

Implementing Lessons Learned for NOAA's Emergency Response Division

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ABSTRACT 3002979:

NOAA's Office of Response and Restoration Emergency Response Division (ERD) is committed to continually improving their response capabilities to hazardous material releases that affect life, property and natural resources. One way of achieving this is by capturing and implementing Lessons Learned from spills and exercises. Following an incident, the ERD reviews their contributions and actions to an incident via an internal "Hotwash" using a standard template, followed by documenting the results in an incident-specific report. Twice a year the Lessons Learned Team (LLT) reviews all incident hotwash reports from the previous period and identifies specific action items to address issues/problems that arose during the recent spill responses. The LLT reviews the action items and assigns a rating for importance, difficulty to implement, and time it would take to implement. These action items are also rated on their importance to improving the overall effectiveness of the ERD to respond to spills. The LLT generates an evaluation report of action items, which is submitted to the ERD's management for determination of whether these action items will be pursued, and if so, how assigned. Health and safety items are implemented immediately. Other items are incorporated into the ERD's Operational Plan and assigned a lead and due date, generally within six months to one year. Using this process has increased confidence in staff that the division has the capability to capture significant issues, effectively manage corrective actions into direct implementation, and improve response products and support capabilities.

INTRODUCTION:

NOAA's Office of Response and Restoration Emergency Response Division (ERD) is charged with responding to oil discharges, chemical releases, and other emergencies in coastal areas, and responds to an average of 120 oil and chemical spills in the United States annually. These spills threaten life, property and public natural resources.

The ERD's history began in 1976 when the NOAA established the Spilled Oil Research (SOR) Team. The ERD's precursor, the SOR Team was a network of coastal geologists, marine biologists, chemists and oceanographers. When an oil spill occurred, the SOR Team would mobilize quickly to go on-scene in order to gain information that would help minimize damages from future spills. Today, under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP – 40 CFR 300.145.c.2), the NOAA is responsible for providing scientific support to the U.S. Coast Guard (USCG) Federal On-Scene Coordinator (FOSC) for oil and hazardous substance incidents in the coastal zone, Great Lakes and inland rivers. To support this

mandate, the ERD provides 24-hour, seven-day-a-week scientific capability to respond to oil and hazardous substance incidents.

The ERD's technical expertise spans oceanography, biology, ecotoxicology, chemistry, geology, as well as information and data management. This in-house expertise allows the response team to model oil and chemical releases and create trajectories, analyze chemical hazards, and assess risks to coastal environments and important human use areas. These multi-disciplinary backgrounds comprise the ERD technical team, or Scientific Support Team (SST), which is led by a regional Scientific Support Coordinator (SSC) who provide scientific support to the FOSC for spills, either remotely or on-scene. The SSCs are stationed throughout the country with the USCG, developing a close working relationship and supporting spills and drills. Additionally, SSCs provide training, expertise in contingency planning, and other preparedness activities. The SSC also serves as the Department of Commerce/NOAA representative on the Regional Response Team.

Over the years, the SSCs and SST have supported a wide variety of oil and chemical spills from vessels, facilities, pipelines and railcars. They have supported the USCG in every waterway in the U.S. and provided support to the USCG National Strike Force overseas, often at the request of the U.S. Department of State or U.S. Navy, in such locations as Mexico, Chile, Korea, Vietnam, Galapagos Islands, Philippines, Africa, Spain, and the Arabian Gulf during the 1991 Gulf War. In addition to oil spills, when requested the ERD expertise and products have also been valuable in responding to search and rescue cases, at-sea plane crashes, body recovery investigations and terrorism events. The ERD has developed oil and chemical response software tools that are used around the world by private and government organizations for oil and chemical response (see GNOME, ADIOS, and CAMEO at www.response.restoration.noaa.gov).

With such a dynamic portfolio of incidents and requests for support, NOAA's ERD has maintained flexibility and openness to continuous growth and improvement of its people, tools and products. The ERD has committed to continually improving its ability to respond to all incidents involving hazardous material releases into the environment providing the absolute best scientific advice possible. A key component to this attitude is the implementation of lessons learned from spill incidents, exercises, and drills.

