

## 2014 INTERNATIONAL OIL SPILL CONFERENCE

**Insights from Meta-Analysis of Recent Exercises**

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**ABSTRACT 300089:**

Oil terminals maintain and assess their oil spill response readiness by conducting drills and exercises in general accordance with the Preparedness for Response Exercise Program (PREP) guidelines; however, they often do not realize the full benefits of the time and effort they invest in their exercise programs. Specifically, the way many terminals conduct and evaluate their drill and exercise programs does not provide an in-depth understanding of the capabilities and competencies of their personnel and their response contractors. URS Corporation (URS) recently performed a meta-analysis of tabletop exercises (TTX), equipment deployment exercises (EDX), and unannounced spill equipment deployment drills (UDD) that we facilitated at terminals around the United States. The meta-analysis was performed as a combined review of the after action reports from the various exercises to identify common lessons learned and areas for improvement. Specifically, the objective of the meta-analysis was to develop recommendations, based on an in-depth understanding of the identified common lessons learned and insights from our exercise facilitators, to enhance or improve terminals' oil spill response performance when implemented in the design of future drills and exercises. Based on our study, URS identified and developed recommendations to address the following areas for improvement: training/exercises did not build on previous efforts; TTX were "walk through" or discussion type of exercises and not conducted in "real time"; UDD were conducted in similar ways each time and did not "stress the system"; exercises and drills did not involve upper level (e.g., regional or corporate) personnel who may have significant roles in the response; terminal personnel did not have relationships with staff of industries, contractors, and/or agencies in their area; terminal personnel were not familiar with the Geographic Response Plans or Area Contingency Plans for their area; and exercise programs and post-exercise reviews and critiques did not effectively assess all 15 response plan components. By implementing the recommendations from our meta-analysis, terminals can expect to obtain significantly greater benefits in terms of competence and confidence to respond to oil spills for a modest investment in additional time, cost, and effort.

**INTRODUCTION:**

Over the past several years URS Corporation (URS) conducted a number of oil spill response exercises (tabletop exercises (TTX), equipment deployment exercises (EDX), and unannounced equipment deployment drills (UDD)) in accordance with the Preparedness for Response Exercise Program (PREP) guidelines (USCG et al., 2002) to assist clients' oil terminals and other facilities around the United States comply with U.S. Environmental Protection Agency (EPA) and U.S. Coast Guard (USCG) regulatory requirements, as well as with the regulatory requirements of other federal and state agencies. In our continuing effort to

improve the services we provide our clients, URS recently conducted a meta-analysis of the results and observations of the exercise programs from a number of facilities. This meta-analysis was performed as a combined review of the after action reports (AAR) and facilitators' notes from TTX, EDX, and UDD to develop an in-depth understanding of common lessons learned and areas for improvement. The objective of the meta-analysis was to develop cost-effective recommendations to enhance or improve oil spill response performance if implemented in the design of future exercises. Our preliminary recommendations were discussed with our facilitators and revised based on the additional insights they gained through their experience. Additionally, URS took into consideration the terminals' constraints of limited funding and competing priorities to develop recommendations that can be implemented with modest investments of additional time, cost, and effort. Since no terminal is immune to oil spills, enhancing and improving a terminal's exercise program will improve response performance, which can reduce the consequences from an oil spill in terms of potential injuries or fatalities; damage to property and the environment; and costs in terms of time, money, good will, and reputation.

Based on the results of our meta-analysis, PREP exercises conducted by many terminals can be improved to significantly enhance their oil spill response readiness and performance by incorporating some or all of our recommendations in the following areas: build on previous training and exercise efforts; conduct some exercises in real time; try new equipment deployment evolutions (i.e., "stress the system"); develop relationships with the personnel from agencies and local/neighborhood industries; increase personnel familiarity with the area's Geographic Response Plan or Geographic Response Strategy (GRP), Area Contingency Plan (ACP), and Environmental Sensitivity Index (ESI) maps; involve upper level (e.g., regional or corporate) personnel in the exercises; and effectively assess all 15 response plan components each triennium. Our observations and recommendations are discussed in the following sections.

