PART C: IMPLEMENTATION, MONITORING AND REPORTING REQUIREMENTS FOR SPILL COUNTERMEASURES TECHNOLOGIES

Introduction

This section of the Selection Guide provides the decision-maker with a basic review of developing monitoring plans for evaluating effectiveness of the strategy or product being used for the incident-specific response as well as information about capturing lessons learned when any of the products reviewed in this guide are used or are reviewed for a response.

Purpose

Implementation and Monitoring

The Region III and IV policy requires that spill countermeasures technologies be monitored to determine and document their effectiveness and to obtain data that can be used to consider the environmental effects of their use. In both Region III and IV, the Special Monitoring of Applied Response Technologies (SMART) protocol will be used to monitor optional technologies. "The SMART protocol has been developed to provide general guidance on establishing a monitoring system for rapid collection and reporting of real-time, scientifically-based information, in order to assist the Unified Command with decision-making [when using these countermeasure technologies]":

Dispersants
In situ Burning

ART protocol is located under the tab for Monitoring Plans within Volume II of this Selection Guide.

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PART C: IMPLEMENTATION, MONITORING AND REPORTING REQUIREMENTS FOR SPILL COUNTERMEASURES TECHNOLOGIES (CONTINUED)

Purpose (Cont'd)

As this Selection Guide discusses other spill countermeasures technologies and strategies outside of the scope of the existing SMART protocols (dispersants, and *in situ* burning), the following guidelines for implementation and monitoring have been developed to provide OSCs with guidance strategies for:

Sorbents
Elasticity Modifiers
Emulsion Treating Agents
Shoreline Pre-treatment Agents
Solidifiers
Surface Collecting Agents
Surface Washing Agents

Tools Needed

- Worksheet 3
- Testing Procedures
- Monitoring Procedures
- Lessons Learned

Reporting Lessons Learned

Sharing information within and among the regions whenever spill countermeasures technologies are used is of vital interest and benefit to the response community. To assure this information is captured, OSCs/users are requested to complete the information questionnaire displayed at the end of this section (Part C) .

The information obtained in this process will be used to continually refine the data presented in Parts A and B of this Selection Guide. It is the RRT's intention that this information be maintained on a web-accessible site that will allow OSCs and other spill response decision-makers to evaluate the lessons learned by other OSCs using the individual spill countermeasure technologies.

PART C: IMPLEMENTATION, MONITORING, AND REPORTING REQUIREMENTS FOR SPILL COUNTERMEASURES TECHNOLOGIES (CONTINUED)

INSTRUCTIONS: Follow the step action table below for part C: Implementation, Monitoring, and Reporting Requirements for Spill Countermeasures Technologies

Step Action Table

STEP	ACTION
1.	Obtain a blank copy of the Testing and Monitoring Worksheet (Worksheet 3) to record information for each product category or strategy. Worksheet 3 is follows these instructions. Another copy is in Appendix H for photocopying. ***Note***: If more than one product category/strategy is being evaluated for an incident, fill out a separate Testing & Monitoring Worksheet for each category/strategy. ***Note:*** The use of this worksheet is required for product use and highly recommended for strategy use.
2.	Identify up to three products in a category or up to three strategies to be reviewed. Record a product name or strategy in each column on Line A. *Use another copy of the worksheet if more than three products or strategies are being evaluated for a product category.*
3.	Complete Line B. Conduct/Record tailgate test to determine whether or not the product is effective on the oil type and at its present conditions and weathering. ***Note:*** A tailgate test may not be applicable for certain strategies such as booming,
4.	After it has been determined that a product or strategy will work on the oil in this situation, record the products or strategies in Line C.

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PART C: IMPLEMENTATION, MONITORING, AND REPORTING REQUIREMENTS FOR SPILL COUNTERMEASURES TECHNOLOGIES (CONTINUED)

Step Action Table Continued.

