Request for the Incidental Taking of Ringed Seals during On-Ice Seismic Operations in Beaufort Sea, February-May 2009

Submitted by
CGGVeritas Land, Inc.
2450 Cinnabar Loop
Anchorage, AK 99507

With Biological Consultation from Jay Bruggeman,
Canyon Creek Consulting

To

National Marine Fisheries Service
Office of Protected Resources
1315 East–West Hwy, Silver Spring, MD 20910-3282

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REQUEST FOR THE INCIDENTAL TAKE OF RINGED SEALS DURING ON-ICE SEISMIC WINTER OPERATIONS, FEBRUARY-MAY 2009

SUMMARY

CGGVeritas plans to acquire 3D seismic data within the months of February-May 2009 on the sea ice, north and northwest of Thetis Island in OCS waters in the Beaufort Sea. CGGVeritas requests to be issued an Incidental Harassment Authorization (IHA) allowing non-lethal takes of Ringed Seals incidental to the planned seismic survey in "OCS" waters of the Beaufort Sea. The energy source for the proposed activity will be vibroseis. A description of seismic exploration and the specific activities that may take place during the period covered in the IHA application is provided below. This request is submitted pursuant to Section 101 (a) (5) (D) of the Marine Mammal Protection Act (MMPA), 16 U.S.C. § 1371 (a) (5).

The ringed seal is the only species of marine mammal managed by the National Marine Fisheries Service (NMFS) that may be present in the project area during the on-ice seismic program. Ringed seals are not listed under the Endangered Species Act (ESA) or designated as depleted under the Marine Mammal Protection Act (MMPA). Other marine mammal species managed by the NMFS that seasonally inhabit the Beaufort Sea, but are not anticipated to occur in the project area during the on-ice seismic program, include the bowhead whale, beluga whale, bearded seal, and spotted seal. The estimated take of ringed seals from the on-ice seismic operations is ~~253~~ 76 animals while in or near lairs or breathing holes. Any disturbance would likely be temporary and short term, and have no effect on the population. Furthermore, it is anticipated that the operation will have no effect on the availability of ringed seals for subsistence. Precautions and a monitoring program will be implemented to assist the seismic operators in avoiding seal holes and lairs during operations. To ensure minimal impact on subsistence activities, CGGVeritas will coordinate will villages nearby the project area.

The items required to be addressed pursuant to 50 C.F.R. § 216.104, "Submission of Requests" are set forth below. They include descriptions of the specific operations to be conducted, the marine mammals occurring in the study area, proposed measures to mitigate against any potential injurious effects on Pinnipeds, and a plan to monitor any behavioral effects of the operations on those marine mammals.

I. OPERATIONS TO BE CONDUCTED

Overview of the Activity

CGGVeritas plans to conduct a 3D seismic survey north and northwest of Thetis Island in State/OCS waters in the Beaufort Sea using vibroseis (Appendix 1). As presently scheduled, the seismic surveys will occur from ~15February 2009- 31May 2009, although surveys are likely to end earlier in May. During late February and early March, ice checking activities and aerial scouting may take place to determine survey and safe access to locate a temporary field camp location and access to the program area to conduct operations.

Vibroseis

With the vibroseis technique, activity on the surveyed seismic line begins with the placement of sensors. All sensors are connected to the recording vehicle by multi-pair cable sections. The vibrators move to the beginning of the line, and recording begins. The vibrators move along a source line, which will be at some angle to a sensor line. The vibrators begin vibrating in synchrony via a simultaneous radio signal to all vehicles.

In a typical survey, each vibrator will vibrate up to four times at each location. The entire formation of vibrators subsequently moves forward to the next energy input point (e.g., 67 m [220 ft] in most applications) and repeats the process. In a typical 16 to 18-hour day, a survey will complete 4 to 10 linear miles (6 to 16 km) in 2D seismic operations and 15 to 40 linear miles (24 to 64 km) in a 3D seismic operation.

Temporary Field Camp

The seismic survey activities will require a temporary field camp located near the work site. A cat train facility on skis or rubber tracks that is fully contained and self sufficient will be located on grounded ice beside the access route out to the program site. Camp locations will be chosen based on ice conditions and safety of access to ice. Camp will generally consist of 35-40 sled trailers which of includes: crew housing, office units, kitchen and dining facilities, laundry and medical facilities, generators, fuel storage and mechanical work spaces.

Camp locations will be chosen based on access trail conditions and grounded ice forecasting near to the prospect. It is highly likely that our camp locations will be near and south of Thetis Island to support the camp. Re supply for fuel and provisions to the camp will be supported out of Oliktok Pt. The route between the camp and Oliktok Pt. is on grounded ice or areas with less than 3 m of water below the ice; of which neither condition is expected to support ringed seals as discussed later in the application.

Seismic Survey

The seismic survey will consist of either laying recording cables with geophones on the frozen sea ice or placing receivers (hydrophones) below the ice surface thru drilled holes in attempts to provide the best mitigation of seismic noise (i.e. a ‘flex wave’) in a shallow marine environment; using Vibroseis techniques as the source of energy to acquire the seismic data. If ice depths are greater than 7 feet, receivers will be laid on the frozen sea ice but if ice depths are less, then holes will be drilled and hydrophones will be located in the water.