## **RESULTS/DISCUSSION:**

### **Build on previous efforts**

To achieve continuing improvements, drills and exercises should build on the previous training and exercises. In other words, a terminal's exercise program should be designed to "crawl, walk, run" (i.e., conduct the exercise assuming little or no relevant experience, assuming limited or some relevant experience, and assuming significant or advanced relevant experience, respectively). This means that the initial exercises should be fairly straightforward scenarios focused on basic skills (e.g., notifications, mobilization, initial response actions) and subsequent exercises should have more complex scenarios with injects that may change the operational focus and incorporate all of the components of the response plan (assessment, containment, recovery, logistics, documentation, etc.).

Even though the Oil Pollution Act of 1990 (OPA 90) has required terminals to conduct exercises for two decades, in our opinion most terminals were still in the "crawl" or "walk" stages of exercise development and our limited sample indicated that 10 to 15% were ready to "run". Of course terminals will move up or down in the crawl/walk/run scale due to turnover, acquisition, decreased budget, and increased media and agency scrutiny. However a more prevalent reason for this appears to be that exercises are typically conducted by the terminal

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personnel who put their emphasis on the basics of the initial response – discovery, notifications, and initial containment and recovery, which may be due to several reasons. First, terminals may emphasize initial response actions so their personnel are well-trained to respond quickly and minimize impacts from a spill and well-trained in those actions that the terminal considers to be its responsibility. URS was informed by some facilities that a spill response contractor will be called for any discharge (e.g., to meet the OPA 90 regulatory requirement to have 1,000 feet of containment boom and means of deploying it onsite within one hour of discovery and to have sufficient oil recovery equipment onsite within two hours of discovery) and the terminal personnel will have a limited role, or no role, in the containment and recovery actions once the contractor is on-scene. Second, terminals may perceive that exercises are only conducted to meet regulatory requirements, and they interfere with the regular duties at the terminal, so previous exercises are re-used to minimize planning time and to demonstrate the competency of their personnel. A third reason may be that outside facilitators (e.g., corporate experts or consultants) do not know the existing competency of terminal personnel and develop exercises to focus on the “basics” or on the initial response actions. This has been specifically identified when our facilitators do not have time to comprehend capabilities and competency of the facility personnel. Designs of the exercises by the outside facilitators often emphasize only initial response actions, even though the previous exercises conducted at the terminal during the triennium have already focused on these actions. This can be changed by corporate support to enhance terminal leadership through additional training and resources, as well as to focus on moving beyond compliance.

URS finds that to have exercises that build on previous training and exercises, the terminal should develop an outline for the entire triennial drill and exercise program at the beginning of each triennium and design drills and exercises so they build on the previously gained experience. For example, the first TTX in the triennium may focus on the basics of the initial response, as well as preparing the incident documentation, incident action plan (IAP), and incident-specific Site Safety and Health Plan (SSHP). This exercise may be a “crawl” or “walk” exercise, so terminal personnel have an opportunity to review and discuss the initial actions and understand how to complete the documentation. The second TTX may resume the same scenario further along the response timeline, such as at the transition from initial actions to continuing actions, implementation of the IAP developed in the first exercise, and/or in-depth exercising of the operational response and response support components. This lets the participants in the second TTX practice other critical skills: transitioning in a new Incident Commander (IC); coordinating spill surveillance and modeling; implementing Shore Clean-up Assessment Technique (SCAT) and/or oiled wildlife recovery; waste management and disposal; etc.

The importance of starting an exercise further along the response timeline was incorporated into the Spill of National Significance (SONS) exercise in 2010 (NOAA, 2013), which started a couple of days into the scenario. This allowed the participants to include a number of other skills into the exercises, such as salvage operations, SCAT, coordinating volunteers, etc.

Although one TTX in each triennium must involve the worst-case scenario, each exercise in a given triennium can still be designed to incorporate the previous experience. For example, the second or third TTX may focus on the operational response and response support

components of the plan, with the magnitude of the discharge increased to simulate impacts and response actions needed for the worst-case discharge.

