The Implementation of Comprehensive Training and Its Effects

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1. Introduction.

During October 12th to 14th 1999 a comprehensive training exercise in Oil Spill Response was conducted at the Petroleum Association of Japan (PAJ) No. 3 Ise Bay Stockpile Base involving the use of Oil Spill Response Equipment. The purpose of this exercise was to help the participants concerned to acquire the necessary skills to use the equipment effectively in the case of an oil spill incident.

Twelve participants from the 6 Japanese Stockpile Bases participated in the training exercise, which was conducted under the guidance of Cosmo Oil's Yokkaichi Refinery.

2.Number 3 Ise Bay Stockpile Base.

(i)Description

Firstly, I would like to describe the location of the Base. Number 3 Ise Bay Stockpile Base was established in March 1993 on the premises of Cosmo Oil Co Ltd. Which is located in Kasumi, Yokkaichi City. This was the third Stockpile Base to be established in Japan after the Tokyo Bay and Seto Inland Sea bases.

Cosmo Oil's Yokkaichi Refinery is under contract with the Petroleum Association of Japan to locate the Stockpile Base on it's premises and the Yokkaichi Office of Cosmo Kaiun Co Ltd. is responsible for maintaining and managing the Stockpile Base and the equipment.

The number 3 Ise Bay Stockpile Base is located in the Cosmo Oil's Yokkaichi Refinery which is in the northern part of Ise Bay close to the Yokkaichi industrial complex. The Aichi Refinery of Idemitsu Kosan and the Chita Refinery of Japan Energy Corporation are located on the Chita Peninsula which lies on the opposite side. Many wholesale oil storage

bases are established at Nagoya Port which is situated on the inner part of Ise Bay. The Owashi Plant of Toho Oil Co., Ltd. is located at Owashi on the Sea of Kumano which is situated to the east of the Kii Peninsula. Thus, the No. 3 Ise Bay Storage Base is located in one of the busiest commercial and industrial regions in Japan.

Many companies engaged in the oil and petrochemical business are located in the Yokkaichi industrial complex, and most of the trucks and service boats which are utilized for loading and unloading operations are based in the neighborhood of Yokkaichi Port.

It is therefore quite easy to arrange for the trucks, vessels and work boats that are necessary for the training exercise and operation of the Stockpile Base. It is also convenient to recruit the staff necessary for our operations.

Due to the location of the number 3 Ise Bay Stockpile Base it is possible to transport equipment and materials rapidly to any location inside the Ise Bay. The Stockpile Base is also close to the Yokkaichi-Higashi interchange on the Tomeihan Motorway so it is also possible to transport equipment rapidly to other locations via the Tomei, Meishin, and Hokuriku motorways etc.

Number 3 Ise Bay Stockpile Base is only one hour drive from Nagoya Airport and Nagoya Seaport, so it is possible to rapidly airlift or ship equipment and materials overseas.

(ii) Relationships with competent authorities.

Cosmo Oil Yokkaichi Refinery is a member of various associations and has taken part in many maritime events so it enjoys a good relationship with the competent authorities.

The competent authorities regularly organise disaster drills for the association members and Cosmo Oil's Yokkaichi Refinery has actively participated in these drills demonstrating the use of equipment and materials which are kept at the number 3 Ise Bay Storage Base. Since Cosmo Oil's Yokkaichi Refinery has regularly participated in these disaster drills and other events including training organized by the Base, we are treated favorably by the competent authorities in terms of training permits, designation of site, training dates, etc.

3. Comprehensive Training

(i) Objectives of the comprehensive training.

The Petroleum Association of Japan has completed its efforts to stock Oil Spill Recovery Equipment in accordance with the "Project to Improve the Organization which Responds to Large-scale Oil Disasters". So in fiscal 1999 the Petroleum Association of Japan started comprehensive training program for the personnel to ensure that staff responsible for domestic storage bases were able to carry out efficient oil spill recovery operations in the event that a large oil spill should take place. The first such comprehensive training was conducted at the number 3 Ise Bay Stockpile Base.

(ii) Preparations for the comprehensive training.

To ensure the safety and success of the training exercise, we watched a video of a previous training exercise which was conducted in 1998 and identified some potential problems and other important points. Then, we held a meeting with the participants prior to the exercise.
Three major rivers flow into the northern part of Ise Bay at variable rates so the direction of the current is not predictable. It is therefore important to select the most suitable location for training within the training area in full knowledge of the weather and maritime conditions on the day of training.

To ensure safe training and smooth operations, it was agreed among participants that one participant should act as the leader and the other participants should follow his directions.

