To: Marilyn Heiman, Director, U.S. Arctic Program, The Pew Charitable Trusts

From: Susan Harvey, Harvey Consulting, LLC

Re: Office of Information and Regulatory Affairs (OIRA)
Office of Management and Budget
Review of Proposed Department of Interior OCS Regulation Revision for Arctic

1. Same Season Relief Well Rig Performance Standards

1.1. Regulatory Shortfall:

The Department of Interior's regulations do not currently include Arctic relief well rig performance standards and do not require Oil Spill Response Plans to include a complete description of its relief well rig capability to control and contain a well blowout. Yet, relief wells are a standard emergency response and are required as a minimum standard in other Arctic countries (e.g., Canada and Greenland).

1.2. Pew's Arctic Standards Report Recommendation:

Oil Spill Response Plan holders should be required to own, have on contract, or have available under a mutual aide agreement a Polar Class (or equivalent) drilling rig capable of drilling a relief well at the proposed location and for the period required to complete the relief well. See Pew's Arctic Standards Report (page 109).

1.3. Why is a Relief Well Rig Critical?

A relief well is the most reliable method of controlling a well blowout and is typically the last resort for well control when surface intervention methods fail. If a well cannot be controlled using surface intervention methods (e.g., well capping and containment) or when surface kill operations may exacerbate the blowout, a relief well must be drilled.

Approximately 90-95% of all well blowouts are solved by the well bridging on its own or by surface intervention methods.[1,2] However, historical data shows there is a 5-10% chance a relief well may be needed to control a blowout. Drilling operators must be prepared for that potential situation.

While there is general agreement that surface intervention options should commence immediately (if technically feasible and safe) in response to a blowout, relief wells are typically started in parallel to ensure more than one well control method is in progress, and to ensure the most reliable method (relief well) is in progress in case surface intervention is unsuccessful. Relief well drilling operations (subsurface intervention) can be stopped if surface intervention methods are successful before the relief well operations are complete.

[1] Pidcock, G.A., and Fowler, D.R. (Gulf Canada Resources Ltd.), Relief Well Contingency Drilling Plans for Remote Areas, SPE/IADC Drilling Conference Paper No. 21997, 1991.
[2] Skalle, P., and Trondheim, J.H. (Southwest Petroleum Institute), and Nanchong, P. (UT Austin), Killing Methods and Consequences of 1120 Gulf Blowouts During 1960-1996, Society of Petroleum Engineers Paper No. 53974, 1999.

While it is true that well blowouts are often controlled using surface intervention ("top-kill" methods) before a relief well is drilled, this does not diminish the need for and role of a relief well, especially in the Arctic where the time to control the well is limited by the weather. Relief well drilling equipment and capability must be in the arsenal of the well control team because it may be the only well control method technically feasible or safe. Without a Same-Season Relief Well (SSRW) option in these situations, the well blowout could continue to leak hydrocarbons into the ocean and atmosphere – unabated – if other well control measures are unsuccessful in that first season.

In general, relief wells are most commonly needed when:

- The well is in a remote location, to ensure the well can be controlled within the seasonal drilling window;
- Debris is blocking access for well capping equipment;
- Hazardous conditions at the surface make top kills unsafe;
- Surface intervention may exacerbate the blowout;
- Capping the well may cause an underground or broached blowout;
- An underground blowout occurs; and,
- When same well surface control techniques are not an option.

Drilling relief wells can take longer than well capping. However, because well capping operations are not always successful, well capping and relief well drilling operations are typically commenced in parallel.

More specifically, a relief well may be needed in the following situations:

- **Remote Locations**: In remote locations, relief well operations must begin soon after the blowout occurs to assure the well can be controlled within the seasonal drilling window. While the well may be controlled by surface intervention methods, a relief well drilling operation is started simultaneously to ensure that the most reliable well control method (relief well drilling) is underway in case surface intervention methods fail. This means that in remote locations, especially in the Arctic, a relief well drilling rig and plan must be in place and ready to execute within the available drilling window before ice or weather hazards preclude relief well drilling operations.