Another way to build on previous experience is to use the TTX scenario as the basis for an EDX or UDD. One benefit is that a terminal can see how the IAP developed during the TTX gets implemented, so the terminal Facility Response Team (FRT) can validate the features of the IAP. This lets the FRT assess and improve the IAP and learn where focus and detail is needed. Another benefit is that this allows the terminal personnel to do a walk-through exercise when it was only discussed in the TTX and then “run” through the response actions for containment and recovery. Often, everything goes smoothly during the TTX, but when equipment operating under actual conditions in an EDX or UDD, a number of unforeseen issues arise – complications deploying the equipment, difficulties using designated launch sites, equipment breakdowns, contractors not having needed equipment when they arrive, etc. Specific examples of “real world” complications included inability to use the intended winch to launch a watercraft, personnel beaching a watercraft, and inadequate numbers of personnel to place boom. In each of these cases, our exercise controllers had to stop that portion of the exercise.

Another benefit facilities may receive from developing exercises to build on previous work is that the designated primary IC and FRT (typically terminal manager and her/his staff) develop their capabilities and competence. Although some terminal managers indicated that they will notify their corporate experts and spill response contractor(s) and let one of them assume command of the response effort, the IC needs to be competent because he/she will be in charge until these others arrive on-scene. Although some firms, such as foreign vessel owners, will use contract spill management teams, most companies that operate waterfront facilities will want to retain command of an incident and not turn command over to a contractor. As a result the IC will continue to be responsible for coordinating the response actions until corporate experts arrive and the IC is transitioned.

As a final note, establishing a training and exercise program that continues to reinforce and build on the previous work will result in an IC and FRT who are competent to handle the command and coordination of an oil spill response, regardless of size. This is important for two reasons. First, the IC and FRT are the ones that are expected to know their area, while the corporate experts and spill contractors typically cover large areas and cannot be expected to know the unique conditions and characteristics around a given terminal. The IC and FRT will often know of conditions that will interfere with the spill response (e.g., construction or road closures, tides or flow conditions, prevailing currents and winds, sensitive or vulnerable areas, etc.). Second, spill contractor employees who arrive first at the scene may be those who were working closest to the incident and could leave their existing task, and may not necessarily be the contractor’s employees with the most relevant experience. In this case, a competent FRT can direct and supervise the contractor’s response actions until relieved by corporate experts and/or more competent contractor personnel arrive.

### **Conduct “real time” exercises**

A TTX is generally considered to be “a facilitated discussion or activity conducted in a conference room setting involving discussion of a scenario by a response organization” and it is typically conducted as “a verbal ‘walk through’ of a response to an incident” (USDOT, 1996).

The main benefit of a discussion TTX (i.e., a walk-through TTX) is that it effectively helps the terminal personnel learn their roles and responsibilities for an oil spill response. However, URS finds that after a terminal's IC and FRT have been trained and conducted several walk-through TTX, periodically conducting a TTX in "real time" provides the IC and FRT with a training experience that lets them put what they have previously learned into action. Conducting a "real time" TTX, means an exercise that is designed to focus on time-critical aspects (e.g., the initial oil spill response actions) under conditions designed to be as close to an actual spill experience as practicable, but without oil on the water or "red lights" (police, fire, or ambulances) arriving at the terminal. With trained terminal personnel, a real-time TTX improves participant engagement, tests the response plans better, and provides additional lessons learned and insights when periodically implemented in conjunction with walk-through TTX.

In a real-time TTX that focuses on the initial response, the IC and FRT do not have time to talk about what they should be doing; instead, they need to execute or simulate the actions required to handle the given scenario as efficiently as they can (e.g., make notifications, prepare IAP and SSHP, conduct safety briefings, prepare media briefings, etc.). Additionally, injects in the TTX (changes in physical conditions of the scenario, follow-up requests after initial mandatory spill reporting requirements, corporate staff needing information, staff waiting for safety plan/briefings, response contractors requesting direction, media wanting press statements or releases, etc.) add pressures that more closely simulate the stresses of an actual spill. When done well, a real-time TTX provides the IC and FRT with a training experience that lets them put what they have previously learned into action in a "safe setting." As noted above, it is important that the IC and FRT have proper training and exercise experience before attempting a real-time TTX, otherwise the exercise may result in confusion and failure without improving the terminal's oil spill response readiness.

