MAJOR OIL SPILL NEARSOURCE CONTAINMENT & REGIONAL CO-OPERATION EXPERIENCE

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Slide 1: Introduction

Good afternoon everyone, my name is Yodi, I am the Operations Director of Oil Spill Combat Team Indonesia and in this opportunity I would like to talk about our recent major oil spill experience and regional co-operation experience. This presentation is about recent major oil spill that occurred last year in West Java and I will explain about the near source containment for the response and regional cooperation for this major oil spill. Firstly, I will briefly explain about OSCT Indonesia.

Slide 2: OSCT Profile

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. As we all know, Indonesia is the largest archipelagic country in the World with over 17,000 islands, 240 million people and the fourth longest coastline at 95,000 km. 85% of Indonesia's territory is ocean and has a big risk of oil spill pollution from major shipping routes, over 200 ports and oil terminal. Indonesia also has one of the largest oil activity in the World including oil production, import and export with over 3.5 million barrels per day.

Slide 3: Oil Spill Combat Experiences

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 that focusing on near-source containment. From each incident, every lesson was taken to improve the effectiveness and efficiency of oil spill combat planning and operations.

Slide 4: Thousand Island – Jakarta

Our capital city is Jakarta. In this picture you can see an area called Thousand Islands (officially named Kepulauan Seribu). This is nearby the incident location, formed 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 such as corals, birds and so on.

Slide 5: Major Oil Spill Incident at West Java

This is the brief information about the incident. Source of the spill is from a platform located at Karawang Sea, West Java. The incident occurred on 15th of July 2019, the type of oil is crude oil. Until today, the company haven't confirmed the spill volume yet but we know the estimated production volume is 3,000 boepd. OSCT was activated on the same day and tracked the spilled oil using trajectory modelling and radar satellite to respond to oil spill before it impacted shorelines. The impacted area of oil spill incidents is also the main concern especially many tourism and World Heritage sites in Indonesia that is extremely sensitive and need to be protected from any oil spill pollution that can harm the environment and wildlife.

Slide 6: Oil Spill Contingency Plan and Response Preparedness

Pertamina Hulu Energi Offshore North West Java (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. They had all these preparedness in place.

Slide 7: Oil Spill Combat Timeline

Here you can see the brief timeline of the oil spill combat operations to the incident. On day 1 gas bubbles appears around platform while drilling activity is ongoing and dynamic boom deployed using "J" configuration with two vessels. On day 5, shoreline protection was started by deploying oil boom at Karawang area to prevent the spilled oil reach the shoreline. Near source containment was started on day 12 with the installation of static oil boom with skimmer and on the same period the jack up rig for relief well arrived on-site. On day 17 from the incident occurred, relief well was drilled obliquely. Drilling is carried out to a certain depth from platform by compressing heavy mud from new well.

Slide 8: Oil Spill Combat Movie Overview (8th August 2019)

To understand the incident comprehensively, we compiled some news clip from the beginning of the incident occurred.

Slide 9: Near-Source Response Strategy

This is the strategy that was used during the oil spill. Static boom application or near-source containment boom strategy has been applied before in South America and the same strategy was improved by PHE ONWJ and implemented by OSCT Indonesia. By using specific calculation, this strategy was carried out by using offshore oil boom and mooring buoys.

Slide 10: Near-Source Response Strategy & Planning

This is the actual strategy that was implemented. 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. First layer was deployed 250 meter from spill source and second layer was deployed 500 m from spill source. Mechanical brush/steel disc skimmers were used to recover contained emulsified oil. This strategy can also be used for large tanker or vessel incident. In total, there were 8.650 meter of static boom, 200 m of dynamic boom, 400 oil boom to protect Floating Storage Regasification Unit (FSRU) deployed with 7 skimmers along with 45 vessels.

Slide 11: Boom & Skimmer Containment Calculation

This is the boom and skimmer calculation. As I mentioned before, static boom application was implemented using specific calculation. One configuration of near source Static Oil Boom requires offshore boom ± 400 meters connected to two mooring buoys and large skimmers that can recover contained oil to prevent oil from escaping. The calculation also considering the oil boom swath width and skimmer recovery rate.

Slide 12: Static Boom Implementation

This is the actual implementation of near source containment using two layers of 9,150 meters of static boom with a open section at the back and and dynamic boom to guard at the back just in case the oil escape. We maintain this strategy for almost two months, with spare of 2,000 meters of boom as backup mirror or maintenance. If the spare boom is used, then we send more oil boom to offshore.

Slide 13: Increasing Effectiveness of Near-Source Containment

Double layer protection (second layer static boom) was implemented to fully contain the oil if some leaked through the gap in between mooring buoys. As showed in the picture, if the oil goes into the configuration there is actually a gap in between the boom because you can't connect offshore boom to mooring buoy. The oil may escape from the first layer through the gap, that is why we install the second layer. And if there's any oil escape from the second layer, we have the dynamic boom that will contain the oil. We also notice that we have to stop the leak by using skimmer vessel. Skimmer vessel is reversing instead of recovering the oil from the back of oil boom apex. As deploying vessel will need crane and most of the crane are deck crane, it is difficult for the crane to reach the oil boom apex.