- **Debris Blocking Access for Well Capping Equipment**: When an offshore well blowout occurs, the rig involved in the blowout is typically damaged (e.g., sinks, burns, or equipment is damaged during fire or explosion). The rig and failed blowout preventer may block access to the well, preventing well capping and containment equipment from being installed until this debris can be safely removed. Debris removal operations may involve clearing or cutting away damaged or melted remains of the rig and substructure.[3] Well capping and containment equipment must be placed on the surface of the well blowout: therefore, debris must be removed for this to be a successful operation.

  Depending on the location and amount of debris and conditions at the well blowout, it may not be safe to remove the debris or it may take longer to remove the debris than to drill a relief well. A relief well can commence without removing debris blocking the surface, because the relief well is drilled from a different location than the well blowout, and is drilled directionally through the subsurface to intercept the well blowout.

[3] John Wright Co., Blowout Control, Part 10- Blowout Surface Intervention Methods, http://www.jwco.com/technical-litterature/tech.htm, accessed May 2013.

- **Hazardous Conditions at the Surface that Make Top Kills Unsafe**: Well blowouts may release oil and/or gas into the environment and may result in a fire or explosion if there is a nearby ignition source. It may not be safe to cap a well that has ignited. Gas expelled from the well may contain deadly hydrogen sulfide gas that may make working at or near the well blowout unsafe.

  Because relief wells are drilled from a different location than the well blowout, relief well drilling is safer for the personnel involved, placing humans away from fire, explosion hazards, and deadly gases.

- **Capping the Well May Cause an Underground or Broached Blowout**: A relief well should be drilled if top kill methods (e.g., well capping operations) could result in surface pressure control that could cause an underground or broached blowout, or has the potential to damage cement or casing.[4]

- **Underground Blowout**: "An underground blowout can be the most difficult, dangerous, and destructive."[5] An underground blowout in an offshore well can fracture formations below the seabed allowing oil and gas to travel vertically through those subsurface formations and reach the seabed floor ("broaching"), often creating a crater near or under the drilling rig (of the well involved in the well blowout). Underground blowouts in offshore wells have occurred when the well involved in the well blowout had less than 4000' of casing in the well.[6]

1.4. Does a Same Season Relief Well (SSRW) Rig Increase Cost?

No, not if an operator conducts efficient drilling operators or works collaboratively with other drilling operators working in the same area.

A Same Season Relief Well Rig Requirement does not trigger incrementing cost, if an operator is drilling a cost effective exploration program that includes drilling multiple wells in the same drilling season to amortize the overall exploration overhead costs over several wells, or is working cooperatively with nearby operators that are drilling wells to share relief well rig capability.

Overall exploration overhead costs include costs not directly related to the cost of drilling an individual well; these costs support the overall drilling effort (e.g., oil spill response, logistics support, safety specialists, study, and monitoring costs, etc.) If an operator only drills one well at a time; the exploration overhead cost burden is carried 100% by that single well. However, if the operator drills two wells in the same season, the exploration overhead cost burden is shared by the wells drilled, reducing well cost by up to 50% each. Economics improve if more wells are drilled in the same drilling season.

For example, industry suggests an average cost of $1.5 billion per well for a well drilled in the Arctic Outer Continental Shelf (OCS). A substantial portion of this cost can be amortized over a two well drilling program to reduce the per well cost, and eliminate the incremental cost of a relief well.

The key point is that drilling at least two wells in one season, eliminates the incremental cost of having a relief well rig on stand-by because two rigs are located in the drilling area and ready to assist in an emergency.

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[4] John Wright Co., Blowout Control, Part 10- Blowout Surface Intervention Methods, http://www.jwco.com/technical-litterature/tech.htm, accessed May 2013.
[5] Grace, R. D., Blowout and Well Control Handbook, Gulf Publishing, 2003, 342.
[6] Grace, R. D., Blowout and Well Control Handbook, Gulf Publishing, 2003, p. 350.

Industry suggests a Same Season Relief Well Rig and support assets would cost an incremental $250 million per year, and $2.1 billion over 10 years. This would only be true if a drilling operator chose to drill only one well in a drilling season, or there was no other drilling operator in the area to share a relief rig. This approach is not efficient, or cost effective, and proposes a worst-case economic scenario that is unlikely to be selected by a drilling operator. Drilling two or more wells in the same season provides a relief well rig at no incremental cost, because a second rig would already be present in the Arctic drilling another well and available in an emergency.

Pew's recommendation for regulatory reform would allow two or more operators to enter into a mutual aide agreement to provide relief well rig services to each other, maximizing the cost savings of cooperative drilling efforts.