Since the real-time TTX more closely simulates an actual incident, real-time TTX are very good tools for assessing the terminal's response plans and readiness to respond to a spill. These types of exercises can be used to provide a better assessment of the competency of terminal personnel to respond to a spill. Putting the terminal IC and FRT through their paces let the URS facilitators see how well they knew what to do and how prepared they were to do it. At terminals where URS understood that the IC and FRT had conducted previous TTX, the feedback in every case was that a real-time TTX allowed the terminal personnel to see how the pieces they learned about previously all come together. More importantly, the real-time TTX provided a better learning experience and allowed terminal personnel to identify a number of lessons learned that previous walk-through TTX had not identified, including:

- Delegating notifications so the IC can assign duties and coordinate the initial response – several times the IC would personally make the notifications, leaving the FRT and contractors to wait until the notifications were completed;
- Making notifications can be very time consuming and can become stressful when several different agencies require spills to be reported within the same specific time window (i.e., within two hours), but each notification can take 20 to 30 minutes;
- Multiple telephone lists at the terminals confused ICs or their delegates when making notifications to internal representatives, contractors, and agencies;

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- Preparing the IAP and SSHP took longer than anticipated. Our experience with a variety of clients indicates that preparing facility-specific templates for the different types of products handled at the facility will reduce the time needed to prepare the incident-specific IAP and SSHP; and
- Coordinating logistics (food services, sanitation, hotel rooms, etc.) may not be as easy as expected – in a couple of TTX the terminal staff would say that they would book blocks of rooms at local hotels, but URS staff knew that it was not possible because they were staying at the same hotels and knew they were already completely booked by responders to an actual weather emergency in the area.

**“Stress the System”**

Since oil terminals have been required to conduct exercises for two decades, it is expected that the ICs and FRTs should be able to handle the typical scenarios for TTX, EDX and UDD. So during exercises we like to “stress the system” by using injects that range from the distracting (requests for information or direction, media requests, etc.) to the complicating, such as equipment or travel delays, changes in tides or wind direction, etc. Although we do not want exercise to stress participants so much that they do not perform well and then “fail”, we do want to challenge them enough so they have to work to achieve a successful outcome where the participants see how their actions contribute to the control, management, and/or clean up the spill. It is important to remember that the goal of every drill and exercise is to help the participants improve their ability and skills in managing an oil spill, and not to drive them to a point where they consider their actions to be incorrect, ineffective, and futile.

URS finds that one way of doing this is to conduct real-time TTX using scenarios with injects to simulate actual conditions as closely as possible, as discussed above. In these exercises the URS facilitators want the participants to perform notifications and call for support services as they would in an actual spill (with the exception of calling 9-1-1, if an actual incident would require that). As noted above, our facilitators have been able to identify instances when terminal staff simulated telephone calls that should have been made to determine that the required support services (e.g., hotel rooms) were available.

Another way to “stress the system” is to develop new and different scenarios than the terminal staff are used to conducting. Since many TTX scenarios are based on the initial response actions, developing scenarios that start further along the time line of an incident challenges the IC and FRT to perform actions and consider the response effort in ways they have not had to do before. As noted above, the 2010 SONS exercise scenario started well after the initial incident to focus on the components of the ACP that address continuing actions (NOAA, 2013). For terminals, more challenging TTX scenarios may start with transitioning the IC or the arrival of and briefings for additional company/corporate staff or response contractors. If these TTX scenarios do not build on previous exercises, they may require some pre-exercise effort to develop the Situation Report, IAP, and SSHP that need to be ready for use. However, URS considers that the effort is valuable because these TTX scenarios will exercise components of the response plans that may not be exercised in scenarios that focus solely the initial response actions, but still need to be evaluated each triennium, as discussed in more detail below.

