Lessons Learned: The Case for Data Optimization between Oil Spill Response and NRDA

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Some early sampling cruises following the Deepwater Horizon (DWH) oil spill carried response and Natural Resource Damage Assessment (NRDA) teams on the same vessels. The response team would collect a cast of samples, and then the NRDA team would collect a cast of samples. These two teams sent their samples to two different laboratories under two different quality assurance programs with two different sets of chemical lists and detection limits. Later, data from these samples were handled by different groups and managed separately.

In the end, these data sets were merged with others to develop the most comprehensive possible understanding of water column exposure, but integrating their many seemingly simple differences required complicated and time-consuming reorganization. Some data were unusable for NRDA, requiring complete reanalysis. Other sampling efforts focused narrowly on standard analyte lists—instead of petroleum-specific compounds—creating massive data gaps.

Figure 1. Because response and NRDA overlap, early sampling efforts should focus on producing multiuse data sets that can ultimately serve cleanup and assessment needs.
Response teams use environmental data to determine the extent of oiling and decide where conditions warrant control, containment, or cleanup; NRDA teams use environmental data to establish potential oil exposure pathways to natural resources and assess possible injury. Both begin very early in a spill but often proceed as disconnected parallel efforts, and the realization that response data will serve NRDA and other purposes tends only to occur later.

While the ultimate objectives, and therefore data needs, of response and NRDA are different, they share the same immediate goal: collecting high-quality environmental data during and following an oil spill. Greater understanding and coordination between these teams can promote data collection that meets more needs without sacrificing quality or usability and without duplicating effort and costs.

Bigger, Faster Benefits from Smaller, Slower Planning

More oil spill response data are being collected than ever before, including field and laboratory measurements, observational data, satellite imagery, chemistry data, photographs, real-time weather data, and ship locations. The links between the collection, management, and uses of those data are growing just as fast, not only for spill response but also for NRDA, determination of civil penalties, and third-party legal claims. While data collection centers on regulatory and legal drivers, digital and social media are driving public interest in spills, and their impact on public perception can drive political decisions, making timely, high-quality data critical to effective communication in times of crisis.

In this high-volume, high-speed information environment, incorporating data optimization frameworks into oil spill response preparedness is important, but generic plans often don’t consider optimizing data collection and analysis. Specific, detailed sampling and analysis plans should focus on key activities immediately following a release, including collection of source oil samples, ephemeral environmental samples (e.g., transient data that can only be collected in the first few hours or days after a spill), and baseline/background samples.

Understanding the multiple uses of these data as the spill moves from response to NRDA helps ensure collection of important information from the perspective of data optimization and usability. However, this approach to optimizing data collection needs to be embraced ahead of a spill incident, making inclusion of this framework in spill response drills and planning activities critical.

What We Know

Lessons learned from experience during previous spills, including DWH, and assessments conducted afterwards can help planning teams understand which data were most useful in different response phases. At the same time, past experiences show where sampling was done prematurely or sub-optimally and where resources were wasted collecting unhelpful data. Knowing what worked, and what could have worked better, allows responders preparing for future spills to select the right tools and methods, set appropriate detection limits, and identify and analyze common reference standards. The MC 252 Analytical Quality Assurance Plan prepared by the National Oceanic and Atmospheric Administration, developed during DWH, provides analyte lists, methods, detection limits, and more, all in agreement with NRDA Trustee standards for collecting and handling appropriate, multiuse data. For DWH, these useful chemistry data included a variety of parent and alkylated compounds and biomarkers, all with the lowest possible detection limits to enable comparisons with toxicological benchmarks.

Going forward, incorporating smarter tools (e.g., hand held devices with electronic field forms, global positioning system capabilities, cameras, and bar code readers) could facilitate the collection of necessary field data and documentation in a database ready format.
**Filling the Planning Gap**

Different spills will create different data needs at different stages and phases of a spill event, but those needs can be predicted and plans can be developed and adapted to future events. These plans largely focus on spill response, so a great optimization opportunity is not generally included. Response and NRDA teams will need to work together on developing common data models and associated validation practices to ensure the ease of data sharing and compilation during an incident. Regardless of the nature of the incident, developing standards—from data collection methods, including metadata for samples, measurements, and observations, to analytical methods, data codes, and data review methodologies—will help make data management strategies transferable from one incident to the next.

Failure to build on the substantial knowledge of what is required for spill response and NRDA knowledge has large costs. Toward that end, Exponent can help companies develop highly optimized data collection plans. We also help put those plans into action across the spectrum of spill-related data needs with the primary goal of establishing best practices for the collection, storage, and retrieval of data. By working with a client in a regular review process to incorporate new research and lessons learned into an evolving quality assurance plan, Exponent can help ensure that collective knowledge is available right off the shelf to optimize data practices across response and NRDA efforts.

*To learn more about data optimization for oil spill response and NRDA, contact Laurie Benton.*