1.5. Is Well Capping Equivalent to a Same-Season Relief Well?

No. Well capping is not equivalent to a same-season relief well.

Industry has requested the federal government to consider a well capping stack to replace a Same-Season Relief Well requirement. Well capping stacks are not equivalent to a Same-Season Relief Well. As explained above, a well capping stack is a viable and necessary surface control intervention method that should be immediately implemented. However, well capping stacks are not successful 100% of the time. History shows that 5-10% of the time surface intervention is not possible and a relief well is the only resort.

Since 1970, there have been several wells controlled by a relief well, including: the Apache Corporation, Gulf of Mexico well (2007); March Island, Offshore Gulf of Mexico well (2002); Steelhead Platform Blowout, Cook Inlet, Alaska (1987); TXO Production Corp., Texas (1982); Pemex, IXTOC No. 1, Gulf of Mexico (1978); Tenneco Oil Company, West Cameron Block 165 (1977); Shell Oil Cox 1 Well Blowout (1970; and, Shell Oil Cox 1 Piney Woods, Mississippi (1970).

A list of well blowouts requiring relief well intervention is provided below. While not exhaustive, this list provides clear evidence that relief wells are used to control well blowouts (even today) when surface intervention options are not viable or safe. Planning to drill an offshore well without a relief well rig nearby, equipped and ready to commence, would eliminate a proven well control option from the well control arsenal available to emergency responders.

- Chevron Nigeria (2012). A relief well was drilled to plug and abandon a gas well in Nigeria.[7] A fire started aboard the shallow-water jack-up drilling rig located approximately six miles off the coast of Nigeria in approximately 40 feet of water, killing two workers and destroying the rig. Chevron determined a relief well was needed to safely control the well by intercepting the blowout at 9,100' below the seabed, because surface well control operations were not safe. Cement was pumped via the relief well to seal off the well blowout.[8] The blowout lasted for 44 days fueling a large fire at the well location when the well stopped flowing on its own; however, the relief well was needed to permanently control the well.

[7] Chevron, KS Endeavor Update, http://www.chevron.com/ksendeavor, accessed May 2014.
[8] Chevron, KS Endeavor Update, Information About the Incident on the KS Endeavor Drilling Rig in the Funiwa Field Offshore Nigera, http://www.chevron.com/ksendeavor, accessed May 2014.

- Qatar Petroleum (2009), Qatar. A relief well was drilled to control a 12,000’ deep oil and gas well blowout with significant hydrogen sulfide gas emission, after top-kill methods were unsuccessful. Initially kill fluids and cement were pumped down the top of the well. The top-kill caused an underground blowout resulting in oil, water, and hydrogen sulfide gas leaking to the surface around the well cellar pit.[9] Explosion hazards and high levels of deadly hydrogen sulfide gas at the well forced a retreat from the top-kill operations, requiring a relief well to be drilled.
- PTTEP Australasia, Timor Sea (2009). A relief well was drilled to control a well blowout at the Montara Platform in the Timor Sea off the coast of Australia. Surface well control operations were precluded because it was unsafe for personnel to remain on the rig involved in the blowout due to fire and explosion hazards.[10]
- Middle Eastern Carbonate Field (2008). A relief well was drilled to control a gas well blowout after initial efforts to pump kill fluids and cement down the hole were unsuccessful. The well’s casing had collapsed and was approximately 8,000’ deep. Two relief wells were drilled simultaneously to secure the well.[11]
- Apache Corporation, Gulf of Mexico (2007). A relief well was drilled to control an offshore well (Main Pass 91) in the Gulf of Mexico to a depth of approximately 5,800’. The blowout was caused by a leak in the casing that broached to the surface causing the well structure to collapse.[12]
- March Island, Offshore Gulf of Mexico (2002). A relief well was drilled to control an offshore well in the South Marsh Island area of the Gulf of Mexico after surface kill operations were unsuccessful due to casing damage. A relief well drilled to 7,500’ was determined to be the best option for personnel safety and to prevent further wellbore damage caused by attempted top-kill operations.[13]
- Petroleum Development Oman, Makarem-1 Well (1994). A relief well was drilled to approximately 12,000’ to control a deep, high pressure, high temperature gas exploration well.[14]
- Saga Petroleum A/S, Norway Well 2/4-14 (1989). A relief well was drilled to 15,400’ to control an offshore well blowout after surface intervention methods failed, including an attempt to pump heavy mud into the well. A relief well effort was started immediately and in parallel to the top kill methods. It was found that the casing had burst in the well and it resulted in a blowout underground.[15,16]

[9] Al-Murru, T., El-Faghi, F., Al-Meer, K., Qatar Petroleum, The First Relief Well Drilled in Qatar to Intersect, Kill and Abandon an Underground Blowout, Society of Petroleum Engineers Paper No. 156119, 2012.

