



Interagency Coordinating Committee on Oil Pollution Research: FY 2016-2017 Activities

Report to Congress
November 07, 2018



U. S. Coast Guard

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Message from the U.S. Coast Guard Chief, Office of Marine Environmental Response Policy

The *Oil Pollution Act of 1990* requires the Chairman of the Interagency Coordinating Committee on Oil Pollution Research to submit biennial reports on the Interagency Committee's activities. The U.S. Coast Guard chairs the Interagency Committee and first reported to Congress in 1994. This report responds to the latest Congressional requirements.

The Interagency Committee, through its activities and member agency research agendas, addresses gaps in oil pollution research by leveraging the collective skills and resources of the 15 federal member agencies as well as those of state and local governments, industry and academia. Over the current reporting period, this approach helped reduce duplication of efforts and advanced the state of oil pollution research by capitalizing on individual agency strengths.

The Interagency Committee's member agencies continued their high level of activity over the past two years. Collectively, they conducted and sponsored 316 oil pollution related research projects and published more than 250 reports and papers. The Interagency Committee, as a coordinating body, continued to promote coordinated and collaborative research through its outreach to industry, academia, research institutions, state governments, and other nations.

Pursuant to Congressional requirements, this report is provided to the following members of Congress:

The Honorable John Thune
Chairman, Senate Committee on Commerce, Science, and Transportation

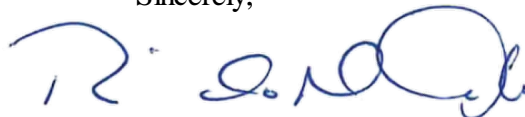
The Honorable Bill Nelson
Ranking Member, Senate Committee on Commerce, Science, and Transportation

The Honorable Bill Shuster
Chairman, House Committee on Transportation and Infrastructure

The Honorable Peter DeFazio
Ranking Member, House Committee on Transportation and Infrastructure

I am happy to answer any further questions you may have, or your staff may contact the Coast Guard's Senate Liaison Office at (202) 224-2913 or House Liaison Office at (202) 225-4775.

Sincerely,



Ricardo M. Alonso
Captain, U.S. Coast Guard
Chair, Interagency Coordinating Committee
on Oil Pollution Research

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I. Executive Summary

Title VII of the *Oil Pollution Act of 1990* (OPA 90) (Pub. L. No. 101-380) established the Interagency Coordinating Committee on Oil Pollution Research (referred to as the “Interagency Committee”) to “coordinate a comprehensive program of oil pollution research, technology development, and demonstration among the federal agencies, in cooperation and coordination with industry, universities, research institutions, state governments, and other nations, as appropriate” and to “foster cost-effective research mechanisms, including the joint funding of research.” This report discusses Interagency Committee activities carried out in fiscal years (FY) 2016 and 2017, as well as activities proposed for FY 2018 and 2019.

The Interagency Committee, through its activities and member agencies’ research agendas, advanced the state of oil pollution research. The Interagency Committee identified research gaps and coordinated the collective skills and resources of the federal member agencies with those of state and local governments, industry, and academia. Over the current reporting period, this approach was effective in reducing duplication of efforts and in capitalizing on individual agency strengths.

In September 2015, the Interagency Committee released its FY 2015-2021 Oil Pollution Research and Technology Plan (OPRTP), which established a research framework grouped into four broad classes: Prevention, Preparedness, Response, and Injury Assessment and Restoration. The OPRTP further classified and prioritized research within the classes into 25 standing research areas (SRAs), representing the most common research themes encountered for oil spills. The Interagency Committee established 150 research priorities across the 25 SRAs. In 2016 and 2017, the Interagency Committee focused their efforts on encouraging the alignment of member agencies’ research programs, to address identified research gaps based on the OPRTP. The Interagency Committee will continue to advertise the OPRTP to non-federal oil spill research entities, to promote the SRAs as an organizing principle, and to focus efforts on the priority research needs identified in the plan.

In 2016-2017, member agencies continued to oversee a large number of research projects related to the prevention of, preparedness for, and response, to oil spills. Overall, there were 316 active member projects during the reporting period, and member agencies generated over 250 publications from their funded research.

During this reporting period, the first two years of performance under the current OPRTP, member agencies conducted research in 92 percent of the 25 SRAs. Member agencies’ research projects addressed 61 percent of the 150 research priorities identified in the OPRTP.

The Interagency Committee encouraged member agency participation in key oil spill related workshops and conferences. Several member agencies sponsored and took leadership roles in planning and conducting major conferences, including the International Oil Spill Conference, the Clean Gulf and Clean Pacific Conferences, the Offshore Technology Conference, and the Gulf of Mexico Oil Spill and Ecosystem Science Conferences. These conferences and workshops were a vital component of the Interagency Committee’s abilities to stay abreast of the latest research initiatives.

The Interagency Committee’s future initiatives include increasing joint interagency research initiatives, tracking and monitoring efforts under the OPRTP, developing a formalized public communication outreach strategy, and exploring best practices of transition from research to operations for spill response.

II. Legislative Requirement

This report responds to the language set forth in Section 7001(e) of the *Oil Pollution Act of 1990* (Pub. L. No. 101-380), as per the following:

SEC. 7001. OIL POLLUTION RESEARCH AND DEVELOPMENT PROGRAM.

“(e) BIENNIAL REPORTS - The Chairman of the Interagency Committee shall submit to Congress every 2 years on October 30 a report on the activities carried out under this section in the preceding 2 fiscal years, and on activities proposed to be carried out under this section in the current 2 fiscal year period.”

III. Background and Legacy Obligations

Purpose of the Interagency Committee

As prescribed by law, the purpose of the Interagency Committee is twofold: (1) to coordinate a comprehensive program of oil pollution research, technology development, and demonstration among the federal agencies; and (2) to promote cooperation with industry, universities, research institutions, state governments, and other nations through information sharing, coordinated planning, and joint funding of projects.

Membership

The 15 Interagency Committee members, representing independent agencies, departments, and department components, include:

Department of Commerce (DOC) represented by:

- National Oceanic and Atmospheric Administration (NOAA)
- National Institute of Standards and Technology (NIST)

Department of Energy (DOE)

Department of the Interior (DOI) represented by:

- Bureau of Safety and Environmental Enforcement (BSEE)
- Bureau of Ocean Energy Management (BOEM)
- U.S. Fish and Wildlife Service (USFWS)

Department of Transportation (DOT) represented by:

- Maritime Administration (MARAD)
- Pipeline and Hazardous Materials Safety Administration (PHMSA)

Department of Defense (DoD) represented by:

- U.S. Army Corps of Engineers (USACE)
- U.S. Navy (USN)

Environmental Protection Agency (EPA)

National Aeronautics and Space Administration (NASA)

Department of Homeland Security (DHS) represented by:

- U.S. Coast Guard (USCG)
- Federal Emergency Management Agency (FEMA)
 - U.S. Fire Administration (USFA)

U.S. Arctic Research Commission (USARC)

Guided by Section 7001(c) of OPA 90, the Interagency Committee monitors, supports, and publicizes a variety of oil pollution research and development initiatives with industry, universities, research institutions, state governments, and other entities. Several ventures were completed in the first decade of the Interagency Committee's existence, while others continue to progress through the current reporting period. Listed below are several key initiatives, identified in Section 7001(c)¹:

Oil Pollution Technology Research: The cornerstone of the Interagency Committee's role and activities is the research that is funded, monitored, conducted, and coordinated by its members. Section IV of this report includes highlights of several member agencies' research initiatives. The selected initiatives illustrate a small sample of the diverse research coordinated by the Interagency Committee. Appendix A includes a listing of specific projects overseen by member agencies, with further details on the Interagency Committee's website: <http://www.dco.uscg.mil/iccopr>.