Seismic operations will be conducted utilizing 5-6 wheeled/tracked vibrators supported by Tucker Sno Cats and our Challenger 95 recording cable transport vehicles. A Challenger 95 or Tucker SnoCat vehicle will travel along a pre-surveyed and groomed route and lay receiver cable lines that extend between 3-10 miles long. Receiver (i.e., geophone) lines will be spaced ~300-400m apart; geophones/hydrophones would be located every 30-55m along each of these lines. Ten to fifteen receiver lines will be placed on the ground at any one time all interconnected to a recording device known as a "recorder". Vibrators will include a 14,400 lb GVW wheeled mini-vibrator (capable of 12,000 ft-lbs of force). Mini-Vibe (Vibroseis) vehicles will then move along a pre-determined groomed route most often nearly perpendicular to the recording lines. Positioning of the cables, Vibroseis and recording vehicles all use Tiger Nav technology; a specialized navigation and positioning software. The Tiger Nav system integrates with GPS and Inertial Technology with Real Time Positioning, Stake-less Source, Receiver Surveying and Vehicle Tracking. The Vibrators (usually 3-4 that travel together) move to a pre-determined GPS point location and begin vibrating in synchrony via a radio signal. The Vibrators will vibrate the usual 2-4 times at each location, move up to the next location about 30-55m and continue the vibrating technique until the end of the line. This activity will occur two lines at a time.

CGGVeritas utilizes satellite imagery, existing bathymetry, drill grids and ground penetrating radar (GPR) to interpret ice integrity for proper planning. It should be noted that while GPR data are extremely accurate on fresh water it has limitations on sea ice. To offset any inefficiency of these systems on sea ice, CGGVeritas utilizes a grid system of drilled holes to verify and/or replace GPR data that may be questionable. To support vibroseis and recording vehicle units, an ice thickness of at least 4-6 feet is required.

The 3D program area will exist within the boundary map in Figure 1.

II. Dates, Duration and Region of Activity

CGGVeritas seeks incidental take authorization for a period of three months (15February through 31 May 2009). On-ice seismic operations are ordinarily confined to this three-month period since ice is sufficiently thick (4-6 ft) to safely support the equipment. The geographic region of activity on ice encompasses an 366 square kilometer program area extending across the Beaufort Sea from point of entry from the northwest corner at approximately N 70 44.149 W 150 53.010 to the northeast corner at approximately N 70 46.138 W 150 06.865 to the southeast corner at approximately N 70 33.400 W 149 36.272 to the southwest corner at N 70 31.699 W 150 19.417 (Figure 1). Water depths range from 4-60 ft in the proposed program area. Depths of water extending south of the islands are less than 10 ft (3 meters) based on bathymetry charts.

