

****DRAFT****

BEAUFORT AND CHUKCHI EXPLORATION NPDES GENERAL PERMITS ENVIRONMENTAL JUSTICE ANALYSIS

I. EPA's Proposed Action

The U.S. Environmental Protection Agency (EPA) issues individual and general National Pollutant Discharge Elimination System (NPDES) permits to authorize and control the discharge of pollutants into waters of the United States. General permits authorize one or more discharges from multiple facilities within a specific industrial category (e.g., oil and gas exploration) and within the same geographic area (e.g., Chukchi Sea). A general NPDES permit ensures regulatory consistency for similar facilities and activities within the same industrial category.

The existing Arctic NPDES General Permit (Arctic GP; AKG-28-0000), which authorized waste water discharges from oil and gas exploration activities in the Beaufort Sea, Chukchi Sea, Hope Basin, and northern Norton Basin, expired on June 26, 2011. EPA plans to reissue this general permit as two separate general permits: one for oil and gas exploration discharges to the outer continental shelf (OCS) and contiguous state waters of the Beaufort Sea; and one for oil and gas exploration discharges to the OCS in the Chukchi Sea. EPA's decision to split the Arctic GP into two permits was made in part, based on input received from the local communities that a single permit covering such a large geographic area is too complex.

EPA plans to reissue the final Beaufort and Chukchi general permits by October 2012. Before issuing the final general permits, EPA will consult with tribal governments and hold a public comment period. EPA will consider all comments received prior to making its final decisions.

NPDES permits for the oil and gas industry must meet the numeric limits and requirements in the Code of Federal Regulations (40 CFR Part 435), and if available and applicable, more stringent limits to control pollutants to meet the water quality standards of the receiving waters. For the Beaufort and Chukchi general permits, EPA will also use the results of the Ocean Discharge Criteria Evaluations (ODCE), dilution modeling, and Traditional Knowledge (TK) data to establish additional monitoring requirements and restrictions.

After the general permits are reissued, individual operators seeking coverage under the permits must demonstrate to EPA that they can meet the permit limits, requirements, and conditions. The following oil and gas exploration discharges and waste streams are proposed to be re-authorized by the Beaufort and Chukchi general permits:

- Discharge 001 – water-based drilling fluids and drill cuttings
- Discharge 002 – deck drainage
- Discharge 003 – sanitary wastes
- Discharge 004 – domestic wastes
- Discharge 005 – desalination unit wastes
- Discharge 006 – blowout preventer fluid
- Discharge 007 – boiler blowdown
- Discharge 008 – fire control system test water

- Discharge 009 – non-contact cooling water
- Discharge 010 – uncontaminated ballast water
- Discharge 011 – bilge water
- Discharge 012 – excess cement slurry
- Discharge 013 – muds, cuttings, and cement at the seafloor

Section 403 of the Clean Water Act requires an ODCE on NPDES permits for discharges into the territorial sea, contiguous zone, and oceans to prevent unreasonable degradation of the marine environment. Unreasonable degradation is defined as:

- Significant adverse changes in ecosystem diversity, productivity, and stability of the biological community within the area of discharge and surrounding biological communities; or
- Threat to human health through direct exposure to pollutants or consumption of exposed aquatic organisms; or
- Loss of aesthetic, recreational, scientific, or economic values, which are unreasonable in relation to the benefit derived from the discharge.

The ODCE is based on ten criteria (40 CFR 125.122):

- Quantities, composition, and potential for bioaccumulation or persistence of the pollutants to be discharged;
- Potential transport of such pollutants by biological, physical, or chemical processes;
- Composition and vulnerability of the biological communities which may be exposed to such pollutants, including the presence of unique species or communities of species, the presence of species identified as endangered or threatened pursuant to the Endangered Species Act, or the presence of those species critical to the structure or function of the ecosystem, such as those important for the food chain;
- Importance of the receiving water area to the surrounding biological community, including the presence of spawning sites, nursery/forage areas, migratory pathways, or areas necessary for other functions or critical stages in the life cycle of an organism;
- Existence of special aquatic sites including, but not limited to, marine sanctuaries and refuges, parks, national and historic monuments, national seashores, wilderness areas, and coral reefs;
- Potential impacts on human health through direct and indirect pathways;
- Existing or potential recreational and commercial fishing, including finfishing and shellfishing;
- Any applicable requirements of an approved Coastal Zone Management Plan;
- Other factors relating to the effects of the discharge as may be appropriate; and
- Marine water quality criteria developed pursuant to Section 304(a)(1).