When URS reviewed the EDX or UDD that have been previously conducted, we observe that the typical scenario did not change much for each exercise at a given terminal. Typically terminal personnel or their response contractors will place boom around a vessel at their dock or place containment boom across a stream or river at the same location they always use. These exercises do not often involve placing boom in different configurations, placing additional boom to capture oil that gets past the first boom, or setting up deflection or protection booms. In Maine and New Hampshire, exercises with or by state agencies are used to assess booming configurations in the GRPs and the results are used to revise the strategies, as needed. In recent work by Maine Department of Environmental Protection, they found that boom angles and anchor configurations needed to be field-tested to identify the best configurations for strategies identified in the GRP (Nuka Research, 2013). However, when we evaluated exercises conducted in other US regions, we observed that terminals outside of New England generally do not practice the boom strategies that are described in their GRPs.

When URS facilitators had terminal personnel and/or response contractors to conduct additional boom deployments after placing the initial containment boom during an EDX or UDD, we found that their competency ranged across spectrum from poor to good. In some exercises, the response contractors did not know what deflection booms were or how to place them. In other exercises, the response contractors used the initial containment boom to conduct the next evolution (e.g., setup a deflection boom) – in other words they would release the contained oil, which in most cases would not be an option during actual response. Therefore, these additional evolutions are good candidates for ways to challenge terminal personnel and response contractors and improve the learning opportunities.

In addition to identifying areas for additional training, the EDX and UDD that stressed the system provided other lessons learned. For some of the exercises the response contractors arrived with incomplete equipment or without needed equipment (e.g., not enough anchors or lines for booms, no recovery equipment or not the proper attachments).

Actual response times for some terminals were longer than anticipated and/or required by the regulations. It is well known that most spill response contractors do not have their employees and equipment waiting at their offices or docks, like firefighters in the firehouse. Instead, the contractors have other more routine, non-emergency jobs that require the skills and training of their employees – hazardous waste removal and transport, tank and oil/water separator cleaning, non-critical removal actions, etc. In follow-up conversations with several spill response contractors, URS was informed that most exercises are conducted first thing on a weekday morning before the contractors' personnel and equipment have gone on to other jobs, so their response times meet the regulatory requirements and they have the needed resources available. However, at times other than first thing in the morning, it is not unusual for the response times to be slower because contractor employees may have to be called in from off-shift or equipment and personnel may be tied up on other jobs during the day.

### **Involve upper level personnel**

The OPA 90 regulations require that a facility's response plan must identify a Spill Management Team (SMT) and that the SMT "shall conduct an annual tabletop exercise, in accordance with the PREP guidelines" (USCG et al., 2002). Furthermore, the USCG et al.

(2002) state “[i]f a response plan lists different types of spill management teams for varying sizes of spills – for example a local spill management team for small spills, a regional team for larger spills, and a national team for major spills – each team identified would be required to conduct an annual spill management team tabletop exercise.” Therefore, if a terminal has a core SMT (e.g., the FRT) to handle most spills and adds regional or corporate personnel/experts or third-party (i.e., contractor) personnel (jointly referred to as upper level personnel) to the team as the size of the spill increases, each progressive level of personnel must participate in an annual TTX.

To address this requirement, many terminals only list their FRT members as the SMT and do not include upper level personnel even though they will say “off the record” that upper level personnel will be part of the SMT. Also, URS found that when terminals listed upper level personnel in their SMT, not only were upper level personnel not included in the annual TTX, but there was no evidence that the upper level personnel participated in another TTX to meet the regulatory requirement. Without participating in terminal exercises upper level personnel may not understand a terminal’s capabilities and competency. During an incident, this can lead to confusion and delay implementing the appropriate response actions and strategies.

Obviously, the easiest solution to this issue is to involve the upper level personnel in a terminal’s TTX. Since upper level personnel will initially be contacted by telephone, they can participate via telephone, e-mail, and/or fax to provide their inputs, as they would do during the initial period of a spill response. In this way, a company health and safety officer can take the initial information on the spill and prepare the SSHP and send it to the terminal via e-mail. Additionally, a company public relations officer can prepare a press release based on the initial spill information, submit it via e-mail, and arrange to have a simulated press conference via telephone or videoconferencing. Other upper level personnel participate in similar ways to work with the Operations and Planning Section Chiefs to implement suitable tactics and strategies.

