CASE STUDY: TEXAS CITY 'Y' SPILL

Overcoming Logistical Response Obstacles with Oil Sensitive SAPs and an Integrated Fast Attack System

Purpose of Case Study

* Compare efficiencies of current vs. alternative cleanup methods
* Identify and analyze the limitations and logistical challenges faced by responders during a spill response operation
* Provide industry with a complimentary advanced solution – A Fast Attack Spill Response System
* Demonstrate cost effectiveness
* Provide recommendations for implementation

The Texas City ‘Y’ Spill

RESPONSE COST

125 MILLION DOLLARS

The Texas City ‘Y’ Spill

125
MILLION
DOLLARS

SPILL SIZE

168
THOUSAND
GALLONS

COST PER GALLON

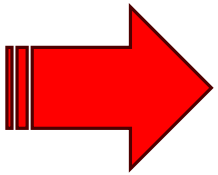
744 DOLLARS PER GALLON

31,248 DOLLARS PER BARREL

The Texas City ‘Y’ Spill

NUMBER OF DAYS	NUMBER OF PERSONNEL	VEHICLES, MACHINERY & EQUIPMENT	LBS. OF CONTAMINATED SAND REMOVED
33	1,325	447	5.5 MIL.

UNAVOIDABLE LOGISTICAL CHALLENGES



42%

DAYS WORKED

Breakdown of the Texas City ‘Y’ Spill

Why was this spill so costly?

OIL

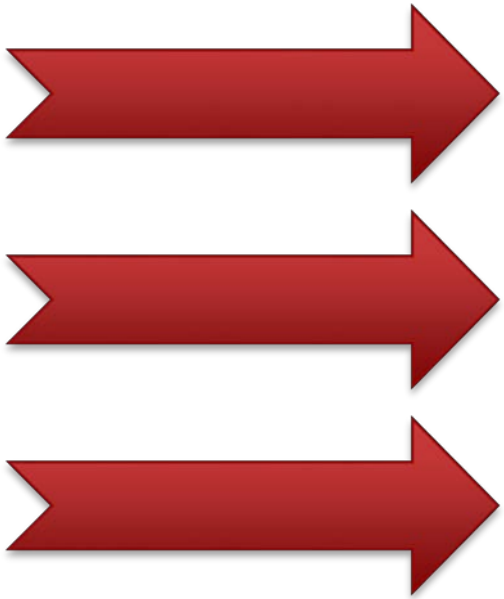
MIGRATION

RESULTING IN ?

* Contamination of an ecologically sensitive area with limited access

Implications

* Long Travel Times
* Limited Access
* Labor Intensive



* Short Work Days
* Logistical Challenge
* High Costs

Response vs. Recovery

* Undoubtedly, oil spill response capabilities have progressed over the past few decades
  * Improvements in the coordination and command
  * Trajectory modeling
  * Current analysis software
  * Strategic planning initiatives

HOWEVER …

RECOVERY STATISTICS REMAIN UNCHANGED

FIVE TO FIFTEEN

PERCENT

WHY?

Understanding the Limitations of Spill Response Capabilities

* An oil spill will spread six square miles within the first twelve hours with little wind or current assistance
  * Therefore, oil and chemical spills often reach **UNMANAGEABLE PROPORTIONS** before response operations are able to mobilize and reach the spill site
  * Leads to long, costly and ineffective **RECOVERY** operations

Understanding the Limitations of Spill Response Capabilities

* Despite all best intentions, the fundamental issue remains:

To date, there is currently NO TECHNOLOGY, PRODUCT, OR SYSTEM being utilized to help prevent an oil spill from becoming unmanageable before responders have a chance to arrive at the site

The Simplest Solution

HOW CAN WE REDUCE THE TIME, EFFORT AND COST ASSOCIATED WITH CLEANING UP OIL AND CHEMICAL SPILLS?

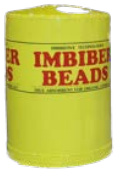
PREVENT IT FROM SPREADING

Integrated Fast Attack System

High Extension Containment Barrier

Oil Sensitive SAPs

Delivery Systems



Recovery

HEROS™ Wrap

Spill Gun Spray Monitors

SEA MAT™ Delivery System

Enhanced Recovery

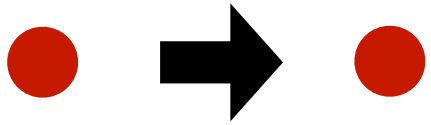
How it Works

- Strategic Inventories of Oil Sensitive SAPs
- Quick Deployment of High-Extension Containment Barrier
- Delivery via Monitor or SEAMAT
- Recovery via Existing Equipment
- Disposal via Incineration

Oil Sensitive SAPs

Liquids diffuse into the SAPs and bind with their solid structure

The process causes them to swell up to 27x their original volume.