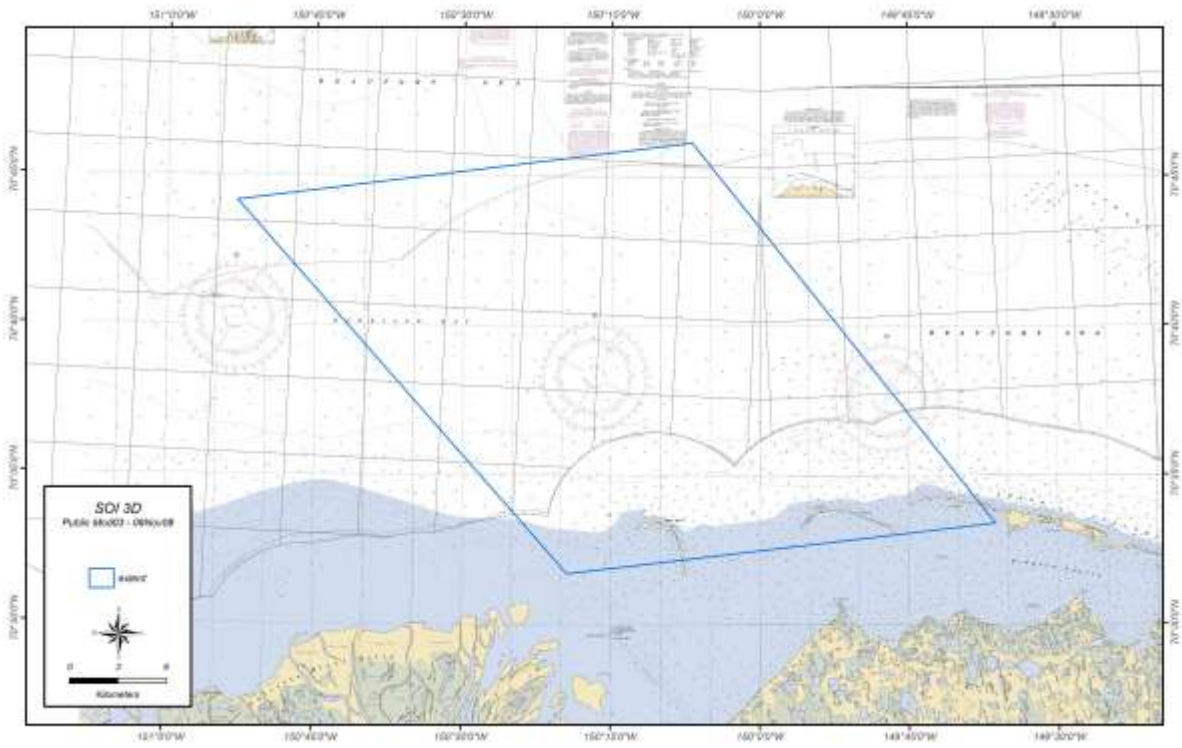

Figure 1 On-ice seismic program project area

III. Species and Numbers of Marine Mammals Likely to be Found within the Activity Area

The ringed seal is the only species of marine mammal managed by the National Marine Fisheries Service (NMFS) that may be present in the project area during the on-ice seismic program. Ringed seals are not listed under the Endangered Species Act (ESA) or designated as depleted under the Marine Mammal Protection Act (MMPA). Other marine mammal species managed by the NMFS that seasonally inhabit the Beaufort Sea, but are not anticipated to occur in the project area during the on-ice seismic program, include the bowhead whale, beluga whale, bearded seal, and spotted seal. Bowhead and beluga whales migrate considerably north of the project area in east-west oriented lead systems during spring (Moore and Reeves 1993). Very small numbers of bearded seal may inhabit the Beaufort Sea in spring, mainly in the offshore pack ice (Moulton et al. 2001, Moulton and Elliott 2000, and Moulton et al. 2000, Burns 1981, Burns and Frost 1979, Burns and Harbo 1972). Since bearded seals are normally found over 37-185 km (20-100 nmi) from shore in broken ice (Anglis and Outlaw 2008) that is unstable for on-ice seismic operation, bearded seals are not expected to be encountered during on-ice seismic operations. Some spotted seals arrive in the Beaufort Sea from the Chukchi Sea from July until September where they haul out on land part of the time, but also spend extended periods at sea (Rugh et al. 1997; Lowry et al. 1998). Polar bears and infrequently Pacific walrus also occur in the Beaufort Sea, but they are not addressed in this application, since they are managed by the U.S Fish and Wildlife Service.

A reliable estimate for the entire Alaska stock of ringed seals is currently not available. A minimum estimate for the eastern Chukchi and Beaufort Sea is 249,000 seals, including 18,000 for the Beaufort Sea (Angliss and Outlaw, 2008). The actual numbers of ringed seals are substantially higher, since the estimate did not include much of the geographic range of the stock, and the estimate for the Alaska Beaufort Sea has not been corrected for animals missed during the surveys used to derive the abundance estimate (Angliss and Outlaw, 2008). Estimates could be as high or approach the past estimates of 1-3.6 millions ringed seals in the Alaska stock (Frost 1985; Frost et al. 1988).

IV. DESCRIPTION OF THE STATUS, DISTRIBUTION, AND SEASONAL DISTRIBUTION (WHEN APPLICABLE) OF THE AFFECTED SPECIES OR STOCKS OR MARINE MAMMALS LIKELY TO BE AFFECTED BY SUCH ACTIVITIES.

Ringed seals have a circumpolar distribution, which is closely associated with sea ice. Ringed seals are found throughout the Bering, Chukchi, and Beaufort Seas (Angliss and Outlaw 2008). They are the most abundant and widely distributed seal in the Beaufort Seas (King 1983).

Ringed seals occupy fast ice and offshore pack ice during winter and spring (Burns 1970; Stirling et al. 1982; Finley et al. 1983; Frost et al. 2004). Frost et al. (2004) conducted aerial surveys of ringed seals on fast and pack ice during late May and early June 1996-1999 between Pt. Barrow and Kaktovik (156°30' and 143°42'W) in the Beaufort Sea within 40 km of shore. The survey area was divided into four east-west sectors (B1-B4) with one sector (B2) encompassing the project area. Seal densities ranged from 0.81 seasl/km² in 1996 to 1.17 seals/km² in 1999 across all sectors. Densities were generally lower in the fast ice (0.57-1.14 seals/km²) than the pack ice (0.92-1.33 seals/km²). Seal densities in sector B2 ranged from 0.61 to 1.10 seals/km², indicating seal use in the project area vicinity was below the average; however the sample size (n=3) for the upper end of the range of the estimate was too small to be reliable. Seal use of the fast ice and pack ice were similar (0.69-0.68 seals/km²) in the project vicinity for the one year (1999) both ice types were surveyed and there was sufficient sample size. In addition, the estimates were below the average estimate for the overall area indicating seal density is lower in the region of the project area on average. In all cases, ringed seal densities were much lower than in the eastern Chukchi Sea, where ringed seal densities averaged 1.91 seals/km² (range 0.37-16.32) in 1999 and 1.62 seals/km² (range 0.42-19.4) in 2000 (Bengtson et al. 2005). No recent data are available for seal densities during the proposed time of the on-ice seismic program during March or April.

Ringed seals maintain breathing holes in the ice and occupy lairs in accumulated snow (Smith and Stirling 1975). Pups are born in late March and April in lairs that seals excavate in snowdrifts and pressure ridges. During the breeding and pupping season, adults on fast ice (floating fast-ice zone) usually move less than individuals in other habitats; they depend on a relatively small number of holes and cracks in the ice for breathing and foraging. During nursing (4 to 6 weeks), pups usually stay in the birth lair. Alternate snow lairs provide physical and thermal protection when the pups are being pursued by their primary predator, polar bears and Arctic foxes (Smith et al. 1991 *cited in* USDI MMS 2003). As the day length and temperature increase in spring, increasing numbers of ringed seal haul out on the surface of the ice near breathing holes or lairs (Frost el al. 2004). This hauling out or basking is associated with the

annual mort, which occurs in May to July. During summer, ringed seals are found on ice remnants and dispersed throughout open water areas of the Beaufort Sea (Burns et al. 1980 *cited in* USDI MMS 2003, Smith 1987).

The primary prey of ringed seals is Arctic cod, saffron cod, shrimps, amphipods, and euphausiids (Kelly 1988; and Reeves et al. 1992 *cited in* USDI MMS 2003). Ringed seals are a major resource that subsistence hunters harvest in Alaska (USDI MMS 2003).

V. The Type of Incidental Taking Authorization that is being Requested (i.e., Takes By Harassment Only; Takes by Harassment, Injury and/or Death) and the Method of Incidental Taking.

