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18 Aug 2010

MEMORANDUM

From: RADM Paul Zukunft
Federal On-Scene Coordinator

To: T. W. Allen
National Incident Commander, Deepwater Horizon MC 252 Response

Subj: SUB-SEA AND SUB-SURFACE OIL AND DISPERSANT DETECTION, SAMPLING AND MONITORING STRATEGY

Ref: (a) Sub-Surface Oil and Dispersant Detection, Sampling, and Monitoring Strategy, Directive memo 16451 of 13AUG10
(b) UAC Adaptive Sub-Surface Sampling Strategy for Transition from Response to NRDA Approved 03AUG10

1. In response to reference (a) this sub-surface monitoring strategy is submitted in accordance with the oil spill removal provisions contained in the National Contingency Plan. This strategy addresses sub-sea monitoring operations in the offshore and deepwater domains as well as sub-surface monitoring in the near shore and inshore domains as identified in Appendix B. The goals of this strategy are to:

a. Monitor and assess the distribution, concentration, and degradation of the remaining portion of the oil that remains in the water column and/or bottom sediments.
b. Evaluate the distribution of indicators of dispersant or break-down products of dispersants used in oil spill response activities.
c. Identify any additional response requirements that may be necessary to address remaining sub-surface oil.

2. This monitoring strategy shall utilize all appropriate existing empirical data, and fate and transport model results to identify likely locations of elevated concentrations of sub-surface oil and dispersants (or their breakdown products) for subsequent at-sea sampling; determine the rates of degradation of sub-surface oil and dispersants (in the water column and where appropriate, in the sediments); and evaluate the immediate impacts to the biological community by measuring factors such as dissolved oxygen levels and other appropriate indicators; and microbial community characteristics. The latter provide a positive indicator of natural degradation – the ultimate fate of residual oil in the environment.

3. Since May 2010, extensive sampling and testing of the air, surface and sub-surface environments in the Gulf of Mexico have been conducted to locate any and all oil and dispersant break down products from the Deepwater Horizon MC 252 oil spill and response. These efforts were guided by the analysis of a broad range of sensor data, model output and knowledge of current systems within the Gulf.

4. Due to the uncertainties in quantifying oil fate, it may not be possible to attain accountability for a significant amount of oil. Therefore, it becomes imperative to sustain and expand the scope of our detection, sampling and monitoring efforts to ensure that no harmful concentrations of oil and dispersants remain as a result of the spill and our response operations.

5. This implementation strategy will deliver a comprehensive set of measures to clarify our understanding of the distribution and degradation of oil and dispersants in the water column, and identify any additional response requirements that may be necessary. It also identifies points where the sampling and monitoring process should be addressed in the Natural Resources Damage Assessment (NRDA) process. The strategy shall culminate in an implementation plan that will conclude with a high degree of confidence and backed by rigorous scientific data, that the concentration of oil and dispersants in the Gulf of Mexico resulting from this spill will require no further response actions.

6. In accordance with paragraph 3.a of reference (a), the monitoring strategy is comprised of the following thirteen steps:

With NOAA as the operational lead, in concert with other relevant Federal agencies (e.g., DOI, EPA, OSTP, CEQ, NSF, HHS, and others) and interagency groups (e.g., Joint Analysis Group, NSTC Committee on Environment and Natural Resources, and others), and expands upon the UAC sampling strategy;

i. Is comprehensive in scope and supports the goals stated above;

Execution Strategy for Response: The UAC currently reflects a multi-agency approach, and all agencies are being engaged as per the referenced directive and supporting documents and protocols. If deemed necessary, augmentation of existing sampling programs will be designed to more thoroughly and effectively address the primary objectives of the directive and address gaps identified by the review.

The sampling design will be capable of providing an adequately robust data set for the multiple parameters of interest (e.g., hydrocarbons, dissolved oxygen, sediments, Colored Dissolved Organic Matter (CDOM), tarballs, etc.). Following a review of data collected during previous Deepwater Horizon MC 252 oil spill response efforts, using a hybrid approach that considers both statistically-based and targeted sampling will be developed. Participating agencies will provide a broad range of expertise and capability. Primary roles and contributions will include:

USCG – overall command and control.
NOAA – lead operational agency for sampling design, implementation and execution, data management and archiving, and communications; provision of some research vessels.
EPA – statistics for sampling design; data management, near shore depth sampling.