EPA may issue an NPDES permit if the ODCE finds that the discharge will not cause unreasonable degradation of the marine environment (40 CFR Part 125 subpart M).

II. Scope of the Environmental Justice (EJ) Analysis

Environmental Justice (EJ) is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, and the accompanying Presidential memorandum, directs each Federal Agency to consider EJ as part of its mission and to develop strategies to achieve environmental protection for all communities to the greatest extent practicable and permitted by law.

Fair treatment means that no group of people, including racial, ethnic or socioeconomic groups should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal and commercial operations or the execution of federal, state, local, and tribal programs and policies. Meaningful involvement means that (1) potentially affected community residents have an appropriate opportunity to participate in decisions about a proposed activity that will affect their environment and/or health; (2) the public's contribution can influence regulatory agency's decisions; (3) the concerns of all participants involved will be considered in the decision making process; and (4) the decision makers seek out and facilitate the involvement of those potentially affected.

This document evaluates whether impacts from discharges authorized under the NPDES general permits for oil and gas exploration in the Beaufort and Chukchi Seas may raise EJ concerns. The evaluation also discusses how EPA involved the Arctic communities in a meaningful dialog regarding their concerns, the potential impacts of EPA's action on those communities, and how EPA intends to address the communities' concerns and mitigate the potential impacts, as permitted by law under the Clean Water Act (CWA).

EPA's tribal trust responsibilities and government-to-government consultation requirements are covered under a separate Executive Order. However, the issues and concerns shared with EPA by tribal governments during consultation meetings are also considered in this EJ analysis because of the nexus of issues and concerns in the Arctic communities regarding safety of subsistence foods and cultural impacts, including continuation of a subsistence way of life.

III. Summary of U.S. Department of Interior EJ Analyses

Numerous EJ analyses pertinent to federal actions within the Beaufort and Chukchi Seas have been completed by the Department of Interior Bureau of Ocean Energy Management (BOEM, formerly Minerals Management Service). A summary of the EJ conclusions made by BOEM are summarized below.

- A. U.S. Department of the Interior, Materials Management Service, Draft Environmental Impact Statement (EIS), Beaufort and Chukchi Sea Planning Area, Oil and Gas Leases 209, 212, 217, and 221, OCS EIS/EA, MMS 2008-055, at www.mms.gov/alaska/ref/EIS%20EA/ArcticMultiSale_209/2008_0055_deis/vol1.pdf

- Proposed Action, Effects in Beaufort Sea. EJ – Effects of 3D seismic surveys, exploration, and possible development should not exceed a moderate level of effect if appropriately mitigated.
 - Incremental contributions of the Proposed Action to cumulative effects – Accompanying changes to subsistence harvest patterns would be expected to disrupt community activities, but not to displace sociocultural institutions. (p. ES-20)
 - Similar EJ effects were reported in the Chukchi Sea for the Proposed Action. (p. ES-30)
- B. U.S. Department of the Interior, Minerals Management Service, Final EIS, Oil and Gas Lease Sale 193 and Seismic Surveying Activities in Chukchi Sea, OCS EIS/EA 2007-026, May 2007, at www.mms.gov/alaska/ref/EIS%20EA/Chukchi_FEIS_193/LS%20193%20FEIS%20Vol%20I.pdf.
- Short term, local disturbance could affect subsistence harvest resources, but no resource or harvest area likely would become unavailable. No disproportionately high adverse effects are expected to occur from planned and permitted activities associated with lease sale evaluated by this EIS. (p. ES-4)
- C. U.S. Department of the Interior, Materials Management Service, Beaufort Sea Planning Area, Oil and Gas Lease Sales 186, 195, and 202, Final Environmental Impact Statement, OCS EIS/EA, MMS 2003-001, at www.mms.gov/alaska/ref/EIS%20EA/BeaufortMultiSaleFEIS186_195_202/2003_001vo11.pdf.
- Chronic disruptions to sociocultural systems likely would occur, but these disruptions are not likely to cause permanent displacement of ongoing traditional activities of harvesting, sharing, and processing subsistence resources. No disproportionately high adverse effects would likely occur from planned and permitted activities associated with any of the three proposed OCS lease sales evaluated in this EIS. (p. ExSum-3)

IV. Description of the Minority and Low-Income Populations

In previous EPA permitting actions, such as the Arctic GP and the Air Quality permits for Shell Exploration, Inc. (Shell), EPA identified substantial minority and low-income populations within the North Slope communities. The North Slope communities are predominantly Alaska Native, specifically Inupiaq. In this EJ analysis, EPA is taking the approach that if the Beaufort and Chukchi NPDES general permits actions are protective of Inupiaq subsistence resources, then they will be protective of all residents on the North Slope.