5.	Have either Field Effectiveness or Effects testing been conducted to determine if the product or strategy will work under realistic field conditions? Record Yes or No in Line D.
6.	If Field Effectiveness or Effects testing has been conducted, record the test protocols in the applicable areas under Line E. . Record your expected outcomes from a Field Effectiveness or Effects test for the products being tested. You need to determine what is considered effective for your given incident conditions as well as when a product is not considered effective.
7	Record the recommended level of monitoring in Line F.
8.	Review product-specific information recorded and compare and contrast products. Rank the products or strategies in terms of value to the incident-specific response conditions. Identify those products that are not suitable at this time. Record this information in Line G.
9.	Record any additional comments or information that is pertinent to this decision in Line H.
10.	This worksheet is designed to assist in the decision-making as well as implementation process. In Line I, if a product(s) appears to add value to the response or be suitable for the incident, the completed worksheets can be used to demonstrate consensus and can be FAXed to the incident-specific RRT for review and/or approval.

Note: Upon completing Worksheet 3, responders will then decide whether or not to recommend the implementation of a product or strategy to the On Scene Coordinator. This evaluation does not determine the best product or strategy to use for the response. Rather the evaluations and worksheets should help to narrow down these options as well as promote discussion between all decision makers and stakeholders to help determine the most beneficial response action for the incident specific conditions.

WORKSHEET 3: TESTING & MONITORING WORKSHEET

This worksheet is intended to be photocopied for each product category evaluated and used during drills and incidents and Faxed to the Incident Specific RRT for review. Use additional paper if needed to record information.

Name(s):

Date:

Incident:

Products of Interest:		Product 1	Product 2	Product 3
A:	Product Name:			
B:	Has a tailgate test proven that product is effective on oil type at this state of weathering? (Y/N)			
Products to Consider for Additional Testing:		**Product 1**	**Product 2**	**Product 3**
C:	Products still being considered:			
D:	Has a Field Effectiveness test or Effects Test been carried out? (Y/N)			
E:	Describe test protocols:			
	Test site specifics (environment):			
	Natural resources at risk:			
	Volume of oil to be treated:			
	Application rate(s)/volume used:			
	Application equipment:			
	Other logistical considerations:			
	Physical impacts expected:			
	Is the oil recoverable?:			
	Expected outcomes of test:			
F:	Recommended Level of Monitoring for this test (Refer to Part D to Determine)			
G:	Mark as 1st, 2nd, 3rd Choice or Not Applicable for use during this incident			

H: Additional Comments/Recommendations on the use of product(s):

I: Initials/Date of Incident-Specific RRT Review of Information:

Initial Box and Include Date Upon Review

USEPA: ☐ Date: **STATE:** ☐ Date:_____

USCG: ☐ Date: **STATE:** ☐ Date:_____

NOAA: ☐ Date: **OTHER:** ☐ Date:_____

USDOI: ☐ Date: **OTHER:** ☐ Date:_____

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OPERATIONAL RESPONSE TECHNIQUES MONITORING PLANS & STRATEGIES

NOTE: Operational Monitoring concludes at the end of the response and is based on the removal criteria developed by the incident command.

During oil spill response, there is a need to monitor the use, effectiveness, and effects of response techniques to support decisions on whether or not the techniques are appropriate for use. The objective of field testing and monitoring is to validate, for the spill-specific conditions, the findings and claims from laboratory tests and previous field use. The two primary measures of field monitoring are: 1) effectiveness, as indicated by the amount of oil removed, recovered, or degraded, and 2) effects, as indicated by impacts to organisms, habitats, and property during use of the response techniques. Monitoring protocols for dispersants use and *In Situ* burning have already been developed and are provided by the Special Monitoring of Applied Response Technologies (SMART) program that is contained in Monitoring Tab of Volume II of this Selection Guide. Detailed protocols for long-term monitoring of use of bioremediation agents are not covered in this guidance as monitoring protocols have previously been developed by the USEPA/NETAC (1993). The following guidelines for monitoring protocols have been developed to address the following optional response countermeasures and strategies:

- Elasticity Modifiers
- Emulsion Treating Agents
- Shoreline Pre-treatment Agents
- Solidifiers
- Sorbents
- Surface Collecting Agents
- Surface Washing Agents

ELEMENTS OF A GOOD TESTING AND MONITORING PROGRAM

A good operational testing and monitoring program should include the following elements (Mearns, 1995):

Clear Objectives

Define the question(s) to be answered from the testing and monitoring program. They must be able to support decisions on further use of the technique. The conclusion of any monitoring program is at the discretion of the Unified Command members based on the response and the extent of damages.