[10] "PTTEP Australasia Timor Sea Operations – Incident Information #87" (Press release). PTTEP Australasia. November 3, 2009.

[11] Salehi, S. and Hareland, G. (university of Calgary), Soroush, M. (Schlumberger), Killing of a Gas Well: Successful Implementation of Innovative Approaches in a Middle Eastern Carbonate Field – A Field Case, International Petroleum Technology Conference, Paper No. 11970-MS, 2008.

[12] Maehs, J. (Baker Hughes), MacAfee, D. (Apache Corporation), et.al., Successful Relief Well Drilling Utilizing Gyroscopic MWD (GMWD) for Re-Entry into an Existing Cased Hole, Society of Petroleum Engineers Paper No. 116274, 2008.

[13] Barnett, D. (Wild Well Control, Inc.), Relief Well Drilling Operations Allow Re-Entry and Control of a Blowout Well, World Oil, Vol. 223, No.1, January 2002, http://www.worldoil.com/January-2002-Relief-well-drilling-operations-allow-re-entry-control-of-a-blowout-well.html, accessed May 2013.

[14] Roes, V.C. (Petroleum Development Oman), Hartmann, R.A. (Shell International), Wright, J.W. (John Wright Company), Makarem-1 Relief Well Planning and Drilling, Society of Petroleum Engineers Paper No. 49059, 1998.

[15] Olberg, T., Gilhuus, T., Leraand, F., Haga, J. (Saga Petroleum A/S), Re-Entry and Relief Well Drilling To Kill and Underground Blowout in a Subsea Well: A Case History of Well 2/4-14, SPE/IADC Paper No. 21991, 1991.

[16] Leraand, F. (Saga Petroleum A/S) and Wright, J.W. (John Wright Co.), et.al., Relief Well Planning and Drilling for a North Sea Underground Blowout, Journal of Petroleum Technology, March 1992.

- Petrobas, Campos Basin (1989). Two relief wells were drilled to control an offshore well blowout that ignited on the Enchova Platform in the Campos Basin, personnel were evacuated, and top-kill operations were no longer viable. The hydrocarbon bearing interval in the well had not been properly isolated with cement during the original cementing job. Relief well drilling operations were completed within 30 days at a depth of approximately 7,000'.[17]
- Steelhead Platform Blowout, Cook Inlet, Alaska (1987). A relief well was drilled to control an offshore well blowout in Cook Inlet, Alaska after surface intervention methods failed. Because a second relief well drilling rig was not located in Cook Inlet, Alaska, it took several months to mobilize a rig and drill the relief well and the well was not completed until June 1988, almost seven months later.[18]
- Lake Maracaibo, Venezuela (1986). A relief well was drilled to approximately 17, 600' to control the SLB-5-4X oil well blowout after a fire and explosion that burned and collapsed the rig into the lake.[19]
- TXO Production Corp., Texas (1982). A relief well was drilled to approximately 13,500' to kill a gas well blowout after surface intervention methods failed on the TXO Marshall well.[20]
- Pemex, IXTOC No. 1, Gulf of Mexico (1978). A relief well was drilled to control the IXTOC No. 1 offshore oil well blowout. Oil and gas flow at the surface of the well required personnel to abandon the offshore platform before the rig caught on fire and collapsed. Surface intervention operations, including pumping well kill fluids and materials into the well, caused a large rupture underneath the blowout preventer. Surface intervention operations were halted and two relief wells were drilled.[21]
- Mobil Oil (1978), Arun Filed, Indonesia. A relief well was drilled to control a "prolific" gas blowout, after surface intervention operations failed.[22]
- Tenneco Oil Company, West Cameron Block 165 (1977). A relief well was drilled to approximately 10,200' to control an offshore well blowout in West Cameron Block 165 in the Gulf of Mexico. The abrasive nature of the blowouts flow stream (gas, mud and sand) had damaged the surface controls and casing making surface intervention options too risky.[23]
- Shell Oil Cox 1 Well Blowout (1970), Piney Woods, Mississippi. A 22,000' deep exploration well was intersected using a relief well at 10,500'.[24]

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[17] Maduro, W.P. (Petrobras) and Reynolds, J. ((Smith International Inc.), Enchova Blowout: Record Relief Time, SPE/IADC Paper No. 18717, 1989.