TURNING ORGANIZATIONAL EVALUATIONS INTO BEST PRACTICES:

The ERD is one of many entities that practice after-action reviews. The ERD views it as a good practice to reflect on the work done in support of the mission. The ERD may do their reviews and implementation of recommendations differently than other groups, but the overall intent of bettering the organization through lessons learned is common throughout all organizations that use a similar process.

Capturing lessons learned is common practice during oil spill exercises, and it is a formalized part of the Preparedness for Response Exercise Program (PREP). The lessons learned from PREP experiences are an important reason for having the drills. By sharing the lessons learned from the PREP exercises across the spill response community the ability of responders to effectively react when real events occur is increased (Kurgan and Laney 1995).

Many other governmental and private organizations have a formalized lessons learned process, both those involved in spill response and those involved in other emergency response operations. These vary in complexity depending on the size and scope of the organization. The USCG, for example, has an extensive lessons learned process that includes detailed incident investigations, safety reviews, regulatory reviews, Incident Specific Preparedness Reviews, and other processes to learn and improve on past performance. Smaller organizations such as Oil Spill Response Organizations (OSROs) also collect, address, and share lessons learned internally and through their trade organizations. Other agencies not usually associated with spill response that also use a lesson learned process include the North Atlantic Trade Organization (NATO) and the National Aeronautics and Space Administration (NASA). NASA even has a searchable, publically available lessons learned database online (NASA 2012).

From a review by the authors, the process of identifying issues and providing recommendations to make them “lessons learned” does not appear to vary drastically from organization to organization. However, how an organization implements lessons does vary, as each organization has a different mission and operations structure, which affects how a recommendation may be acted upon.

An inquiry of International Oil Spill Conference papers on the lesson learned topics determined that other groups have used a process to do formal analysis of not just one particular incident, but a review of many related incidents or processes that result in recommendations to address the issue being examined. A few examples are as follows: a review of case studies of Norwegian oil spills in order to make recommendations for shorelines cleanup strategies (Guénette, Aasnes & Follum 1997); a review of how PREP lessons learned from pipeline related exercises are incorporated into the pipeline industry (Epler & Hunt 1999); and Chevron’s review of its prevention, preparedness and response efforts in response to the Exxon Valdez spill (Jardin 1991). While the ERD usually does hotwashes for single spill events, the ERD hotwash process has been used to review larger topics, like these other groups have explored, and is open to any professional subject that requires examination.

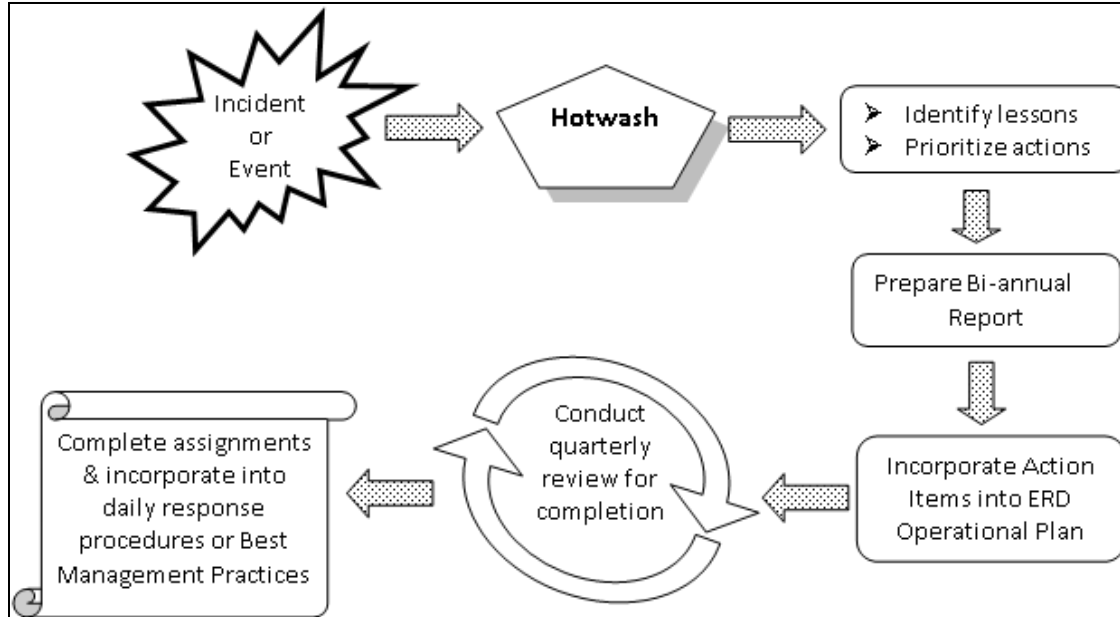
The lesson learned process can be an effective tool for improvement if followed through to implementation (Loesch, Drie, Moffatt & Rich, 2001). For the ERD, the process leads to continually higher quality response support. Although the ERD may not follow the exact same process as others, the essential idea of improving one’s abilities through a lesson learned process is the same.

