



## **Emergency Response Exercise Best Practice**

### **Task 6 Final Report**

#### ***Summary of Best Practices and Innovative Approaches for Exercise Design, Conduct and Evaluation***

**May 11, 2015**

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**1. Introduction:** In October of 2014, PCCI was contracted by the Bureau of Safety and Environmental Enforcement (BSEE) to identify best practices and innovative approaches for designing, conducting, and evaluating exercises for potential application to BSEE's oil spill exercise program for the outer continental shelf (OCS). BSEE identified the following primary tasks in their scope of work:

- Conduct a Literature Search of Existing Exercise Programs to Identify Best Practices and Lessons-Learned
- Analyze Exercise Programs Demonstrating Best Practice and Innovative Concepts
- Identify Best Practices and Innovative Approaches for Exercise Design, Conduct and Evaluation

In the course of completing these tasks, PCCI reviewed the existing National Preparedness for Response Exercise Program (PREP) to identify those program elements that could be considered best practice. PCCI also identified possible metrics that could assist BSEE in measuring to what extent their oil spill exercise program improved response readiness across their regulated facilities and operations. This report summarizes all of these research findings and provides recommendations to BSEE for enhancing the oil spill exercise program for the OCS going forward.

**2. Approach:** PCCI relied on the following methods to identify best practices and innovative approaches for designing, conducting, and evaluating exercises:

**2.1. Internet Research.** The Internet was PCCI's primary source for locating studies, reports, and technical papers that discussed best practice or innovative methods for designing, conducting and evaluating exercises for emergency incidents. Of particular use in this study were the International Oil Spill Conference (IOSC) Proceedings that are all online in a searchable format. A number of technical papers dealing with oil spill exercise case histories, programs, and improvements from

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prior IOSC Conferences, including the 2014 IOSC, were reviewed, and these papers provided useful information in the development of this report.

2.2. Teaming Partners. PCCI relied on two subcontractors with recognized expertise in designing, conducting, and evaluating oil spill exercises and reviewing exercise programs: DNV GL in Norway and Ross Campbell and Associates (RCA) in Australia.

In addition to DNV GL and RCA, two United States (US) oil spill cooperatives with leading exercise programs, Clean Islands Council in Hawaii and Alaska Clean Seas in Alaska, lent their expertise and analyses to this study. A third organization with recognized oil spill exercise knowledge and experience, the Pacific States-British Columbia Oil Spill Task Force, maintains an excellent website with reports, resources, and links to member states' sites. This website provided valuable information for this report on member states' oil spill exercise and readiness programs.

2.3. Other Sources: In addition to the Internet research and contributions from teaming partners, PCCI relied on the following methods to identify additional emergency exercise practice and innovation:

- Interviews - Meetings and phone call discussions were held by the PCCI team to solicit input for this report from BSEE, industry, and federal and state agencies who manage leading oil spill exercise programs.
- Contributing Industry Organizations - The American Petroleum Industry (API) and the International Petroleum Industry Environmental Conservation Association (IPIECA) both provided guidelines developed for their respective members that contain relevant best practice applications for oil spill training and exercise programs.
- PCCI Library - PCCI reviewed their library, compiled over the previous 30 years, for oil spill exercise documentation and spill event case histories to provide information and data for this report.
- Team Member Experience - PCCI, DNV GL, and RCA staff members also relied on their many years of oil spill readiness consulting and operational response experience with emergency incidents in identifying best practices and innovative approaches for this study.

**3. Executive Summary:** Best practice for emergency preparedness recognizes that exercises are just one component of what the U.S., under the National Incident Management System (NIMS), calls the "National Preparedness Cycle". NIMS defines preparedness as a continuous cycle of planning, organizing, training, equipping, exercising, evaluating and improving. This report focuses on best practice associated with the *exercise* component of the National Preparedness Cycle.

The research approach described in Section 2 of this report identified several exercise programs with the U.S. Federal Government that exhibit best practice or innovative features. The most comprehensive and progressive exercise program resides within the Department of Homeland Security (DHS). This program, known as the Homeland Security Exercise and Evaluation Program (HSEEP), is an all risk-all hazards exercise program that provides for the entire process of exercise design,

conduct and evaluation. HSEEP contains many of the exercise best practices that were identified throughout government and industry in this study.