[18] Nuka Research and Planning Group, LLC and Pearson Consulting, LLC , Oil Spill Prevention and Response in the U.S. Arctic Ocean, Unexamined Risks, Unacceptable Consequences, November 2010., p. 70.

[19] Voisin, J.A., et. al., Relief Well Planning and Drilling for SLB-5-4X Blowout Lake Maracaibo, Venezuela, Society of Petroleum Engineers Paper, No. 16677, 1987.

[20] Grace, R.D. (GSM) and Kuckes, A.F. (Vector Magnetics) and Branton, J. (TXO Production), Operations at a Deep Relief Well: The TXO Marshall, Society of Petroleum Engineers Paper, No. 18059-MS, 1988.

[21] Lugo, O.L.U. (Halliburton De Mexico), De Leon, I.O. (Petroleous Mexicanos), IXTOC No.1, Blowout and Control Operation, Society of Petroleum Engineers Paper, No. 9697, 1981.

[22] John Wright Co., Blowout Control, Part 11- Relief Wells, http://www.jwco.com/technical-litterature/tech.htm, accessed May 2013.

[23] Barnett, R.D., Tenneco Oil Company, A Logical Approach to Killing and Offshore Blowout West Cameron 165 Well No. 3- Offshore Louisiana, Society of Petroleum Engineers Paper, No. 6903, 1977.

[24] John Wright Co., Blowout Control, Part 11- Relief Wells, http://www.jwco.com/technical-litterature/tech.htm, accessed May 2013.

2. Seasonal Drilling Limitation

2.1. Regulatory Shortfall:

Drilling restrictions that limit OCS offshore operations in the Arctic to summer periods ensures there is sufficient time left in the operating season to cap a blown-out well, drill a relief well, and clean up spilled oil in open water, thereby providing a critical margin of safety in the proposed plan. Seasonal drilling restrictions, with these specific components, are not included in existing regulations.

2.2. Pew's Arctic Standards Report Recommendation:

Seasonal drilling limitation standards should be added to the Interior Department's regulations for periods when oil spill response is not possible in the Arctic. More specifically, Arctic offshore operations drilling through hydrocarbon-bearing zones should be limited to periods of time when the drilling rig and its associated oil spill response system are capable of working and cleaning up a spill in Arctic conditions, minus the time required to drill a relief well before ice encroaches on the drill site and the time required to clean up the spilled oil from the last day that a spill could occur. See Pew's Arctic Standards Report (page 123).

2.3. Why is a Seasonal Drilling Restriction Critical?

Seasonal drilling restrictions provide time to control a well blowout before ice sets in and well control would be precluded. Seasonal drilling restrictions can be applied such that it does not limit drilling wells above the hydrocarbon zone(s). In the Chukchi and Beaufort Sea this means approximately 70% of the well could be drilled without any limitation. Drilling would only need to cease through the last section of the well (the hydrocarbon zone(s)) to eliminate the risk of a well blowout when well control may not be feasible.

2.4. Does the Seasonal Drilling Limit Increase Cost?

No, not if the drilling program is efficiently scheduled. As proposed, an operator would not have to cease drilling a well after the seasonal drilling limit date, it would only need to cease drilling though the hydrocarbon section of the well. The operator could start drilling another well, and drill most of the well (approximately 70%), if safe. Drilling through the hydrocarbon zone would be limited to the Arctic open water season when oil spill response is most successful.

Industry suggests a Seasonal Drilling Limitation increases costs by $456 million per year, and $3.9 billion over a 10 year period. This claim assumes only drilling a single well per season, not efficiently optimizing the drilling schedule, and drilling with rigs that have limited or no capability to work safely in fall or winter ice conditions. For example, the seasonal drilling limit set for the 2012 Exploration Program in the Chukchi Sea was a function of the rig selected, that was only capable of operating in up to 1.5 feet of ice, and therefore required work stoppage when ice conditions exceed the selected rig's capability. Use of a more robust Arctic rig will extend the drilling season.