Since many vessels navigate close to the training area, a supervisor was nominated to give a warning if the exercise went out of the prescribed training area.
On the day prior to the training, participants had a meeting with Mr.Y.Henmi, Manager of the Oil Spill Response Department of the Petroleum Association of Japan, and Mr. Andrew M. Crawford, Technical Advisor to Petroleum Association of Japan on detailed matters.

(iii) Outline of the training.

The following four types of training exercise were conducted over a three-day period.

Maritime Training-1: this is an exercise to recover spilled oil by extending an inflatable oil boom in the shape of a "J".

Maritime Training-2: this is an exercise to recover spilled oil by extending a V Sweep oil boom to concentrate the oil, which is towed by a boat.

Maritime Training-3: this is an exercise to recover spilled oil by extending both inflatable type and V sweep type oil booms.

Maritime Training-4: this is an exercise to clean the shoreline.

(iv) Detail of Maritime Training-1.

a. Assumptions of this exercise:

Oil, which has been spilt in the sea covers a wide area, normally in wind rows in the shape of a long belt. In the practice, two boats will surround the spilled oil and extend an inflatable oil boom in the shape of a "J", and the spilled oil will be recovered by an oil skimmer.

b. Equipment for the exercise and their positions:

The 250-meter inflatable oil boom, Komara-12K oil skimmer and the skimmer power pack for the seashore oil boom are installed on the work boat, and the work boat is moored to boat-B.

The oil skimmer (GT-185) is mounted on boat-B.

The oil recovery barge (25 m^3) is inflated and towed by the work boat.

c. Procedure of the practice:

Boat-A draws the oil boom from the work boat and sends air into the oil boom using the blower and surrounds the oil spill by extending the oil boom in the shape of a "J".

Boat-A and boat-B navigate at a speed of 1 knots or less to collect the spilled oil into the inner most part of the oil boom. The two boats must pay attention to maintaining the "J" shape so that no spilled oil will escape from the oil boom.

- Boat-B lowers the oil skimmer onto the sea. The skimmer sends a continuous stream of recovered oil to the oil recovery barge.

d. Discharging the recovered oil and recovering the oil boom:

- In the case of actual oil recovery operations, the recovered oil stored in the barge is transported to the pier and transferred to an onshore tank or other container using a transfer pumping system. In this exercise we only recovered seawater so we discharged the recovered seawater using the water pump from the beach protection oil boom.

Boat-A navigates so that the inflatable oil boom and the work boat are in a straight line. The work boat staff deflate the oil boom and reel up the inflatable oil boom.

e. Essential points of the exercise:

We need a support boat which is high maneuverable when deploying the oil boom.

The oil skimmer should be located at the proper position in the apex of the "J" shaped oil boom.

We need a small boat to tow the oil recovery barge.

Since we have experience in the practice, we were able to complete the exercise without any problems.

(v)Details of Maritime Training-2.

a. Assumptions of the practice:

The conditions of the oil spill are the same as described above. In the exercise, spilled oil is recovered by the V Sweep type oil boom in the shape of a “V" which is towed by a boat.

The oil boom entrance is extended using an outrigger which positions the outboard end of the boom and tows the oil boom .

b. Equipment for the exercise and their positions:

The V Sweep type oil boom is installed on the work boat, and the outrigger is also mounted on the work boat, which is fixed to boat-B.

The oil skimmer is mounted on boat-B.

The oil bag (used to store recovered oil: 50m^3) is fixed to the work boat, which is towed by boat-B.

c. Procedure:

On the work boat, the outrigger with a length of 18m is assembled, and is fixed on the right side of boat-B. Since the outrigger is heavy, careful operation is needed.

The outrigger is held in place by ropes attached to its outboard

The ropes which are fixed to both ends of the gathering V Sweep boom are connected to the winch through the outrigger.

Air is charged into the oil boom on the work boat, and the oil boom is reeled out onto the sea.

After the V Sweep boom is reeled out onto the sea, the oil boom is separated from the work boat; the outrigger, which is fixed to boat-B, is released out; and the oil boom is extended in the shape of a "V".

Boat-B navigates at a speed of 1 knot or less to collect spilled oil into the inner most part of the oil boom.

Then, the oil skimmer (GT-185) is lowered onto the sea to collect the spilled oil and pump it into the oil bag.

d. Discharging the recovered oil and recovering the oil boom:

The oil boom is released from the vessel. Boat-B takes up the rope at the top end of the oil boom, and navigates so that the work boat and the oil boom are in a direct line. On the work boat, the oil boom is deflated and recovered.