Meaningful Exposures

Test sites and conditions should use real, operational conditions to the extent practical. It may be difficult to simulate all real conditions in test plots, so evaluators should consider additional impacts from full-scale operations. At a minimum, use samples of the oil in its current weathering stage and application rates and methods as proposed for full-scale use.

Experimental Design

At a minimum, testing should involve replicate observations or sampling at both treated and untreated (control) areas, before and after treatment. Controls should be similar to the treated area in all ways except the treatment. If the testing program includes comparison of different products, then it is even more important to have similar test sites for each product. In some cases, it may be appropriate to use a site (before treatment) as its own control for comparing effectiveness and effects after treatment.

Trained Team for Preparation and Observation

Product testing and monitoring at spills relies heavily on visual observations and an understanding of the products' mechanism of action, chemical components, environmental concerns, and expected or desired results. Thus, it is critical that the team members be skilled in both the design and implementation of field tests and trained in how to observe and monitor. They should be experienced with a broad range of countermeasure technologies. It is usually a complex and difficult task to conduct field tests during an oil spill emergency that offer any real value to decision making. Such tests usually require experienced staff with technical backgrounds in:

- Chemistry
- Biology
- Physical processes
- Environmental engineering

Untrained team members without a background in spill response countermeasure technology will not be able to provide the Unified Command with appropriate test protocols and meaningful evaluations of the products' operational use and results. OSCs are strongly encouraged to use the specialized teams available to them, such as the Trustees, EPA Environmental Response Team (ERT), the USCG Strike Teams, the NOAA Scientific Support Coordinator (SSC), or Superfund Technical Assessment and Response Teams (START), when they consider evaluating, testing, and monitoring specialized response strategies during spill.

TESTING AND MONITORING PROCEDURES

Five levels of testing and monitoring are outlined below. Depending on the questions to be answered, any level can be used at a spill. Testing is not always progressive; some products or types of products have been shown to have little toxicity and thus the primary question is whether the product is effective on a particular oil type or under unique spill conditions. Table 25 at the end of this section is a matrix of the types of questions to be answered by each level of testing and monitoring, for specific product categories.

Testing

Level T-1: "Tail-gate Testing"

The objective is to determine if the product or technology works to some minimum degree with the oil under the current spill conditions. Use existing information, from laboratory tests or previous field applications, to select the most promising product(s). Then conduct on-scene tests to evaluate product effectiveness for the specific oil type, temperature, substrate, etc. Often, the tests are conducted on samples of oil from the spill site and placed in buckets, aquaria, etc. The test platform can be the tail-gate of a truck. The tests can be used to compare product effectiveness, but be aware that such tests are highly qualitative, have low reproducibility, and there are no standard field test protocols to follow. Use common sense in interpreting the results, and repeat the tests if the results are not clear.

An example of the approach for "tail-gate" testing for solidifiers is listed below.

Objective: To ascertain the ability of solidifiers to solidify the spilled oil under current field conditions.

1. For on-water applications, use containers of at least 1 liter volume. Fill half-full with water from the spill site.
2. Collect a large bucket of the oil to be solidified. Add a measured amount of oil to each 1 liter container, enough to cover the water surface in the container (create a surface slick).
3. Measure out the recommended amount of solidifier for the oil volume in the 1 liter containers. While stirring vigorously, add 1/5 of the recommended amount of solidifier, stir for 1 minute, then repeat for a total of 5 additions, or until there is no more visible free oil.
4. Record the total amount of solidifier added at this point.

5. Leave the solidified oil in the water for up to 1 hour before making observations. Leave it longer if necessary, recording the time needed to finish curing.
6. Describe the solidified oil, using the one of each of the following visual descriptors in each column. Also note if free oil remains.

Extent of Solidification	Texture	Tackiness	Other
Solidified	Firm mass	Sticky	Holds together when lifted
Cohesive	Elastic	Non-sticky	Breaks apart when lifted
Non-cohesive	Weak	Crumbly	

Level T-2: Field Effectiveness Testing

The objective is to determine if the product(s) or technology works on the oil under realistic field conditions. Write out a detailed testing protocol that is reviewed and approved by both agency representatives and operations staff. The response operations will usually have to conduct the tests, and they can suggest changes that will make the test more realistic. They also need a list of equipment that they are expected to provide.