If upper level personnel do not participate in the terminal TTX, URS recommends that upper level personnel conduct their annual TTX by picking up a terminal’s scenario where they would take over the response effort. The terminal can provide the upper level personnel with copies of the Situation Report, IAP, SSHP, maps of the spill and response actions, and other documents, so the upper level personnel can see what has been done. The upper level personnel start with the IC transition to their designated IC and carry on from there with or without input from the terminal IC or FRT. This provides upper level personnel with a better understanding of what the terminal will do and how the terminal and upper level personnel can work together.

### **Know your neighbors and regulators**

At most terminals URS noted that the supervisors, managers, and senior personnel knew a few of the personnel at other nearby terminals and some neighboring industries, but they were generally not active in oil spill response co-operatives (co-ops) or Area Committees (AC). In many cases, URS also found that terminal personnel did not meet regulatory agency personnel except during an inspection of their terminal.

A bad time to meet regulatory agency personnel and/or your neighbors for the first time is during an incident. Based on our experience in New England, we find that terminals where the managers or supervisors are active in the co-ops, AC, and/or industry groups have better



relationships with the staff of the state and federal environmental agencies and U.S. Coast Guard. Terminal personnel, oil spill response contractors, and agency personnel meet and get to know each other in a relaxed atmosphere at the meetings. These meetings also provide the opportunity for terminal personnel to ask questions about and get interpretations of existing and new regulations from the regulators, as well as discuss changes in oil spill response measures and lessons learned by others during their exercises or spill responses.

### **Be familiar with the geographic response and area contingency plans**

URS finds that most companies want to maintain supervisory control of the response effort if there is an incident at their terminal, because they have the financial responsibility for the clean-up. However, many exercises demonstrated that the IC and FRT did not have the requisite knowledge of vulnerable areas that need to be protected or pre-established booming strategies to effectively direct the response efforts. Working with terminals in New England, we noted that these terminals had access to good quality GRP and ESI maps, for example through the Maine Department of Environmental Protection websites (Maine DEP, 2013a and Maine DEP, 2013b, respectively). Furthermore, through their participation in co-ops and the AC, these terminals were notified when the ACP was updated. However, in other US geographic regions, we found that some terminal personnel (including personnel who would be ICs) did not know what the GRP, ACP, and/or ESI maps were, where to find them for their area, and/or how to use these plans in directing the response actions. During terminal assessments, when updating response plans, and/or preparing for exercises, it is not uncommon for URS to find that these plans had been recently updated, but where a terminal had a copy it was not current. We have also worked in areas where the GRP, ACP, and/or ESI maps were out-of-date and/or were not readily available, so terminals in these areas did not have access to good plans to work from.

In Maine and New Hampshire the EDX conducted by terminals and regulatory agencies (organized in conjunction with the oil spill response co-operatives or contractors) frequently involved setting booms in the locations designated in the GRP, which assessed booming strategies in the GRP. Terminal and spill contractor personnel also gained experience implementing these strategies and, as importantly, they developed an understanding of the resources (boats, boom, anchors, etc.) needed to implement each strategy. The lessons learned during these EDX are then incorporated into revisions of the GRP.

Furthermore, the strategies in the GRP were developed by incorporating the local knowledge of the terminal personnel and others familiar with each area. For example, the Penobscot River forms an eddy near the town of Bucksport, Maine, and personnel from the terminals in the area knew that this area was a good collection site, which recent tests of the booming strategy confirmed (Nuka Research, 2013).