Several of the Federal Agencies have adopted HSEEP as the primary component of their emergency exercise program and added innovative features such as hardware and software applications to better plan, design, conduct, evaluate, and improve their exercises.

Amongst other services, the oil industry oil spill cooperatives in the U.S. generally provide role and skills training and readiness exercises for member companies. Two of these cooperatives, CIC in Hawaii and ACS on the Alaskan North Slope, partnered with PCCI in this study and provided several examples of best practices and innovative approaches associated with their oil spill exercise programs. The U.S. and international oil industries have also developed oil exercise program guidelines that apply to all upstream, midstream and downstream operations. These guidelines exhibit multiple best practices and innovative features.

Outside of the U.S., government and industry oil exercise programs in Norway and Australia were reviewed and revealed many of the same best practices identified in the U.S. In Norway, the approach of applying Net Environmental Benefit Analysis (NEBA) to oil spill exercises, a best practice more commonly associated with responses to real events, has been used successfully for many years. Norway and Australia both exhibit long coastlines, small populations, and limited resources. This results in small, agile response management teams poised for quick decision-making, at the lowest possible levels of government and industry. Both countries design and conduct their oil spill exercises closely simulate the limitations they face in responding to real events, using these smaller organizations. Australia also works on creating a realistic social media environment for exercise events, and as shown in Section 4 of this report, they have developed innovative means to prepare response teams to effectively deal with social media through exercise practice.

What are the best practice features for designing, conducting and evaluating emergency exercises? Though these best practices have not been established by classification or code, clearly those practices that result in improvements to response readiness can be considered government and industry benchmarks, or best practice. This report suggests that the following practices and approaches for designing, conducting and evaluating exercises be categorized as best practice:

- Conducting training before, during, and in some cases, even after the exercise.
- Identifying opportunities for improvement in response capability, tracking and assigning these lesson-identified through lessons-learned, and then incorporating these lessons into subsequent exercises for validation or further improvement.

- Designing realistic and challenging scenarios and conducting exercises to validate response plans and capabilities, identify gaps or areas for improvement, and advancing response capabilities.
- Designing and conducting exercises that collectively span the entire range of response phases.

Most of the best practices and several of the innovative approaches described in this report can be applied to BSEE's oil spill exercise program for the OCS, as further discussed in Section 5.

**4. Detailed Findings:** PCCI identified a number of best practices and several innovative methods for designing, conducting, and evaluating exercises with potential to enhance BSEE's oil spill exercise program for the OCS. This section presents these best practices and innovative methods.

Section 4.1 summarizes the results of the literature searches and interviews that identified leading exercise programs in the U.S.

Section 4.2 identifies the key features of the oil spill exercise programs in Norway, Australia and the U.K.

Section 4.3 highlights the state-of-art exercise programs for two U.S. regional oil spill cooperatives and also identifies best practice guidelines for the U.S. and international Oil Spill Industries.

The results of the research into best practice and innovative approaches for designing, conducting and evaluating exercises are provided in Sections 4.4, 4.5 and 4.6, respectively.

4.1. Leading Exercise Programs in the U.S. The initial literature research and the follow-up meetings and interviews identified several U.S. Federal Agency emergency exercise programs that demonstrate best practice. This section summarizes the key features of the leading emergency exercise programs in the U.S.

4.1.1. Department of Homeland Security. Several U.S. federal agencies have exercise programs that stand out as innovative and best practice. Most of these programs make use of the DHS HSEEP. HSEEP is a comprehensive, forward-looking all risks-all hazards" exercise program that was closely evaluated in this study. It is important to note that this program is far broader in scope than PREP, which addresses the types and frequencies of oil spill exercises designed to meet specific regulatory components contained in OPA 90. HSEEP is a comprehensive program for managing all aspects of exercise design, conduct, evaluation, and improvement. HSEEP addresses both core capabilities and capability targets across prevention, protection, mitigation, response, and recovery mission areas. HSEEP provides for the entire process of exercise design, conduct and evaluation.

