PROPOSAL TO RRT VI FOR USE OF NATURAL ABSORBENTS ON RIPRAP ALONG MISSISSIPPI RIVER BANK IN RESPONSE TO THE DM932 OIL SPILL

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Background

As a result of the 23 July 2008 collision between the tanker TINTOMARA and oil barge DM932 over 276,000 gallons of heavy fuel oil was spilled into the Mississippi River near mile 99 in New Orleans, Louisiana. The oil discharged from the barge sporadically impacted nearly 200 miles of the Mississippi River. Four weeks later, the barge has been salvaged, but cleanup challenges remain. Since the incident, the Mississippi River has dropped some 6 feet leaving oil stranded in batture areas and riprap shorelines above the current river level. These bands of stranded oil on and in rip rap shoreline have posed a very challenging cleanup issue. The Unified Command seeks RRT VI concurrence (or approval) for use of a natural sorbent to mitigate residual oil that cannot be effectively recovered or flushed from riprap and that remain a threat to wildlife. This technique is potentially being considered for selected public use areas as well.

Appropriate review has been given to use of conventional and alternative cleanup options with respect to the geography of the area and environmental sensitivities that must be factored into any response actions. A synopsis of the conventional methods attempted and alternative methods considered follow:

Conventional Techniques Employed and Considered

<u>Ambient Temperature Flushing.</u> After nearly four weeks of weathering in hot summer temperatures, the oil will not flush with ambient water. Even on relatively unweathered oil earlier in the response, low pressure flushing was not effective in removing the sticky oil off of the rocks. Areas that were flushed with this method showed little difference after two weeks compared to areas unflushed. The best flushing tended to just smear the problem and recovery with snare and sorbents was only marginally effective. At present, ambient flushing would have no effect.

<u>Hot Water Flushing.</u> High pressure, hot water flushing has been used in high visibility locations within the port and city of New Orleans to clean riprap and solid structures, but has not removed all staining and is problematic especially on heavily weathered residues. The process dislodges soil, smaller rocks and gravel, which can negatively impact the stability of the levees and it also forces oil into adjacent sediments. Oil recovery is limited to flushing into snare and sorbents placed below the treated area. Any oil that is mobilized into the water (not captured) during such high-pressure flushing sinks and cannot be recovered.

<u>Hand Cleaning.</u> Response crews have also been manually wiping riprap with sorbent pads and pompoms, but the weight of some of the larger rocks and the pure number of oiled rocks makes this option a safety issue, potentially damaging to the structures themselves, extremely costly, highly time consuming, and has reached diminished effectiveness. At present, the sorbent pads simply stick to the oil. More pad is left on the rock than oil removed. Hand cleaning with putty knives and spoons would have marginal benefit for oil in crevices and hard to access locations.

Natural Recovery Option. Until the oil residues naturally degrade, they remain a contact risk to wildlife. Natural recovery alone would leave pools of oil trapped in-between rocks with potential access by wildlife and possible re-introduction of scavenged oil back into the environment when the river water rises. The ultimate fate of any oil residue remaining would be natural recovery. The shear scouring capacity of the river (and associated sediment loading) during the flood season would essentially complete the process.

Alternative Approaches

Surface Washing Agents (Lift and Float Agents). Such agents would potentially liberate the oil residues, but since the oil is stranded far above the current water level there is no viable means of collecting mobilized oil. Past experience with such agents would also suggest that currently immobile oil (oil residues deep in riprap) could become a chronic sheening concern during rain events if flushing is not completely effective.

Surfactant Cleaners (Lift and Disperse Agents). The use of surface washing agents and surfactant cleaners that would disperse oil were not considered due to the presence of city drinking water intakes in the upper portions of the spill zone.

Bioremediation. Given the nature of the stranded oil residues, traditional bioremediation techniques are expected to have limited benefit and the time scales required would not mitigate the immediate wildlife risks.

