Shell Exploration & Production

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Dear Mr. Fesmire and Mr. Johnston

Shell Gulf of Mexico Inc. (Shell) provides the following responses to recent questions raised by the Department of the Interior regarding Shell's 2015 Chukchi Sea drilling operations. Specifically, you have asked Shell to address how it will ensure effective execution of the Drilling Ice Management Plan (DIMP) 1) in light of the U.S. Fish & Wildlife Service's (FWS) conditional Letter of Authorization (LOA) limiting incidental take coverage to areas outside of the Hanna Shoal Walrus Use Area (HSWUA) 50 percent utilization distribution areas (UDs) during the months of July through September, and 2) with the temporary delay of the arrival of the MSV Fennica (Fennica). Shell appreciates that the Bureau of Safety and Environmental Enforcement (BSEE) requested this information to further inform its upcoming decision on Shell's request for permits to drill (APDs) at Burger J and V.

Regarding the first issue, Shell's DIMP relies on multiple tools to assess ice conditions and hazards, with the goal of ensuring that any risk to personnel, environment, drilling units, vessels, and wells is minimized. Shell's DIMP includes: 1) collection of satellite imagery, more notably synthetic aperture radar (SAR); 2) ice reconnaissance overflights; and 3) the multiple, redundant ice management vessels used to scout and potentially manage ice.

First, weather and satellite imagery will be provided at appropriate resolution for all areas of interest to allow mapping and forecasting of the ice without restriction, as surveillance can penetrate cloud cover and other weather conditions. For 2015, Shell will have satellite imagery (including SAR) for all of July and August, except for 4 days within these two months (specific to July = 27). These data are delivered in near real time (*i.e.* imagery received within hours of acquisition) and with the 24/7 weather forecasting produces ice drift and fate (melting) assessments. In 2015, forecasts reveal that ice is melting earlier than usual, with the ice currently in an advanced state of decay and retreating northward. No new ice is expected to form in July and August. Hazardous ice can only be driven on to the prospect if wind and seas push it from the remaining pack. Our surveillance from satellite imagery can detect all but small individual floes in very low concentrations. These individual floes will abate as the peak melt season progresses.

Next, ice reconnaissance overflights of the HSWUA are expected to be performed up to a daily frequency when weather conditions allow us to map residual ice that may remain within the exclusion zone that can no longer be resolved in satellite imagery. The set and drift of these targets can be estimated from weather forecasting (Ekman Transport) or ice management vessel based radar and visual observation. As noted above, current Shell data reveals that 2015 will be a light ice year within the HSWUA and Shell's Burger Prospect, but that may not prove true in future years.

If weather conditions shift such that ice begins to move towards the prospect, Shell has four ice management vessels in its approved plan for exploring the Chukchi Sea. These include the Fennica (whose timing is addressed below), the MSV Nordica (Nordica), the MS Aiviq (Aiviq), and MS Tor Viking II (Tor Viking). The ice management vessels are equipped with ice imaging radar systems that have an approximate range of 6 nautical miles from the vessel, which allows surveillance far ahead of the vessels. For example, any one or more of the vessels could approach the HSWUA UDs for any specific month and ground-truth ice imagery data gathered by satellite and ice reconnaissance overflights. In cases where ice is possible further than 6 miles inside the UD, Shell will make conservative assumptions about ice presence and drift rates to generate a Hazard Time (HT) to guide the rig, and Shell will take the necessary steps to ensure the safety of its personnel and equipment.

Finally, and not necessarily unique to 2015, is the premise that Shell requires flexibility to scout the ice edge with our ice management vessels and engage in ice reconnaissance alone, activities that do not necessarily entail ice breaking. This need would be the same wherever ice management activities would occur, within or outside of HSWUA, and regardless of month.

In regard to execution of the DIMP pending the arrival of the Fennica, Shell's Exploration Plan, generally, and its DIMP, specifically, includes a number of redundancies to cover just such a situation. As stated above, Shell's DIMP identifies the Fennica, Nordica, Aiviq, and Tor Viking, each of which is capable of taking-on the role of a primary ice management vessel, and explains how the DIMP does not depend on a set number of ice management vessels per drilling unit, but uses an adaptive approach that tailors an appropriate response to the ice threat. This includes activity without ice management vessels in areas that have been determined to be ice free for a given period.

As described in the DIMP, an assessment of ice threat should involve Shell's full suite of assets, including ice management vessels, satellite imagery, ice reconnaissance overflights, and vessel radar/visual reconnaissance prior to moving the drilling units to the drill sites. Should hazardous ice be forecast or observed approaching the site after mooring, a conservative hazard time (HT) will be calculated to ensure the drilling unit has adequate time to secure and move the drilling unit off at all times. Should the drilling unit need to move off location and only one drilling unit is drilling, then this further reduces the total time (TT) that will be required to move the drilling units off the drill site as one drilling unit will not need additional time to secure the well. This also offsets the required anchor handling as one drilling unit is securing operations while the other is handling anchors, and allows less anchor handlers/ice management vessels to be used at one time. For 2015 specifically, the ice is currently forecast to be well to the north of the Burger Prospect drill sites of Burger J & V from July 23 past the end of July, with weather creating metocean conditions conducive to aiding the melt and northward retreat of the ice edge. During the onset of exploration drilling in 2015, the temporary delay for the arrival of the Fennica does not reduce Shell's capability to manage the ice forecasted for this season.

As a final point, further information was requested on the Secure Time (ST) associated with the MLC operations. The ST will be set on the rig and witnessed by the BSEE representatives onboard to account for conditions at the time, but calculations are less than half of ST for operations deeper in the well given by Shell to BSEE as part of the APD submission. The ST during all periods in the well will be calculated daily along with HT to ensure there is always adequate time and safety factor to move the drilling unit off prior to ice arrival.

As always, as you complete your review of our APDs, we are available to address any further questions you might have regarding our planning and preparation for operations. Shell is committed to conducting its operations safely and in accordance with our BSEE and BOEM approvals. We look forward to hearing from you soon.

If there are any further questions or comments, please contact me at (907) 646-7112 or via email at Susan.Childs@Shell.com

Thank you.

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