USGS – sediment sampling and protocols and analytical chemistry.
BOEMRE – sediment, seep, and bathymetric mapping; baseline.
NSF – academic liaison and research cruise data relay.
HHS/USPHS – public health threats and reporting.
State of Louisiana – sampling, public health thresholds, baseline data.
State of Florida – sampling, public health thresholds, baseline data.
State of Mississippi – sampling, public health thresholds, baseline data.
State of Alabama – sampling, public health thresholds, baseline data.
State of Texas – liaison and information sharing.
CEQ/OSTP – coordination peer review and long-term science needs.
Joint Analysis Group – formal analytical report generation and review.
Mexico – liaison and information sharing.

ii. *Encompasses a sufficient period of time to adequately meet the monitoring strategy objectives in the short-term (i.e., 60 days) and transitions to establish the foundation for long-term assessment;*

Sub-surface sampling has been ongoing as part of the Deepwater Horizon MC 252 incident response since May 2010. Thousands of physical water samples have been collected, and in many cases already analyzed for chemical characteristics. The deep water column has also been extensively sampled in the near-field (<30km) from the source, using fluorometry, particle analyzers, oxygen probes, hydrocarbon analyses and standard Conductivity and Temperature at Depth (CTD) casts. Sediment samples have been concentrated in the near shore environments. Additional air samples, fish and shellfish samples have been taken over a wide area. An additional 60-day timeframe will provide for the continuation of important sampling programs, integration of other key sampling strategies (e.g., deepwater sediments), and time to analyze the results and make them available to the public.

Execution Strategy for Response: Maintain sustained sampling efforts required to resolve the immediate, stated Response objectives, to facilitate effective transition to long-term assessment. This will include:

a. Start date of 04 August 2010 to sustain and integrate ongoing sub-sea and sub-surface monitoring efforts and maintain the schedule contained in reference (b).
b. Quantitative thresholds to clearly define the points of resolution for each of the primary science objectives stated herein. For example, baseline/historic levels of dissolved oxygen at depth can serve as the effective threshold for when sampling of this parameter can cease.
c. Weekly status reports from lead operational agency (NOAA) and other participants (as necessary) to the FOSC, to provide basis for re-evaluation of each primary decision point and any need to modify or discontinue sampling strategy components.

d. Engaging academic institutions and research councils to help determine the long-term science objectives that might follow any designated removal action.
e. A current baseline assessment that combined with a hybrid approach of each agency's activities, will allow the UAC to assess current sampling status, identify gaps, and conduct targeted sampling and monitoring.
f. A communications strategy sufficient to enhance the public's awareness of the sub-sea and sub-surface conditions with respect to response actions associated with oil and dispersants in those environments.

iii. Explicitly incorporates academic and private scientific institutional partners and the relevant state agencies in the planning and execution of the program;

Execution Strategy for Response: Engage the academic sector, private entities, and state agencies more effectively to help resolve the key objectives. Specifically:

a. Provide baseline knowledge of Gulf of Mexico characteristics and dynamics.
b. Serve as embarked scientists on monitoring cruises supported under this plan, and continue contributing to the NIC-codified Joint Analysis Group.
c. Serve on the Operational Science Analysis Team (OSAT), along with NOAA and other scientists from the UAC, providing analytical expertise and reviewing the overall sampling strategy.
d. Contribute to press briefings and public forums as regional experts.
e. Integrate relevant data from National Science Foundation (NSF) sponsored research cruises (e.g., R/V Oceanus and R/V Cape Hatteras) as part of this more comprehensive strategy.
f. Utilize assets, personnel, and data from Regional Associations within the Integrated Ocean Observing System (IOOS) to help address the key monitoring objectives.
g. Engage the Southeastern Universities Research Association (SURA), Integrated Ocean Observing System (IOOS) Regional Associations, Gulf of Mexico Alliance (GOMA), and other key institutions to assist with education and outreach, community engagement, and examine the potential/need for model synthesis to improve sub-surface trajectory forecasting.
h. Maintain use and deployment of new technologies (e.g., high-endurance wave gliders and passive sampling devices) from the private sector.
i. Engage minority serving institutions for additional expertise and collaboration, potentially via SURA or the Gulf of Mexico Alliance. Develop a partnership with one institution in each impacted State.
j. Consistent with the overall plan, and subject to availability of research vessels and personnel, execute specific sampling missions using University - National Oceanographic Laboratory System (UNOLS) ships and institutional resources.

iv. Employ a requirements-driven approach and develop a statistically robust detection and sampling scheme (which incorporates existing sampling locations) supported

by existing analytical and modeling data across all impacted geographic areas, from near shore to offshore;

Ongoing efforts represent a complex mix of sampling programs ranging from the inshore to deep water environments. Deep water mission guidance activities are informed by both model output and empirical sample results. Not all sampling programs have an underlying statistical framework due to the adaptive or reactive nature of the efforts. The sampling design will be capable of providing an adequately robust data set for the multiple parameters of interest (e.g., hydrocarbons, dissolved oxygen, sediments, Colored Dissolved Organic Matter CDOM, etc.). Following a review of data collected during previous Deepwater Horizon MC 252 oil spill response efforts, using a hybrid approach that considers both statistically-based and targeted sampling will be developed.