METHODS:

There are multiple steps taken between response to an incident and implementing any corrective or improved action items. In the ERD, the process is coordinated by the Incident Operations Coordinator and the Lessons Learned Team (LLT). Soon after an incident the first step is to review the response actions and technical support through a standardized internal review or “hotwash,” an after-action discussion evaluating of actions and performance. Following the hotwash, lessons learned are identified, put into an action item format to address

the issue, and then prioritized. These action items are compiled into a report for the ERD's management team to make the final determination of action to be taken to address the lesson learned (Figure 1).

Figure 1. The basic Lessons Learned process for NOAA ERD.



The essential piece in transforming recommendations into lessons that are “learned” is to make effective changes to the organization, policy, training, and/or procedures as appropriate, and implement them. Failure to act on lessons from an incident makes them simply “lessons logged”.

a. Lessons Learned Team

The purpose of the LLT is to increase the organization's effectiveness and ability to respond to spill incidents. The Team accomplishes this by acting as the reviewing body to the ERD's performance after an incident, capturing “lessons” (positive and negative) and categorizing them for implementation. Lessons or action items are identified most often during a post-incident hotwash. The team lead is usually the ERD Incident Operations Coordinator – the person who coordinates the organization's response to a spill incident, or their assistant. There are three other members of the team that include a member of the organization who supports the response from the headquarters office (“Home Team”), an on-scene responder (“Away Team”), and a NOAA Scientific Support Coordinator (SSC), who is the on-scene lead for the organization.

b. Hotwash

The LLT lead organizes a hotwash based on significant or unique circumstances that occurred during a spill response, or at the request of the SSC, on-scene responders or other organization personnel. Hotwashes may also be conducted for other significant events, such as

spill drills. The purpose of a hotwash is not to critique an individual - as each team member is a capable professional in the work they do - and the group in attendance for the hotwash is reminded of this as part of the ground rules. The intent is to examine the collective contribution of the team members in what was done well, what needs consideration, and to improve customer service and skills and abilities in support of spill response.

The hotwash session may include few to many individuals depending on the scope of the incident. For large responses, multiple hotwashes are often conducted to focus on specific functions or components of support to an incident (e.g., Home Team support vs. Away Team providing on-scene support, Shoreline Clean-up Assessment Technique, or Information Management). Participants include all those directly involved in the response and for the specific topic of discussion. Although the hotwash is most often internal to the ERD other NOAA partners are invited, as appropriate, and occasionally the USCG, as they are the ERD's principal customer.

To conduct an effective hotwash and maintain as much objectivity as possible, a standardized incident hotwash template is used as an agenda (Figure 2). As necessary, the LLT lead will tailor the hotwash template for any major issues that came up during the response so as to use the time allotted for the hotwash efficiently.

Figure 2: The standard hotwash template without spill-specific modifications.