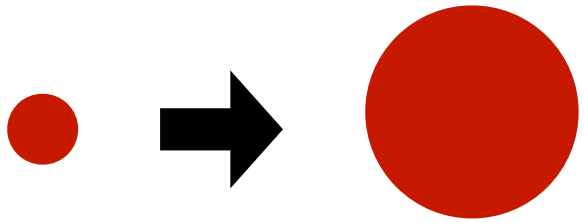


* The result is a revolutionary absorption capability and the ONLY product that can offer complete capture and containment

Oil Sensitive SAPs

Liquids diffuse into the SAPs and bind with their solid structure

The process causes them to swell up to 27x their original volume.



* The result is a revolutionary absorption capability and the ONLY product that can offer complete capture and containment

High Extension Containment Barrier

* A temporary, quickly deployable containment barrier used to help manage the spill at the point of origin and provide a target for the application of SAPs

USES A COMBO OF …

- ✓ **A Proprietary High Extension Sorbent Barrier**
- ✓ **A Patented Compact Easy-Use Deployment System**

Deployed at up to 34 mph

Small enough to store on- site

Ensures rapid response & containment

Delivery Systems

BROADCAST VIA MONITOR & VENTURI SYSTEM

USING WATER AS CARRIER

SEAMAT

HELICOPTER DELIVERY SYSTEM

A MULTI-PURPOSE EXTERNAL LOAD HOOK CONTAINER CAPABLE OF RAPID DISCHARGE

Recovery of SAPs

* The integrated system is designed to utilize existing recovery equipment used in current spill response operations

INCLINED PLANE & WIER SKIMMERS MADE MUCH MORE EFFECTIVE

POTENTIAL TO CHANGE EFFECTIVE DAILY RECOVERY CAPACITY (EDRC)

RECOVERY STATISTICS DRAMATICALLY INCREASED

OIL NO LONGER A THREAT TO COASTLINES AND MARINE LIFE

Disposal of SAPs

* Absorbed oils/chemicals provide an extremely good source of energy and BTU value when incinerated

17,000 BTU PER LBS.
WITHOUT ANY ORGANIC COMPOUND

LESS THAN 1% ASH CONTENT

Addressing the Limitations

SPREAD TIME MATERIAL

The Result

Concept Champion – MDPC & Japanese Coast Guard

7 YEAR

Template was tested by the Maritime Disaster Prevention Centre (MDPC – Yokahama) under the guidance of the Commandant of the Japanese Coast Guard.

