

Impact on human resource training in environmental contingencies: SEMAR and UPALT

Impacto en la formación de recursos humanos en contingencias ambientales: SEMAR y UPALT

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Abstract

The Secretariat of the Navy-Navy of Mexico, through the First Naval Zone and coordination With the members of the Local Coordination Body has Carried out an action to Obtain a satisfactory response to Environmental Contingency due to oil spill. The conception of Human Resources for the attention of this type of emergencies is the generation of People with an integral formation. THEREFORE, the relevance of esta research, the impact of training actions in Situations of environmental contingency and the generation of human resources, the level of historical competence and the level of acceptance in upper level students. It is Important to mention That the generation of response capabilities in Environmental Contingencies requires conviction and being aware of the impacts That are made to the environment. The number of students has Increased to this dynamic, as well as the awareness of them Knowing That is a key factor it can be Sought That only on one side of esta magnitude. The perspective of the research is to continue generating the strategic lines to Improve the current ones in order to transfer students to the participation and Involvement of environmental problems.

SEMAR, UPALT, Human resource, Environmental Contingency, Oil spill

Resumen

La Secretaría de Marina-Armada de México, a través de la Primera Zona Naval y en coordinación con los integrantes del Organismo de Coordinación Local ha llevado a cabo acciones para tener una respuesta satisfactoria a Contingencia Ambiental por derrame de hidrocarburos. La concepción de Recurso Humano para la atención de este tipo de emergencias, es la generación de personas con formación integral. Por ello, la relevancia de esta investigación, es el impacto que tiene las acciones de capacitación en situaciones de contingencia ambiental y la generación de recurso humano, por medio de la descripción histórica de actividades de capacitación y el nivel de aceptación en alumnos de nivel superior. Es importante mencionar, que la generación de capacidades de respuesta en Contingencias Ambientales se necesita la convicción y ser consciente de los impactos que se hacen al medio ambiente. Se ha incrementado el número de alumnos a esta dinámica, también la conciencia de ellos al saber que son un factor clave que acudirá si es que pasa un siniestro de esta magnitud. Las perspectivas de la investigación es el continuar generando líneas estratégicas para mejorar las actuales con el fin de trascender con los alumnos hacia la participación e involucramiento de problemas ambientales.

SEMAR, UPALT, Recurso humano, Contingencia ambiental, Derrame de hidrocarburo

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Introduction

The risks of oil spills from sea start instant that it detects and locates a well and drilling thereof starts to check the chemical properties (composition) of the hydrocarbon; there you can list a set of causes or events constituting spill risks.

These risks can be grouped into:

- Technical problems related to media, equipment, systems, mechanisms, and other conduits employed in the exploration, drilling and extraction, as well as storage and transportation of oil.
- Violations of rules and safety measures in operations likely to cause spills goals
- Breaches in performing the maintenance, both in terms of time and quality.
- Violations in the manufacture of the mechanisms and systems for oil extraction, when using inappropriate materials and lack of quality control.
- Failure to comply with the requirements regarding navigation routes and the technical condition of the tankers.
- Technical operations performed incorrectly, for not having operating instructions, or lack of training and preparation of personnel responsible for them.
- Acts of terrorism and sabotage against facilities or prone to spills goals.

Furthermore, (natural) atmospheric phenomena such as cyclones, tornadoes, earthquakes, tsunamis (tsunami), may constitute elements of risk.

Impacts oil spills

Impacts that may cause oil spills in marine and coastal ecosystems and economic activities.

On marine life, the impact produced is compounded by the toxic effects and impregnation, as a result of the chemical composition of the hydrocarbons, and the diversity and variability of biological systems and their sensitivity to contamination.

Oil spills can cause a serious economic impact on coastal activities and the exploitation of marine resources, both in the country and neighboring states.

The influence on marine life, manifested in:

- In the open sea and the bed (background) ocean, causing migration of plankton and large swimming fish from their habitat to other regions; if it is near the coast causes serious damages to the marine fauna. Plants and animals also suffer affectations seabed in shallow waters.
- On the coasts and coastal vegetation in these areas the impact is large, damaging mangrove roots and thus shelters for fish and crustaceans.

Oil spills can destroy living coral and thus the coral reef is subject to erosion. This happens when the coral is impregnated by the floating oil when low tide occurs.

In Figure 1, a Oiled bird is observed. The birds are among the species most affected and vulnerable to oil pollution, since they eat when cleaning and make up their pens, can be lethal; also they die as consequences of suffocation, hunger and loss of body heat damage to the plumage, as the impregnated feathers lose their waterproof and insulating properties.