The oil skimmer (GT-185)is recovered from the sea. Recovered oil stored in the oil bag, is then discharged by operating the pump installed in the oil bag nose cone, with power from the skimmer power pack.

e. Characteristics:

Since only one boat tows the oil boom and operates the oil skimmer, the operation of the boat is easy once the "V" shape has been formed. But we need practice in this operation, because the outrigger is very heavy and must be handled in the narrow space available on the boat.

Main operations include the assembly and deployment of the outrigger. It is necessary to secure space for this work, and equipment to hoist the outrigger up is required.

It is necessary to study how to lighten the outrigger. After practicing operating the outrigger two or three times, an operator can operate it without too much difficulty, but it still takes a long time.

(vi)Maritime training-3. This training is a mixture of training-1 and training-2. The characteristic of this training is that spilled oil can be recovered from a wider area than with training-1 or training-2.

a. Assumptions of the practice:

Inflatable and V Sweep type oil booms are connected together onboard the boat. The connected oil booms are deployed and towed by two boats. Spilled oil is collected in the inner part of the V Sweep oil boom and recovered using the oil skimmer.

b. Equipment for the practice and their positions:

The inflatable oil boom with a length of 250m and the V Sweep oil boom are loaded on board the work boat. The work boat is fixed to boat-B.
The oil skimmer and the oil bag ($50m^3$) are loaded on board boat-B.

c. Procedure:

The air inflatable oil boom is inflated and deployed on to the sea.
The air inflatable oil boom has a length of 250m which is composed of five sections (each section has a length of 50m). The oil boom is separated when the extended length reaches 100m.
The separated inflatable oil boom is connected to the V Sweep oil boom, and the V Sweep boom inflated.
Boat-A tows the top end of the inflatable oil boom and boat-B tows the top end of the V Sweep oil boom forming a "V" shape.
The inflatable oil boom and the V Sweep oil boom are controlled by an adjustment rope called a "three-point bridle rope" which is adjusted so that the oil booms will form a direct line.
As in other cases, the oil skimmer is lowered onto the sea to collect spilled oil into the oil bag ($50m^3$).

d. Recovering the oil boom and discharging the recovered oil:

The same procedure as in training-1 and training-2 is followed.

e. Essential points of the practice:

Concerning how to keep the inflatable oil boom and the V Sweep oil boom in a straight line, we learned from experience that a good balance can be achieved if the three-point bridle rope is attached to the whole section length (50m) of the second span of the inflatable oil boom.

We learned from the exercise that a prior briefing to all participants is quite important so as everybody understands what each rope does as there are a lot of ropes involved in the system.
The operation of this boom system seems complicated but if you pay attention to the above two points, you can deploy and recover the system without difficulty once you have practiced the operation twice.
There is a net which is attached to the bottom of the V Sweep oil boom so that the "V" shape can be maintained, we must be very careful to avoid tangling the net with the propeller of the vessel before the "V" shape is made.
The most important points to remember are not to get the many ropes and net tangled together or in the propeller and the close communication between the two vessels when the oil booms are deployed.

(vii) Maritime Training-4 for cleaning the seashore.

a. Assumptions of the practice:
This exercise is for the protection of the shoreline and recovery of spilled oil which was one of the most important objectives of the comprehensive training.
Large quantities of spilled oil can be expected to be washed up on the coast due to the effects of current and the wind direction. Therefore, efforts need to be made to protect sensitive areas of the coast from being polluted by spilled oil and this oil needs to be collected, recovered and transported to other locations.
In this exercise, all participants were divided into two groups. Each group started their operation after studying the equipment available, transportation available to move the equipment and the method of deploying the booms and their locations.

b. Procedure:
The shore protection boom (Shore guardian and Sea Sentinel) was deployed to protect the beach.
Spilled oil was recovered using the beach cleaner and recovered oil was tentatively stored in a Fastank5.

The recovered oil was transported to the onshore permanent location using the transfer pumping system, the oil skimmer and the Komara-12K power pack. Then, the arrangement was made for inland transportation of the oil to the oil treatment center.

c. Results of the practice:

Since we did not have enough time to examine the training beach and operations in advance, it took time to decide the locations of equipment and materials.

We learned that it is extremely effective to hold training sessions in which all participants practice the operations for themselves.

4. The effects of the comprehensive training

As I explained before, the comprehensive training was conducted in a practical manner using the various equipment and materials that we currently use.