For the Chukchi general permit, EPA assessed EJ concerns for the North Slope communities of Point Hope, Point Lay, Wainwright, and Barrow. For the Beaufort general permit, EPA assessed EJ concerns for the North Slope communities of Barrow, Nuiqsut, and Kaktovik.

EPA concluded the Beaufort and Chukchi general permit will be protective of the Northwest Arctic Borough (NWAB) communities and the Alaska Eskimo Whaling Commission (AEWC) whaling communities, such as Kivalina, Kotzebue, Gambell, Wales, Little Diomedede, and Savoonga. EPA will use available means to identify particular natural resources that, if affected by the proposed action, could have a disproportionately high and adverse effect on minority and/or low income communities, in particular natural resources that support subsistence living. EPA has, and will continue to collect and evaluate information relative to local concerns and ensure meaningful involvement and fair treatment of North Slope communities.

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A. Demographics¹

EPA considered available demographic information for the North Slope Borough with respect to two reference populations, the state of Alaska and the United States of America.

Table 1 – Population, Age and Race

Location	Total Population	Under 5	Over 65	American Indian or Alaska Native	Asian	White	African American	Hispanic or Latino
<i>North Slope Borough</i>	7,385	9.50%	4.20%	68.40%	5.90%	17.10%	0.70%	2.20%
<i>State of Alaska</i>	626,932	7.60%	5.70%	15.60%	4.00%	69.30%	3.50%	4.10%
<i>United States</i>	310M	6.80%	12.40%	0.90%	3.60%	75.10%	12.30%	12.50%

(2000 US Census²)

As Table 1 illustrates, in total, all eight villages within the North Slope Borough comprise of 7,385 people. The individual village populations range in size from 228 to 4,581 residents. In comparison to the rest of the Alaska, these eight villages have a slightly higher percentage of children under 5, yet a slightly lower percentage of people 65 and older. Sixty-eight percent of all people classify themselves as Alaskan Natives, making them the majority population in the North Slope Borough. This number is significantly higher than the Alaskan Native/ Native American population in both the State of Alaska and the United States as a whole. Asians comprise the second largest minority group in this area making up nearly 6% of the total populace.

¹ Data was gathered from the 2000 US Census via American Fact Finder at http://factfinder.census.gov/home/saff/main.html?_lang=en

² 2000 Census data is used in the draft EJ analysis; EPA will update using 2010 data prior to finalizing the report.

Table 2 – Social Characteristics

Location	Total Population	Population 25 & Over	High School or Higher	Associate's Degree	Bachelor's Degree or Higher	Speak a language other than English at home
<i>North Slope Borough</i>	7,385	52.58%	77.40%	3.90%	17.00%	49.90%
<i>State of Alaska</i>	626,932	60.54%	88.30%	7.20%	24.70%	14.30%
<i>United States</i>	310M	63.45%	80.40%	6.30%	24.40%	17.90%

(2000 US Census²)

A little more than half of the population in the North Slope Borough is over 25 year of age (Table 2). Within this group, 77.40% of residents report earning at least a high school diploma. This number is slightly lower than both reference populations. Limited formal education is a barrier to employment, health care and social resources, and can increase the risk of poverty, stress, and impacts from environmental stressors. Over 20% of people over 25 have earned at least an Associate’s degree. Nearly half the people who reside in the North Slope Borough speak a language other than English at home, which is significantly higher than those in the State of Alaska and the United States.

Table 3 – Economic Characteristics

Location	Total Population	Population In Labor Force	Individuals Below Poverty	Children 5-17 Below Poverty
<i>North Slope Borough</i>	7,385	72.20%	9.10%	9.00%
<i>State of Alaska</i>	626,932	71.30%	9.40%	10.30%
<i>United States</i>	310M	63.90%	12.40%	15.40%

(2000 US Census²)

Seventy-two percent of those 16 and older are reported as being in the labor force (Table 3). This indicates that there are employment opportunities for residents within the Borough. Less than 10% of all North Slope residents live below poverty levels, i.e., the total family income is less than the threshold appropriate for that family). This number is somewhat less in proportion to those in the United States. The percent of children 5-17 living below poverty in the North Slope Borough is 9%, which is also less than the percentage of children of the same age living in poverty in both the State of Alaska and the United States.