HSEEP demonstrates multiple best practice features and is gaining wide acceptance and application across federal and even state government agencies. HSEEP provides

the platform for the Transportation Security Administration (TSA) Intermodal Security Training and Evaluation Program (I-STEP). HSEEP is also a key component in the Federal Emergency Management Agency (FEMA) National Exercise Program.

4.1.2. TSA Exercise Program. TSA's I-STEP is considered an innovative exercise program that includes best practice features for designing, conducting and evaluating emergency exercises. This program "strengthens the nation's ability to prevent, respond to, and recover from a transportation security incident within the nation's surface transportation sector." I-STEP promotes stakeholder awareness and participation, as well as provides the ability to conduct relevant transportation exercises. The evaluation process promoted by I-STEP is consistent with international best practices identifying areas for improvement during exercise evaluations, assigning corrective actions, and tracking lessons-identified through ultimate resolution and verification of lessons-learned.

I-STEP utilizes an Internet-accessible knowledge-management platform called the Exercise Information System (EXIS). EXIS "gives stakeholders exercise information tailored to the transportation industry, and gives developers best practices and past work for use in future exercises." To ensure the best outcomes from the exercises, I-STEP also uses the Exercise Evaluation System resident in HSEEP as a supplemental evaluation tool. As an example of the technological capabilities of this program, evaluators can use the program to turn hand-written notes into electronic text. This enables the evaluation process to "correlate multiple objectives from multiple evaluators and sites electronically to develop the after-action report quickly".

4.1.3. FEMA Exercise Programs. FEMA administers the National Exercise Program (NEP) "to test, assess and improve the nation's preparedness and resiliency." NEP promotes the use of a "National Preparedness Cycle" which consists of planning, organizing and equipping, training, exercising, and evaluating and improving. This systems approach, where the exercise component is just one of the steps necessary to achieve readiness, is considered a best practice. Another notable, best practice feature of NEP is that the program assesses preparedness and resiliency against a set of common national preparedness priorities called the Principals' Objectives. NEP uses the results of this assessment to adjust policy, priorities and fiscal budgets. This approach can be considered a broad use of metrics to validate program effectiveness in improving readiness.

4.1.4. Other Promising Federal Agency Exercise Programs. The Nuclear Regulatory Commission (NRC) places foremost emphasis on public safety while ensuring that their operators demonstrate individual skills and full capabilities to cover an exhaustive range of protective actions and response procedures. Another Federal Program demonstrating several best practice features is the Environmental Protection Agency Water and Wastewater Exercise Program. This program incorporates web-based tools for planning, conducting and evaluating their exercises in a fashion that begins with small exercises and basics skills and leads all the way up through complex, interactive exercises that fully test an organization's ability to respond to worst case emergency scenarios.

4.2. International Exercise Programs. Two countries with recognized oil spill exercise programs were examined during PCCI's research: Norway and Australia. A third country with highly developed offshore oil and gas operations, the United Kingdom (UK), was also reviewed to identify potential best practices associated with oil spill exercises.

4.2.1. Norway Exercise Program Approach. Norway has long been a leader in offshore oil exploration, production, and environmental control, including oil spill response readiness. Norway's emergency exercise program is progressive and forward-looking, and challenges the oil industry to continually advance oil spill response equipment and techniques. Of all of the exercise programs reviewed for this study, Norway's program offers the clearest statement of the program objectives that are directly tied to their "Unified Management System". This approach incorporates the principles of responsibility, equality, proximity and cooperation into all national safety and preparedness activities in Norway.

Norway has an added benefit over the U.S. and other countries in having government approval for controlled spills of oil during readiness exercises, allowing unparalleled realism and simulation. This is one of the forward-looking features of Norway's approach to exercise planning. Although there are obvious concerns and environmental tradeoffs associated with intentional, albeit controlled oil spills, Norway demonstrates the desirability and effectiveness of applying the concept of Net Environmental Benefit Analysis (NEBA) to their oil spill exercise program, just as they do for actual spill events.

Another salient feature and best practice of Norway's program is the concept of turning lessons-identified into lessons-learned. This concept is widely recognized as an exercise program best practice. Norway also has a system in place that allows for agency relationships during day-to day operations to remain the same during emergency events of all scales. Even for their largest spill events, Norway has historically had little "politicization" of spills, but rather followed the procedures and experience gained from smaller events, as well as training and exercises.