To our regret, we could not locate a suitable beach on which to practice cleaning the seashore. To avoid spilled oil from being washed up on shore, all the participants studied, for the first time in training in Japan, the selection of equipment that was available to them. They also had to study the location and method of deploying the booms, the recovery of the spilled oil, treatment of recovered oil, etc., for themselves based on the given information, and all participants practiced these operations. I believe that this experience will be really helpful for all participants in the event of a real oil spill taking place in the future as well as the first step toward improving their equipment operation skills.

We really felt that if the assumptions of the comprehensive training are reexamined and practical training is conducted repeatedly, the oil spill response skills and capabilities of the parties concerned at the storage bases will be further improved.

In the meantime, we found some aspects to be improved in the future training. I would like to mention the essential points and methods for future training.

(1) Prior meeting.

The purpose of the comprehensive training is to give all participants an opportunity to practice actual operations. Therefore, it is necessary to have a meeting with all participants for each training item based on the schedule and equipment for detailed operations.

For the comprehensive training, prior meetings were held and explanations were given for each aspect but I think that explanatory material was insufficient and, as a result, the actions of the participants were restricted.

In the past, explanatory materials for training were prepared by each storage base but I would suggest that in the future it is necessary to compile a common manual of explanatory material based on the experience and comments of past training exercises.

(2) Skill Level in operating equipment.

Some of the twelve participants in the comprehensive training had less experience than others, so it was sometimes difficult for me to determine how much I should explain.

Of course, participants could learn new skills depending on their ability, irrespective of their degree of experience.

To improve equipment operation skills and capabilities of the emergency response members through operational training and oil spill response training, I believe that it is more effective to divide participants into groups depending on their skill level and capabilities.

For example, participants are given the following ranks based upon their past experience.

Rank-0: Participant has no experience in operating the equipment.

Rank-1: Participant can manage one item of equipment.

Rank-2: Participant can manage more than one item of equipment at a time.

Rank-3: Participant can manage and operate any item of equipment depending on the conditions.

To make the training more effective, I felt that it is also important to screen participants for a particular training exercise, depending on their skill.

(3) Leader's capability

In the comprehensive training exercise, I acted as the leader and I believe that the training was successful thanks to the cooperation of all participants, although I found many things to be improved.

At the time of an actual oil spill response operations, the leader must demonstrate the following three capabilities which should be developed through future training and exercises.

a. Skill in operating equipment.

It is essential for the leader to be fully experienced in operating equipment and I believe that that people responsible for the maintenance and management of equipment will acquire this skill without difficulty, if they participate in training at home and/or overseas.

b. Leadership

If a person enhances his experience in operations, he will naturally acquire leadership qualities. If the leader gives all participants full explanations on operating methods, etc., they will have no problem with operations.

If an oil spill occurs, a leader must be able to make decisions under all conditions of tidal current, wind velocity, wind direction, quantity of spilled oil, equipment etc., andavalible and be totally aware of the chain of command below him. If the leader only possesses knowledge about operating the equipment, he may not give effective directions to all parties concerned.

I participated in the operations to recover the oil spilled from the M/V "Nakhodka". This experience was very helpful for me in the comprehensive training, and when I think of the next generation of leaders, I believe that this will be of great importance in their training in the future.

c. Boat maneuvering skill

Maneuvering a boat in spilled oil recovery operations may be the most difficult task a leader may face.

A person who has no practical experience in maneuvering a boat may not understand the delicate moves of a boat. As a result, the person cannot communicate well with the captain of the boat. Thus, the person may distrust the captain and the training may result in failure.

In my opinion, it is necessary to have a meeting between the leader and the

captain to be used for spilled oil recovery operations. Then, the leader can learn how to give directions with the correct timing and what terms should be used for directions.

5. Concluding Remarks

I understand that training is conducted once a year at six domestic storage bases. This training is the only opportunity for the staff responsible for maintaining and managing the equipment to demonstrate their operation skills and learn other operational skills and techniques from other people. Therefore, it will be much more effective if a thorough review meeting is held after training is completed.

Training is a good opportunity for persons to acquire practical operating skills in all weathers and maritime conditions. If people gain experience in practical operation using various equipment they can improve their skills, which will enable them to respond to real oil recovery operation in a more efficient way. In view of this, I believe this training is of great significance.
To help improve operational skills, I would like to propose that training be conducted more frequently in the future.
With the understanding and direction of the parties concerned, we are determined to improve our oil spill response skills in order to respond accurately and promptly in case there is an accident, although we hope there will no be any.

Thank you for giving me the opportunity to present my comments.