B. Health³

The 2009 Alaska Native Health Status Report, issued by the Alaska Native Tribal Health Consortium, provides an overview of health conditions in this region. Between 2004 and 2007, the leading causes of death in Alaskan Natives living on the North Slope were cancer, heart disease, suicide, unintentional injury and chronic obstructive pulmonary disease (COPD), respectively. This is fairly consistent with the death rates of Alaskan Natives across the state. Cancer is the leading cause of death for Alaska Native people, accounting for 1 out of every 5 deaths. The Alaska Native cancer death rate was 30% greater than for U.S. Whites. Heart disease is the second leading cause of death for Alaska Native people.⁴

Furthermore, over the 2 year period between 2005 and 2007, more than 30% of adults in the North Slope area were classified as obese. Additionally, from 1990 to 2007, there has been a large increase in the prevalence of diabetes for Alaskan Natives statewide. The percent of rate increase has jumped to 117% over the 17 year time frame. This increase is present in the North Slope region, with a 158% increase. Finally, there are nearly three times (58% vs. 20%) as many Alaska Native people in this area who are smokers, compared to Alaska non-Natives.

Only 30% of pregnant Alaskan Native women in the North Slope area had access to adequate prenatal care between 2006 and 2007. These numbers are lower than the state average of 46%. In the North Slope region, 6% of children were born with a low birth weight compared to a statewide average of 5%.

The percent of housing units with water and sewer service varies by major rural regional health corporation within the state, ranging from 58% to 98%. In 2008 it was reported that 94% of the Alaskan Natives in the North Slope region had access to water and sewer service. This is well above the percentages of Alaskan Natives statewide.

Table 4 – Health Overview

Health Indicators	North Slope	Alaskan Natives Statewide	Year
Obese (BMI 30+)	37%	31%	2005-2007
Diabetes: % Rate of Increase since 1990	158%	117%	2007

³Alaska Native Tribal Health Consortium: Alaska Native Epidemiology Center. Alaska Native Health Status Report 2009 http://www.anthc.org/chs/epicenter/upload/01_HSRintro.pdf

The Arctic Slope Service area as defined by Alaska Native Tribal Health Consortium covers the North Slope Borough with the exception of Point Hope, which falls under the Northwest Arctic service area. Point Hope is located the furthest distance from the activities proposed for authorization under the permits. The health statistics for the Northwest Arctic Service Area do not differ significantly in most respects from the statistics presented here for villages that are located much closer to the proposed activities. Please visit the Alaska Native Health Status Report for more details.

⁴ Id.

C. Diet and Nutrition

Changes in diet and nutrition may occur as a result of oil and gas activities where the local populations rely on subsistence resources. These changes can lead to a number of important public health outcomes. The traditional diet in Alaska is associated with reduced risk of chronic diseases such as diabetes, high blood pressure, high cholesterol, heart disease, stroke, depression and arthritis (NMFS, 2011). A vital, productive subsistence way of life is strongly correlated with measures of overall well-being and psychosocial health in Arctic communities (Poppel et al., 2007; Hicks and Bjerregaard, 2006; Shepard and Rode, 1996). Impacts to subsistence harvest, if they were severe enough, would also impact food security and nutritional status, thus increasing the risk of nutritionally-based chronic medical problems such as high blood pressure, obesity, diabetes, and cardiovascular disease. Individuals dependent on subsistence resources could experience these effects in varying degrees; however, the effects could be most prominent in Inupiaq residents of the region, in whom current data suggest that subsistence is a foundation to general well-being and physical health (MMS, 2008).

While a wide variety of species are harvested, marine mammals represent an essential part of the diet providing micronutrients, omega-3 fatty acids, and anti-inflammatory substances (MMS, 2008). In the 2010 NSB census, between 44 and 67 percent of households indicated that they consume at least half of their meals from subsistence sources, and virtually all Inupiaq households reported relying on subsistence resources to some extent. Rates of obesity, diabetes and heart disease – all outcomes associated with dietary changes towards less-healthy foods – have been rising rapidly in the North Slope area over the last several decades. This combination of a high reliance on subsistence foods and metabolic changes in the population means that changes to the availability or quality of subsistence resources could have detrimental impacts on nutritional health outcomes and food insecurity for the local population (NMFS, 2011).

In addition to simply providing a food source, subsistence activities support important cultural and social connections. Acculturation is a commonly used concept to describe the psychological and cultural impacts of rapid modernization and loss of tradition. Studies have found rapid cultural changes to be linked to a wide variety of health concerns, ranging from impaired mental health and social pathology (such as substance abuse, violence, and suicide), to cardiovascular disease and diabetes. The specific health implications of acculturation in the Inupiaq are well documented; for example, the shift away from a nutrient-rich traditional diet and towards store-bought and western foods is associated with cardiovascular risk and obesity. However, equally if not more important, is the loss of the sociocultural value of subsistence. Traditional foods are highly valued among circumpolar populations, as they are considered to be healthy and provide strength, warmth and energy in ways that store-bought foods do not (Arctic Climate Impact Assessment, 2004). Subsistence foods contribute to cultural identity, tradition, and social cohesion. The enjoyment of traditional foods is seen to be of equal cultural value to speaking the native language (Kleivan 1996, Searles 2002, NMFS, 2011).