Simulated Environmental Testing: Section 7001(c)(7) directed agencies of the Interagency Committee to ensure the long-term use and operation of Ohmsett - the National Oil Spill Response Research & Renewable Energy Test Facility. BSEE continues to operate and maintain Ohmsett, which is located in Leonardo, New Jersey. Ohmsett provides independent and objective performance testing of full-scale oil spill response equipment and marine renewable energy systems (wave energy conversion devices). It is the largest outdoor saltwater wave/tow tank facility in North America and is the only facility where full-scale oil spill response equipment testing, research, and training can be conducted in a simulated marine environment using real oil under controlled environmental conditions. The Ohmsett facility is able to simulate varying wave conditions (such as breaking waves), drift ice conditions, and vessel movement up to six knots with the movable bridge. For more information on Ohmsett's capabilities and current projects, see <http://www.ohmsett.com>.

Regional Research Grant Program: Section 7001(c)(8) authorized a Regional Research Program. Funding for the program was not appropriated in FY 2016-2017².

¹ Other key requirements under this section of OPA 90 were completed, including demonstrations under Section 7001(c)(6). Technical demonstrations were held during the triennial International Oil Spill Conference.

² Last appropriation for this program was in 1995.

IV. Interagency Committee Activities

The Interagency Committee pursued several different activities during this reporting period. These activities addressed Government Accountability Office (GAO) recommendations^{3,4} and emerging and continuing oil pollution research needs. The research activities of the member agencies, coordinated through the Interagency Committee, focused on research priorities, as identified in the OPRTP.

Organizational Changes

Leadership Changes: EPA served as the Vice Chair during the reporting period. Each of the three Vice Chair agencies – NOAA, BSEE, and EPA – completed a successful two-year term in accordance with the rotation schedule established by the 2012 revised Interagency Committee Charter. NOAA will assume the role of Vice Chair during the FY 2018 - 2019 reporting period, as the rotational cycle resumes. The USCG, as Interagency Committee Chair, continued to support a full-time Executive Director position to provide the Interagency Committee with robust organization, coordination, and outreach.

Workgroup: In June 2015, the Interagency Committee established an Intentional Release Workgroup to evaluate issues related to obtaining permits for release of oil into the environment for research purposes. As the group advanced their work, the focus of the Workgroup evolved into evaluating the scientific need for an intentional release. The Workgroup will continue with this project in the next reporting period.

Interagency Committee Meetings

The Interagency Committee formally met 10 times during FY 2016-2017. These gatherings included quarterly and special meetings of the membership, and engagement with the Prince William Sound Regional Citizen's Advisory Council (PWSRCAC):

- December 15, 2015 – Arlington, VA: Quarterly Meeting
 - Main Themes: Remote Sensing to Detect/Analyze Oil, Joint Testing of Unmanned Aircraft Systems, and In Situ Burn Capabilities
- March 9, 2016 – Arlington, VA: Quarterly Meeting
 - Main Themes: Diluted Bitumen Studies: Fate and Effect, and Dispersant Science
- March 16, 2016 – Washington, DC: Meeting with PWSRCAC
- July 6, 2016 – Arlington, VA: Quarterly Meeting
 - Main Themes: Advancing Oil Spill Innovation through XPrize, Arctic Oil Spill Response, and Aerial Oil Spill Monitoring
- October 17, 2016 – Arlington, VA: Quarterly Meeting
 - Main Theme: Dispersant Spray Model
- December 14, 2016 – Washington, DC: Quarterly Meeting
 - Main Theme: National Academy of Sciences Gulf Research Program, Ecotoxicity Assessments, and Arctic Response Capability Gap Analysis
- March 8, 2017 – Arlington, VA: Quarterly Meeting

³ Government Accountability Office, Federal Oil and Gas: Interagency Needs to Better Coordinate Research on Oil Pollution Prevention and Response. GAO-11-319, March 2011

⁴ Government Accountability Office, Oil Dispersants: Additional Research Needed, Particularly on Subsurface and Arctic Applications. GAO-12-585. May 2012

- Main Theme: Oil Spill Science Outreach to Community Stakeholders
- March 29, 2017 – Washington, DC: Meeting with PWSRCAC
- June 21, 2017 – Washington, DC: Quarterly Meeting; and
 - Main Themes: Big Data Tools for Advanced Offshore Research and Oil Spill Modeling Enhancements
- October 4, 2017⁵ – Arlington, VA: Quarterly Meeting
 - Main Themes: National Laboratory Oil Spill R&D Capabilities, Remote Sensing

During the quarterly meetings, the Interagency Committee shared information on recent research projects, identified new research issues, hosted presenters from government agencies, industry, and academia, and developed strategies for future initiatives. At each meeting, the 15 member agencies provided their research updates. These updates prompted increased collaboration within the membership by fostering new ideas and opportunities for joint agency projects or new initiatives. The meetings with PWSRCAC provided opportunities for Interagency Committee members to share information with this stakeholder organization and to hear their issues and perspectives on research needs.

Member Research and Technology Initiatives

The Interagency Committee conducted an analysis of the member agency projects carried out during this reporting period⁶ to assess the federal government’s research relative to the OPRTP, and the level of focus on the identified research priorities. During this reporting period, member agencies conducted research in 92 percent of the 25 SRAs, and addressed 61 percent of the 150 research priorities identified in the OPRTP. In many instances, research was conducted in the additional priority areas by other entities such as federal agencies not currently represented on the Interagency Committee, or by state, local, academic, and industry researchers. While some research priority areas were not addressed by the member agencies, the comprehensive body of research illustrated how the Interagency Committee coordinated efforts to advance research of oil pollution prevention, preparedness, and response. Appendix B includes a complete list of projects conducted by the Interagency Committee members in FY 2016 - 2017⁷.

Member Collaboration and Ongoing Initiatives

In addition to the specific research projects, some member agencies prepared joint research strategies and initiatives and presented them to the Interagency Committee. These initiatives provide pathways for further research collaboration. They include:

BSEE/USCG Quality Partnership: Through this partnership, the USCG and BSEE coordinated strategic policy and oil spill preparedness and response in the offshore environment. BSEE and USCG coordinated their research and development priorities to align their on-going and future R&D project portfolios, allowing for greater synergies.