Execution Strategy for Response:

a. Explicit requirements will be driven by the parameter thresholds contained in the pending implementation plan. These requirements will, in turn, define the assets needed for sampling execution.
b. Use statistical tools to define a sampling grid for a wider geographic area to ensure effective integration of far-field locations. More comprehensive and statistically conceived sampling of water column, sea floor and sediments across the shelf and in deep waters will enable more robust evaluation of fate and transport of hydrocarbons and dispersants, as well as their immediate impact on pelagic and benthic communities.
c. Use maps, surveys and model projections to define the geographic scale of sampling at the surface and sub-surface to assure that all likely locations where oil and dispersants may have occurred are within the sampling frame.
d. Integrate existing sampling locations to minimize the extent and redundancy.
e. Identify optimal locations for revisitation to permit trend analysis.
f. Utilize the current matrix of sampling plans and protocols and locations to assure proper coordination of ongoing and future sampling.
g. Determine and utilize the most readily available resources for collection and analysis of samples of various media.

v. *Utilizes currently deployed and/or readily available platforms (including but not limited to surface vessels, AUVs, gliders, ROVs, and passive sampling devices), equipment and systems from Federal and State government agencies, academic and independent research institutions (with particular emphasis on Gulf State institutions), the responsible party, and commercial sources including vessels of opportunity with appropriate command and control;*

A wide range of sampling techniques, platforms, and equipment is already being used to investigate and characterize the sub-surface environment. Surface vessels,

AUVs, gliders, ROVs, and fixed stations provide the bulk of the platforms, with everything from acoustics and fluorometry to advanced analytical chemistry employed to help with the characterization.

Execution Strategy for Response:

a. Continue to deploy surface vessels across the response zone as a primary, mobile sampling platform type.
b. Continue to utilize oil and gas industry infrastructure as sampling platforms.
c. If analysis indicates a need, deploy additional wave and ocean gliders to serve in a sentinel mode at the extremes of the search field. These platforms carry complex instrument payloads and possess very high endurance. In addition, they can operate during heavy weather and do not require dedicated personnel at sea. Data are easily relayed and analyzed via remote communications.
d. If analysis indicates a need, use scientific submarines and Remote Operated Vehicles (ROVs) for sub-surface particle analysis, sediment sampling and shelf and deepwater sampling.
e. If analysis indicates a need, Autonomous Underwater Vehicles (AUVs) can be used to cover extensive areas at deeper depths than most of the ocean gliders, and also carry sophisticated instrument payloads, which can include on-board chemistry analytics.
f. Continue the use of passive samplers such as snare sentinels and membrane-based devices in the near shore.
g. If analysis indicates a need, air-dropped water column profilers (ADCP) could help provide broader coverage without having to rely strictly on vessels and gliders. Air-Dropped Expendable Bathythermographs (AXBTs) provide important information about basic ocean state variables to help with modeling.
h. If analysis indicates a need, additional Acoustic Doppler Current Profilers (ADCPs) can be deployed to provide strategic information about deep water along and cross shelf currents. These data are crucial to effective model development and validation.
i. Ocean profiling floats are already being deployed to track specific water masses, which may host sub-surface oil.
j. Sediment sampling devices need to be deployed more extensively in order to meet the directive in a timely fashion. Multi-corer devices, traditional box coring devices, and ROVs can all be deployed to meet the range of sediment sampling needs that are anticipated.
k. If appropriate, the program will utilize vessels of opportunity and commercial vessels.

vi. *Immediately incorporates and expands, as appropriate, other sub-surface sampling and monitoring programs including but not limited to the Snare Sentinel Program in near shore areas;*

Dozens of existing sub-surface sampling efforts already exist. For near shore regions, agencies and states have, in many cases, already collected baseline data prior to impact. Sampling in key coastal and estuarine sites should continue. For offshore regions, little true baseline data were collected prior to the Deepwater Horizon oil spill, but historical data exists.

Execution Strategy for Response: Maintain relevant existing sampling programs, and expand or augment them as determined by the sampling strategy requirements. Specific actions to ensure effective integration include:

a. Execution of recently developed inshore and near shore sampling plans from both ICP Houma and ICP Mobile. Review the existing sampling program and perform gap analysis to determine what, if any, augmentation needs to occur.
b. A requirement to verify that other existing or previous sampling efforts have not already effectively resolved the issue of concern. Requiring sampling locations to be projected in ERMA would be useful to meeting this need.
c. The review and incorporation of state public health assessment information.
d. An adaptive mission guidance process, (already coordinated by the Sub-Surface Monitoring Branch), and additional operational products such as the Daily Vessels Status Report.
e. Additional toxicity sampling requirements will be explored and appropriate locations sampled if necessary.

vii. Incorporates existing public reporting processes for identifying the locations of sub-surface oil and procedures for vetting the validity of such reports;

Existing public hotlines are used for relaying information about sub-surface oil that is sighted offshore. In addition there is a dedicated anomaly detection verification program currently supported by the Responsible Party (RP).