Slide 14: Trained Responders for Near-Source Containment

This is one of the challenges, on each of the vessel we had only 4 people, 1 supervisor and 3 responders accredited OPRC IMO 1 and 2 by Nautical Institute. Among 45 vessels that supported the oil spill response operations, half of it is deployment vessel so there was about 40-50 of our personnel onboard maintaining all of those vessels. It is important that these personnel are fully trained so they can work safely and also trained the deck crew to help. Responder that is not trained are not allowed to be at the deck because it is dangerous and we don't want to damaged the oil boom and skimmers. During this oil spill

combat operation for two months, there is no recordable accident at offshore and also no major incident at onshore because safety is our main priority.

Slide 15: Increasing Effectiveness of Near-Source Containment and Recovery

The oil was very emulsified, hence dispersant was not effective. Mostly the oil mix with water, debris, mud, etc. But as the oil floats, it can be contained effectively with oil boom and recovered during day time with brush/steel disc type skimmer assisted with vessel's fire monitor for easier skimming process. In order to transfer the recovered oil, we use 1,000 liters IBC tanks. One vessel can fit around 30-40 IBC tanks and transported daily to barges via crane.

Slide 16: Offshore Skimmer Performance

In this slide, we can see detailed performance data of each offshore skimmer that we use during offshore oil spill combat operations. We use many skimmers, and we use mostly offshore brush skimmer since the oil type is emulsified oil. The bigger the skimmer, more recovery it has. But the bigger system it is, once it jams it will be not easy to replace because its big and heavy. Once the big skimmer jams, we have to pick it up to the deck, dismantle it and it takes time to find the spare part. Giant skimmer with umbilical system has to be welded to the vessel and the vessel needs to be certified after the installation. Certifying a vessel will take time and it will delay the operations.

Slide 17: Standby Aerial Dispersant Spraying

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. The objective is to get everything ready and in place in case it is needed.

Slide 18: Shoreline Protection Strategy

As we can see the big strategy, this is the shoreline and the spill location was located near our Headquarters in West Java. We tried to build the staging area every 20-30 km and within the staging there are several teams that mobilize equipment to several sites. We deployed up to 11 km of booms to protect sensitive shoreline area including The Thousand Islands.

Slide 19: Overview Response Strategy & Planning

As you can see, this is the location of static boom deployed. We use helicopter for aerial surveillance, radar satellite, drone to ensure the oil not reach the shoreline and if it does then we sent a team to the location. We also protect the sensitive asset to Jakarta such as power plant facility. So this is the actual picture that described that this is a very extensive operation. At offshore we use huge amount of equipment and it is also a very extensive and wide operation at onshore as we have to protect sensitive islands and we have to recover the oil before it hits sensitive area.

Slide 20: Shoreline Protection with Pre-SCAT

Before the spill hits the shoreline, we sent a team that operate a drone to see the overall location and another team that operate an Unmanned Aerial Vehicle (UAV). We find this very useful and faster method compare to helicopter. All of the reported pictures were geotagged for easier mobilization of equipment and personnel if necessary.

Slide 21: Recovery Containment & Shoreline Protection

If they did find oil or sensitive location that may be impacted by spilled oil, the advance team will inform the response team to come to the location and deploy oil boom as in the picture. After oil boom deployed then the response team will report to the command center that the deployment is completed. If oil was found at the location by the advance team, they will request for cleanup team to cleanup the oil. In summary, the role of advance team is very important.

Slide 22: Shoreline Response Supervision and Training

Same like offshore operations, there are over 2,000 personnel consisting of local community, army and local boats. These personnel required daily supervision from 100 accredited IMO supervisor. The ratio between supervisor and worker is 1:20. 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.

Slide 23: Offshore Response Chart

This is one of the data that is compiled from updated information. The boom at one point was about 4 km and it increases to 6 km. We can see here that the more oil boom deployed, we are able to collect more oil and the oil that reached shoreline will be much less.

Slide 24: Onshore Response Chart

We found that onshore response needs extensive of manpower. If we want to deploy more boom, we need a big amount of people. 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.

Slide 25: Overall OSRE Resources for Major Oil Spill

The total equipment that was allocated for this response is 11 km of offshore boom and 12 km of shoreline boom. 15 sets of offshore skimmers as we need to prepare skimmer replacement if on-site skimmer cannot be operated, 10 sets of onshore skimmer and 4,800 liters of dispersant. OSCT Indonesia resources covers over 75% of the national oil spill response resources to respond to major oil spill incidents.

Slide 26: 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.

Slide 27: PAJ OSRE

PAJ sent us 1,75 km of booms with 4 sets of skimmers and onshore/shoreline set and we mobilized to OSCT Indonesia Headquarters and then sent to offshore incident site immediately.

Slide 28: Equipment Shipment Timeline

After equipment from PAJ Indonesia Base was picked up, the equipment was sent to offshore site in the next 2-3 days. Around 1 month after that, the equipment from PAJ Malaysia base was also arrived at our Headquarters and mobilized to offshore site.

Slide 29: Appreciation to PAJ

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

Slide 30: Relief Well Actual Timeline

Within those 8 weeks, the relief well was conducted safely and completed 1 week ahead of scheduled time.

Slide 31: Well Killing Operations Phase (21st September 2019)

Here is a video after the relief well was completed.

Slide 32: Summary Lesson Learnt

To summarize, as you can see in the video that the relief well was successful and the shoreline impact was minimized because of the offshore and onshore resources to contain the oil spill. 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/unified command so the stakeholders and government able to coordinate better. Before the incident, Indonesia did not adopt the unified command system but now we are considering to adopt this system. 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. 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. 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.