CGGVeritas is requesting authorization for incidental taking by harassment (Level B as defined in 50 CFR 216.3) of small numbers of ringed seals during on-ice seismic activity. The activity includes the use of vibroseis energy source to collect seismic data. This activity is not likely to result in physical injuries to, and/or death of, any individual seal. Seals are expected to avoid the immediate area around the on-ice seismic operations. Given the level of vibroseis sounds and the tendency of ringed seals to avoid the immediate area around on-ice seismic operations, seals are not expected to be subject to potential hearing damage from exposure to underwater or in-air sounds from that operation. No take by serious injury is anticipated, given the nature of the planned operations and the planned mitigation measures (see § XI, "MITIGATION MEASURES"). No intentional or lethal takes are expected.

VI. By Age, Sex, and Reproductive Condition (if Possible), the Number of Marine Mammals (By Species) that May be Taken by Each Type of Taking, and the Number of Times such Takings by Each Type of Taking are Likely to Occur.

All anticipated takes would be "takes by harassment", involving short term, temporary changes in behavior. The mitigation measures to be applied will minimize the possibility of injurious takes. In the sections below, we estimated take or the numbers of ringed seals that might be affected during the proposed on-ice seismic program. The estimates are based on the most recent data obtained during ringed seal surveys conducted within the geographic area of the planned operation by Frost et al. (2004). The actual density during on-ice seismic program may be lower, since surveys conducted by Frost et al. (2004) were in May and June when seals may have been more concentrated in fast ice and pack ice remnants than in March or April, when most of the on-ice seismic program will occur.

Several aspects of the on-ice seismic program were considered to not cause a take that are briefly discussed below. Seismic activities in water depths below 3 m (south of Thetis Island) were excluded from the estimated take since few if any seals inhabit water less than 3 meters during winter-spring. The water typically freezes to or near the bottom at this depth and supports few food resources (Miller et al. 1998 and Link et al. 1999). In addition, helicopter flights were excluded from the estimated take, since

they would occur when seals would be using lairs and not basking on the ice, and planned altitude (1000 ft) should reduce any disturbance to ringed seals in lairs. The insulating capacity of snow used to build the lair adds another level of protection to seals from helicopter noise even if a helicopter has to fly at a lower altitude due to weather conditions. As has been reported (Amstrup 1993; Blix and Lentifer 1992) for polar bear dens, snow sufficiently attenuates the sound of helicopter to a level not likely to disturb ringed seals in lairs.

The estimated take of ringed seals is ~~253~~ 76 animals including all sex and ages while in or near lairs or breathing holes. The estimate was derived by multiplying the density estimate (0.69 per km² in fast ice, which is where seismic operation will occur) times the size of the project area (366 km²) and then reducting the estimate by 70% to account for the percentage of time ringed seals spend in lairs. Kelly (1988) reported that ringed seals spend 12-30% of their time in lairs from March to early June.~~.~~ The estimate reflects the design of the seismic program relative to reported distances seals respond to on-ice seismic. Burns and Kelly (1982) and Kelly et al. (1988) concluded that localized displacement of ringed seals in close proximity (within 150 m) to seismic lines does occur, but the overall displacement was insignificant. The design of the program is to space the lines 300 m apart which would presumably expose all seals between the lines to on-ice seismic. However, localized displacement would likely be temporary and short term as reported by Burns and Kelly above, particularly since on-ice seismic operations are not stationary but highly mobile and noise levels are below the primary hearing range of seals (Richardson et al 1995). Moreover, disturbance is not likely to have any effect on the population as a whole because to the (1): limited area of seismic surveys relative to the total ringed seal habitat in the arctic ocean: (2) avoidance by seismic operators of optimal seal habitat (areas of extensive pressure ridging and snow accumulation) due to safety and operational constraints; (3) the relatively large size of the ringed seal population in the Beaufort Sea and throughout Alaska; and (4) the lack of scientific evidence of on-ice seismic activity negatively affecting the reproductive viability or distribution of the ringed seal population.

There is a remote chance that pup mortality could occur if any of these animals were nursing and displacement was protracted. However, it is highly unlikely that a nursing female would abandon her pup given the normal levels of disturbance from the proposed activities and the typical movement patterns of ringed seal pups among different holes as reported by Lydersen and Hammill (1993). Similarly, Kelly and Quakenbush (1990) observed that radio-tagged seals used as many as four lairs spaced as far as 3,437 m apart, with mean distances for males equaling 1,997 m and for females 634 m. In addition, seals have multiple breathing holes. Pups may use more holes than adults (mean 8.7), but the holes are generally closer together (Lydersen and Hammill 1993). Holes have been found as far apart as 0.9 km (0.56 miles). This pattern of use indicates that adult seals and pups can move away from seismic activities, particularly since the seismic equipment does not remain in any specific area for a prolonged time. Given these consideration combined with the small proportion (<1%) of the population potentially disturbed by the proposed activity, impacts are expected to be negligible for the ringed seal populations.

VII. THE ANTICIPATED IMPACT OF THE ACTIVITY ON THE SPECIES OR STOCK

The anticipated impact of seismic activities on the species or stock of ringed seals is expected to be negligible for the following reasons.

- The activity area supports a small proportion (<1 %) of the ringed populations in the Beaufort Sea.

- Seismic operators will avoid moderate and large pressure ridges, where seal and pupping lairs are likely to be most numerous, for reasons of safety and because of normal operational constraints.

- The sounds from energy produced by vibrators used during on-ice seismic programs typically are at frequencies well below (1000 Hz) those used by ringed seals to communicate. Thus, ringed seal hearing is not likely to be very good at those frequencies and seismic sounds are not likely to have strong if any masking affects on ringed seal calls. This effect is further moderated by the quiet intervals between seismic energy transmissions.