4.2.2. Australia Exercise Program Approach. Australia is less developed in its offshore oil and gas industries than the U.S., Norway, and the UK, but their exercise programs demonstrate several best practice features nevertheless. Like Norway, Australia seeks to identify both challenges and weaknesses in the oil industry's oil spill readiness program, and focus exercise efforts in these areas, with the objective of demonstrating advancement and improvement. Also similar to Norway, Australia promotes, through regulation, doctrine and practice, the concept of managing emergency events at the lowest practical levels. This approach is practiced in exercises, where player participation is generally much smaller and streamlined than, for example, a similar-sized exercise conducted in the U.S. Australia accomplishes this by communicating strategic objectives from senior leadership on down, but then allowing subordinates and stakeholders far more latitude in responding to incidents without the need to conform to rigid command arrangements. As an example of the effectiveness and efficiency of Australia's approach to command and control, at the time of this report, their County Fire

Authority in Victoria was responding to 41 major fires. Allowing fire response crews within their ICS-based system the ability to make decisions that reflect the overall mission objectives that are established by Unit Commanders has allowed concurrent, rapid, effective fire response at each location. Australia practices this concept of “Mission Command” during their oil spill exercises as well.

4.2.3. United Kingdom Approach to Exercises. Little best practice or innovation was observed in the research of emergency exercise programs in the UK. One requirement for the UK offshore oil and gas industry is for them to incorporate the lessons-identified from exercises into improved response arrangements that then are incorporated into response plan updates and also future exercises. This approach is consistent with international best practice for exercises. In the UK, the International Association of Oil & Gas Producers formed the Global Industry Group in July of 2010. This group developed recommended practices for oil spill exercises. These recommended practices were then further developed by a Joint Industry Team. Ultimately, IPIECA captured the best practice components contained in this industry guideline and incorporated them into their “Guide for Oil Spill Exercise Planning” as discussed in Section 4.3.2 below.

4.3. Oil Industry Exercise Programs and Guidelines. Within the oil industry, several of the U.S. oil spill cooperatives have developed and refined their exercise programs to the point of demonstrating best practice. The industry has also developed exercise guidelines that feature a number of best practices.

4.3.1. Oil Industry Spill Cooperative Exercise Programs. Alaska Clean Seas (ACS) and Clean Islands Council (CIC) both provided multiple examples of how their respective exercises go beyond simply meeting the regulatory requirements embodied in OPA 90 and link their readiness program to member prevention, assessment, readiness, response and evaluation programs, an approach contained within HSEEP and considered best practice. ACS and CIS placed considerable focus in their exercise programs on providing the necessary role training to all key personnel on the response management team – before, during and after the exercise. They also strive to practice and maintain situational awareness at all levels of response during exercise events. Both organizations leverage technology to provide timely, accurate site assessment and pictures.

ACS and CIC also exercise particular challenges or potential gaps within their members’ response structures and capabilities. This approach is widely accepted as best practice. Both organizations take a progressive approach with their exercise program, starting with small, more frequent exercises that, together with role and skills training, lead to more challenging and complex exercises. This progressive approach is another commonly identified exercise best practice.

4.3.2. Oil Industry Exercise Guidelines. API and IPIECA have both published oil spill exercise guidelines that represent best practice within the commercial oil industry. Both of these organizations stress the importance of developing realistic exercises, having the right response managers and operators in attendance during the conduct



and evaluation of the exercises, and identifying and refining roles, responsibilities, and interrelationships.

**4.4 Designing Exercises.** This study focused on identifying innovative approaches and best practices associated with exercise design. For the purposes of this report, the design phase was identified as everything from the first task associated with planning the exercise up to the beginning of the conduct of the exercise. PCCI found several existing exercise processes that demonstrated best practice or innovative method for exercise design.

4.4.1. Best Practices in Exercise Design. Examples of some best practices for exercise design include:

- Ensuring exercise players fully understand their roles prior to the exercise through appropriate training before the exercise.
- Incorporating lessons-learned from previous exercises or real spill responses into the scenario development.
- Selecting non-standard conditions or low probability events for scenario development.
- Addressing future events as a result of the designed incident.
- Identifying limits of response capabilities and realistic challenges that require difficult decisions or trade-offs.
- Including technological challenges and problem solving, in addition to free oil recovery and removal, i.e. well control equipment and techniques.

