & SCAT to increase response process. Consideration of using unified coordination

OIL SPILL RESPONSE TRAINING

To increase oil spill response especially in shoreline response regularly training need to conduct. This purpose of this training is to improve oil spill response equipment, personnel, logistics, and local resources capability & preparedness

LOGISTIC & STAGING AVAILABILITY MAPPING

In oil spill response, availability of logistic is the key to speed up response activates and mobilization of equipment. Therefore logistical availability must be mapped beforehand to simplify and speed up response activities

EFFECTIVE RESPONSE STRATEGY

Near source containment static boom is an effective response strategy able to work 24/7, and is efficient because it does not require vessels to operate once moored. This is now adopted as standard strategy for oil spill contingency plan and response in Indonesia.

PREPAREDNESS IS KEY TO A SUCCESSFUL RESPONSE

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