Application of Loose Natural Sorbents (Left in Place). Loose natural sorbents would reduce wildlife contact threats and enhance natural weathering. Accessable pooled oil and thick heavy oil residues would be manually removed before application using manual techniques (scoops and putty knives). This option is believed to be a potential alternative and the focus of this request.

Preliminary Investigation

In order to determine if natural absorbents would work in the area, members of the Unified Command conducted a small field trial of three different products to see if they would actually stick to the oil. The products tested were Bagasse, Oil Gator and Sphag Sorb (see Addendum A through C). This test was conducted above the current water level and nothing was added to the river itself. From this initial investigation, members of the Unified Command found that in general, all three absorbents reduced the impact of the sticky/tacky oil on rocks, but were not as effective on pools of oil that lay deep between large rocks. Positive results were mainly a function of application rate and amount of coverage. The test showed that it was easier to achieve initial coverage of the area with Oil Gator because of how fine the product is and its ability to be blown under the rocks while Bagasse and Sphag Sorb proved to be more effective over a longer period of time and when exposed to heavy rain. Reapplication of heavier residues would be required.

The Unified Command believes that an alternative cleanup technique is to manually remove the pools of oil and thick oil residues followed by a series of applications of natural sorbents to bind the residual oil on the rocks, mitigate wildlife contact, and enhance natural degradation. Ideally, the oil would slowly sorb into the natural sorbents enhancing natural degradation. This method would potentially reduce residual oil

toxicity before the river again rises late winter and early spring. In the past, application of natural absorbents that would not be recovered has required RRT approval. Such applications were used during the Exxon Valdez Oil Spill in Alaska for selected seal haulouts and the Little Lake Oil Spill in Louisiana to mitigate oil in selected marsh habitats.

Proposed Natural Absorbent Treatment

Currently there are 32 one-mile segments active in Divisions B through F. The Unified Command estimates that of these active segments, some 12 miles of riprap will be candidates for the proposed natural absorbent application.

Application Rates
The rate of application will vary depending on the amount of oil impacting the riprap in the area. Since the areas with pooled oil and accessible heavy oil residues will be removed manually, the amount left coating the rocks may require anywhere from a thin dusting (1/32 of an inch or less) to about ½ inch of product application. The area of the rocks and dusting that is blown from the affected area by wind are two factors that need to be taken into consideration in determining the application rate. Based on these variables, the Environmental Unit has estimated an average application rate of 1/8 inch thick for planning purposes.

Volume
The typical size of the band or "bath tub ring" of oiled riprap averages approximately 3 ft. The oiling zones are mostly in 100 linear ft sections. For the purposes of estimating volume, the Environmental Unit used 100 ft long by 3 ft wide sections, which have an area of 300 square ft. A section containing 300 square ft applied with an 1/8 inch coating of product will require approximately 3.13 cubic ft of product, which would equal approximately 50 lbs. of the Oil Gator. Oil Gator was used as an example for weight measurements. The other products would not weigh the same as Oil Gator, and may have to be more heavily applied to achieve the same results.

The 12 river miles of impacted rip rap equates to 63,360 linear ft or 634, 100 ft sections. The Environmental Unit would anticipate applying approximately 2000 cubic ft of product to the rip rap area between Divisions B and F (or 30,000 lbs of Oil Gator). A follow up treatment with Bagasse, Sphag Sorb, or additional Oil Gator may also be required.

Monitoring Guidelines
The FOSC will provide visual monitoring to insure that Oil Gator is being applied as recommended and evaluate effectiveness. Visual monitoring will include observations of the initial trails and spot observations during the clean up. Photographic documentation will be provided. Workers should wear dust masks and goggles during application of the product as per the Material Safety Data Sheet (MSDSs).

There is also interest in both visual and chemical monitoring of selected treatment areas where the natural absorbents were used over the period months prior to the river rise and after the river drops to compare this technique with non-treated areas to evaluate the effectiveness for future responses. Funding would have to be secured or provided by the RP for such a study.