2.5. Does the Seasonal Drilling Limit Correspond to the Quality of the Arctic Rig Selected by the Operator?

Yes. The seasonal drilling limit corresponds to the quality of the Arctic rig selected by the operator. If an operator selects a drilling rig that is not capable of operating in late season ice, the seasonal drilling restriction date will be substantially earlier than an operator that selects a more robust, Arctic/Polar Class rig rated to work in year-round ice.

2.6. Is There a Demonstrated Benefit to Seasonal Drilling Limits?

Yes. There is a demonstrated benefit to seasonal drilling limits. Seasonal drilling limits have been effectively used in the Arctic offshore by both federal and State of Alaska regulators for decades, without the incidence of a well blowout.

3. Credit for Dispersant Use in Arctic

3.1. Should Dispersants be used in the Arctic to Replace Mechanical Response?

No. Dispersants should not be used to replace mechanical response capability in the Arctic at this time. Pew recommended that dispersant use in the Arctic should not be conducted until the Operator has proven that dispersant application is nontoxic, not harmful to subsistence resources, is acceptable to the local community, and has been proven to result in a net environmental benefit. [See Page 127 of Pew's Arctic Standards Report.]

Industry states that operators in the Gulf of Mexico receive 10% credit for dispersants and 10% credit for in situ burning, reducing the requirement to have 100% mechanical response capability that meets a worst case discharge scenario and contends that, as a result, it costs industry in the Arctic an additional $51 million more per drilling season. However, data comparing the cost savings of reducing mechanical response capability by 10% and replacing that capability by 10% dispersant use is not provided. Presumably the $51 million cost would decrease by $5.1 million; however, industry does not provide cost data to show how much of the $5.1 million dollar cost savings would be used to purchase dispersant chemicals, and provide logistic support to transport the chemicals to the Arctic, store the chemicals and apply them by air or vessel.

3.2. Is Dispersant Chemical Application to the Sea Equivalent to Mechanical Response?

No. Dispersant chemical application to the sea is not equivalent to mechanical response. Dispersants do not remove oil from marine waters. Dispersants distribute oil in the water column increasing its biological availability to marine life and subsistence resources.

Both State of Alaska and federal law and regulation require the use of mechanical response as the primary oil spill response method because it removes oil from the marine environment. Chemical dispersant application to the sea can work at cross-purposes with oil removal by mechanical methods, by distributing oil through the water column and making it more difficult to recover.

The 2005 National Academy of Sciences report[25] on the state-of-the-art in dispersant application

[25] Oil Spill Dispersants Efficacy and Effects. 2005. National Academy of Sciences, available at: http://dels.nas.edu/Report/Spill-Dispersants-Efficacy-Effects/11283

concluded there remains many uncertainties regarding the efficacy and toxicity of dispersant use and recommended the need for more research.

The 2012 the United States Arctic Research Commission[26] recommended the effects of dispersed oil on Arctic ecosystems be defined including assessments of the toxicity of dispersed oil and dispersants on benthic flora and fauna, marine mammals, and seabirds, yet this work has not been completed.

The Unified Command for Alaska, led by the United States Coast Guard has not pre-authorized any dispersant use zones in the Arctic (Chukchi and Beaufort Seas).

Local residents harvesting subsistence resources from the sea are concerned about the use of dispersant chemicals and the potential for bioaccumulation of toxins in subsistence foods.

3.3. Is there a negative net impact to the environment from mechanical response as compared to dispersant use?

Industry stated that use of 100% mechanical response results in negative environmental impacts, however, it has not provided documentation, form a net environmental benefit analysis for example, comparing mechanical response to dispersant use. Dispersants do not increase oil <u>recovery</u>. Oil remains in the sea after dispersant application and is not removed; dispersant chemicals reduce oil drop size and make the oil more biologically available for consumption by marine life.

4. Harmonization with International Standards

4.1. What do other Arctic Countries Require?

US offshore drilling regulations have been compared to Canada, UK, Greenland, and Norway; however, the UK and Norway should not be used for comparison as these countries do not have Arctic offshore drilling operations with seasonal pack ice such as the US, Canada and Greenland experience.

