# National Petroleum Council
# Arctic Research Study

## Presentation at the
## 2015 Arctic Oil Spill Technology Symposium

**Peter Velez**
**Fairbanks, Alaska**
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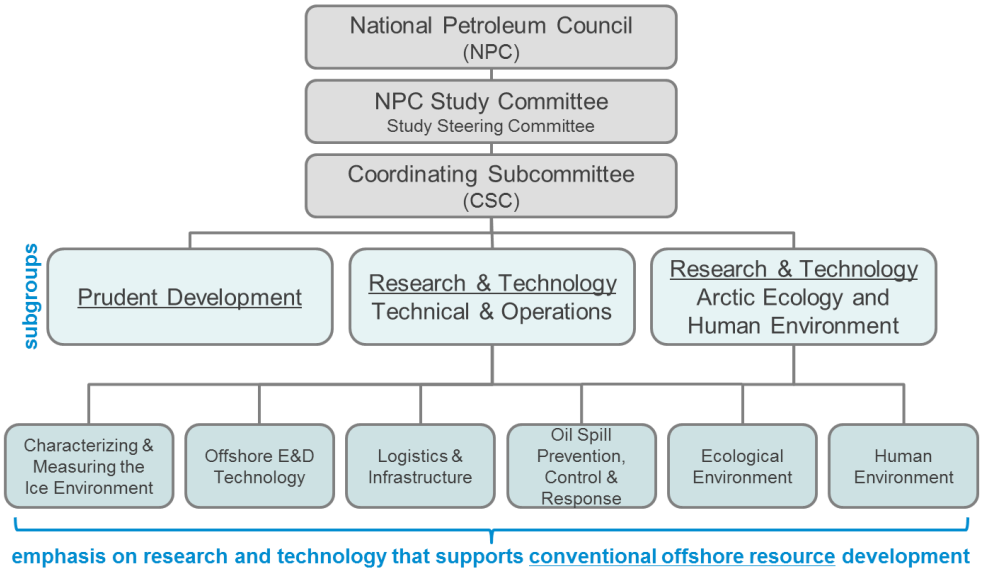
# Study Request and Organization

## In October 2013, the Secretary of Energy requested the NPC to conduct a study

- "What research should the Department of Energy pursue and what technology constraints must be addressed to ensure prudent development of Arctic oil and gas resources while advancing U.S. energy and economic security and ensuring environmental stewardship?"
- The Secretary also noted that the Council's perspective would be helpful input to the U.S. chairmanship of the Arctic Council, the quadrennial energy review and as considerations for implementing the U.S. National Strategy for the Arctic Region

## The report was approved by the NPC on March 27, 2015




***Diverse Team:***
~ 200 participants
from 90 organizations

# Executive Summary - Key Findings

1. Arctic Oil and Gas Resources are Large and Can Contribute Significantly to Meeting Future U.S. and Global Energy Needs
2. The Arctic Environment Poses Some Different Challenges Relative to Other Oil and Gas Production Areas, But is Generally Well Understood
3. The Oil and Gas Industry Has a Long History of Successful Operations in Arctic Conditions Enabled by Continuing Technology and Operational Advances
4. Most of the U.S. Arctic Offshore Conventional Oil & Gas Potential Can Be Developed Using Existing Field-Proven Technology
5. The Economic Viability of U.S. Arctic Development is Challenged by Operating Conditions and the Need for Updated Regulations that Reflect Arctic Conditions
6. Realizing the Promise of Arctic Oil and Gas Requires Securing Public Confidence
7. There Have Been Substantial Recent Technology and Regulatory Advancements to Reduce the Potential for and Consequences of a Spill

# Securing Public Confidence Required

**Industry and government** have a shared responsibility to gain and maintain the public trust

- Both must engage the local community

**Industry** must operate responsibly and continuously improve technology and operations

- Commitment to operate safely and with high environmental standards
- Maintain and continuously improve risk management systems, practices, tools
- Use trained personnel
- Appropriately manage change
- Learn from incidents