In a related issue, terminals need to obtain and review current versions of the ACP and/or ESI maps for their areas. One very important reason that a terminal should be familiar with the ACP and ESI maps, as well as with the GRP, is that this is required by the OPA '90 regulations. For example, the USCG OPA 90 regulations (33 CFR 154.1065(a)), require marine terminals to review the FRP annually, and the owner or operator "shall incorporate any revisions to the plan, including listings of fish and wildlife and sensitive environments identified in the ACP in effect 6 months prior to plan review." The USCG also requires the FRP to contain maps to show

sensitive areas (i.e., ESI maps) and to show response action to protect the sensitive areas (33 CFR 154.1035 (b)(4)(ii)(C)). Furthermore, the EPA requires “[t]he owner or operator shall review relevant portions of the National Oil and Hazardous Substances Pollution Contingency Plan and applicable Area Contingency Plan annually and, if necessary, revise the facility response plan to ensure consistency with these plans” in accordance with 40 CFR 112.20(g)(1).

### **Assess all 15 response plan components**

Federal regulations require that terminals subject to the OPA 90 regulations effectively assess all 15 response plan components each triennium during post-exercise reviews and critiques (40 CFR 112.21 and 33 CFR 154.1055(a)(6)). According to the PREP guidance (USCG et al., 2002) the components to be assessed in each triennium are as follow:

<b><u>Organizational Design</u></b>	<b><u>Operational Response</u></b>	<b><u>Response Support</u></b>
(1) Notifications	(4) Discharge control	(10) Communications
(2) Staff mobilization	(5) Assessment of discharge	(11) Transportation
(3) Ability to operate within the response management system described in the plan	(6) Containment of discharge	(12) Personnel support
	(7) Recovery of spilled material	(13) Equipment maintenance and support
	(8) Protection of sensitive areas	(14) Procurement
	(9) Disposal of recovered material and contaminated debris	(15) Documentation

In addition, the EPA’s oil spill exercise guidance (USEPA Region 5, 2000) lists a number of criteria to be evaluated for each component. However, our review of drill and exercise critiques, lessons learned, and AARs, indicated that these documents did not assess the drills and exercises to the level of detail that is provided in the EPA’s oil spill exercise guidance. Furthermore, our reviews of the drill and exercise documentation for many terminals indicated that those terminals did not clearly track that each component of a plan was evaluated in each triennium. As noted above, many of the exercises at those terminals emphasize the basics of the initial response, which typically address components 1 through 6 in the above list. Therefore, components 7 through 15 are often not evaluated by exercises, or we find that if they are evaluated, they are not evaluated in-depth or well (e.g., no lessons learned were developed).

Not only do the federal regulations require evaluation of all 15 components of a terminal’s oil spill response plan, but there are many potential benefits to the terminal IC and FRT from exercising all components. These benefits include developing greater understanding

and proficiency with spill response after the initial response actions and learning how to coordinate with corporate response personnel and contractors.

URS recommends developing evaluation sheets similar to the ones provided in the EPA's oil spill exercise guidance (USEPA Region 5, 2000). The evaluation sheets provide clear documentation of the components that were exercised and which components need to be exercised during the triennium. They also provide an outline for leading the post-exercise critiques or "hot washes" as well as a clear outline for writing the AAR.

As an added benefit, the evaluation sheets can be used when designing exercises. In particular, when developing an exercise program that is intended to build on previous exercises and training, as discussed above, the evaluation sheets can be used in the design of the subsequent exercises. Using the evaluation sheets to develop the triennial exercise program will ensure that all 15 components are exercised and evaluated well.

## CONCLUSION:

In the opinion of the authors, oil terminals will realize greater benefits from the time and effort they invest in the PREP drills and exercises they conduct if they incorporate some or all of our recommendations into their existing programs. Specifically, the URS meta-analysis identified several key areas for improvement to assist terminals enhance and improve their competence and confidence to respond to oil spills for relatively modest investments of additional time, cost, and effort. The key lessons or recommendations from our analysis are: training and exercises should be outlined and organized at the beginning of each triennium to build on each other and on previous efforts; during the triennium some drills and exercises should be conducted in real time; drills and exercises should challenge the participants and "stress the system"; exercises and drills need to involve upper level (e.g., regional or corporate) personnel who will have active and/or significant roles in a spill response; terminal personnel should get to know personnel from neighboring facilities and the state and federal agencies in their area through active participation in industry groups; terminal personnel need to be familiar with the GRP, ACP, and ESI maps for their area; and exercise programs need to be designed to effectively assess all 15 response plan components during each triennium.

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