Arctic Domain Awareness Center (ADAC): ADAC, a Department of Homeland Security Science and Technology Center of Excellence, was established to provide mission-focused support to USCG operations in the high latitudes. Its mission is to develop and transition technology solutions, innovative products, and educational programs to improve situational awareness and crisis response

⁵ Postponed from September 13 due to Hurricane Harvey/Irma Response Operations

⁶ Projects that have been initiated, on-going and/or completed during FY 2016-2017.

⁷ More detail on these projects, as well as publications, can be found through the Interagency Committee website: <http://www.dco.uscg.mil/iccopr>

capabilities related to maritime challenges, including oil spill response, posed by the dynamic Arctic environment. Interagency Committee member agencies are integral advisors to, members, and customers of the research conducted by ADAC and its network of academic researchers.

NOAA Arctic Dispersant State of the Science Initiative: Chemical dispersants could be a response option, should a large spill occur in Arctic waters. Senior federal agency leadership identified the need for a definitive evaluation of the state-of-science of dispersants and dispersed oil (DDO), particularly as it applies to Arctic waters. To address this need, the NOAA-funded Coastal Response Research Center (CRRC) led a comprehensive effort to determine the state-of-science regarding DDO, as it applied to Arctic waters. This initiative will continue in the FY 2018-2019 reporting period and focus topics continue to include Efficacy and Effectiveness, Physical Transport and Chemical Behavior, Degradation and Fate, Eco-Toxicity and Sublethal Impacts, and Public Health and Food Safety.

BSEE/EPA and Canadian Government Interagency Agreement: Through this collaboration, BSEE, EPA and the Government of Canada conducted flume tank oil plume simulations to evaluate spill response tool options for in situ detection of oil under various environmental conditions.

DOI Inland Oil Spill Preparedness Project (IOSPP) Work Group: DOI's Office of Environmental Policy and Compliance coordinated with multiple DOI bureaus⁸ to fund projects that increase DOI's preparedness for inland oil spills. Funded projects included baseline (pre-spill) data collection for endangered fish species⁹, risk/vulnerability assessments for DOI lands, and modeling of oil fate/behavior in freshwater systems.

Marine Arctic Ecosystem Study (MARES): MARES is an integrated ecosystem research initiative coordinated and planned by BOEM in conjunction with its federal and private sector research partners: USARC, USCG, USGS, U.S. Integrated Ocean Observing System, Marine Mammal Commission, National Science Foundation, NOAA, Office of Naval Research, and Shell Oil Company.

External Interagency Committee Collaborations

Coordination and cooperation with external stakeholders is critical to advancing oil pollution research in the United States. During the reporting period, the Interagency Committee pursued collaboration with numerous external oil spill related programs through direct engagement and participation in joint meetings, forums, and workgroups.

National Academy of Science's Gulf Research Program (NAS GRP): During the reporting period, Interagency Committee members met with NAS GRP Advisory board members and staff several times to help shape future NAS GRP grant opportunities, in alignment with OPRTP. Interagency members also participated in several NAS workshops across the spectrum of oil spill response, including the "Oils Spills and Community Health and Well Being" workshop.

Prince William Sound Regional Citizen's Advisory Council (PWSRCAC): During the period, the Interagency Committee met several times with PWSRCAC to share current and future research initiatives, as well as results of studies of interest conducted by the members of both organizations.

⁸ U.S. Geological Service, U.S. Fish and Wildlife Service, Bureau of Reclamation, Bureau of Land Management, Bureau of Indian Affairs, and National Park Service

⁹ Pallid sturgeon and Bull trout

Gulf of Mexico Research Initiative (GoMRI): During the period, the head of the GoMRI Sea Grant Oil Spill Outreach Team attended Interagency Committee quarterly meetings, and presented updates on their research. In addition, Interagency Committee members collaborated with GoMRI researchers on specific research projects. For example, EPA and GoMRI researchers conducted research on the cutting edge technologies for spill/plume detection employed during Deepwater Horizon, and offered a perspective on how the response community can build from the experience to prepare for a future spill of national significance.

Member Agency Participation in Workshops and Conferences

Each year a variety of workshops and conferences are held that address various facets of the petroleum industry and oil pollution research. The Interagency Committee monitors these to stay abreast of the latest topics and issues that support on-going and future research initiatives. During the reporting period, the Interagency Committee's member organizations participated in or directly sponsored many of these workshops and conferences, including:

2017 International Oil Spill Conference (IOSC)¹⁰: During the reporting period, the USCG, EPA, NOAA, and BSEE, with staff on the Executive Committee, played key roles in planning the 2017 IOSC. The goals of the IOSC were: "To promote an international exchange of information and ideas dealing with spill prevention, planning, response and restoration processes, protocols and technology," and "to promote international sharing of best practice as it relates to management of the varied impacts of oil spills and their aftermath." The USCG chaired the Program Committee, which solicited and evaluated 370 abstracts for papers and presentations in 45 topic areas covering diverse topics such as oil spill modeling, dispersant use policies and applications, Arctic issues, and cutting-edge response technologies. BSEE planned a technical demonstration of oil pollution prevention and cleanup systems, highlighting advancements made in response technologies over the past 25 years. Stations were setup to walk participants through various aspects of an oil spill response beginning with the incident command center, highlighting communications and spill modeling. Other stations included remote sensing, spill collection and containment, mechanical recovery, in-situ burning, and dispersants. NOAA designed a suite of 14 short courses on oil pollution issues. EPA organized multimedia events to garner additional interest from over 1500 conference participants from over 60 different nations.

Gulf of Mexico Oil Spill and Ecosystem Science (GoMOSES): Sponsored by the Gulf of Mexico Research Initiative, the annual conference linked fundamental research on the Gulf of Mexico ecosystem with practical application. During this reporting period, the Interagency Committee members served on the planning committee for GoMOSES, participated as session and panel leaders, and presented numerous presentations on their oil spill related research during two conferences.

Clean Gulf/Clean Pacific/Clean Waterways Series: These regional conferences focused on improving oil and hazardous materials spill prevention, preparedness, and response for inland, offshore, and coastal incidents.

Offshore Technology Conference (OTC): Department of Energy representatives attended the OTC in Houston, TX. The OTC is the world's largest oil and gas sector trade show, where energy professionals meet to exchange ideas and opinions to advance scientific and technical knowledge for offshore resources and environmental matters. In 2017, over 300 technical papers were presented, including four papers reflecting DOE-funded work. DOE's National Energy Technology Laboratory

¹⁰ IOSC, including tech demo, fulfills the requirements of Sec 7001(c)(6) to hold Port Demonstrations

sponsored a booth in the Exhibition Hall and hosted a speakers' forum at the booth, highlighting DOE's R&D on oil spill prevention.