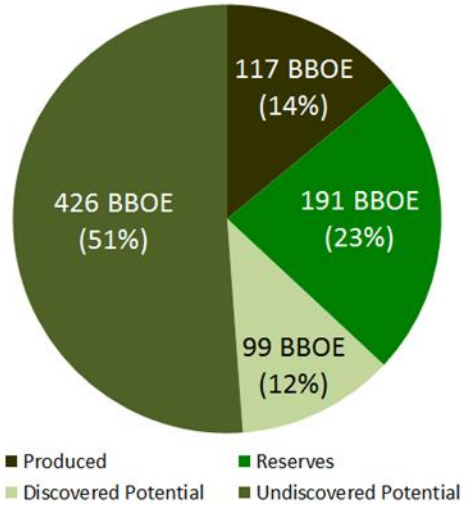
**Government** must maintain / continuously improve policies and regulations that ensure public safety and environmental protection, and support development

- Arctic O&G already extensively regulated
- Coordination / role clarity essential - 39 Federal agencies in the Arctic Policy Group; 27 agencies / groups in the Implementation Plan for the National Arctic Strategy; 22 member agencies in the Arctic Executive Steering Committee

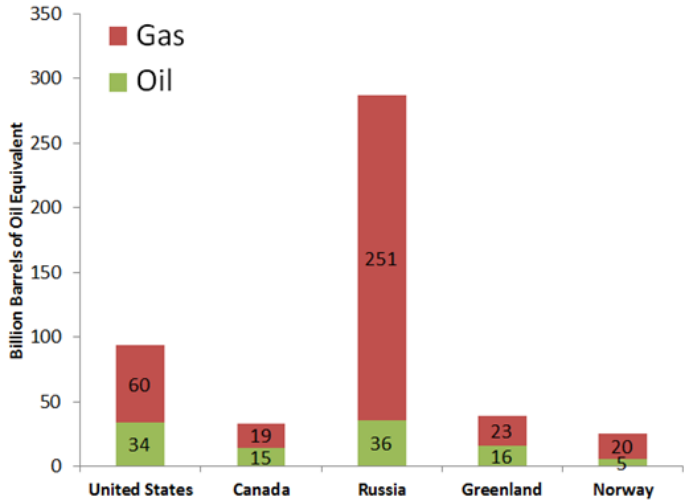
# Large Arctic Oil and Gas Potential

## Arctic Oil and Gas Resources are Large and Can Contribute Significantly to Meeting Future U.S. and Global Energy Needs

- The global Arctic contains about 25% of remaining undiscovered global conventional resources (USGS), and the U.S. has a large portion of oil potential
- If exploration starts now, offshore Alaskan development could coincide with the expected decline in the lower 48 fields
- National security and economic benefits associated with increased U.S. activity




**Global Conventional Arctic Endowment**




**Global Arctic Conventional Oil and Gas[1] Resource Potential by Country**

[1] Natural gas liquids not shown

# The Arctic Environment

## The Arctic Environment Poses Some Different Challenges Relative to Other Oil and Gas Production Areas, but is Generally Well Understood

- The Arctic has been studied for many years by industry, government, and academia, and much is known about the physical, biological, and human environment
- Key challenge that distinguishes the Arctic is ice
  - Conditions vary – ice type, water depth, length of open water season most important
- Experiences from other remote and challenging oil and gas areas applicable
- The climate is changing and there are additional information / monitoring opportunities, such as interaction of key species with oil and gas activities