Figure 1 Oiled bird.

Source: *sdpnoticias*, 2013

In economic activity, the impact is reflected in:

- Industrial, port and sea lanes.
- Recreation and tourism activities linked to the sea.
- Fishing and acuocultivos.

- An oil spill can lead to the establishment of closed seasons on fishing and harvesting of marine products in a given area (related to the location and extent of the stain and retention).

Crude oil spilled can permeate floating non-degradable waste (garbage) and can lead to the formation of so-called cays or islands of garbage, floating in the ocean, with appropriate involvement to areas along which such training. A side impact of a spill product constitutes involvement trade in seafood, given the loss of confidence in the international market because the public does not generally purchase products from the region of the spill.

On April 22, 2010 an oil spill was detected in the Gulf of Mexico (Figure 2). Which it reached more than 1,550 km² and was moving towards the east side from the Louisiana coast to the shores of Alabama and Mississippi. This event is known as "environmental disaster" before the great "black tide" that formed the oil spill.



Figure 2 Oil spill. Source: ElBlogVerde.com, 2015

Navy Department (SEMAR)

The Secretariat of the Navy of Mexico, through the First Naval Zone and in coordination with members of the Local Coordination Agency has taken action to have a satisfactory answer to this type of Environmental Contingency (CA).

Developing Spill Contingency Plan for oil and other hazardous substances in the Sea of the First Naval Zone.

Whose objective is to analyze and evaluate the responsiveness of agencies, organizations and public and private institutions, against an oil spill in deep water, in order to detect areas of opportunity for strengthening coordination between the three levels government, civil society and the private sector, to strengthen the Local Plan

Contingency. Where they perform various techniques and actions for the containment and recovery of hydrocarbons.

Actions for containment or diversion of spots

Techniques containment of spilled oil at sea should be applied close to the points of origin spills or sensitive areas, although the latter techniques may also be intended to divert the oil spilled into other areas that would be less affected.

The most commonly used for containment and diversion techniques are the barriers, which are designed and constructed under two broad categories:

- Barriers curtains: have a floating device or element or holding a flexible mesh skirt submerged. They have good ability to adjust to the waves and are relatively easy to clean.
- Barriers fences: remain vertically in the water by flotation whole, and have a flatter and less flexible cross section. They are more suitable for calm waters, where the currents are low speed.

The main feature of a barrier is holding capacity or deviation of the hydrocarbon, which is determined by its behavior in relation to the movement of sea water; therefore should not be placed barriers at right angles to the current when this speed exceeds a knot.

The optimal length of a barrier is closely related to the sea state. Providing a barrier must determine the freeboard (height from the waterline to the top), which avoids the above-dotted, and the depth of the skirt must have similar dimensions to the freeboard.

Other features to consider are: strength, ease and speed of deployment of the barrier, operational safety, weight and cost. A barrier must tolerate handling by untrained staff, and must possess structural strength and durability.

Tide, wind and waves affect the barrier and its operation.

In offshore operations, the barriers chase designed to restrict the spreading of hydrocarbon on the sea surface. These barriers are generally used with the use of boats.

On channels barriers are also placed, for which are spaced along the channel, and must consider the maximum deployment angle relative to the direction of current flow and its velocity, and the retaining strength of the anchor depending on the type and characteristics of the background.

Based on these elements and purpose, barriers can be of various types, depending on the material manufactured and the function they perform:

- Absorbing barriers: the material absorbs the hydrocarbon content in the water and operates similar to a filter; generally they used in areas where current velocity is low.
- Bubble barriers: is a pipe device with holes, placed on the seabed, through which air is pumped from the bottom to the surface; These bubbles create a counter on the sea surface which retains the hydrocarbon.
- Chemical barriers: are based on chemical compounds that inhibit the spread of low viscosity hydrocarbons; use is generally not advisable because these compounds cause damage to marine ecosystems, as dispersants.
- Makeshift barriers: those that are hand built with the resources available in the region or spill site: fences usually are.

Oil recovery techniques at sea

When an oil spill occurs at sea, the need to adopt and implement a set of measures and actions aimed at two goals:

- Achieving contain the spilled oil.

- Clean sea and littoral (coastal) affected by spilled oil.