Execution Strategy for Response:

a. Maintain the existing public call line supported by HHS and FDA, as well as those supported by State agencies.
b. Mapping to demonstrate responsiveness and also begin building a data set for analysis.
c. Vet strategy to maintain efficiency of response. This vetting might include screening of sightings by comparing the location to known seagrass beds or Harmful Algal Blooms (HABS) forecast maps to better understand the potential for false identification of oil.
d. Develop mechanisms to better use the partnerships with NGOs and with Academic Institutions.
e. Analyze comments and report back to UAC and the public the result of the sighting investigations on a weekly basis. A comprehensive understanding of incoming calls to hotline can provide a gauge on the level of community

concern about an area or a specific issue as well as how communities perceive risk.

f. Establish a unit within the operations section staffed by trained technicians to assess reports and embark reporting vessels as necessary to capture physical samples. This group could include regional university graduate students.

viii. Is implemented with appropriate command and control;

Execution Strategy for Response:

a. Maintain existing command and control of overall coordination via the UAC and specifically the Planning Section and subordinate Environmental Unit.
b. Use the Incident Commands to help define inshore and near shore requirements and maintain operational control of sampling missions.
c. Use existing mission guidance and planning processes used by the Sub-Surface Monitoring Branch (ICP - Houma).
d. Use existing data management guidelines and protocols established by the UAC.
e. NOAA is identified as the operational lead agency at the federal level. State Trustees will maintain operational responsibilities for their respective activities.

ix. *Yields real-time operational results and information communicated on a regular basis;*

The revisions to *Deepwater Horizon Response Unified Area Command Daily Report* will incorporate a series of daily and weekly metrics in the Response at a Glance as well as provide appropriate back up materials (maps or reports) linked to a data layer in ERMA. These information needs, along with those of the public, demand rapid relay of empirical sampling data to enable processing and analysis.

Execution Strategy for Response:

a. Use daily vessel reporting report (already established by Sub-Surface Monitoring Branch) to relay data from sampling vessels.
b. Daily review of data by Operational Science Analysis Team at UAC.
c. Weekly updates on offshore/deepwater sampling; 48-hour updates on inshore and near shore to Federal On Scene Coordinator.
d. A standardized set of maps, graphs, and tables will be developed that elucidate the manner of collection, location, and type of data that has been gathered. Images that depict the data results will convey a sense of the environmental status of the ecosystem. This will involve the creation of a catalog of color-coded symbols that convey when the parameter is at pre-spill levels or still showing an anomalous signature.

e. Continue to execute mission guidance for surface vessels to effectively coordinate multiple cruises and inform scientists about work already being conducted.
f. Continue to provide situational awareness maps of samples to demonstrate the extent and nature of the sub-surface monitoring.
g. Webcast of daily or weekly ship logs or vignettes provided to the public that cover issues such as deep-water currents, natural seeps, acoustics, gliders and other technologies, modeling, reef dives, etc.
h. Use ERMA and GeoPlatform to provide exposure and access to these data, with ERMA providing an operational timeframe update and GeoPlatform reflecting a broader audience information feed using all verified results.

x. *Is communicated clearly and effectively to the scientific community and the public;*

Execution Strategy for Response:

a. Identify diverse communications team to help define, along with the science team members, the optimal daily and weekly products to develop and maintain for the duration of the sampling effort.
b. Communicate the results of the Deepwater Horizon MC 252 sampling effort with clear and concise presentations. A standardized set of maps, graphs, and tables will be developed that elucidate the manner of collection, location, and types of data that has been gathered. Images that depict the data results will convey a sense of the environmental status of the ecosystem. This will involve the creation of a catalog of color-coded symbols that convey green when the parameter is at pre-spill levels, yellow to note some change caused by oil or dispersants, and orange for significant changes.
c. Continue to execute mission guidance for surface vessels to effectively coordinate and inform scientists aboard sea-going vessels about work already being conducted.
d. Provide updated maps of samples to demonstrate the extent and nature of the sub-surface monitoring.
e. Publicize, through press forums and web media, a summary of trends and anomalies with respect to the key parameters being measured.
f. Develop webcast of daily or weekly ship logs, and/or provide press embeds on NOAA ships.
g. Provide vignettes to the public that cover issues such as deep water currents, natural seeps, acoustics, gliders and other technologies, modeling, reef dives.
h. Use Environmental Response Management Application (ERMA) and GeoPlatform to provide exposure and access to these data, with ERMA providing an operational timeframe update and GeoPlatform reflecting a broader audience information feed using all verified results.
i. Include regional academic representatives in press briefings and Joint Analysis Group meetings.

j. Improve risk communications (range and probabilities). Educate public on major environmental factors and conditions in the Gulf.

xi. *Is coordinated with and informs other science-based monitoring strategies including the seafood safety and monitoring plan;*

Currently data regarding seafood safety and monitoring results are not fully integrated with other monitoring strategies. The pending implementation plan will address this gap. Fish tissue sampling data can help inform both public health exposure and seafood safety risks. These data can be used to help make decisions about shoreline closures, and finfish and shellfish harvesting.