The importance of Inupiaq participation in subsistence activities and consumption of subsistence foods extends beyond their nutritional and dietary importance. For example, the hunt and consumption of subsistence foods involve cultural, traditional, and spiritual activities that involve the entire community. Of particular importance among subsistence activities is the bowhead whale hunt. The Inupiaq have hunted the bowhead whale for over 2,000 years (Stoker and Krupnik 1993), and the whale hunt

continues as a cornerstone of diet, social organization, and cultural survival (Brower et al. 1998, Michie 1979, NMFS, 2011).

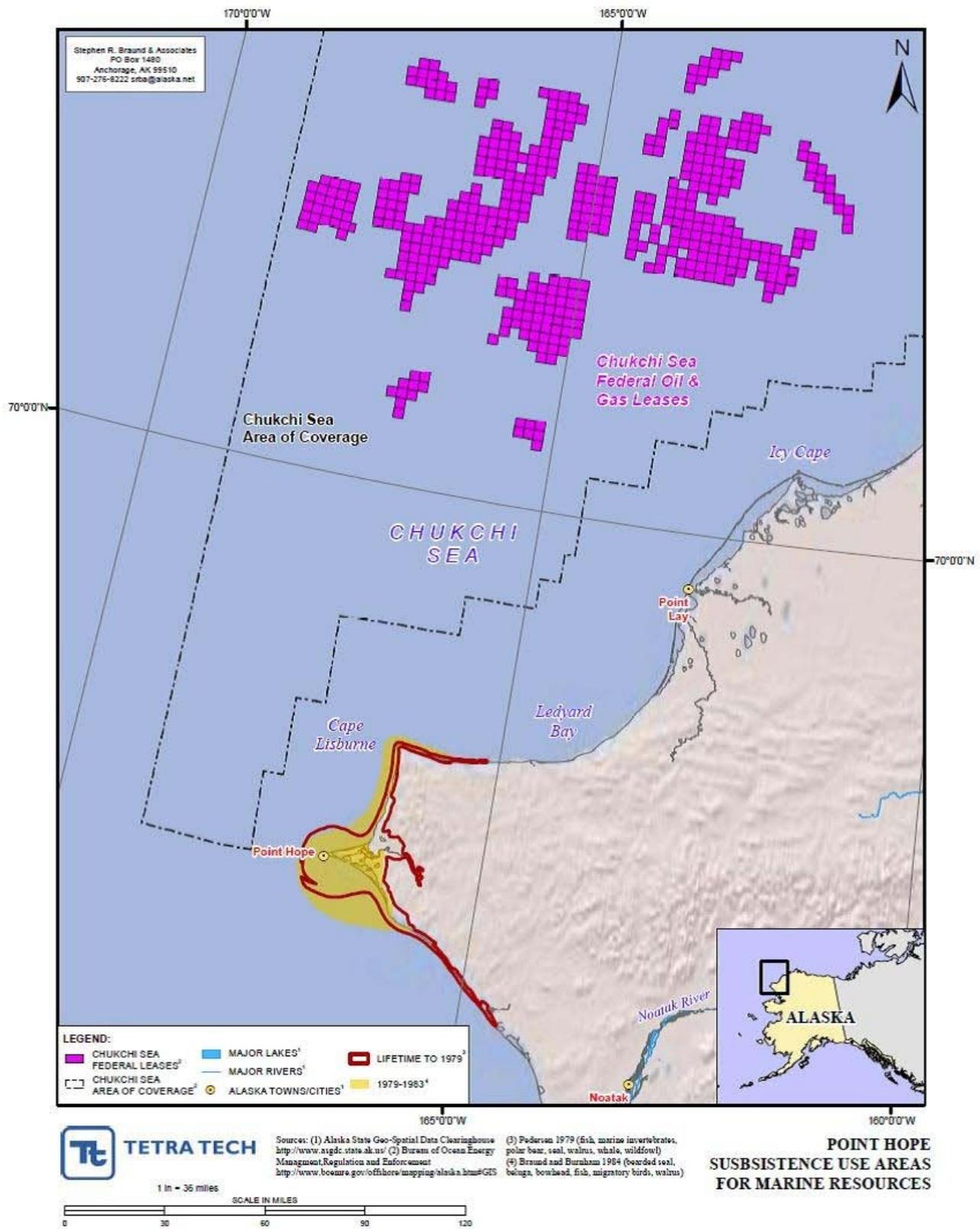
Although acculturative stress is a concern among the Inupiaq, the strength of traditional culture and local institutions, and in particular, the value and stability of the bowhead hunt, provide a strongly protective effect against the health impacts of acculturation (NMFS, 2011).