Society of Environmental Toxicology and Chemistry (SETAC) World Congress: With participation of many Interagency Committee members, SETAC brought together more than 2,400 scientists from over 40 countries to share their research and exchange information and ideas that will help develop solutions to some of the most challenging environmental problems. This conference included many panels and presentations directly related to toxicology effects of oil pollution.

Website and Other Outreach

The Interagency Committee continued to provide information through its website. During the reporting period, the Interagency Committee migrated the content to a new URL location at <http://www.dco.uscg.mil/iccopr>. The website provides data on research projects in accordance with the OPRTP. In addition, member agencies continued using their websites as tools to convey information on research initiatives to partners and the public. The Interagency Committee website contains links to these member sites.

Several member agencies published periodic newsletters that highlighted agency activities, including oil spill-related research. Examples include the BOEM Ocean Science quarterly newsletter, BSEE's semi-annual Ohmsett Gazette, USARC Arctic Daily Update by e-mail, the USFWS Fish & Wildlife News, and several NOAA programmatic newsletters.

V. Future Activities

The Interagency Committee will continue to promote research and development in the four research classes: Preparedness, Prevention, Response, and Injury Assessment and Restoration. Future initiatives include:

Oil Pollution Research and Technology Plan: The Interagency Committee will continue to use its Oil Pollution Research Categorization Framework as a tool to track and measure research progress within the government, academia, and industry. This information will be promulgated on the Interagency Committee website. In FY 2018-2019, the Interagency Committee will analyze why the gaps in addressing priorities identified in this period exist, and determine the best ways to address the gaps. The Interagency Committee will continue to release revised versions of the OPRTP every six years to reflect conditions and needs at that time.

Intentional Release of Oil for Field Scale Research: The Interagency Committee's Intentional Release Workgroup will continue to define the specific scientific need for intentional release, and work with policy makers to explore scientific opportunities for field testing.

National Academy of Sciences Gulf Research Program: The Interagency Committee will continue to work closely with NAS as it implements the 30-year NAS GRP "focused on human health and environmental protection including issues relating to offshore oil and hydrocarbon production and transportation in the Gulf of Mexico and on the United States' outer continental shelf."

Continued Outreach to Non-Federal Stakeholders: The Interagency Committee will continue to engage non-federal stakeholders to gain insights into additional research needs, share research results and ideas, and promote advancements in the state of oil pollution research and technology. The upcoming year will include an increased focus on coordination with industry research programs.

Addressing Emerging Issues and Challenges: The Interagency Committee will continue to monitor technological advancements for oil spill prevention and response, as well as the conditions that increase the risk of oil spills.

Research to Operations: The Interagency Committee will examine the best practices of member agencies skilled at transitioning research to operations, and will seek to accelerate this transition for promising Interagency Committee priority area research.

VI. List of Acronyms

ADAC	Arctic Domain Awareness Center
API	American Petroleum Institute
ASAMM	Aerial Surveys of Arctic Marine Mammals
ATON	Aids to Navigation
AUV	Autonomous Underwater Vehicle
BOEM	Bureau of Ocean Energy Management
BOP	Blow Out Preventer
BSEE	Bureau of Safety and Environmental Enforcement
CFD	Computational Fluid Dynamics
CRRC	Coastal Response Research Center
DDO	Dispersants and Dispersed Oil
DFO	Department of Fisheries and Oceans Canada
DHS	U.S. Department of Homeland Security
DOC	U.S. Department of Commerce
DoD	Department of Defense
DOE	U.S. Department of Energy
DOI	U.S. Department of the Interior
DOT	U.S. Department of Transportation
DWH	Deepwater Horizon
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GAO	U.S. Government Accountability Office
GNOME	General NOAA Operational Modeling
GOM	Gulf of Mexico
GoMOSES	Gulf of Mexico Oil Spill and Ecosystem Science
GoMRI	Gulf of Mexico Research Initiative
HPHT	High Pressure High Temperature
IOSC	International Oil Spill Conference
ISB	In situ burning
ITAC	Industry Technical Advisory Committee
JIP	Joint Industry Project
JMTF	Joint Maritime Training Facility
MARAD	Maritime Administration
MARES	Marine Arctic Ecosystem Study
MOC	Memorandum of Cooperation
NAS	National Academy of Sciences
NAS GRP	National Academy of Sciences Gulf Research Program
NASA	National Aeronautics and Space Administration
NCP	National Contingency Plan
NIST	National Institute of Standards and Technology

NOAA	National Oceanic and Atmospheric Administration
NOPP	National Oceanographic Partnership Program
NRT	National Response Team
OCS	Outer Continental Shelf
OPA 90	Oil Pollution Act of 1990 (Public Law 101-380)
OPRTP	Oil Pollution Research and Technology Plan
OTC	Offshore Technical Conference
PHMSA	Pipeline and Hazardous Materials Safety Administration
PINC	Potential Incident of Non-Compliance
PWSRCAC	Prince William Sound Regional Citizen's Advisory Council
R&D	Research and Development
RESTORE	Resources and Ecosystems Sustainability Tourist Opportunities and Revived Economies
SAR	Synthetic Aperture Radar
S&T	Science and Technology
SETAC	Society of Environmental Toxicology and Chemistry
SRA	Standing Research Area
UDW	Ultra Deep Well
USACE	U.S. Army Corps of Engineers
USARC	U.S. Arctic Research Commission
USCG	U.S. Coast Guard
USFA	U.S. Fire Administration
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geologic Service
USN	U.S. Navy

VIII. Appendix A: Listing of Fiscal Year 2016 and 2017 Research Projects¹¹

PREVENTION

Human Error Factors

1. Accreditation Body Audit Support Services
2. Airborne Oil Spill Remote Sensing and Reporting
3. Aviation Safety Support Services for BSEE
4. BSEE-Approved Verification Organization (BAVO) Services
5. Inspection Alternatives Study
6. Potential Incident of Non-Compliance (PINC)
7. PINC Development and Training
8. Probabilistic Risk Assessment Procedures Guide and Methodologies: Phase 1
9. Probabilistic Risk Assessment Procedures Guide and Methodologies: Phase 2
10. Trident: A Human Factors Decision Aid Integrating Deepwater Drilling Tasks, Incidents, and Literature Review