Execution Strategy for Response:

a. Expose the data sets to decision-makers and analytical science teams via a range of discovery tools such as ERMA, ResponseLink, web sites, and UAC presentations.
b. Evaluate the potential for seafood surveillance and monitoring program vessels to assist with sub-surface response efforts.

xii. *Incorporates existing data management and sample archiving capabilities to ensure that the data acquired in support of this plan are made publically available in easily accessible formats and in a timely manner and that sample replicates are adequately preserved for possible future analyses; and*

Display of this data for response purposes should be within ERMA and public data should be pushed up to GeoPlatform.gov. NOAA will lead the development of a comprehensive data archive, and providing for a searchable, file-based access system.

a. The Integrated Ocean Observing System (IOOS) has developed Data Management and Communication protocols that allow multiple data sets and types to be searched for and accessed via a web services data catalog. These protocols enhance interoperability and transfer of file-level data. The stored data will be universally accessible to the academic community and other users for future analysis.
b. Use ERMA as the common display mechanism for monitoring data, with access to the data files provided as a link or via other Response-oriented web site access points.
c. All data will be formally archived at NOAA-National Oceanographic Data Center (NODC).

xiii. *Includes a clear data sharing policy that explicitly outlines how data will be collected, archived, undergo quality control/quality assurance; assures data and analyses are widely available on a timely basis; and outlines how data and results will be shared among partners.*

There is an existing data sharing policy that was adopted by Unified Area Command during the early Response stages. It has been employed successfully across a range of data collection efforts, and served as common point of exchange within the Unified Area Command. This data sharing policy also contains a clause to ensure the integrity and use of research data that might also be valuable to the Response activities.

Execution Strategy for Response:

a. Maintain the existing data sharing policy, but augment it to accommodate any gaps.
b. During the Response phase, require all sub-surface sampling data to be quickly displayed in ERMA and stored in SCRIBE, and undergo formal QA/QC processes including those applied to all SCRIBE data sets.
c. Use existing NOAA data archiving capacity (at National Oceanographic Data Center – NODC) to provide long-term storage and maintenance of data collected under this effort.
d. Promote data policy in the public and academic communities to improve understanding, and encourage additional use and exchange.

7. Develop a plan to implement the detection, sampling and monitoring strategy that emphasizes timely and complete reporting of monitoring results and conclusions, keeps the scientific community and general public informed on a regular basis, and engages stakeholders.

8. The implementation plan shall be developed not later than 25 August 2010, to incorporate the thirteen tenets and satisfy the three goals of this strategy, and will also include prioritized requirements, mission plans, resourcing, schedules, and communications.

9. Develop a set of explicit, measurable endpoints that can be used to guide the removal action and decision making process. This response effort is developed to provide consistent monitoring of the sub-sea and sub-surface environments to inform and advise the FOSC with respect to the completion of the response phase and transition exclusively to the Natural Resource Damage Assessment (NRDA) phase. Response and NRDA methods may require different levels of precision, depending on the kind and type of data collected. Samples collected under response might be analyzed and discarded, whereas samples collected under the NRDA process follow a strict collection and storage protocol. Monitoring activities should lead to actionable information, while NRDA process activities lead to a comprehensive assessment of natural resource injury. Decision points for each parameter will be identified to augment trigger point criteria contained in the UAC Transition Plan, and may include the following parameters:

a. Dissolved Hydrocarbons in Water Column
b. Dissolved Hydrocarbons in Sediments
c. Dissolved Oxygen
d. Evidence of Microbial Degradation
e. Dispersant (COREXIT 9527/9500)
f. Distribution and density of pelagic tarballs

10. Develop a detailed timeline that implements this strategy, and a list of required resources for effective execution. The general strategy for the UAC to advance this effort is outlined below:

a. Collect and evaluate existing data and ongoing work being conducted by the various agencies. This will be accomplished by conducting a QA/QC evaluation of all of the existing response data in the SCRIBE data base and making any necessary corrections.
b. Assess this information and identify data gaps taking into consideration existing and ongoing actions as well as the future response activities identified by the assisting agencies.
c. Determine how to fill any data gaps by using a combined statistical and targeted approach, outlining equipment needs and requirements, establishing a cost estimate and identify the appropriate entity to complete the activity.
d. Monitor progress and report achievements based upon established metrics.

Tentative Timeline

04 AUG	Initiate this sub-sea and sub-surface sampling effort
17 AUG	Progress report delivered to FOSC
18 AUG	Submission of Strategy Plan to NIC
18 AUG	Research coordinator arrives at UAC
19 AUG	Initial engagement of academic community
*19 AUG	Final comprehensive sampling strategy defined
*20 AUG	Final sampling locations determined (statistical framework)
*21 AUG	Communication plan developed
*21 AUG	Daily and weekly metrics defined
*21 AUG	Development of final data use and management policy
*23 AUG	Final list of Resources and Assets required for execution
*23 AUG	Final measurable endpoints determined
*21 AUG	Full list of products developed
*22 AUG	Federal presence on participating vessels begins
*23 AUG	Operational Science Analysis Team (OSAT) formed at UAC
*23 AUG	Progress report delivered to FOSC
*25 AUG	Final Implementation Plan
*25 AUG	Complete review of relevant existing data sets by OSAT
*27 AUG	PRFAs prepared for review
	* Notional dates