**First-year ice with numerous pressure ridges**

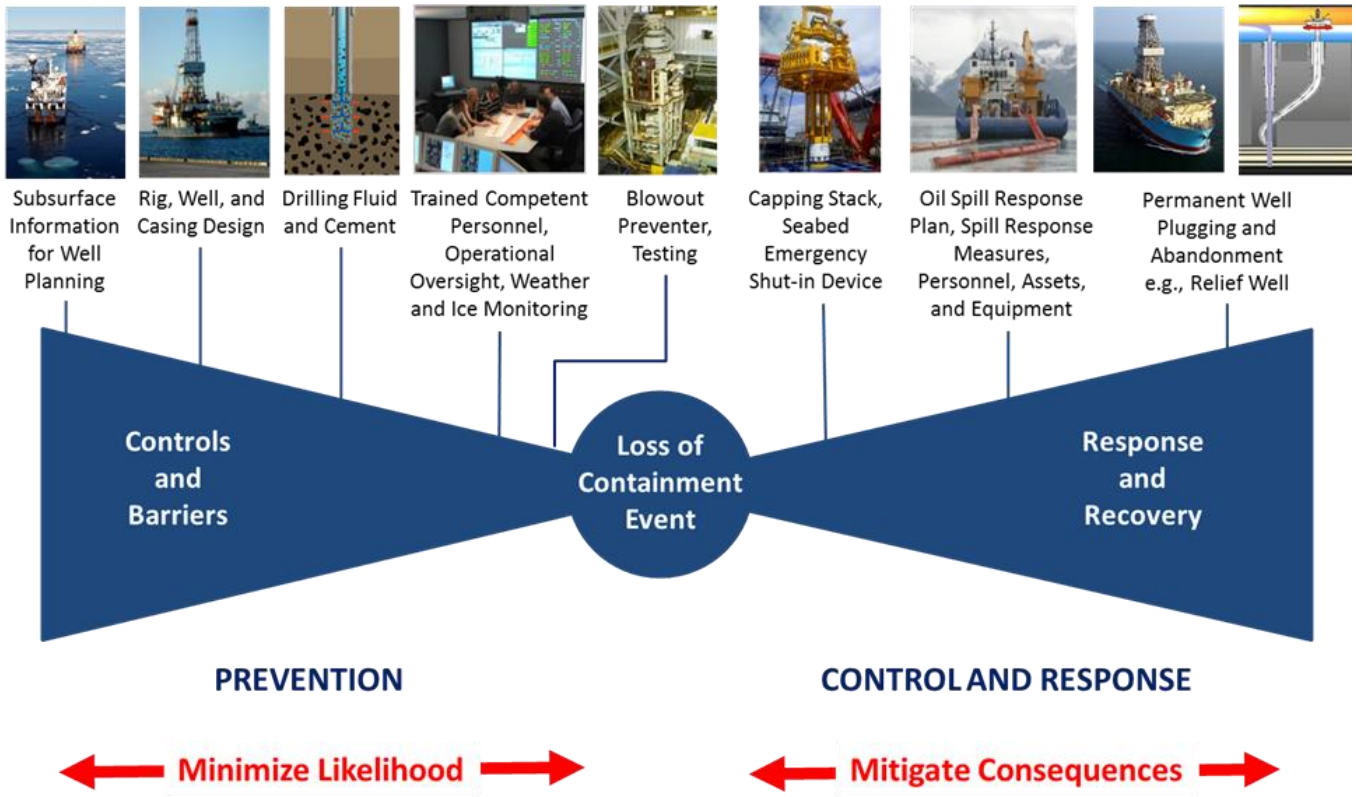
**Multi-year ice ridge in the Canadian Beaufort Sea**

**Iceberg, ~ 200 meters across, in open water**

# Well Control Technology Improvements

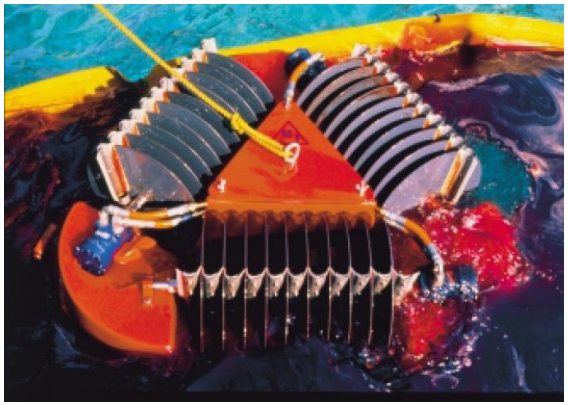
## There Have Been Substantial Recent Technology and Regulatory Advancements to Reduce the Risk and Consequences of a Spill

- The greatest reduction of environmental risk comes from preventing a spill
- Recently developed control and mitigation technologies should be assessed



# OSR Response Techniques

- Spill containment
- Mechanical recovery
- Dispersant application (Surface & Subsurface)
- In-situ burning (ISB)
- Shoreline response
- Natural attenuation (monitoring)
- Combination of those above