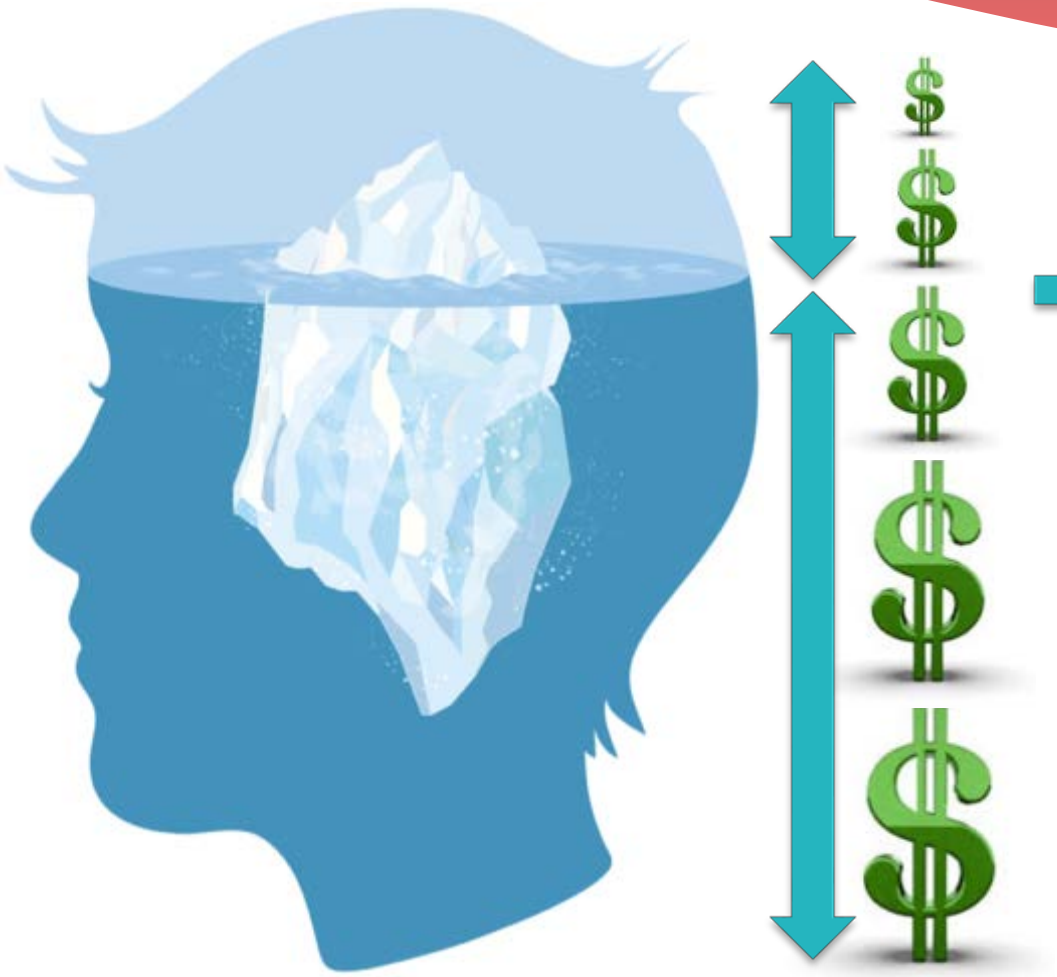
As a Result …

MDPC placed strategic inventories

23

HIGH RISK LOCATIONS

Response Operation Costs – Only the Tip of the Iceberg



Actual Response Costs

ANCILLARY COSTS

* Litigations
* Demurrages
* EPA Fines
* Civil Lawsuits
* Environmental Damage
* Economic Impacts
* Operational Shutdowns

Texas City ‘Y’ Spill

125 MILLION DOLLARS

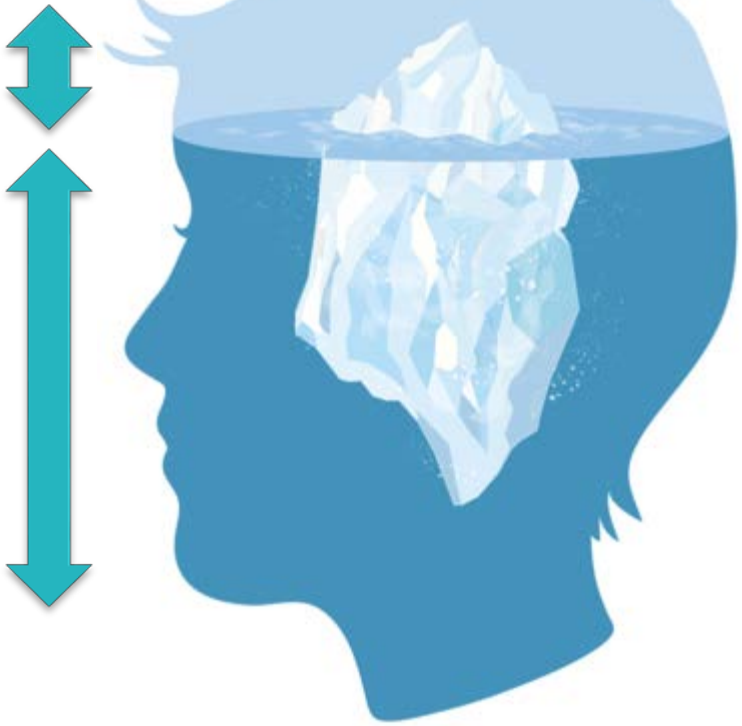
HOUSTON SHIP CHANNEL CLOSURE COSTS

325 MILLION DOLLARS

PER DAY

Comparing Costs

Typical Response Materials



Oil Sensitive SAP System

Total Cost – Oil Sensitive SAP Fast Attack System

Total Cost per System (168,000 Gal. Spill)

Oil Sensitive SAPs	**$ 2,500,000**
High Extension Containment Barrier	**$ 17,925**
Delivery Systems	**$ 70,850**
Recovery Equipment	**ALREADY UTILIZED**
	$ 2,588,785

Cost Comparison – Texas City 'Y' Spill

	Actual Response	Fast Attack Response
Spill Size	168,000 gallons	168,000 gallons
Response Cost	$125,000,000	$3,883,177 *
Cost per Gallon Spilled	$744 / gal	$23 / gal
Time Frame	33 Days	1-3 Days
Avg. Spill Recovery Rate	15%	50% +
Cost Per Gallon Recovered	$4,960 / gal	$46 / gal

* Added 50% of total cost for labour

Potential for a Cooperative in High Risk Areas

A Collaborative Approach

* Members initiate recovery operation from shared resources at strategic locations

* Localize spill and provide time for response organizations to mobilize minimizing time, effort, damage and cost.

Bottom Line

The constraints faced by responders for recovering significant volumes of spilled oil CANNOT be used as validation for not improving performance and maintaining the status quo

The **SPILL RECOVERY** operation, which should be the most critical part of the response plan, has demonstrated that it is in fact the weakest and alternatives should be explored