11. Develop an appropriate resourcing plan to implement the approved sampling and monitoring strategy. Primary resources will include (at minimum): sampling platforms (vessels, fixed

stations, AUVs and gliders, etc.), expendable sampling supplies, use of analytical chemistry laboratories, trained scientific personnel, and trained communications experts.

a. Develop a resourcing plan by using a requirements process that reviews existing efforts. Combined with the statistical framework for the sampling plan, the plan will only include needed sampling efforts.
b. Using the statistical framework and specific knowledge of current findings, mission requirements will be developed. Analysis of those requirements and assets already deployed will form the basis for analysis to determine any additional resources needed to meet the sampling requirements. If additional resources are required, platforms will be determined based on their ability and availability to meet the requirements.
c. Examples of operational projects under this effort may include:

    i. Continued sub-surface sampling of water in deep water and shelf environments
    ii. Augmentation of near shore sampling, for example:
        a. Augmentation of existing plan to detect oil in near shore troughs
        b. SCUBA diver assessment of wreck/artificial reef sites
    iii. Inshore and deep water sediment sampling, including drilling mud
    iv. Augmentation of existing near shore sediment sampling
    v. Microbial degradation sampling
    vi. Anomalous features and investigations
        a. Seep mapping and characterization
        b. More refined strategy to verify and map reported sightings
    vii. Continued execution of Snare Sentinel program (with potential augmentation)

12. Descriptions of all projects included will be created during the development of PRFAs. Additionally, an appendix will be developed summarizing existing efforts to date.

Enclosures: (1) Appendix A: Implementation Planning
(2) Appendix B: Sampling Design Development Process
(3) Appendix C: Glossary of Acronyms

Appendix A: Implementation Planning - Operational Participants (as of 17 August 2010):

- CAPT Kevin Cavanaugh, Chief Planning Section, Unified Area Command
- Charlie Henry, SSC, Unified Area Command
- Brian Tusa, LA Department of Environmental Quality, Unified Area Command
- John Martin, EPA, Unified Area Command
- Barbara Keeler, EPA, Unified Area Command
- Al Venosa, EPA and JAG (remote)
- Lisa Symons, NOAA, Environmental Unit Leader, Unified Area Command
- Sam Walker, SMU NOAA, Unified Area Command
- Janet Baran, SMU NOAA, Unified Area Command
- Ben Shorr, SMU NOAA, Seattle
- Jim Crocker, SMU, NOAA, Houma
- Becky Shortland, SMU, NOAA, Houma
- Doug Helton, Response, ORR, NOAA
- Amy Merten, ORR, NOAA
- Allen Mearns, ORR, NOAA
- Mary Baker, NRDA, ORR, NOAA
- Debbie Payton, ORR NOAA
- Bob Pavia, JAG co-chair, NOAA
- Debbie French McCay, NRDA
- Marion Reed, USDA-NRCS, Unified Area Command
- Rick Bennette, FWS, Unified Area Command
- Holly Herod, FWS, Unified Area Command
- Susan Finger, USGS (remote)
- Pat Roscigno, BOEMER
- CAPT David Callahan, HHS/USPHS, NIC
- Larry Malnor, EU Lead, BP, Unified Area Command
- Rich Kostecki, Deputy EU Lead, BP, Unified Area Command
- Tony Parkin, Marine Science Specialist, BP, Unified Area Command
- Marion Reed, NRCS, Unified Area Command
- Ronnie Crossland, EPA, Unified Area Command
- Steve Backstrom, LA Dept. of Health and Hospitals, Unified Area Command
- Traci Floyd, MS Dept. of Marine Resources, Unified Area Command
- Doug Upton, MS Dept. of Environmental Quality, Unified Area Command
- David Palandro, FL-FWC, ICP-Houma/SMU
- Dawn Lavoie, USGS, Unified Area Command
- Patrick Breaux, LA Department of Environmental Quality, Unified Area Command
- Traci Floyd, Mississippi Department of Marine Resources
- Kari Sheets, NOAA, Unified Area Command
- Tim Davis, HHS, Unified Area Command
- Doug Levin, NOAA Unified Area Command
- Marc Greenberg, EPA-ERT, Unified Area Command
- Vic Kremrsel, BP, Unified Area Command
- Don Rice, NSF, Unified Area Command
- Eric Delgado, EPA, Unified Area Command
- Martin McComb, EPA, Unified Area Command
- Joe Vermette, External Affair, USCG, Unified Area Command

Enclosure (1)

Appendix B: Sampling Design Development Process

The available and relevant data are being compiled and reviewed in order to identify data gaps develop a sampling design capable of achieving the goals of the short-term removal action. These existing data, parameters and models include: (1) CTD casts (i.e., fluorescence, colored dissolved organic matter, dissolved oxygen), (2) Chemical analysis results from water and sediment sampling (e.g., hydrocarbon chemistry, dispersants), (3) seafood safety samples of finfish and shellfish, (4) indicators of microbial degradation of oil and/or dispersed oil, (5) oil transport/trajectory, and subsurface oxygen demand modeling outputs, (6) indicators of presence/absence of oil (i.e., snares), and, (7) background data from existing databases (NOAA National Oceanographic and Data Center, NOAA Query Manager, EPA SCRIBE).