Offshore Facilities and Systems

1. All Electric Subsea Autonomous High Integrity Pressure Protection System Architecture
2. Analysis and Laboratory Services for Evaluation of Fasteners (I)
3. Analysis and Laboratory Services for Evaluation of Fasteners (II)
4. Arctic Mooring Joint Industry Project (JIP)
5. Capping Stack Technology Requirements
6. Comparative Assessment of Electrical Standards and Practices
7. Construction and Testing of Deepwater Permanent Subsea Pressure Compensated Chemical Reservoirs
8. Decommissioning Cost Update for Pacific Outer Continental Shelf (OCS) Region Facilities
9. Development of Advanced Computational Fluid Dynamics (CFD) Tools for the Enhanced Prediction of Explosion Pressure Development and Deflagration Risk on Drilling and Production Facilities
10. Development of BSEE De-Rating Methodology for Qualification Testing of High Pressure High Temperature (HPHT)
11. Equipment and Materials in Certain Applications, Phase II
12. Development of Hazard Curves for Wind Energy Areas (WEAs) off the Atlantic Seaboard
13. Effects of Damping Properties of Anchoring Systems, Tension Legs, and Risers on Fatigue, Longevity and Life Extension Decisions
14. Fatigue of Sea Ice: A Wave-Induced Process of Rapid Self-Destruction
15. Freeze-Up and Break-Up Studies of the Alaskan Beaufort and Chukchi Seas
16. Hi-Res Environmental Data for Enhanced Ultra Deep-Water (UDW) Operations Safety
17. HPHT Potential for Equipment Failure (Materials)
18. HPHT Testing Capability (Corrosion)
19. Hydrate Modeling & Flow Loop Experiments for Water Continuous and Dispersed Systems
20. Integrity Management of Risers to Support Deepwater Drilling and Production Operations

¹¹ Further detail on the projects can be found at <http://www.dco.uscg.mil/iccopr>

21. Laboratory Testing of Lateral Load Response for Monopiles in Sand
22. Loss of Well Control Occurrence and Size Estimators for the Alaska OCS
23. Low Cost Flexible Production System for Remote Ultra-Deepwater Gulf of Mexico (UDW GOM) Field Development: Flexible Production Systems for UDW GOM: Concept Development and Comparison of Three Different Solutions
24. Methodology and Algorithm Development for the Evaluation of Ultra-Deepwater or Arctic Floating Platform Performance Under Hazardous Sea Conditions
25. Model Testing to Evaluate Degradation of Axial Capacity for Cyclic Loading
26. More Improvements to Deepwater Subsea Measurement
27. Offshore Substation Design Development of Standards
28. Physical Oceanographic and Meteorological Data for Beaufort and Chukchi Seas to Support Reliability-Based Design Criteria for Arctic Offshore Oil and Gas Structures
29. Probabilistic Risk Assessment Procedures Guide and Methodologies: Phase 1
30. Probabilistic Risk Assessment Procedures Guide and Methodologies: Phase 2
31. Qualification of Flexible Fiber-Reinforced Pipe for 10,000-foot Water Depths
32. Reliability-Based Sea-Ice Parameters for Design of Offshore Structures
33. Risk Assessment Life Cycle Management and Failure
34. Subsea Bolts Performance and Critical Drill-Through Equipment Fastener Project
35. Subsea Direct Current Connectors for Environmentally Safe and Reliable Powering of UDW Subsea Processing
36. Subsea Produced Water Sensor Development
37. Suitability of Source Control and Containment Equipment versus Same Season Relief Well in the Alaska OCS Region
38. Synthetic Hurricane Risk Model for Gulf of Mexico
39. The Effect of Healing on the Resistance to Frictional Sliding of Sea Ice
40. Ultra-High Conductivity Umbilicals: Polymer Nanotube Umbilicals
41. Updates to the Fault Tree for Oil-Spill Occurrence Estimators
42. Vortex Induced Motion Study for Deep Draft Column Stabilized Floaters
43. Wireline Operations Research

Onshore Facilities and Systems - NONE

Waterways Management

1. Assessment and Technology Demonstration of Inertial Navigation System Technology
2. Next Generation Arctic Navigational Safety Information System
3. Western Rivers e-AtoN Technology Demonstration

Vessel Design - None

Drilling

1. Annular Isolation in Shale Gas Wells: Prevention and Remediation of Sustained Casing Pressure and other Isolation Breaches
2. Assessment of Blow Out Preventer (BOP) Control Valves
3. BOP Shear Ram Certification Review
4. BOP Shear Ram Testing Assessment
5. Cementing Alternative Resins
6. Development of Best Practices and Risk Mitigation Measures for Deepwater Cementing in Oil Based Mud and Synthetic Based Mud
7. Effects of Tripping and Swabbing in Drilling and Completion Operations

8. Evaluation of Automated Well Safety
9. Frequency of Blowout Preventer Pressure Testing
10. Hampering Active Wellbore Kit: Complementary Safety Tool for Blowout Preventers
11. High Pressure High Temperature Mapping of the Gulf of Mexico
12. Hydraulic Fracturing Test Site
13. Intelligent Ram-Type Blow Out Preventer (BOP RAM) Actuation Sensor System
14. International Offshore Energy Exploration
15. Liner Seal and Cement Studies
16. Loss of Well Control Occurrence and Size Estimators
17. Marcellus Shale Energy and Environment Laboratory
18. Nxis Tool for Interrogating Well Integrity in Zones with Multiple Strings of Casing
19. Pressure Prediction and Hazard Avoidance through Improved Seismic Imaging
20. Probabilistic Risk Assessment Procedures Guide and Methodologies: Phase 1
21. Probabilistic Risk Assessment Procedures Guide and Methodologies: Phase 2
22. Reducing the Impacts of Deterioration of Cement on Small Producers
23. Regulatory Application of Real-Time Monitoring
24. Reliability of Annular Pressure Buildup Mitigation Technologies
25. Risk Basis Multiple Physical Barrier System
26. Root Cause Analysis Workshop and Study on Subsea Bolts Performance and Critical Drill-Through Equipment Fasteners
27. Roundtable on Unconventional Hydrocarbon Development
28. Safety Technology Verification for Materials and Corrosions in the US OCS, HPHT Material Evaluations
29. Shear Ram Test Protocol
30. Smart Cementing Materials and Drilling Muds for Real Time Monitoring of Deepwater Wellbore Enhancement
31. Subsea BOP Stack Shear/Seal Capability Modeling Tool
32. Well Integrity Monitoring Using Nanite™
33. Well Integrity Via Microbially-Induced Calcite Precipitation (MICP)
34. Well Stimulation Effects on Annular Seal of Production Casing in OCS Oil and Gas
35. Wellbore Survey Technology
36. Wellbore Thermal Shock Technology

Rail and Truck Transportation

1. Crude Oil Characteristics

Pipeline Systems

1. An Inorganic Composite Coating for Pipeline Rehabilitation and Corrosion Protection
2. Approaches for Preventing Catastrophic Events
3. Bayesian Network Inference and Information Fusion for Accurate Pipe Strength and Toughness Estimation
4. Chemically Bonded Porcelain Enamel Coated Pipe for Corrosion Protection and Flow Efficiency
5. Combined Vibration, Ground Movement, and Pipe Current Detector
6. Composite Repair Guideline Document for Nonmetallic Repairs for Offshore Applications
7. Consolidated Project Full Scale Testing of Interactive Features for Improved Models
8. Corrosion Under Insulation: Innovative Solutions to Cold Climate Corrosion Challenges
9. Critical Review of Candidate Pipeline Risk Models