Actions before a spill begin from the moment itself that is spotted or detected a stain hydrocarbon, either by an accident, explosion, collision, stranding or other causes, for reporting the observed is the first action in that regard. The information offered about as much as possible must contain the following:

- Date and time of observation (local time or half an hour in Greenwich HMG).
- Position by latitude (ö) and length (e), or by reference to a known point.
- Source and cause of pollution (name and type of boat, stranding, collision, accidents at refineries, thermoelectric or platforms, or other).
- Estimate of the amount of oil spilled and the possibility of additional spills.
- Description of oil slicks, including address, length, width and appearance.
- Spilled oil type and its characteristics.
- Weather and hydrometeorological conditions.
- Actions taken and to be taken, to combat pollution and prevent further spills.
- General information about the initial observer and intermediate reporters, and indications of how they can be contacted.

It is very important to inform crews of aircraft and ships, about zones of increased risks of oil spills and forecasting models of the movement of the spots, depending on time of year.

In order to provide information as complete as possible should be knowledgeable about the aspect that acquires the oil at sea.

Environmental contingencies and Human Resource

Environmental Contingency (CA), is a risk, derived from human activities or natural phenomena that can jeopardize the integrity of one or more ecosystems.

Mexico, has programs and actions to be prepared for this type of disaster. Achieving environmental sustainability is a challenge for the new generations. The evolutions of different scenarios regarding environmental problems such as oil spills or derivatives, are some of the reasons for the need to include knowledge and tools to address these areas of opportunity finding solutions in the short, medium and long term starting with the generation trained to deal with such circumstances (SEMARNAT, 2006; Ballesteros and Roman, 2016) human resource.

Today Institutions of Higher Education (IES), mainly universities of technology, are formed based education Competence according to curriculum competency-based education Professionals (EBCP) (DGEST, 2012), which includes the study of environmental issue.

The inclusion of such environmental topics include sustainable development concepts (DS), which provide comprehensive training for students who are the future professionals of the future surrounds (BAUTISTA-VARGAS et al., 2016).

In the IES, they are priority issues DS, which should form the behavior change agents who are students. Which allows education based on DS has a link with the theory and practice as well as the different social sectors that can strengthen the objectives pursued. HEIs are the basis of consolidating a sustainable awareness knowledge bases and skill acquisition for preservation actions for DS environment around them (BAUTISTA-VARGAS et al., 2016).

Agenda 21, Chapter 36, makes no mention of promoting education, training and awareness related to Sustainable Development. Education is the critical factor to promote this concept, thus increasing the capacity of populations to sensitize them on environmental and development aspects (Yáñez and Zavarce, 2009, Juncos and CEDES, 2015; UN, 2016).

Human Resource generation for the care of CA, is the generation of people with comprehensive training. Therefore, the relevance of this research is the impact of training activities in situations of environmental contingency and the generation of human resources, through the historical description of training and the level of acceptance among students of Engineering program Energy (IE) of the Polytechnic University of Altamira (UPALT).

It is important to promote training activities and involvements of students in environmental activities, strengthening their comprehensive education promoting sustainable awareness to transcend the generations.

Methodology to develop

This research was conducted in the IE UPALT linked to the Mexican Navy. In the period 2011 - 2018. IE Students and teachers have attended various activities developed for generating human resources to support an environmental contingency, this has been held for seven years.

Some of the events are focused to assist in oil spill situations, which aims to form human resources, enabling containment techniques, assist Oiled wildlife, among others.

These events were used as research platform and as part of strengthening the training of human resources in CA and comprehensive training in environmental education. Such actions were integrated chronologically analyzing the evolution of the activity and the impact on participants.

Results

In Table 1, it is shown chronologically activities have been carried out in the IP. As seen has increased the number of students and training activities they have been conducted.

Year	No. Students	No. Teachers	Description
2011	two	3	First year of participation in the simulacrum of Spill Contingency Plan for oil and other hazardous substances (SPCDHOSPP) with the Mexican Navy.
2012	0	0	He did not participate.
2013	4	two	2nd year that participated in the SPCDHOSPP with the Mexican Navy.
2014	twenty	one	First field practices in facilities Marine Environment Protection (PROMAM), with recovery techniques and containment of hydrocarbons in the waterfront area on the banks of the Rio Panuco. He did not participate in the SPCDHOSPP, because it was held in Houston Texas.
2015	0	0	He did not participate, because the SPCDHOSPP was held during the holiday period.
2016	fifteen	two	2nd year of involvement of recovery techniques and containment of hydrocarbons in the Panuco River with PROMAM. It was held the first round this river for identifying types of mangroves. And he participated for the 3rd time in the SPCDHOSPP with SEMAR.
2017	fifteen	two	He participated for the 4th time in the SPCDHOSPP with SEMAR. And 3rd year of involvement of recovery techniques and containment of hydrocarbons in the Panuco River with PROMAM. The first time we participated in the Oiled Wildlife Workshop taught by professors from the University of California.
2018	twenty	two	4th time participation participation of recovery techniques and containment of hydrocarbons in the Panuco River with Mexican Navy. 5th time in SPCDHOSPP WITH SEMAR. And 2nd participation in the workshop Oiled Wildlife at the Oiled Wildlife Workshop taught by professors from the University of California.