The data will be summarized and mapped to provide clarification on their quantity and spatial distribution. Maps will be produced relative to the following strata: (1) inshore bays and marshes, (2) near shore (0-3 mi), (3) offshore (3mi-shelf break), (4) offshore blue water (beyond shelf), and (5) deep sea. Spatial depiction of the data will include both depth and areal coverage of the sampling. Spreadsheets will be produced with summary statistics. These products will be evaluated to inform the sample design team on whether enough data currently exist for a given parameter, and, if not, sampling plans will be designed to obtain the additional data needed to provide adequate spatial and temporal coverage. A hybrid, adaptive sampling design approach will be employed—this means that statistical sample size determinations (e.g., power analysis) and targeted sampling using professional judgment will be used to determine the sampling effort needed for decisions on the measured endpoints as measured against existing benchmarks, screening values and criteria.

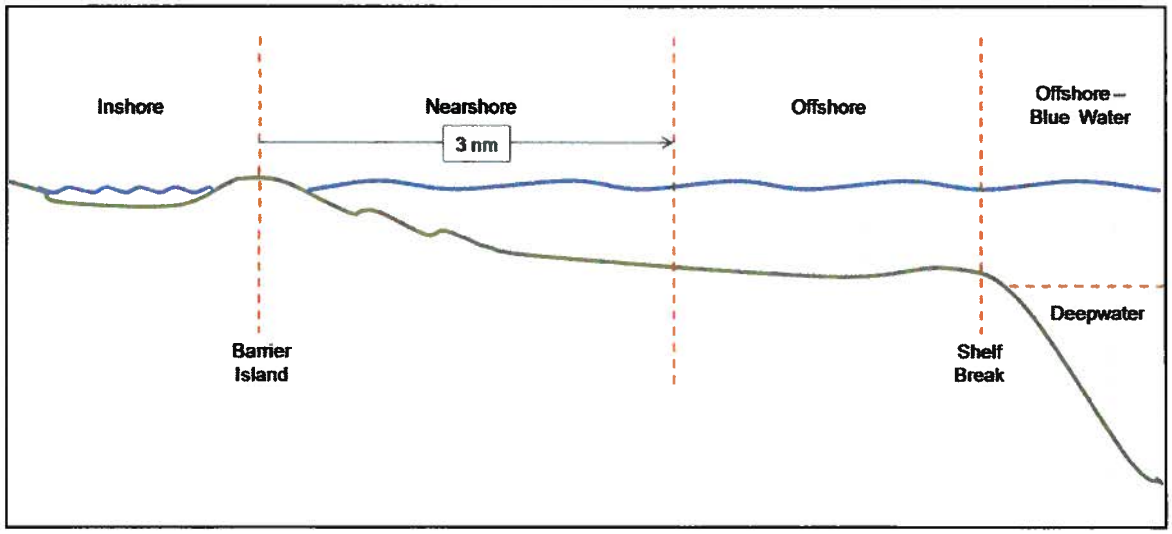

Figure 1: Profile of proposed sampling zones

Enclosure (2)