10. Definition of Geotechnical and Operational Load Effects on Pipeline Anomalies
11. Determination of Fracture/Fatigue-Fracture Behavior of Equipment Constructed with Cladded Weld Materials
12. Development of Comprehensive Pressure Test Design Guidelines
13. Development of New Multifunctional Composite Coatings for Preventing and Mitigating Internal Pipeline Corrosion
14. Framework for Verifying and Validating the Performance and Viability of Leak Detection Systems for Liquid and Natural Gas Pipelines
15. Improving Models to Consider Complex Loadings, Operational Considerations, and Interactive Threats
16. Laser Peening for Preventing Pipe Corrosion and Failure
17. Mitigating Pipeline Corrosion Using A Smart Thermal Spraying Coating System
18. Paper Study on Risk Tolerance
19. Patch and Full-Encirclement Repairs for Through-Wall Defects
20. Pipeline Damage Prevention Radar
21. Robust Anomaly Matching for Inspection and Cleaning Pigs (ICIPs): Reducing Pipeline Assessment Uncertainty Through 4-Dimension Anomaly Detection and Characterization
22. Status of Arctic Pipeline Standards and Technology
23. Understanding and Mitigating the Threat of Alternating Current Induced Corrosion on Buried Pipelines
24. Use of Electromagnetic Sensors to Quantify Strength and Toughness in Steel Pipelines In and Out Of Service
25. Wall Break-Through in Composite Repaired Defects

PREPAREDNESS

Pre-Spill Baseline Studies

1. A Critical Real-Time Louisiana Coastal Ocean Observing Station
2. A Demonstration Marine Biodiversity Observation Network (BON) for Ecosystem Monitoring
3. Abundance Estimates of Ice Associated Seals: Bering Sea Populations that Inhabit the Chukchi Sea during Open-Water Period
4. Aerial Surveys of Arctic Marine Mammals
5. An Analysis of Marine Environmental Conditions to Improve Understanding of Ecological Processes in Lower Cook Inlet and Kachemak Bay Alaska
6. Analysis of Benthic Communities on Weathervane Scallop Beds in Shelikof Strait
7. ANIMIDA III: Arctic Kelp Communities in the Beaufort Sea: Sentinels of Long-Term Change
8. Arctic Ecosystem Integrated Survey, Phase II: Seabirds
9. Arctic Ecosystem Integrated Survey, Phase II: Distribution, Abundance, and Condition of Demersal Fish
10. Arctic Whale Ecology Study: Use of the Chukchi Sea by Endangered Baleen and Other Whales
11. Assessing the Impact of Oil Spills to Subsurface Biota using Three-Dimensional Oil Spill Modeling
12. Atlantic Deepwater Ecosystem Observatory Network—An Integrated System for Long-Term Monitoring of Ecological and Human Factors on the OCS
13. Beaufort Sea Marine Fish Monitoring: Pilot Survey in the Central Beaufort Sea
14. Benthic Habitat Mapping in Eastern Cook Inlet
15. Biophysical and Chemical Observations II

16. Changes in Beaufort-Chukchi Seas Intense Storm Activity and Impacts on Surface Climate and Ocean Properties
17. Characterization of Hydraulic Fracturing Processed Waste Waters
18. Characterization of the Circulation on the Continental Shelf Areas of the Northeast Chukchi and Western Beaufort Seas
19. Characterizing Bacterial Communities in Beaufort Sea Sediments in a Changing Arctic
20. Chukchi Acoustic, Oceanography, and Zooplankton Study: Hanna Shoal
21. Coastal Community Vulnerability Index and Visualizations of Change in Cook Inlet, Alaska
22. Collaboration with North Pacific Research Board Arctic Marine Research Program
23. Community Based Monitoring: LEO Network
24. Community Web Access to Weather Research and Forecasting Atmospheric Model Results and Meteorological Station Data, 1979–2009
25. Continued Archiving of Outer Continental Shelf Invertebrates by the Smithsonian Institution National Museum of Natural History
26. Cooperative Monitoring Program for Spawning Aggregations in the Gulf of Mexico: an Assessment of Existing Information, Data Gaps, and Research Priorities
27. Data Synthesis and Advanced Predictive Modeling of Deep Coral and Hardbottom Habitats in the Southeast Atlantic: Guiding Efficient Discovery and Protection of Sensitive Benthic Areas
28. Deepwater Atlantic Habitats II: Continued Atlantic Research and Exploration in Deepwater Ecosystems with Focus on Coral, Canyon, and Seep Communities
29. Defining Abnormal Events of Oceanographic, Biological, and Physical Properties in The Gulf Of Mexico to Identify Data Gaps
30. Determining Offshore Use by Diving Marine Birds Using Satellite Telemetry
31. Developing the Next Generation of Animal Telemetry: A Partnership To Develop Cost Effective, Open-Source, Marine Megafaunal Tracking
32. Development of a Very High-Resolution Regional Circulation Model of Beaufort Sea Nearshore Areas
33. Development of a Weathered Oil Standard Reference Material SRM 2977 Weathered Gulf of Mexico Crude Oil
34. Development of an Autonomous Carbon Glider to Monitor Sea-Air CO₂ Fluxes in the Chukchi Sea
35. Discerning Behavioral Patterns of Sea Turtles in the Gulf of Mexico to Inform Management Decisions
36. Distribution and Habitat Use of Fish in the Nearshore Ecosystem of the Beaufort and Chukchi Seas
37. Distribution and Relative Abundance of Marine Mammals in the Chukchi Sea and the Fall Migration of Bowhead Whales in the Beaufort Sea
38. Distribution of Fish, Crab and Lower Trophic Communities in the Chukchi Sea Lease Area
39. Ecological Baseline Studies of the U.S. Outer Continental Shelf
40. Ecosystem Modeling Efforts in the Gulf of Mexico: Current Status and Future Needs to Address Management and Restoration Activities
41. Endangered Pallid Sturgeon Risk Assessment and Data Collection, Planning and Training
42. Estimation of Abundance and Demographic Rates of Pacific Walrus Using a Genetics-based Mark-Recapture Approach
43. Expansion of West Coast Oceanographic Modeling Capability