Table 1 Chronology of SEMAR and UPALT participation.

Source: self made

Protocols in case of oil spill are used when an oil spill occurs at sea, the need to adopt and implement a set of measures and actions aimed at two goals:

- Achieving contain the spilled oil.
- Clean sea and littoral (coastal) affected by spilled oil.

Actions before a spill begin from the moment itself that is spotted or detected a stain hydrocarbon, either by an accident, explosion, collision, stranding or other causes, for reporting the observed is the first action in that regard. The information offered about as much as possible must contain the following:

Phase I. Discovery, notification and alarm.

Phase II evaluation of the incident.

Phase III Containment and measures against the spread of the contaminant.
Phase IV cleanup and recovery.

Containment and recovery techniques for hydrocarbons in the Panuco River

Workshops were conducted in contingencies oil spill given by personnel PROMAM and SEMAR where students are trained to identify, prepare and manage the equipment used for the containment and recovery of hydrocarbons (Figure 3, 4 and 5).



Figure 3 Training with the containment barrier. Own source.



Figure 4 Different absorption equipment hydrocarbons. Own source.



Figure 5 Students finishing their training workshop containment and recovery of hydrocarbons. Own source.

Simulacrum of Spill Contingency Plan for oil and other hazardous substances (SPCDHOSPP) with the Mexican Navy

The first meetings are held with Mexican Navy and public and private institutions involved in the drill. The person in charge of developing SPCDHOSPP development is the Lieutenant Junior Teresa Alejandra Mendoza Guadarrama (Figure 6).

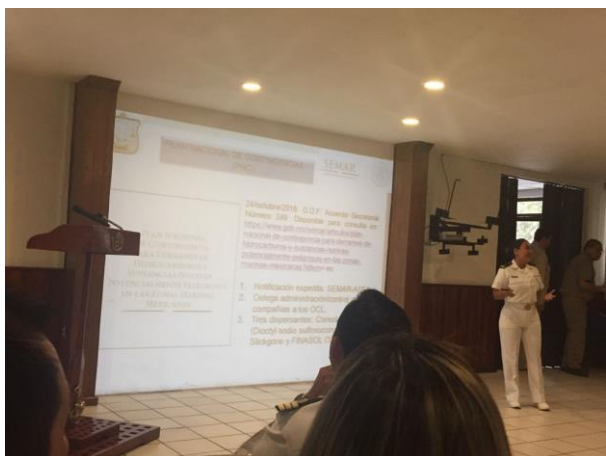


Figure 6 Meeting SPCDHOSPP activation. Source: Own.

In Figure 7, activation occurs SPCDHOSPP where all involved are presented and the activities to be performed are assigned. Students previously trained, are assigned in various areas of planning.



Figure 7 Meeting SPCDHOSPP activation. Source: Own.

In Figure 8, students are observed in the area Oiled wildlife, they were used in order intake, washing and stabilization of the animals were "rescued" during the drill. In Figure 9, has already seen the group of students who participated in the drill.



Figure 8 Students participating in the SPCDHOSPP. Source: Own.



Figure 9 Students participating in the SPCDHOSPP. Source: Own

Oiled Wildlife workshop taught by professors from the University of California

The workshop is training students in admission, washing and stabilization of the animals that were rescued from the CA. In Figure 10, the received training is observed.



Figure 10 Students participating in the workshop Oiled Wildlife. Source: Own.

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Conclusions

It is noteworthy that capacity building Environmental Contingency Response conviction is needed and be aware of the impacts that do to the environment. A phenomenon that was presented during this investigation was that it has increased the number of students, they also made aware that they are a key factor that will come if it passes a loss of this magnitude. The prospects of the research is to continue generating other strategic lines and improve current in order to transcend the students towards participation and involvement of environmental problems. It is therefore the importance of strengthening comprehensive human resource training of future professionals to transcend to future generations.

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