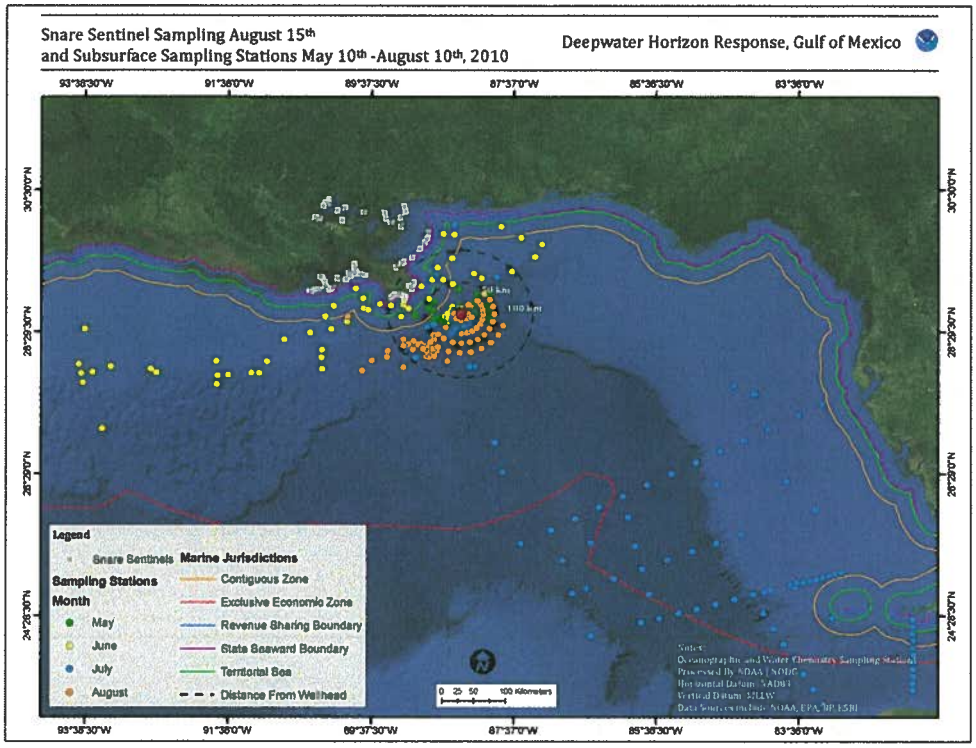

Figure 2: Map view of proposed sampling zones

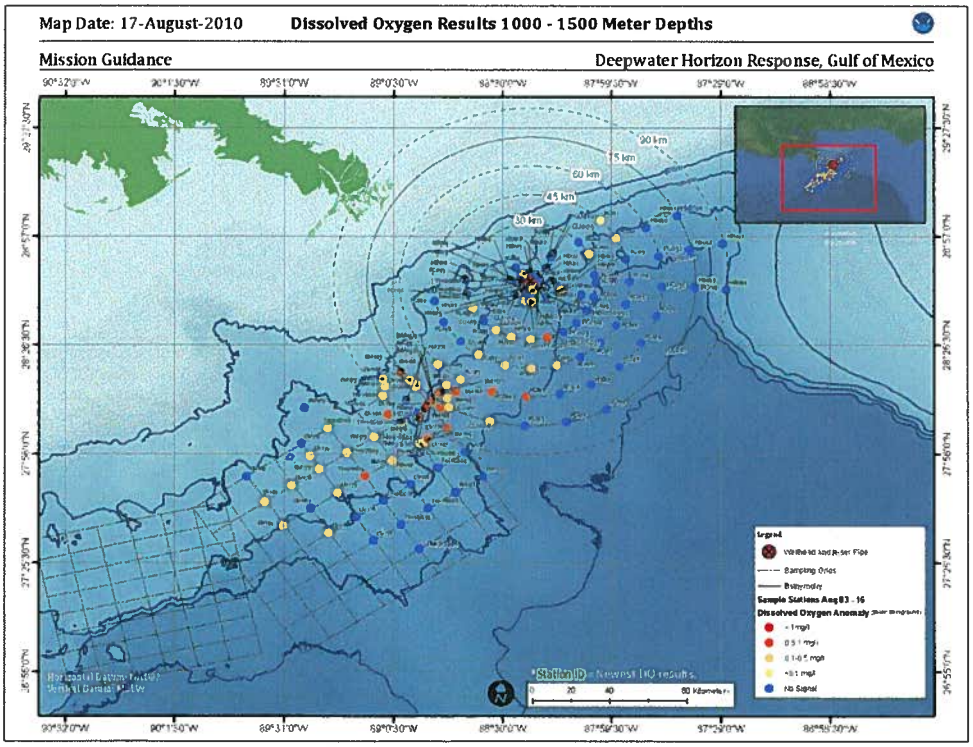

Figure 3: Example of adaptive mission guidance for sampling program Enclosure (2)

Appendix C: Glossary of Acronyms

ADCP:	Acoustic Doppler Current Profiler
AUV:	Autonomous Underwater Vehicle
BOEMRE:	Bureau of Ocean Energy Management, Regulation and Enforcement
CaRA:	Caribbean Regional Association
CDOM:	Colored Dissolved Organic Matter
CEQ:	Council on Environmental Quality
CTD:	Conductivity Temperature Depth
DOI:	Department of Interior
DWH:	Deepwater Horizon MC 252
EPA:	Environmental Protection Agency
ERMA:	Environmental Response Management Application
FDA:	Food and Drug Administration
GCOOS:	Gulf of Mexico Coastal Ocean Observing System
HHS:	Health and Human Services
ICP:	Incident Command Post
IOOS:	Integrated Ocean Observing System
JAG:	Joint Analysis Group
JIC:	Joint Information Center
NIC:	National Incident Command
NIMS:	National Incident Management System
NODC:	National Oceanographic Data Center
NRDA:	Natural Resources Damage Assessment
NSF:	National Science Foundation
NSTC:	National Science and Technology Council
OSAT:	Operational Science Analysis Team
OSTP:	Office of Science and Technology Policy
ROV:	Remotely operated underwater vehicle
SECOORA:	Southeast Coastal and Ocean Observing Regional Association
SIMAP:	Spill Impact Model System
SURA:	Southeastern Universities Research Association
UAC:	Unified Area Command
UNOLS:	University - National Oceanographic Laboratory System
USCG:	United States Coast Guard
USGS:	United States Geological Survey
USPHS:	United States Public Health Service
VOOs:	Vessels of Opportunity

#

Enclosure (3)