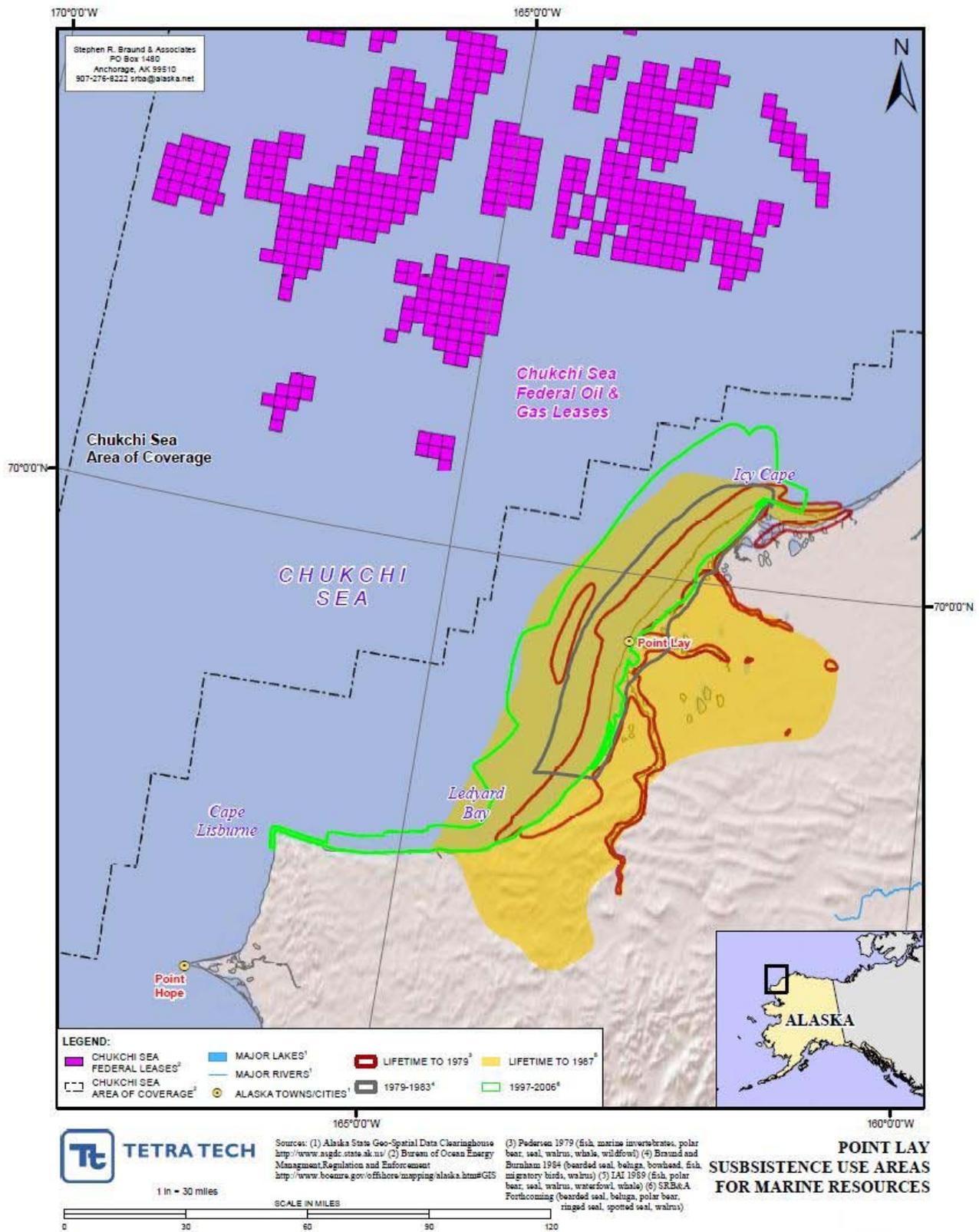
The following maps illustrate the locations of the existing oil and gas leases in the Beaufort and Chukchi Seas relative to the subsistence use areas for each of the Chukchi and Beaufort communities. The subsistence use areas for Barrow are shown from the perspective of both the Chukchi and Beaufort Seas. It is important to note that the presence of the discharges outside of the subsistence use areas does not preclude the food security concerns regarding subsistence resources.