<p>Incident Name: _____ Incident Response Date(s): _____</p> <p>Hotwash Date: _____</p> <p>Incident Responders (from the organization): _____</p> <p>1) <u>Hotwash attendees:</u></p> <p>2) <u>Introduction:</u></p> <p><u>Purpose of hotwash: To increase the organization's effectiveness and ability to respond to spill incidents by reviewing the response.</u></p> <p><u>Method: Discuss lesson learned from the response and identify action items that address lessons learned issues.</u></p> <p>3) Short overview of incident and the organization's involvement:</p> <p>4) General Questions:</p> <p>STAFF</p> <p>a) Did we have the right mix (expertise, field vs. home) of staff?</p> <p>b) Should we have had more or fewer staff on-scene?</p> <p>c) Were on-scene workloads too light or too heavy?</p> <p>d) Did any other staff from the organization, or other offices within the organization, participate in response?</p> <p>e) Were contractors used? If so, who and were they of value to the response?</p> <p>TIMELINESS</p> <p>a) Did staff arrive on-scene quick enough?</p> <p>b) How quickly was the internal posting site created?</p> <p>c) Were internal notifications made?</p> <p>d) Were ERD products generated in a timely manner?</p> <p>PRODUCTS AND SERVICES</p> <p>a) Were the home team (non on-scene responders supporting the on-scene incident response) products useful/effective?</p> <p>b) Were any unique products or services generated? If so, what? How was it useful?</p> <p>c) Any research and development needs identified?</p> <p>d) Was the internal posting site useful and/or effective?</p> <p>SAFETY</p> <p>a) Were there any injuries or chemical exposures to personnel?</p> <p>b) Did any safety issues or potential issues affecting staff arise during incident?</p>

Figure 2: Continued.

MEDIA AND OUTREACH

- 1) Were there any media requests for the organization during this response?
- 2) If so, how did they go? What media was it?
- 3) Was any outreach conducted during, or as a result of, this incident?
- 4) If so, how did it go? What format was the outreach done in?

OTHER

- 1) Funding and/or PRFA established?
- 2) Are there any equipment needs, malfunctions, replacements?
- 3) What additional equipment or tools would have been useful?
- 4) Were there any logistical issues - Transportation? Lodging?
- 5) What did we learn that would be useful to share with other regions?

c. Post Hotwash Processing and Reporting

After the hotwash is complete the LLT reviews and organizes the data. Issues or suggestions to improve organizational response (lessons) are documented and converted into action items. Each action item must be specific, actionable, and have perceived benefit to the organization. Some items that come up as issues during hotwashes are outside the realm of control of change for the organization, for example; protocol or policy of another agency or the responsible party that affected response. These items are noted, and can be used to educate the ERD responders, but it is recognized that, while an issue, the ERD is not in the position to fabricate the solution to the problem. As appropriate these issues are raised to senior staff in the agency or organization most able to take action on the issue.

The identified action items are then synthesized into a Lessons Learned Report submitted bi-annually to the ERD management team. The LLT rates the action items in order to assist management with priority and level of effort for implementation (Figure 3). The rating for the action item is based on importance to the organization, the skills needed to implement the action item, and the difficulty to implement the action item.

The final bi-annual report includes:

- A summary table of action items to address actionable lessons learned
 - a. Includes a recommended link to the annual ERD Operating Plan, thereby making inclusion of these action items simple.
- Explanation of action items, including: (Figure 4)
 - a. Action item description
 - b. Background of action item
 - c. Perceived impacts if action item is implemented

d. Ratings assigned to action item

Figure 3: Rating structure for identified action items to address Lessons Learned

<p><u>Importance:</u></p> <ol style="list-style-type: none">1. Utmost importance, should be started as soon as possible2. Important3. Low importance <p><u>Expertise required to implement (“specialized skills”):</u></p> <ol style="list-style-type: none">1. Will take a person with specialized skills to complete (i.e., an oceanographer, a chemist, etc.)2. Will take a person that has complete knowledge of spill response and the organization to complete3. Someone with little specialized knowledge could implement this action item <p><u>Effort required to implement:</u></p> <ol style="list-style-type: none">1. Would require a team of individuals many meetings and tasks to resolve. Would require an individual many weeks to months to resolve.2. Would require a team of individuals few meetings and tasks to resolve. Would require an individual a few weeks to resolve.3. Would require one team meeting and/or task to resolve. One individual could resolve this in a week.
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Figure 4: An example of a lessons learned action item with accompanying rating as it is presented in the bi-annual report.