Canada and Greenland are Arctic offshore drilling nations and are worthy comparisons.

Canada and Greenland both require same-season relief wells and have seasonal drilling limitations. Pew's Arctic Standards Report references a number of standards required by Canada and Greenland for the Arctic that exceed the current US standards, including:

- Greenland requires operators to undergo an operator prequalification program to demonstrate they have the expertise, experience, and capacity to "undertake drilling activities offshore in harsh remote Arctic locations" prior to leasing. (Page 29)
- Greenland requires the operator to provide extensive information on personnel competencies and qualifications. (Page 29)

[26] U.S. Arctic Research Commission and U.S. Army Corps of Engineers, Oil Spills in Arctic Waters: An Introduction and Inventory of Research Activities and USARC Recommendations, (Arlington, Virginia: USARC, November 2012).

- Both Canada and Greenland have a two-rig drilling policy. Both countries require that a relief well rig be located in the same area of drilling at the same time. (Page 111).
- Relief wells are a standard emergency response in Canada and Greenland (Page 36).
- Canada requires offshore drilling operations to have a designated relief well drilling rig that is capable of drilling a relief well to kill an out-of-control well during the same drilling season (commonly referred to as the "same season- relief-capability"). (Page 111).
- Greenland requires Arctic OCS vessel performance standards. The Government of Greenland, Bureau of Minerals and Petroleum, requires vessels conducting exploration operations off the coast of Greenland to meet the IMO Guidelines for Ships Operating in Polar Waters. (Page 75).
- Greenland requires a remotely operated acoustic activation module with portable activation devices. (Page 77).
- Greenland requires offshore operators to finish drilling at least 60 days before hazardous late fall/winter ice sets in. (Page 88).
- Canada requires that an operator demonstrate, including field exercises in Arctic conditions, that its oil spill response equipment and personnel are trained and equipped to work in the Arctic. More specifically, the Canada National Energy Board, Filing Requirements for Offshore Drilling in the Canadian Arctic require an operator to describe in its application the "key response strategies and methods for spill containment, monitoring, tracking recovery, and clean-up on surface water, the subsurface, shoreline, ice, and ice infested waters. For each response method, describe operational limitations (response gaps) caused by unique Arctic environmental conditions such as wind, waves, ice, temperature, visibility, and daylight. (Page 130).

Industry points out that Canada's National Energy Board allows for an operator to propose an equivalent method to replace a Same-Season Relief Well (SSRW) requirement for review and approval. However, to date, no company has provided an equivalency proposal to the National Energy Board that has been approved by the National Energy Board. A few companies have proposed replacing the SSRW requirement with well capping. The National Energy Board has not approved this replacement, and instead has required both well capping and relief wells at this time.

5. Performance Based Regulations

Industry advocates for performance based regulations.

Pew recommends that OIRA consider the 2012 Arctic Ocean drilling season performance including the associated transit to and from the drilling location, and resulting reviews and investigations from DOI, the Coast Guard and the Environmental Protection Agency when evaluating this recommendation.

Pew recommends a combination of performance and prescriptive standards. Please see page 3 of Pew's Arctic Standards report.

> *"To achieve these goals, the Interior Department should develop a combination of prescriptive and performancebased Arctic OCS standards to regulate the offshore oil and gas industry. Prescriptive standards set minimum technology and operating benchmarks based on proven, tested, and generally accepted best industry technology and practices. Prescriptive standards create less complex approval processes for regulators. Because*

prescriptive standards may become less effective as new technology and practices are developed, the Interior Department should routinely update minimum prescriptive standards to ensure that technical innovations are routinely integrated into regulation. Industry can propose alternatives that exceed the minimum requirement at any time, allowing industry to voluntarily advance technology without delay. However, alternative proposals should be subject to close regulatory review, and third-party experts should be consulted to ensure that the alternative meets or exceeds the minimum prescriptive standard.

Performance-based standards allow the operator flexibility and encourage the development of new technologies. But these standards are not always efficient and they require regulators to have substantially more time and expertise to ensure the desired objective is achieved. Here again, third-party experts should be consulted.

Because of the additional study, time, and decision-making required with performance-based standards, a regulatory system based on a mix of prescriptive and performance-based standards is preferred."