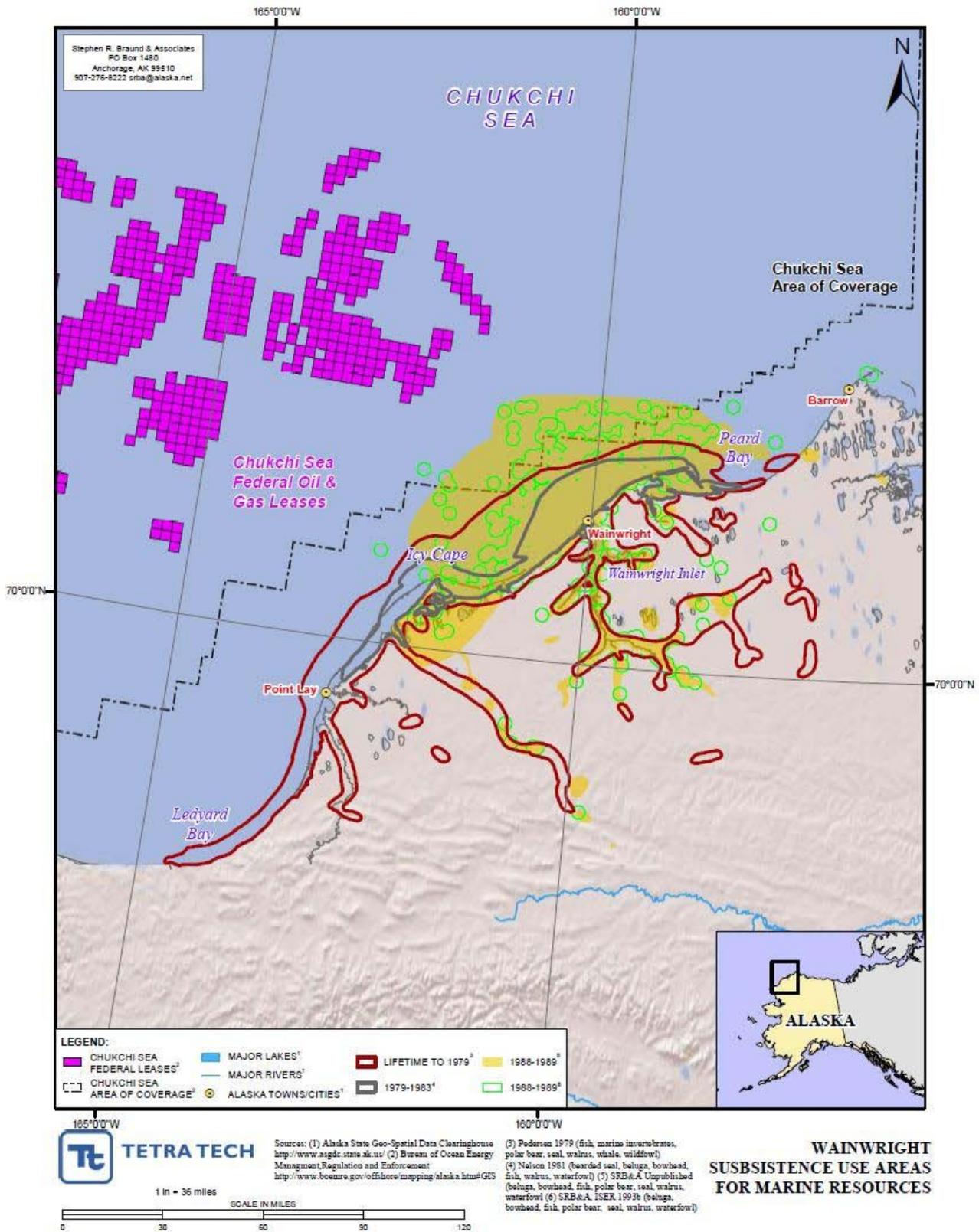
Concerns have been expressed over animals swimming through domestic or sanitary wastes, as well as the plume containing drilling fluids, cuttings, and other effluent associated with discharges from oil and gas exploration activities in the Beaufort and Chukchi Seas. In addition to the subsistence resources potentially exposed to the contaminants in the discharges, the perception of contamination alone causes stress and anxiety about the safety of subsistence foods and avoidance of subsistence food sources. Avoidance may result in changes in nutrition-related diseases (NMFS, 2011).