- There has been no reported major displacement of seals away from on-ice seismic operations (Frost and Lowry 1988, Frost et al. 2004). Further confirmation of this lack of major response to industrial activity is illustrated by the fact that there has been no major displacement of seals after the 2004 on-ice seismic operations in Harrison Bay or near Northstar development. Studies at Northstar have shown a continued presence of ringed seals throughout winter and creation of new seal structures (Williams et al. 2001, Moulton et al. 2003). The scale of activities at the Northstar development is magnitudes greater than the proposed on-ice seismic operations.

- Although seals may abandon structures near seismic activity, studies have not demonstrated a cause and effect relationship between abandonment and seismic activity or biologically significant impact on ringed seals. Studies by Williams et al. (2001), Kelley et al. (1986,1988) and Kelly and Quakenbush (1990) have shown that abandonment of holes and lairs and establishment or re-occupancy of new ones is an ongoing natural occurrence, with or without human presence. Link et al. (1999) compared ringed seal densities between areas with and without vibroseis activity and found densities were highly variable within each area and inconsistent between areas (densities were lower for 5 days, equal for 1 day, and higher for 1 day in vibroseis area), suggesting other factors beyond the seismic activity likely influenced seal use patterns. Consequently, a wide variety of natural factors influence this patterns of seal use including time of day, weather, season, ice deformation, ice thickness, accumulation of snow, food availability and predators as well as ring seal behavior and populations dynamics.

Consequently, the effects of on-ice seismic are expected to be limited to short-term and localized behavioral changes involving relatively small numbers of seals. NMFS came to a similar finding in an Environmental Assessment of on-ice seismic activity in the Beaufort Sea, where they concluded that behavior changes were expected to be, at worst, negligible (NMFS 1998). The effects of the proposed on-ice seismic operations fall within the MMPA definition of Level B harassment.

VIII. THE ANTICIPATED IMPACT OF THE ACTIVITY ON THE AVAILABILITY OF THE SPECIES OR STOCKS OF MARINE MAMMALS FOR SUBSISTENCE USES

Residents of the village of Nuiqsut are the primary subsistence users in the activity area. The subsistence harvest during winter and spring is ringed seals, but during the open-water period ringed seals are taken. Nuiqsut hunters may hunt year round; however in more recent years most of the harvest has been in the summer during open water instead of the more difficult hunting of seals using holes and lairs during

winter and spring (McLaren 1958, Nelson 1969). The most important area for Nuiqsut hunters is off the Colville River Delta in Harrison Bay, between Fish Creek and Pingok Island, which is largely south of the project area. Seal hunting occurring in this area before spring break-up is by snow machine and by boat during summer. Subsistence patterns are reflected in the harvest data collected in 1992 where Nuiqsut hunters harvested 22 of 24 (92%) ringed seals during the open water season from July to October (Fuller and George, 1997). Harvest data for 1994 and 1995 show 17 of 23 (74%) ringed seals were taken from June to August (Brower and Opie, 1997). Consequently, on-ice seismic operations should have a negligible effect on the availability of ringed seals since hunting primarily south of the project area and mainly during summer.

In order to further minimize any effect of seismic operations on the availability of seals for subsistence, crews and the helicopter pilot will be required by CGGVeritas to avoid hunters and the locations of any seals being hunted in the activity area, whenever possible.

IX. THE ANTICIPATED IMPACT OF THE ACTIVITY UPON THE HABITAT OF THE MARINE MAMMAL POPULATIONS, AND THE LIKELIHOOD OF RESTORATION OF THE AFFECTED HABITAT.

The proposed seismic operation will not cause any permanent impact on habitats and the prey used by ringed seals. All surface activities will be on sea ice, which will breakup and drift away following spring breakup and reform in the fall. Any spills on the ice would be small in size and cleaned up before completing the operations. Similarly, all materials from the camp and seismic activities will be removed from the site before completion of operations. Areas containing ice conditions suitable for lairs will be avoided by the seismic crews to prevent any destruction of the habitat. Seismic survey crews do not place energy sources over observed seal holes or lairs, nor do they typically operate along pressure ridges or near the edge of the land fast ice where seal structures are often located The operation should have no effect on the prey of ringed seals, since physical disturbances will be on the sea ice and not the ocean bed. Consequently, there will be no need for restoration of the habitat used by ringed seals.

X. THE ANTICIPATED IMPACT OF THE LOSS OR MODIFICATION OF THE HABITAT ON THE MARINE MAMMAL POPULATIONS INVOLVED

As discussed in Item IX above, the only losses of or modifications to ringed seal habitat from on-ice seismic operations are the temporary change of the surface ice associated with removal of ice and snow along survey lines and camps. In all cases, the modification involves a very small proportion of the total area of habitat available to ringed seals. Because seismic operations tend to avoid rough, deformed, and broken ice, cracks, and areas near the edge of the landfast ice, they also avoid the preferred habitat of ringed seals. Disturbed habitat is often immediately restored by periodic storms. Furthermore, since the ice and snow are restored annually by the melting and reformation of sea ice, no impact to habitat would last beyond spring breakup. Consequently, on-ice seismic activities will have a negligible impact on the ringed seal population and its habitat.

XI. THE AVAILABILITY AND FEASIBILITY (ECONOMIC AND TECHNOLOGICAL) OF EQUIPMENT, METHODS, AND MANNER OF CONDUCTING SUCH ACTIVITY OR MEANS OF EFFECTING THE LEAST PRACTICABLE ADVERSE IMPACT UPON THE AFFECTED SPECIES OR STOCKS, THEIR HABITAT, AND ON THEIR AVAILABILITY FOR SUBSISTENCE USES, PAYING PARTICULAR ATTENTION TO ROOKERIES, MATING GROUNDS, AND AREAS OF SIMILAR SIGNIFICANCE.