4.4.2. Innovative Approaches to Exercise Design. A number of organizations were identified that streamlined and expanded exercise design capabilities through the application of web-based tools and software applications. For example, TSA has developed their EXIS program to allow their exercise designers enhanced capabilities and efficiencies to:

- Customize exercise design through the development of objectives, scenarios, injects, and other data sets.
- Conduct analyses and analytical reports by sorting lessons-learned, corrective actions, and best practices from previous exercises or other jurisdictions.
- Share libraries by tagging exercise components (i.e. objectives, scenarios, and findings with lessons-learned from previous exercises.
- Use an exercise “wizard” that walks the designers through a step-by-step process to allow them to build an exercise profile, including injects that are based on the exercise’s area of focus.

Other government agencies, including the U.S. Guard Guard, are in the process of upgrading or replacing software and computer-based tools to enhance exercise design, and in some cases, exercise conduct and evaluation as well.

**4.5. Conducting Exercises.** This study also focused on identifying best practice and innovative approaches to conduct exercises. The *conduct* phase of the exercise is everything from the players briefing that immediately precedes the exercise

through the end of all exercise play and the debrief or "hot-wash" that immediately follows the exercise. Best practices and innovative methods that were identified include:

- **Enhancing the realism and challenges of exercises:** This could include actually spilling a material that poses little environmental threat so that equipment deployment realism is enhanced.
- **Practicing stakeholder management:** This would provide the opportunity to involve local citizens, communities, and officials that would be impacted by the scenario. PCCI notes that local, state, regional and even national and international stakeholders have been involved to a greater or lesser extent in exercises, including PREP exercises, in the past. The key finding here is that a continued and concerted effort to include all key stakeholders – particularly local stakeholders – in the exercise event can enhance response readiness.
- **Addressing public outrage and mistrust:** This could include bringing in associated stakeholders to bring very contentious or challenging issues into play, for example, potential seafood tainting or other issues that threatened public health. One innovative process associated with this best practice would be to structure the exercise to include breaks that would allow for discussions and information exchange. These breaks would be longer than a typical "time out" and would result in issues identification and, if not resolution, tasking and follow-through similar to other lessons-identified/lessons-learned.
- **Addition of conflict:** Exercise controllers or actual stakeholders could be involved in forcing difficult decisions or tradeoffs. Again, as with public outrage, breaks could be used to provide discussion or training for both sides of the conflict.
- **Addition of political or social concerns:** Local or state political processes and social demands that can readily hinder science-based response decisions can be identified. One training option could include simulating the historical political or social issues and let them play out accordingly. Next, this same scenario could be run where everyone "plays by the book". Discussions then could analyze each response and how to achieve desired results in either scenario.
- **Inclusion of social media issues:** Response organizations need to be transparent during emergency response, and ideally act with the same speed as stakeholders do when they scrutinize and critique the response. The only way this can be achieved is to efficiently engage the social media world. Various approaches, from developing a "dark" website on the company webpage to using social media crisis simulators can provide the opportunity to realistically deal with how social communications system react and grow exponentially during real events.

**4.6 Evaluating Exercises.** The *evaluation* phase of the exercise begins during exercise design when planning the evaluation, and goes through the longer-term analysis, discussion, and identification of "how well we performed" that takes place

after the immediate information exchange and discussion of the exercise is complete. Evaluation also addresses the assignment and tracking of lessons-identified through the ultimate closure of lessons-learned. Best practices for comprehensive evaluation process includes:

- Analysis of exercise performance versus exercise objectives to identify those areas where objectives were met.
- Identification of the assignable actions to improve or correct the actions, procedures, or documentation.
- Development of a tracking system to capture the progress of these actions.

Exercise evaluators not only need to know what processes or procedures are in need of modification, but also how to make these modifications so that response readiness is improved. This could involve the development and implementation of metrics to assist in gauging how well the exercises were improving response readiness. Such metrics are discussed further in Section 5 of this report.