The problem – oiled riprap with trapped, less weathered oil residue between rocks in Div. D. The surface oil has been significantly degraded, but is shaded locations is less weathered.

Close up of highlighted area in top photograph. This oil will not flush with ambient water.

Typical test application area before treatment.

After Oil Gator treatment by hand. A leaf blower was used to enhance treating the between rock cracks during selected tests.

Note, the Oil Gator itself will sink in freshwater. Oiled Oil Gator will also sink. Heavily weathered oil residues on the riprap will also sink.

One of the test treatment areas five days later. This area would have required a reapplication as the oil has slowly sorbed and saturated the natural sorbent. This same result was observed for all three products. There is a positive affect, but reapplication would be required to achieve the defined endpoints. Heavy oily tar residues would required multiple application. A goal would be to remove as much of the heavy oil residue as possible to enhance the treatment affect.

Addendum A: Bagasse Information Sheet

Bagasse is a fibrous byproduct of sugarcane production.

- It can be used to soak up oil and create an environment that supports the growth of oil-eating bacteria, without having to be recovered later.
- It has the ability to absorb the same amount of oil whether it is wet or dry. The fibers do not dissipate and sink in water.
- This product can be found easily in Louisiana because of high sugarcane production.
- Bagasse would be delivered in loose form via 100 yd dump truck. The cost is estimated to be $1250 per load.

Addendum B: Oil Gator Information Sheet

Oil Gator is an absorbent powder made from the lint extracted from recycled cotton seed, an abundant by product of the cotton industry.

- Comes in a 30 LB Bag, approximately $34.
- Oil Gator is a chemically modified cellulosic fiber containing nutrients such as Nitrogen, Sulfur, and Phosphorous, and Potassium which enhance the biodegradation of hydrocarbons by indigenous bacteria. When activated by the addition of moisture, the indigenous bacteria can reproduce and rapidly utilize the available hydrocarbon as a food source.
- Oil Gator acts as a physical emulsifier by extracting hydrocarbons from less absorptive material. It encapsulates the fine droplets making the hydrocarbons available to the bacteria as a food source.
- The company states that if applied correctly, a range of 40% to 80% degradation every 30 days is possible.
- A dust mask and goggles are recommended during application.
- This product has passed an LC50 toxicology tests.
- The supplying plant for this product is located in Flora, MS, but the sales and service are located in British Columbia, Canada.
- More information can be found at: http://www.oilgator.com/Oil_Absorbents/Oil_Gator/oil_gator.htm

Addendum C: Sphag Sorb Information Sheet

Sphag Sorb is an absorbent organic compound made from sphagnum peat moss from the bogs of Canada. The peat fibers are separated from inorganic hard material and then activated into a high-grade product with the ability to absorb and encapsulate oils.

- Sphag Sorb is capable of absorbing hydrocarbons from any type of surface, and can effectively remove hydrocarbons from a water surface as well.
- This product can come in a variety of bags, 55 gallon drums, containers, pads, socks and spill kits. Oil Mop typically orders: IBS No. SS-2 or IBS No. SS-2 ME SS-2: approximately $36 per bag.
  Description: Two cubic foot loose-filled bag
  Absorption: from 12 to 15 gallons
  Shipping size: 32" x 16" x 9"
  Approx. weight: 23 lbs. per bag
  Palletizing: 40 bags
- Sphag Sorb absorbs and encapsulates on contact and is non-abrasive and non-leaking.
- Loose Sphag Sorb will float for approximately 48 hours.
- Sphag Sorb will eventually take on water depending on water temperature, presence of wave action and whether or not sphag sorb has absorbed waste.
- More information can be found at: http://www.sphagsorb.com/product_info.html and http://www.industrialbolt.com/downloads/SPHAG_SORB_INFO_SHEETS.pdf