The number of individual ringed seals likely to be exposed to on-ice seismic operations is expected to be relatively low. Effects on most individual seals are expected to be limited to localized and temporary displacement (Level B Harassment). No greater than a negligible impact is anticipated on the species or stock or the availability of the species for subsistence uses. Moreover, any effects on ringed seal habitat are expected to be temporary and localized. No rookeries, areas of concentrated feeding or mating, or other areas of special significance to marine mammals occur in or near the planned seismic operation area.

Nevertheless, all activities will continue to be conducted to assure the least practical adverse impact on the species, habitat, and availability for subsistence uses. For example, as required under current regulations, all activities will be conducted as far as practicable from any observed ringed seal or ringed seal lair and no energy source will be placed over an observed ringed seal lair as per 50 C.F.R. § 216.113. Similarly, only vibrator-type energy-source equipment shown to have similar or lesser effects will be use as per 50 C.F.R. § 216.113(a)(1). CGGVeritas will also provide training for the seismic crews so they can recognize potential areas of ringed seal lairs and adjust the seismic operations accordingly. There have been no injuries or deaths of seals or no more than temporary displacement of seals by on-ice seismic operations since NMFS instituted regulations. Consequently, the history of industry has been one of responsible operations of on-ice seismic activities relative to seals, their habitat, and use by subsistence hunters in Alaska.

To further ensue that on-ice seismic operations have the least practicable impact on the species, habitat and subsistence use, CGGVeritas will continue to work with NMFS, other Federal agencies, the State of Alaska, Native communities of Barrow and Nuiqsut, and ICAS to assess measures to further minimize any impact from seismic activity. In addition, a Plan of Cooperation will be developed between CGGVeritas and Nuiqsut to assure that seismic activities do not interfere with subsistence harvest of ringed seals. Furthermore, a survey using trained dogs will be completed to identify active seal holes/ birthing lairs or hole/lair habitats so they can be avoided by seismic operations to the greatest extent practicable. If trained dogs are not available, potential habitat will be identified by trained marine mammal biologists based on the characteristics of the ice (i.e., deformation, cracks, etc.).

XII. PLAN OF COOPERATION

Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or may affect the availability of a species or stock or marine mammal for Arctic subsistence uses, the applicant must submit a plan of cooperation or information that identifies what measures have

been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses. A plan must include the following:

A Statement that applicant has notified and provided the affected subsistence community with a draft plan of cooperation; ***CGGVeritas will be working with village of Nuiqsut and the Kuukpik Subsistence Oversight Panel to develop a proposed plan for circulation prior to our community meetings. CGGVeritas will also be working with the Alaska Eskimo Whaling Commission, the North Slope Borough Wildlife Department and Planning Department during this process. The Inupiat Community of the Arctic Slope (ICAS) and the Native Village of Barrow(NVB) will receive a visit to address each board of our activities.***

A schedule for meeting with the affected subsistence communities to discuss proposed activities and to resolve potential conflicts regarding any aspects of either the operation or the plan of cooperation; ***CGGVeritas will conduct a community meeting in Nuiqsut during the month of December to hear comments from the community.***

A description of what measures the applicant has taken and/or will take to ensure that proposed activities will not interfere with subsistence whaling or sealing; ***CGGVeritas will be using subsistence representatives to help with monitoring prior to operations and during our operations as subsistence observers.***

What plans the applicant has to continue to meet with affected communities, both prior to and while conducting activity, to resolve conflicts and to notify the communities of any changes in the operation; ***Subsistence representative/Observers on the crew will be responsible for communicating directly with the Village of Nuiqsut.***

XIII. THE SUGGESTED MEANS OF ACCOMPLISHING THE NECESSARY MONITORING AND REPORTING THAT WILL RESULT IN INCREASED KNOWLEDGE OF THE SPECIES, THE LEVEL OF TAKING OR IMPACTS ON THE POPULATION OF MARINE MAMMALS THAT ARE EXPECTED TO BE PRESENT WHILE CONDUCTING ACTIVITIES AND SUGGESTED MEANS OF MINIMIZING BURDENS BY COORDINATING SUCH REPORTING REQUIREMENTS WITH OTHER SCHEMES ALREADY APPLICABLE TO PERSONS CONDUCTING SUCH ACTIVITY. MONITORING PLANS SHOULD INCLUDE A DESCRIPTION OF THE SURVEY TECHNIQUES THAT WOULD BE USED TO DETERMINE THE MOVEMENT AND ACTIVITY OF MARINE MAMMALS NEAR THE ACTIVITY SITE(S) INCLUDING MIGRATION AND OTHER HABITAT USES, SUCH AS FEEDING

Ringed seal pupping occurs in lairs from late March to mid-to-late April (Smith and Hammill 1981). A survey using experienced field personnel and trained dogs will be conducted in areas where water depths exceed 3 meters to locate and map (GPS) potential seal structures along the planned survey routes; few, if any, seals inhabit ice-covered waters below 3 meters due to water freezing to the bottom or poor prey

availability caused by the limited amount of ice-free water. The seal structure survey will be conducted to ensure that seals, particularly pups, are not injured by equipment. The maps and GPS locations of all seal structures will be used to assist seismic survey crews in avoiding seal structures. Surveys will be conducted 150m to each side of the survey routes. Actual width of route may vary depending on wind speed and direction, which strongly influence the efficiency and effectiveness of dogs locating seal structures. As mentioned in Section XI potential seal structures will be identified by trained marine mammal biologists based on the characteristics of the ice (i.e., deformation, cracks, etc.) if trained dogs are not available.