Use small areas or test plots in the physical setting and under actual field conditions. Follow the manufacturer's recommendations for application rate and methods. Always have a comparison, which can be other products, other technologies, or no action. Measures of effectiveness can be visual, as long as they are objective and well defined (e.g., change in percent cover of oil on the substrate), or based on sampling and chemical analysis (e.g., change in oil content of samples collected before and after treatment). Be sure to evaluate:

- Application equipment, whether it is effective and produces the specified application rate.
- What logistics are required (and thus potential problems for full-scale operations).
- Physical impacts from use, such as trampling.
- Undesirable changes in treated oil behavior (e.g., a surface washing agent that disperses the oil).
- Recoverability of the treated oil, effectiveness of removal methods.
- The amount and nature of residual treated oil and free product remaining.

Level T-3: Effects Testing

The objective is to determine if the product(s) or technology results in impacts to natural resources that are likely to cause more harm than other techniques, including natural recovery. Write out a detailed testing protocol for agency review and approval. Points to consider include:

- Use resident organisms as identified by applicable agencies that are characteristic of, or important to, the spill location.
- The results should be measurable in a short time, within 1-2 days.
- Include "oil only" and "treatment, no oil" controls where appropriate.
- Physical changes to the treated substrate or habitat may be the most significant impact.
- It is difficult to conduct controlled experiments under emergency field conditions, and the results will be only semi-quantitative at best.

As an example, during the evaluation of the use of surface washing agents at the *Morris J. Berman* spill in Puerto Rico, the biological effects monitoring program consisted of:

- descriptive nearshore survey of the first treatment site, recording general biota condition and behavior before and after treatment;
- transplant studies using sea urchins, snails, and mussels suspended in the water immediately adjacent to three sites: 1) oiled and treated with the product; 2) oiled and untreated; and 3) unoiled and untreated. The animals were recovered after 1 tidal cycle and observed for differences in behavior.
- water sampling to measure concentrations of oil and product.

Monitoring

Level M-1: Operational First-Use Monitoring

The objective is to determine if full-scale operational use of the product or technology is effective and does not have unacceptable impacts. Again, it is necessary to have a detailed monitoring plan for approval by agency representatives. Operations will need to know that monitoring will be conducted, so plans can be made to give monitoring staff site access and notification as needed.

Level M-2: Continued Operational Monitoring

The objective is to routinely monitor the progress of cleanup using the approved technologies and assess the need for modifying cleanup methods. Field monitors should visit cleanup sites to ensure that the approved methods are being properly implemented. Oil weathering, temperature changes, or other physical processes, may render approved methods ineffective, requiring either termination of cleanup or testing of other methods.

Reporting Lessons Learned

Sharing information within and among the regions whenever spill countermeasures technologies are used is of vital interest and benefit to the response community. To assure this information is captured, OSCs/users are requested to complete the information questionnaire displayed at the end of this section (Part C) .

The information obtained in this process will be used to continually refine the data presented in Parts A and B of this Selection Guide. It is the RRT's intention that this information be maintained on a web-accessible site that will allow OSCs and other spill response decision-makers to evaluate the lessons learned by other OSCs using the individual spill countermeasure technologies.

Table 25. The types of questions to be answered by different levels of testing and monitoring for specific types of oil-spill treating agents.