44. Field Evaluation of an Unmanned Aircraft System (UAS) for Studying Cetacean Distribution, Density, and Habitat Use in the Arctic
45. Freeze-Up and Break-Up Studies of the Alaskan Beaufort and Chukchi Seas
46. Functional Diversity of Epibenthic Communities on the Chukchi and Beaufort Sea Shelves
47. Genomics of Arctic Cod: A Sentinel Species in a Changing Environment
48. Gulf of Mexico Marine Assessment Program for Protected Species (GOMMAPPS)
49. Hanna Shoal Ecosystem Study
50. Identifying Sources of Organic Matter to Benthic Organisms in the Beaufort and Chukchi Outer Continental Shelves
51. Initiating an Arctic Marine Biodiversity Observing Network (AMBON) for Ecosystem Monitoring
52. Integration of Offshore Avian Spatial Data into the USFWS Information, Planning and Conservation System
53. Integrative Statistical Modeling and Predictive Mapping of Seabird Distribution and Abundance on the Atlantic Outer Continental Shelf
54. Marine Arctic Ecosystem Study: Task 3 Pilot Biophysical and Chemical Observations
55. Marine Arctic Ecosystems Study: A Multi-Agency National Oceanographic Partnership Program
56. Marine Bird Distribution and Abundance in Offshore Waters
57. Mass Wasting Processes and Products of the Mississippi Delta Front: Data synthesis and Observation
58. Mesoscale Climatology and Variation of Surface Winds Over the Chukchi-Beaufort Coastal Areas
59. Microbial Biodegradation of Alaska North Slope Crude Oil in the Arctic Marine Environment
60. Migration Trends for King and Common Eiders and Yellow-billed Loons past Point Barrow in a Rapidly Changing Environment
61. Multibeam Survey of Small Topographic Features to Determine Efficacy of Current "No Activity Zones"
62. Nearshore Food Web Structure on the OCS in Cook Inlet, Alaska
63. Net Environmental Benefit Analysis of Pacific Platform Decommissioning Scenarios
64. Northern Alaska Sea Ice Project Jukebox: Phase III
65. Passive Acoustic Monitoring (PAM) Program for the Northern Gulf of Mexico
66. Phase II Development of the Tethys PAM Metadata System
67. Range-Wide Distribution of Cook Inlet Beluga Whales in the Winter
68. Satellite Tracking of Bowhead Whales: Habitat Use, Passive Acoustic and Environmental Monitoring
69. Seabird Distribution and Abundance in the Chukchi and North Aleutian Basin Offshore Environment
70. Sensitivity to Hydrocarbons and Baselines of Exposure in Marine Birds on the Chukchi and Beaufort Seas
71. Shelf-Slope Sediment Exchange in the Northern Gulf of Mexico: Application of Numerical Models for Extreme Events
72. Social Indicators in Coastal Alaska: Arctic Communities
73. Spatial & Acoustic Ecology of Pelagic Megavertebrates (SPAM)
74. Sperm Whale Prey in the Northern Gulf of Mexico
75. Subtidal and Intertidal Habitats and Invertebrate Biota in Lower Cook Inlet, Alaska
76. Synthesis of Arctic Research (SOAR) Physics to Marine Mammals in the Pacific Arctic

77. Task 4: Integrated Observations of the Beaufort Sea Ecosystem
78. The Central Role of the Mississippi River and its Delta in the Oceanography and Ecology of the Gulf of Mexico Large Marine Ecosystem
79. Traditional Knowledge Implementation: Accessing Arctic Community Panels of Subject Matter Experts
80. U.S.-Canada Transboundary Fish and Lower Trophic Communities
81. Updating Status and Trends of Seabirds and Forage Fish in Lower Cook Inlet
82. USA-Mexico to Coordinate Future Environmental Studies Related to Ocean Energy in the Gulf of Mexico
83. Using Genotyping by Sequencing Population Genetics Approaches to Determine the Population Structure of Tanner Crab in Alaska
84. Using Trace Elements in Pacific Walrus Teeth to Track the Impacts of Petroleum Production in the Alaskan Arctic
85. Wading Shorebirds Habitats, Food Resources, Associated Infauna, Sediment Characteristics and Bioremediation Potential of Resident Microbiota of Deltaic Mudflats
86. Walrus Seasonal Distribution and Habitat Use in the Eastern Chukchi Sea

Response Management Systems

1. Arctic Tracer Release Experiment Applications for Mapping Spilled Oil in Arctic Waters
2. Developing an Innovative Dispersant Spray Drift Model
3. Equipment Surge Risk Assessment Tool
4. Evaluation of Gulf of Mexico Oceanographic Observation Networks Impact Assessment on Ecosystem Management and Recommendation
5. Gulf of Mexico Response Viability Analysis
6. Leveraging Offshore Hydrocarbon Risk Assessment Models and Datasets to Support the Evaluation and Ranking of Worst Case Discharge Scenarios
7. Mobile Asset Tracking and Reporting During an Incident of National Significance
8. Oil Spill Response Emerging Technology Research
9. Physical and Chemical Analyses of Crude and Refined Oils: Laboratory and Mesoscale Oil Weathering
10. Preliminary Technical Guidance and Literature Review to Assist in Evaluation of Wellhead Burning as a Blowout Response.
11. Response to Oil In Ice
12. Scientifically Based Field Tools for Predicting Dispersant Effectiveness and Usage Rates
13. Shale Oil & Gas Preparedness and Response
14. WebGNOME Additions for Trajectories Visualization and Oil Libraries

Other

1. Developing a Capabilities-Based Framework for Designing and Evaluating Oil Spill Response Exercises

RESPONSE

Structural Damage Assessment and Salvage

1. Robot Capability Requirements and Alternatives for National Strike Force Response Support

At Source Control and Containment

1. Suitability of Source Control and Containment Equipment versus Same Season Relief Well in the Alaska OCS Region

Chemical and Physical Behavior Modeling

1. Arctic Oil Spill Modeling
2. Chemical Aquatic Fate and Effects Database Version 1.2
3. Equipment Surge Risk Assessment Tool
4. Oil Sands Products Spill Response
5. Shale Oil & Gas Preparedness and Response
6. Simulation Modeling of Ocean Circulation and Oil Spills in the Gulf of Mexico

Oil Spill Detection and Surveillance

1. Airborne Oil Spill Remote Sensing and Reporting
2. Arctic Operations Support
3. Characterizing Dispersant Effectiveness of Crude Oils at High Salinities: Implications for Subsea Spill Preparedness
4. Deepwater Horizon Lessons Learned-Methodology and Operational Tools to Assess Future Oil Spills
5. Detection and Mitigation of Oil within the Water Column
6. Detection of Oil Thickness and Emulsion Mixtures using Remote Sensing Platforms
7. Development of Acoustic Methods to Measure Oil Droplet Size and Slick Thickness of Remotely Operated Underwater Vehicle (ROV) and Autonomous Underwater Vehicle (AUV) Platforms
8. Environmental Characterization of Oil in Shallow Surface Mixing Layer Associated with Floating Oil
9. Estimating Oil Slick Thickness with Light Detection and Ranging (LiDAR)
10. Experimental Wave Tank Studies of Oil Spill Response Using Dispersants
11. Oil Sands Products Spill Response
12. Oil Simulants to Mimic the Behavior of Oil Droplets in the Ocean
13. Propeller Driven Long Range Autonomous Underwater Vehicle (LRAUV)
14. Remote Sensing Assessment of Surface Oil Transport and Fate during Spills in the Gulf of Mexico
15. Robot Capability Requirements and Alternatives for National Strike Force Response Support