Action Item:

Create an online (or otherwise accessible folder) to compile common documents created for past incidents.

Documents that are commonly written for a large response include, but are not limited to:

- End points document
- Best management practices when working in sensitive environments: Cultural resource protection, natural resource protection during activities such as Aerial Operations, Open-water Operations, Land-based Operations, Marsh Operations
- SCAT plan
- Data management for “targets” (pollution target management post storms)

Action item is a result of hotwash for:

Hurricane Sandy Pollution Response, Autumn 2012

Background:

Often there are many scientific advisory documents that have already been developed that will be asked for again during a response, hurricane or not.

Perceived results from implementing lesson learned:

- a. With adjustments and edits to make past documents incident specific, it will be easier, more efficient, and faster to create documents for the FOSC on a response.
- b. Better library of past information
- c. Consistency
- d. Becomes a training tool for incoming employees
- e. Easier to navigate than any other current set-up
- f. The organization is ready with answers (ensuring they are situation appropriate). Example: A document with best practices while working in marshes is ready, and then tailored to the impact zone.
- g. Able to advise the FOSC what scientific answers they may need to anticipate.

Rating

Action Item	Resulting Importance: Rate 1, 2, or 3	Difficulty to implement action item: Rate 1, 2, or 3	Amount of effort to implement action item: Rate 1, 2 or 3
#9: Establish and compile documents for a folder of common documents used in responses.	2	2: Already have a system to use but needs to be advertised, used and consolidated. Will take time and training.	1

d. Implementation

Implementation of the action items from lessons learned is based on priority and level of effort. Safety issues during response are addressed immediately. If the action items from a hotwash is safety related and can be corrected with equipment or training they are addressed as soon as is practicable. Other action items that are more procedural, administrative or training related are reviewed for incorporation into the ERD Operational Plan, and are generally completed within six months to one year.

In order to act on recommendations from the LLT, they are incorporated into the annual ERD Operational Plan in the form of an action to be taken and a milestone or result to be obtained. Each action item as an assignment an employee is given is tracked quarterly at the individual and Branch levels. Throughout the year, employees check-in with their supervisors or project managers about their progress on each task. If, for whatever reason, the assignment cannot be completed that year the task goes back into discussion and evaluation for the next year's ERD Operational Plan. Projects that are not completed are captured in the ERD's Operational Plan report. By capturing lessons in bi-annual Lessons Learned reports that are then moved into the Operational Plan, tracking and follow-up is easy to do, and the Lesson Learned process remains accountable.

DISCUSSION/CONCLUSION:

As a pollution response organization that has been responding to an average of more than 120 incidents annually since 1976, the ERD has experienced countless scenarios and scientific challenges. Although many spills may appear routine, each is unique in location, environmental conditions and behavior. Furthermore, responder capability, response technology, norms, expectations and political climate are always in flux and will continue to change with time. There are always ways to improve and adapt. Because of the reactive and continuous nature of emergency response work the ERD has found it challenging to establish an expeditious, yet still meaningful procedure in which to capture lessons for each response; and even more difficult to evaluate and implement those lessons. The process outlined in this paper has been in place for approximately five years. As with any change, it took time to adopt this method, yet through the dedication of the LLT, lesson learned reports and an annual Operating Plan, this approach has been successful. The ERD staff sees the benefits come back around during improved training, equipment, skills, preparedness and responses. Use of this process is now standard and expected. It has increased confidence in staff that the organization has the ability to capture and address both small and significant issues, the courage and dedication to evaluate and implement changes, and to become a progressive learning organization. Through the use of this system the ERD's response products have been improved, the ERD responders are more aware of lessons learned, anticipate potential situations that could lead to known outcomes, make conscious decisions to choose wiser courses, and engage in spill response with improved effectiveness and efficiency.

DISCLAIMER:

The information in this paper reflects the views of the authors and does not necessarily reflect the official positions or policies of the National Oceanic and Atmospheric Administration or the Department of Commerce.

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