Several federal agencies have implemented methods and systems that seek to capture lessons identified and track these lessons through resolution, or lessons learned. DHS, the National Oceanic and Atmospheric Administration (NOAA), and USCG all have well documented measures in place to track, assign, and correct lessons identified.

DHS, through HSEEP incorporates a comprehensive evaluation system that maintains a record for exercise improvement planning through the conduct of the following activities:

- Planning for exercise evaluations.
- Observing the exercise, collecting necessary data, and analyzing the collected data.
- Reporting the exercise outcome in an after-action report that includes an overview of performance related to each exercise objective and associated core capabilities, while highlighting strengths and areas for improvement.

The After Action Report is provided to those individuals within each applicable organization that will have the responsibility of ensuring the appropriate actions are taken to effect the necessary changes.

NOAA has established a system to capture lessons-identified using a standard template. Semi-annually, a team reviews actions items and assigns ratings for importance, difficulty to implement, and time to implement. An evaluation report is submitted to management to determine which items can be pursued. Those items are then assigned a completion date for action.

USCG has established policy, guidance and responsibilities for documenting, tracking and acting on lessons identified and recommended areas for improvement from both exercises and actual events. This same system also identifies best practice for retention and potential adoption by other units or commands.

**5.0 Recommendations for BSEE.** In reviewing the best practices and innovative methods identified in Section 4 above, a number of recommendations can be made for BSEE on ways to enhance the oil spill exercise program for the OCS.

- Adopt a program similar to HSEEP. HSEEP is an exercise program that provides for the entire process of exercise design, conduct, evaluation and improvement.
- Retain PREP for the regulatory component of BSEE's overall oil spill exercise program, but move towards a performance-based exercise program that demonstrates response capabilities across all response requirements and goals.
- Identify and add performance metrics to BSEE oil spill exercise program.
- In addition to exercises that validate response plans, design, conduct and evaluate exercises that identify the limits of response capabilities (industry and government). Design and conduct, or require and evaluate, exercises that challenge operators up to their limits of capability.
- Address the many lessons-identified from prior exercises and real events.
- Bring NEBA into Exercises. Though intentional discharges will not likely be allowed in the U.S., NEBA can be used during exercises to practice decision-making for controversial environmental decisions, including mechanical versus non-mechanical response, shoreline cleanup techniques, etc.

These recommendations are discussed in more detail below:

5.1. Adopt a Comprehensive, Performance-Based Oil Spill Exercise Program. BSEE's current oil spill exercise program for the OCS has its foundation in the OPA 90 statute and BSEE's implementing regulations. As a result, BSEE's exercise program, like the other agencies with implementing OPA 90 regulations, is fairly prescriptive and geared towards regulatory compliance. As DHS has shown with HSEEP, emergency readiness goes well beyond compliance, and best practice for an emergency exercise program is to fully integrate it within the continuous readiness cycle of *planning, organizing, training, equipping, exercising, evaluating, and improving*.

5.2. Retain PREP to Meet OPA 90 Regulatory Requirements.

BSEE should incorporate and retain PREP within an overall HSEEP-type program to provide the framework for meeting the statutory oil spill readiness requirements contained within OPA 90 for testing and validating the mandatory components of oil spill response plans.

PREP exhibits multiple features associated with a regulatory "exercise requirements" program that can be considered best practice, and should be considered for retention by BSEE in any future exercise program. Note the following observations and recommendations of the desirable features inherent in PREP are based upon the last draft rulemaking, the March 2015 PREP draft that is currently out for public comment.

First and foremost, PREP incorporates and requires the use of the NIMS. The foundation for NIMS is the Incident Command System (ICS), a response management system that is widely accepted around the world as a best practice for emergency management.

PREP provides a strong foundation with the 3-yr. cycle for conducting a series of exercises for examining and validation response plans across a broad range of requirements and capabilities. The 15 core components embodied in PREP are considered essential features of spill response plans developed under OPA 90.

In addition to the six different types of exercises contained within PREP, the unannounced exercise requirements provides regulators the ability to ensure that those in charge of the vessel, facility or process are fully prepared, at any time, to initiate a capable response to any emergency that could result at their particular location or operation.