The methods may be refined after the IHA application has been reviewed by NMFS. If additional activities will be ongoing in the Beaufort Sea in 2009 spring season, CGGVeritas will coordinate its monitoring programs with other industries if applicable. Monitoring and reporting of the on-ice seismic operation will follow the requirements listed under 50.C.F .R. § 216.114.

XIV. SUGGESTED MEANS OF LEARNING OF, ENCOURAGING, AND COORDINATING RESEARCH OPPORTUNITIES, PLANS, AND ACTIVITIES RELATING TO REDUCING SUCH INCIDENTAL TAKING AND EVALUATING ITS EFFECTS

On-ice operations have been conducted in the Beaufort Sea region for over 25 years and, during this time, there have been no noticeable adverse impacts on the ringed seal population or the availability of the species for subsistence uses. Moreover, any effects on seal habitat have been temporary and localized. However, to further ensure that there will be no adverse effects resulting from on-ice operations, CGGVeritas will continue to cooperate with the NMFS, MMS, other appropriate federal agencies, the State of Alaska, the North Slope Borough, ICAS, and Nuiqsut community to coordinate research opportunities and assess all measures than can be taken to eliminate or minimize any impacts from these activities.

XV. LITERATURE CITED

Amstrup, S.C. 1993. Human disturbances of denning polar bears in Alaska. Arctic 46(3):246-250.

Angliss, R.P. and Outlaw. 2008. Alaska marein mammal stock assessment 2007. National Oceanic and Atmospheric Administration Technical Memorandum National Marine Fisheries Service-AFSC-180. U.S. Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service, Alaska Fisheries Science Center, National Marine Mammal Laboratory. Seattle Washington

Bengtson, J.L., L.M. Hiruki-Raring, M.A. Simpkins, and P.L. Boveng. 2005. Ringed and bearded seal densities in the eastern Chukchi Sea, 1999-2000. Polar Biology. 28:833-845

Blix, A.S. and J.W. Lentifer. 1992. Noise and vibration levels in artificial polar bear dens as related to selected petroleum exploration and developmental activities. Arctic 45(1):20-24.

Brower. H.K. and R. Opie, 1997. North Slope Borough subsistence harvest documentation project: data for Nuiqsut, Alaska for the period July I, 1994 to June 30. 1995. Department of Wildlife Management, North Slope Borough. January 14, 1997.

Burns, J.J. 1970. Remarks on the distribution and natural history of pagophilic pinnipeds in the Bering and Chukchi Seas. J. Mammal. 51(3):445-454.

Burns, J J .and SJ. Harbo. Jr. 1972. An aerial census of ringed seals, northern coast of Alaska. Arctic 25(4): 279-290.

Burns, JJ. 1981. Bearded seal- Erignathus barbatus Erxleben, 1771. pp. 145-170, fu S.H. llidgway and RJ. Harrison (eds.), Handbook of Marine Mammal, vol. 2. Seals. Academic Press, New York.

Burns, J. J. and L.F. Frost. 1979. The natural history and ecology of the bearded seal. *Erignathus barbatus*. U.S. Dep. Comm.. NOAA. Outer Contin. Shelf Environ. Assess. Prog. Final Report. 19(1983): 311-392.

Burns, J.J., and B.P. Kelly. 1982. Studies of ringed seals in the Alaskan Beaufort Sea during winter: impacts of seismic exploration. Unpublished annual report, OCSEAP RU 232. U.S. Department of Commerce, Office of Maritime Pollution Assessment, NOAA, Junea, AK.

Finley, K.J., G.W. Miller, R.A. Davis and W.R. Koski. 1983. A distinctive large breeding population of ringed seals (Phoca hispida) inhabiting the Baffin Bay pack ice. Arctic 36(2):162-173.

Frost, K.J. 1985. The ringed seal. Unpubl. Rep., Alaska Dep. Fish. and Game, Fairbanks, Alaska. 14 p.

Frost, K.J., L.F. Lowry, G. Pendleton, H.R. Nute. 2004. Factores affecting the observed densities of ringed seals in the Alaksan Beaufort Sea, 1996-99. Arctic 57(2): 115-128.

Frost, KJ., L.F. Lowry, J.R. Gilbert, and JJ. Burns. 1988. Ringed seal monitoring: relationships of distribution and abundance to habitat attributes and industrial activities. U.S. Dep. Commer., NOAA. OCSEAP Final Rep. 61 (1989) 344-445.

Frost, K.J. and L.F. Lowry .1988. Effects of industrial activities on ringed seals in Alaska, as indicated by aerial surveys. P115-120 In: Alaska OCS Region 1987 Arctic Information Transfer Meeting

Conference Proceedings. OCS Study MMS 88-0040. U.S. Minerals Management Service, Anchorage, AK. 245 p plus Appendices. Fuller, A.S. and J.G. George. 1997. Evaluation of subsistence harvest data from the North Slope Borough 1993 census for eight North Slope villages: for the calendar year 1992. North Slope Borough, Department of Wildlife Management. Barrow, AK. 152pp.

Fuller, A.F., and J.C. George. 1997. Evaluation of subsistence harvest data from the North Slope Borough 1993 census for eight North Slope villages: for the calendar year 1992. North Slope Borough, Department of Wildlife, Barrow, AK 152 p.

Kelly, B.P. and L.T. Quakenbush. 1990. Spatiotemporal use of lairs by ringed seals (*Phoca hispida*). Can. J. Zool. 68(12):2503-2512.