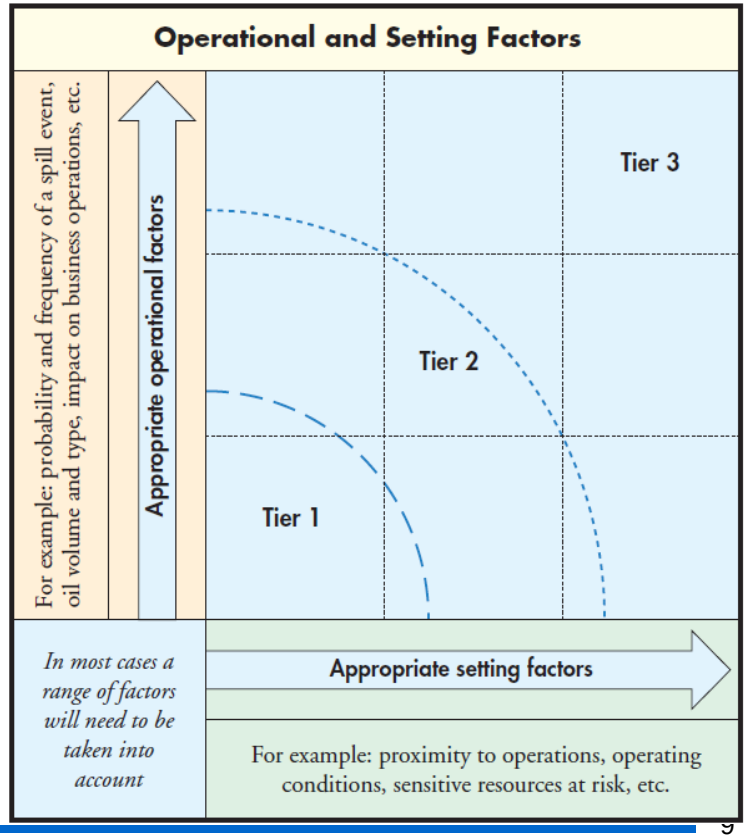
# Spill Response Toolbox

Mechanical Recovery:
Booms & Skimmers

Detect, Monitor
& Evaluate

In-Situ Burning

Aerial or Vessel
Dispersants




**Goal is to design a response strategy based on *Net Environmental Benefit Analysis***

# Differences in Arctic that can Impact Recovery

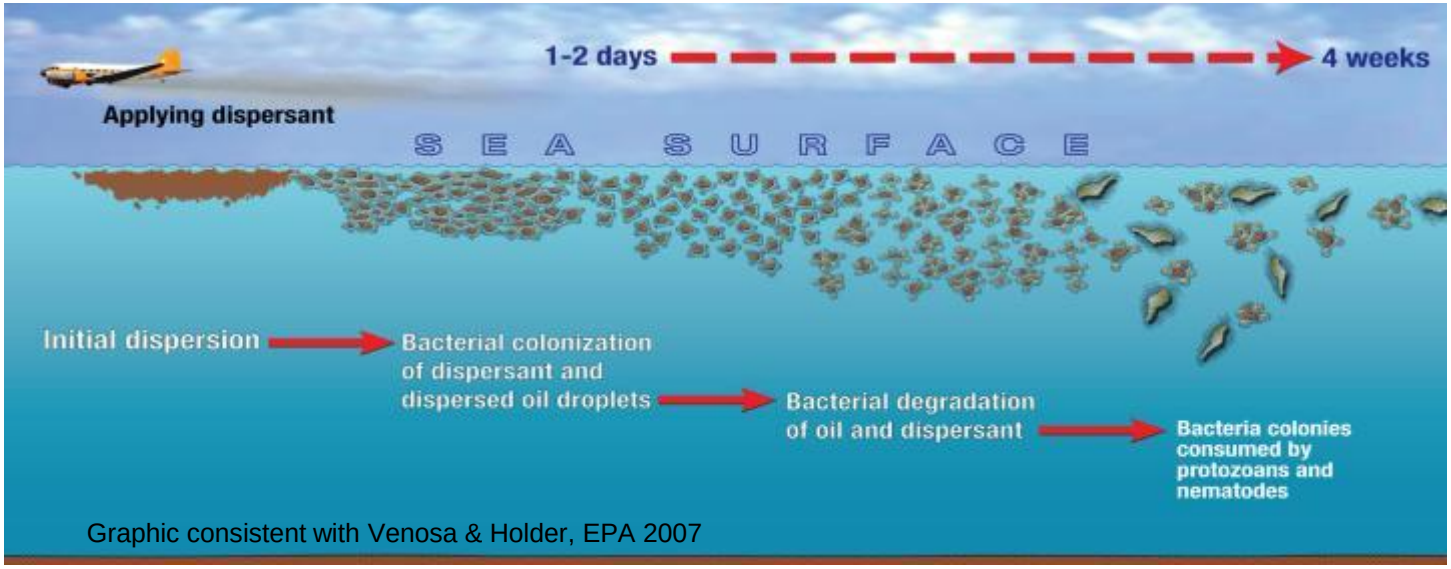
- Less Evaporation
- Reduced Spreading & Smaller Area Affected
- Viscosity
- Weathering
- Shallow Water & Open Water Drilling
- In-Situ Burning
- Ice – Positive & Negative
- Challenges – late permits to utilize dispersants