### 5.3. Identify and Add Performance Metrics.

Similar to TSA's I-STEP, BSEE should identify and implement the use of performance metrics to measure the effectiveness of their oil spill exercise program on improved response readiness.

The best gauge of how well an oil spill exercise program is working to improve response readiness would be to evaluate spill response efforts to a real event soon after the completion of an exercise cycle. Such an approach is neither desirable nor practical. Consequently, in the absence of spills, other metrics must be identified and monitored to evaluate the effectiveness of an oil spill exercise program. These metrics, called surrogate or proxy metrics, are intended to identify response readiness, and changes or improvements to response readiness, over time.

The research conducted for this study did not identify any performance measures that have been developed specifically for evaluating how well oil spill exercises improve response readiness. However, a number of studies and reports that were reviewed for this study lead to the identification of surrogate metrics.

The American Petroleum Institute, in their "Guidelines for Oil Spill Response Training and Exercise Programs" (API Technical Report 1159 dated July 2014), discusses the need for continual improvement and identifies factors for exercise evaluators to focus on. These evaluation factors could readily be included as performance metrics to assess how well exercises were improving response readiness, and they include the following:

- Necessary or desirable response plan revisions.
- Changes to training or exercise procedures/processes.
- Changes to company response procedures/processes.
- Changes to training or exercise requirements and frequencies.
- Potential purchase of additional equipment or supplies.
- Changes in oil spill response strategies and tactics.

PCCI reviewed other reports, including the U.S. Government Accountability Office report on “The Cost of Oil Spills” and also the various Deepwater Horizon After Action and Lessons-Learned Reports that led to the identification of additional potential metrics to assess changes to response readiness:

- Improvements in qualifications and increased skills and training of response personnel and managers.
- Response equipment readiness and improvements.
- Knowledge of area contingency plans and operators plans, including priority resources for protection, preferred response strategies, and alternate strategies.
- Numbers of revisions to operators response plans, as well as Area Contingency Plans and Geographic Response Plans (ACPs and GRPs) resulting from the exercises.
- Numbers of near misses versus numbers of accidents or failures that resulted in oil spills.
- Number of BSEE-led oil spill exercises.

Further to identifying surrogate or proxy metrics, metrics from the offshore spills that do occur are important to review against the oil spill exercise program. These metrics could include: amount spilled; amount contained and recovered; time to detect and respond; distance or area covered by spill. Each of these metrics could serve to measure the effectiveness of the drill program improvements and any resulting improvements in response planning and readiness.

In looking at performance measures, it is important to clearly distinguish those measures associated with individual evaluations and those measures intended to evaluate the performance of the exercise and drill program improvements as a whole.

#### 5.4. Design Exercise Program to Measure up to Limits of Capabilities and Identify Gaps.

Best practice promotes designing and conducting exercises that challenge operators up to their limits of capabilities. In addition to the 15 core components identified in PREP, BSEE should encourage operators, in a no-fault environment, to design and conduct exercises that expose weaknesses or gaps in response. These exercises should stress the system to reveal the limits of response capabilities in terms of logistics, response resources, and overall knowledge and capabilities.

#### 5.5. Address Lesson-Identified from Previous Exercises and Real Events.

In addition to the best practices associated with the emergency exercise programs described in Section 4 of this report, a number “lessons-identified” resulted from the literature research and expert interviews. Some of these lessons-identified relate to government readiness and require corrective government action; BSEE should examine these lessons-identified, and similar to the system developed by NOAA and discussed in Section 4.6, the priority lessons-identified as they apply to BSEE’s Government – Initiated Unannounced Exercises (GIUEs) in the OCS should be determined, budgeted for correction to lessons-learned, and incorporated into

future BSEE exercises. Many of the other lessons-identified require action and correction by Federal, State, Local or Industry partners, and include areas that do not directly fall under the 15 core objectives identified in PREP. PREP, however, does not prohibit the addition of other components that could be applicable to the specific vessel, facility or process. Thus, where previous lessons-identified are important to overall response readiness in the OCS, BSEE should encourage the associated operators to incorporate the challenges represented by these lessons-identified into operator-led exercises. Examples of these real world challenges include:

- Limit exercise participation in size to the necessary and targeted key players and the design team members (exercises participation has a tendency to grow too large).
- Ensure that exercise participants include the key senior, federal, state, local and industry response managers (Senior key response personnel are often not present at exercises).
- Expand on the 15 core components included in PREP to incorporate challenges and issues that nearly always come up in real events that are rarely practiced in oil spill exercises, including:
  - Social media
  - Outrage and mistrust
  - Conflicting federal laws and programs
  - Geopolitics
  - Dispute resolution
  - Stakeholder management

#### 5.6. Incorporate Concept of NEBA into Exercises.

Another recommendation for BSEE's oil spill exercise program for the OCS includes incorporating the concept of Net Environment Benefit Analysis into exercises. While this approach will likely not result in BSEE being able to conduct controlled oil discharges for exercises such as it done in Norway, it can involve local governments, stakeholders, and other members of the applicable Area Committees in interacting and resolving difficult decision-making as relates to environmental trade-offs or non-mechanical response methods such as dispersant use.

Innovative approaches to the way exercises that only consist of "free play" and very short "time outs" are conducted may have potential to better incorporate training, defuse major response issues, build public trust, etc. For example, BSEE exercises could be run in a format of free play, i.e. real time events with little coaching or moderating, followed by breaks to train and discuss sensitive or contentious issues.

## **6.0 References**

The following key references were used in the preparation of this report:

6.1. Flourney, Alyson C., 2011. Three Meta-Lessons Government and Industry Should Learn from the BP Deepwater Horizon Disaster and Why They Will Not, 38

- B.C. Environmental Affairs Law Review 281. Available online at: <http://lawdigitalcommons.bc.edu/ealr/vol38/iss2/4>.
- 6.2. API Technical Report 1159, July 2014. Guidelines for Oil Spill Response Training and Exercise Programs: Guidance for Spill Management Teams and Oil Spill Responders. Available online at: <http://oilspillprevention.org/oil-spill-research-and-development-cente>.
- 6.3. Cashman, D., 2005. Lessons-Learned, Best Practices, and Common Sense from U.S. Government-Led National Preparedness for Response Exercise Program (PREP) Drills. IOSC Technical Paper.
- 6.4. Tarpley, J., Drury, A., Helton, D., 2014. Implementing Lessons-Learned for NOAA's Emergency Response Division. IOSC Technical Paper.
- 6.5. Narin van Court, W.A., Robinson, M.B., 2014. Insights from Meta-Analysis of Recent Exercises. IOSC Technical Paper.
- 6.6. Schuler, P., 2014. MOBEX Cayenne 2013: Lessons-Learned & Response Enhancements Derived from the International Mobilization, Preparedness & Response Exercise in French Guiana. IOSC Technical Paper.
- 6.7. Leonard, J.J., Karwan, K.G., Hahn, J., Gibeault, C., 2014, Exercising the Recovery Phase: Taking the Next Step. IOSC Technical Paper.
- 6.8. IPIECA, 1996. Guide to Oil Spill Exercise Planning. IMO/IPIECA Report Series, Volume 2. Available online at: <http://www.ipieca.org/publication/guide-oil-spill-exercise-planning>
- 6.9. Deployable Training Division, Joint Staff J7, U.S. Army, 2013. Insights and Best Practices Focus Paper: Interorganizational Coordination, Fourth Edition.
- 6.10. Walker, A. H., Scholz, D., Ott, G., 2014. Local Level Stakeholder Coordination and Communications to Support Oil Spill Preparedness and Response. IOSC Technical Paper.
- 6.11. Chang, J., Taylor, J.S., 2001. A Risk Based Drill Candidate Selection System for the U.S. Department of Transportation, Office of Pipeline Safety. IOSC Technical Paper.
- 6.12. Allen, T. W., 2010. National Incident Commander's Report: MC252 Deepwater Horizon.
- 6.13. Ann Hayward Walker, Debra Scholz, and Gary Ott – International Oil Spill Conference Proceedings: May 2014, Vol. 2014, No. 1, pp. 1172-1185.
- 6.14. Tarpley, J., Drury, A., Helton, D., 2014. Implementing Lessons-Learned from NOAA's Emergency Response Division. IOSC Technical Paper.