In and On-Water Containment and Recovery

1. Advancing ICEHORSE Proof-of-Concept to Make it More Useful in an Operational Environment
2. Arctic Operations Support
3. Detection and Mitigation of Oil within the Water Column
4. Development of an Oil Thickness Sensor
5. Enhancement to Boom Technologies
6. Evaluation of Skimmer Performance in Diminishing Oil Slick Thickness
7. Improved In-Situ Burning (ISB) for Offshore Use
8. Methods to Enhance Mechanical Recovery in Arctic Conditions
9. Nearshore and Inland Evaluation of the Estimated Recovery System Potential Calculator
10. Oil Boom Biofouling Control by Mechanical Intervention and Material Technologies
11. On-Board Flotation System for Removal of Surface Oil under Arctic Conditions
12. Response to Oil In Ice
13. Development of an Oil Recovery Efficiency Sensor

Shore Containment and Recovery

1. Efficacy and Ecotoxicological Effects of Shoreline Cleaners in Salt Marsh Ecosystems
2. Shoreline Cleanup Assessment Technique (SCAT) for Tomorrow Workshop Report and Appendices
3. Toxicity Comparison of the Shoreline Cleaners Accell Clean and PES-51 in Two Life Stages of the Grass Shrimp, *Palaemonetes Pugio*

Dispersants

1. Analysis of How Environmental Conditions Affect Dispersant Performance During Deep Ocean Applications
2. Characterizing Dispersant Effectiveness of Crude Oil at High Salinities: Implications for Subsea Spill Preparedness
3. Comparative Toxicity of Chemical Dispersants and Weathered Oil in Saltmarsh Mesocosm Systems
4. Comparative Toxicity of Two Chemical Dispersants and Dispersed Oil in Estuarine Organisms
5. Effects of Salinity on Oil Dispersants Toxicity in the Eastern Mud Snail, *Ilyanassa Obsolete*
6. Evaluation of the Use of Chemical Dispersants in Oil Spill Response
7. Oil Composition vs. Dispersant Effectiveness
8. Oil/Dispersed Oil-Sediment Interactions in Deepwater Environments and Impacts of Dispersants on the Environmental Fate of Persistent Oil Components
9. Operational and Efficiency Assessment of Dispersant Delivery Techniques/Systems
10. Screening for NCP Product Schedule Potential New Reference Oils
11. State-of-the-Science of Dispersants and Dispersed Oil (DDO) in U.S Arctic Waters
12. Sub-lethal Effects of Crude Oil Dispersants on a Tidal Creek Crustacean
13. Toxicity of Oil and Dispersant on the Deepwater Gorgonian Octocoral *Swiftia Exserta*, with Implications for the Effects of the Deepwater Horizon Oil Spill
14. Warm Water Dispersant Study

In-situ Burning

1. An Offshore Oil Burn Enhanced by Floating Immersed Objects
2. Characterization of Emissions and Residues from Simulations of Crude Oil Surface Oil Burns
3. Fire and Fuel Configurations
4. Fire Whirl Fundamentals
5. Improved In-Situ Burning for Offshore Use
6. In-situ Burn Emissions Testing
7. In-situ Burn Testing of California Crude Oils
8. Quantitative Measurement of In-situ Burn Efficiency and Rate
9. Underwater Igniter
10. Vigorous Burn Inducer

Alternative Chemical Countermeasures

1. Development of a Laboratory Protocol for Effectiveness of Commercial Solidifiers in Cleaning Up Oil Spills on Water
2. Development of a Laboratory Protocol for Effectiveness of Commercial Surface Washing Agents in Cleaning Up Oil Spills on Shorelines

Oily Waste and Oil Disposal

1. Demonstration of a Polypropylene Packed Material for the Treatment of Solids in Shipboard Bilge Water

Bioremediation and Biodegradation

1. Developing BOEM's Access to Protected Species Occurrence Data for Impact Analyses and Rulemaking
2. Effects of Oil Bioremediation Products on Three Life Stages of the Grass Shrimp, *Palaemonetes pugio*

Other

1. Oil Spill Response Emerging Technology Research

INJURY ASSESSMENT AND RESTORATION

Environmental Impacts and Ecosystem Recovery

1. A Comparative Analysis of an Oil Spill on Biota Inhabiting Several Gulf of Mexico Shipwrecks
2. Barataria Bay Bottlenose Dolphin Health Assessment
3. Biodegradability of Diluted Bitumen Oil by River Cultures in Freshwater at Two Temperatures
4. Biodegradability of Dispersants and Dispersed Crude Oil at Two Temperatures
5. BOEM-MARINe (Multi-Agency Rocky Intertidal Network)
6. Characterizing and Quantifying Sea Lion and Seal Use of Offshore Man-made Structures off California
7. Chemistry and Toxicity of Heterocyclic Compounds in Petroleum
8. Disturbance Index Development for the Pacific OCS
9. Effects of the Deepwater Horizon Oil Spill on Protected Marine Species
10. Metagenomic Sequencing of Oil Degrading Microbial Communities
11. Multidisciplinary Assessment of Deep-Water Coral Ecosystems: Tools to Detect Impacts of Sub-Lethal Stress
12. Offshore Oil and Gas Activity Impacts on Ecosystem Services in the Gulf of Mexico
13. Oil Spill Threats to High Latitude Fish Species That Are Either Commercially or Ecologically Important
14. Quantifying Changes to Infaunal Communities associated with Several Deep-Sea Coral Habitats in the Gulf of Mexico and their Potential Recovery from the Deepwater Horizon Oil Spill
15. Pacific Marine Assessment Partnership for Protected Species - California Current
16. Response of Nearshore Ecosystems to the Deepwater Horizon Oil Spill
17. Ultraviolet (UV) Light-enhanced Toxicity of Surface Oil Slicks to Early Life Stages of Marine Organisms
18. UV-Enhanced Toxicity of Weathered Deepwater Horizon Oil to Early Life Stage Red Drum
19. Vulnerability Assessment of Threatened Shallow Coral Reefs to Toxic Effects from Oil Spills
20. Wave and Hydrodynamic Modeling in the Nearshore Beaufort Sea

Environmental Restoration Methods and Technologies

1. Indicators and Assessment Framework for Ecological Health and Ecosystem Services

2. Inventory of Gulf of Mexico Ecosystem Indicators Using an Ecological Resilience Framework

Human Safety and Health

1. Measuring Wave Forces Along Alaska's Coastal Sea Ice

Sociological and Economic Impacts

1. An Analysis of the Impacts of the Deepwater Horizon on the Seafood Industry
2. Assessing Temporal and Spatial Variability in Community and Parish-Level Responses to Oil Spills and Other Events in Coastal Louisiana
3. Highlights and Lessons Learned from Deepwater Horizon Statistical Natural Resource Damage Assessment Approaches for Measuring Recreational Use
4. Social Impacts of Deepwater Horizon Oil Spill on Coastal Communities along the U.S. Gulf of Mexico
5. State Sponsored Oil Spill Research Relevant to the Regulation of Offshore Oil and Gas Development