Kelly, B.P., 1.1 .Burns and L. T .Quakenbush. 1988. Response of ringed seals (*Phoca hispida*) to noise disturbance. p. 27-38 in: W.M. Sackinger, M.O. leffries, I.L. Imm and S.D. Treacy (eds.) Port and Ocean Engineering under Arctic Conditions, Vol. ll; Symposium on Noise and Marine Mammals. Geophysical Inst. Univ. AK, Fairbanks. 111 p.

Kelly, B.P. 1988. Bearded seal, Erignathus barbatus. p. 77-94 In: J.W. Lentfer (ed.), Selected Marine Mammals of Alaska/Species Accounts with Research and Management Recommendations. Marine Mammal Commission, Washington, DC. 275 p.

Kelly, B.P. 1988. Ringed seal. In: Selected marine mammals of Alaska: species accounts with research and management recommendations. Jack W. Lentfer, editor. Marine Mammal Commission, Washington, D.C. pages 57-75.

King, J.E. 1983. Seals of the World, 2nd ed. Cornell Univ. Press, Ithaca, NY. 240 p.

Link, M.R., T.L. Olson and T\M.T. Williams. 1999. Ringed seal distribution and abundance near potential oil development sites in the central Alaskan Beaufort Sea, spring 1998. .LGL Rep. P- 430. Rep. from LGL Alaska Res. Assoc., Inc. Anchorage, AK. for BP Exploration (Alaska) Inc., Anchorage, AK 58 pp.

Lowry, L.F., K.J. Frost, R. Davis, D.P. DeMaster and R.S. Suydam. 1998. Movements and behavior of satellite-tagged spotted seals (Phoca largha) in the Bering and Chukchi Seas. Polar Biol. 19(4):221-230.

Lydersen, C. and M.O. Harnrnill, 1993. Diving in ringed seal (*Phoca hispida*) pups during the nursing period. Can. I. Zool. 71(5):991-996.

Miller, G.W., R.E. Elliot and W.l. Richardson. 1998. Ringed seal distribution and abundance near potential oil development sites in the central Alaska Beaufort Sea, spring 1997. LGL Rep. TA2160-3. Rep. from LGL Ltd., King City, Ont.. for BP Exploration (Alaska) Inc., Anchorage, AK 36 pp.

Moore, S. and R. Reeves. 1992. Distribution and movement. The bowhead whale. Eds. J.J. Burens, J.J. Montegue, and C.J. Cowles. Special Publication Number 2. The Society for Marine Mammalogy. p 313-386.

Moulton. V D.. R.E. Elliott and M.T. Williams. 2000. Fixed-wing aerial surveys of seals near BP.s Northstar and Liberty sites, 2000. LGL Report TA2428-1. Rep. from LGL Ltd. King City. Ont. for BP Exploration (Alaska) Inc., Anchorage, AK 31 pp.

Moulton. VD., R.E. Elliott and M.T. Williams. 2001. Fixed-wing aerial surveys of seals near BP.s Northstar and Liberty sites, 2001. LGL Report T A2570-1. Rep. from LGL Ltd. King City, Ont. for BP Exploration (Alaska) Inc., Anchorage, AK 31 pp.

Moulton, V.D., M.T. Williams. W. I. Richardson and T.L. McDonald. 2003. Estimated numbers of seals and whales potentially affected by Northstar Activities, Nov. 2001 to Oct. 2002. In Monitoring of industrial sounds, seals, and bowhead whales near BP's Northstar Oil Development, Alaska Beaufort Sea, 1999-2002. LGL and Greeneridge Sciences Inc. May 2003.

Moulton, V .D. and R.E. Elliott. 2000. Fixed-wing aerial surveys of seals near BP's Northstar and Liberty sites, 1999. LGL Report TA2570-1. Rep. from LGL Ltd, King City. Ont, for BP Exploration (Alaska) Inc., Anchorage, AK 72 pp.

National Marine Fisheries Service. 1998. Environmental assessment on regulations governing the taking of ringed and bearded seals incidental to on-ice seismic activities in the Beaufort Sea. U.S. Department of Commerce, 39 p.

Richardson, W.J., C.R. Greene, Jr., C.I. Malme and D.H. Thomson. 1995. Marine mammals and noise. Academic Press, San Diego. 576 p.

Rugh, D.J., K.E.W. Shelden and D.E. Withrow. 1997. Spotted seals, Phoca largha, in Alaska. Mar. Fish. Rev. 59(1):1-18.

Smith, T.G. 1987. The ringed seal, Phoca hispida, of the Canadian Western Arctic. Can. Bull. Fish. Aquat. Sci. 216: 81 p.

Smith, T .G. and M.O. Hammill. 1981. Ecology of the ringed seal, Phoca hispida, in its fast ice breeding habitat. Can. J. Zool. 59(6): 966-981.

Smith, T .G. and I. Stirling. 1975. The breeding habitat of the ringed seal (*Phoca hispida*). The birth lair and associated structures. Can. J. Zool. 53:1297-1305.

USDI MMS. 2003. Beaufort Sea Planning Area, Oil and Gas Lease Sales 186, 195, and 202. Final Environmental Impact Statement. USDI MMS Alaska OSC Region. Anchorage, Alaska.

Williams, M.T., T.G. Smith, C.J. Perham and J.A. Coltrane. 2001. Location of ringed seal structures in the sea ice near Northstar, winter 2000 and spring 2001. LGL Report P557-1. Rep from LFL Alaska Research Associates, Inc. Anchorage, AK. 24 pp.