	"TAIL-GATE" TESTING	EFFECTIVENESS FIELD TESTS	EFFECTS FIELD TESTS	OPERATIONAL FIRST USE MONITORING
Sorbents	Does product sorb the oil? Does the oil/sorbent float? What is the actual application rate? Does the oil drip out of the sorbent?	Application equipment effective? What is the field-scale application rate? Are the actual recovery and removal methods efficient?	Does the oil/sorbent float or sink on water? What is the amount and risk of product overspray?	Is the product still effective? Does the oil/sorbent remain floating during typical operational periods? Can the teams contain and recover the oil/sorbent?
Elasticity Modifiers	Does the product make the oil more visco-elastic?	Can the product be applied at the proper dosage under field conditions? Is recovery of the treated oil improved?	Does the treated oil stick more to vegetation/debris?	Can all of the treated oil be recovered so there is little risk of exposure to animals and habitats? Can application rates be controlled?
Emulsion Treating Agents	Does the product break the emulsion? How long does it take?	Does the product break the emulsion under field conditions?	What is the toxicity of the separated water? Can it be released without treatment?	Are there any immediate impacts to fish, shellfish, insects, etc. in the treatment areas?
Solidifiers	Does product solidify spilled oil? What are properties of solidified oil in small containers?	Is the application equipment effective? What are properties of solidified oil in the field? Is recovery and removal efficient?	What are the risks of treated oil residues? What are risks of overspray product?	Observe that product is still effective. Is there excessive substrate disturbance during retrieval?
Surface Collecting Agents	Does the product herd the oil? Does the product quickly dissolve or evaporate?	Does the product herd the oil under field conditions? How often is it necessary to re-apply the product?	Are there any immediate impacts to fish, shellfish, insects, etc. in the test area?	Are there any immediate impacts to fish, shellfish, insects, etc. in the treatment areas?
Surface Washing Agents	Does the product improve the rate of oil removal from samples of the substrate? Is the treated oil dispersed?	Is oil removal from the substrate improved under field conditions? Can the flushing pressure and temperature be reduced? What fraction of the treated oil is recoverable?	Is there a change in the condition of biota before and after product use? Are animals in the adjacent water affected after treatment, either lethally or sub lethally?	What are the oil concentrations in water adjacent to treated areas? Is there any change in biota condition over the course of product use?

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SELECTION GUIDE REVIEW

Please complete form in its entirety and **FAX** to: (301-713-4387). Attach additional pages if more space is required.

Dear Selection Guide User:

We need your assistance in both assessing the overall usefulness of the Guide and to increase the quality of the information contained in the Guide.

Sharing information within and among the regions whenever spill countermeasures technologies are used is of vital interest and benefit to the response community. To assure this information is captured, Selection Guide users are requested to complete the information questionnaire on both sides of this form.

Please take the time to rate and express your view with regard to the following questions. Circle the number that best describes your answer to each question and include your remarks. *Use an additional sheet if more space is needed.*

Scale: 5 = EXCELLENT 4 3 2 1 = POOR

1) Were the components of the Selection Guide understandable and applicable to the spill response/emergency-related aspects of your job?

5 4 3 2 1

a. What subjects or portions of the Selection Guide are of greatest benefit or interest?

b. What subjects or portions of the Selection Guide are of least benefit or interest?

2) How would you rate the overall utility of the information contained in the Selection Guide?

5 4 3 2 1

3) How would you change the Selection Guide to improve its content and/or usefulness?

4) Do you currently make the Selection Guide a regular part of your spill response decision-making? Why/Why Not?

5) Your overall evaluation of the Selection Guide is rated as:

5 4 3 2 1

6) Please list any additional suggestions or comments regarding any aspect of the Selection Guide that are not covered in the above questions:

Thank you for your assistance in this matter. Please send your completed forms to:

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History	**Name of Spill/Vessel/Location:** **Date of Spill (mm/dd/yy):** **Location of Spill:** **Latitude:** **Longitude:** **Oil Product:** **Oil Type (USCG Classification code):** **Barrels:** **Source of Spill:**
Technical Information	**Source of Spill:** **Resources at Risk:** **Applied Technologies/Optional Response Countermeasure(s) Used:** **How This Countermeasure Was Used (*purpose, application quantity, date, method*):** **Shoreline Types Impacted:** **Incident Summary (*specifics*):** **Behavior of Oil Before and/or After Treatment:** **Other Countermeasures and Mitigation:** **Lessons Learned from Optional Response Countermeasure Use:** **Recommendations for future Optional Response Countermeasure Use:** ***Please attach any necessary data and/or reports to this form.***
Contact Information	**Contact Name:**_____ **Position:**_____ **Agency:**_____ **Address:**_____ **Phone:** **FAX:**
Questions?/Submittal	Contact 843-766-3118 for additional assistance/questions. Submit this form via FAX to 843-766-3115, email dscholz@seaconsulting.com or mail it to Debra Scholz, SEA, Inc. 109 Wappoo Creek Drive, Suite 4B, Charleston, SC 29412. Thank you for your assistance in this matter.