# Encounter Rate is Key to Offshore Response

# Mechanical Recovery in Broken Ice


# Dispersants

- **Dispersants are solutions of surfactants dissolved in a solvent**
- **Surfactants reduce oil-water interfacial tension – allows slicks to disperse into very small droplets with minimal wave energy**
- **Dispersed oil rapidly dilutes to concentrations <10 ppm within minutes, <1 ppm within hours, ppb range within a day**
- **Each dispersed oil droplet is a concentrated food source that is rapidly colonized and degraded by marine bacteria**
- **Dilution allows biodegradation to occur without nutrient or oxygen limits**




Graphic consistent with Venosa & Holder, EPA 2007

# Subsea Dispersants Use

- Dispersants are most effective on fresh, non-emulsified oil when high turbulence is present.
- Oil is most fresh and fluid at the point of release.
- Subsea use of dispersants is a valuable response option, especially since dispersants application can be controlled at one point.
- Water column provides environment for rapid dilution.
- GOM response showed good subsea dispersion efficiency and rapid dilution.
- Subsea dispersants helps to reduce surface VOCs and protect responders.

# Subsea Dispersant Use in GOM - Macondo


# In-situ Burning

More than 500 bbl of oil
can be eliminated
in less than an hour
with 500 feet of fire boom and
achieve 90+% removal rate

# NPC Oil Spill Response Conclusions

Oil Spill Response

- Developing and gaining acceptance of a credible, environmentally acceptable OSR strategy is critical to drilling approvals and year-round operations
- Responders need flexibility to use all tools in toolbox – dispersants, ISB, mechanical recovery, remote sensing and detection
- Existing state of knowledge enables robust contingency planning & decision making
- Need to apply new technology to advancing oil in ice detection/mapping
- Future advances in all OSR areas will need collaborative effort including stronger Government, Industry, and Academic partnerships and Experimental Releases
- A NEBA-based approach is the best way to make defensible science-based decisions on the most effective mix of response strategies
- Industry capabilities and environmental/health impacts of response options are not fully understood by stakeholders – need better communication/education & dialogue

# NPC Recommendations

**Although the technology exists today to explore and develop the majority of U.S. offshore oil and gas potential, additional research opportunities are recommended to:**

- Validate recently developed technology for use in the U.S. offshore,
- Pursue technology extensions that could lead to improved safety, environmental or cost performance

**Policy and regulatory recommendations are included where they enable the application of best technology and practices**

**Recommendations grouped into themes: Environmental Stewardship; Economic Viability; Government Leadership and Policy Coordination**

**Total 32 Recommendations (13 research, 3 regulatory, 16 leadership/policy)**

- Additional 60 research recommendations in the report

# NPC Environmental Stewardship

DOI intersection

**Considering environmental stewardship, the NPC recommends:**

- Industry and regulators should work together to perform the analysis, investigations and any necessary demonstrations to validate technologies for improved well control
- Government agencies should participate in ongoing and future industry collaborative research programs for oil spill response in ice, such as the Arctic Response Technology Joint Industry Program that has been underway since 2012
- Regulators should continue to evaluate oil spill response technologies in Arctic conditions, and all spill response technologies should be pre-approved to enable selection of the appropriate response technology to achieve the greatest reduction in adverse environmental impacts

# QUESTIONS www.npc.org