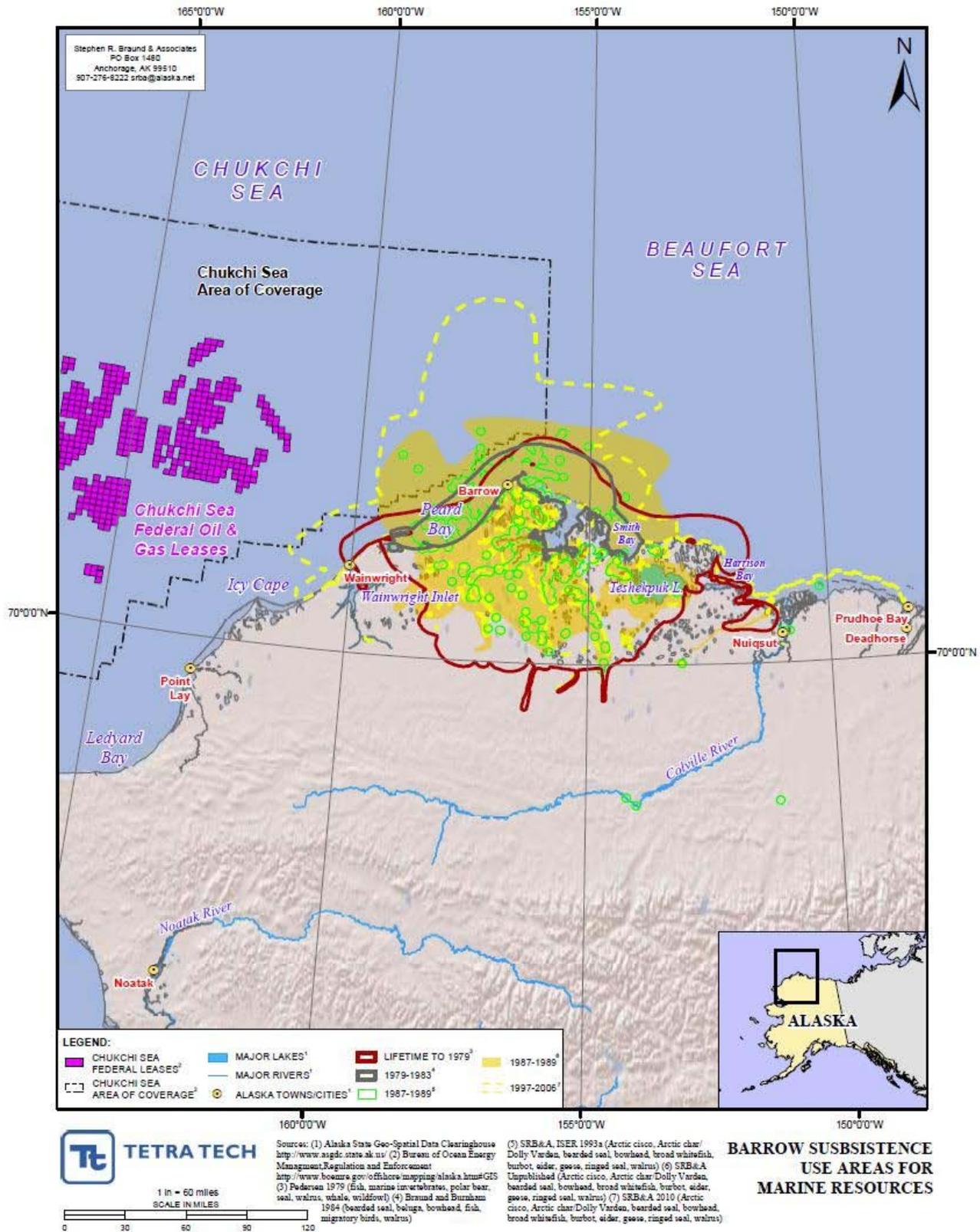
Many Inupiaq residents of the North Slope Borough have reported that they are concerned that current and/or future oil and gas activities could increase contaminant loads of subsistence resources to a level that would threaten human health (Poppel et al., 2007). Concerns include accidental oil spills, persistent leaks, and poor waste management practices. In a recent survey, 44 percent of Inupiaq village residents outside of Barrow reported concern that fish and animals may be unsafe to eat (Poppel et al., 2007). Residents have also expressed concerns regarding the contaminant thresholds established by regulatory agencies do not take into consideration the large amounts of fish or game consumed by the Inupiaq, rather, they were developed based on the consumption levels of the general population (BLM, 2005, cited in NMFS, 2011).

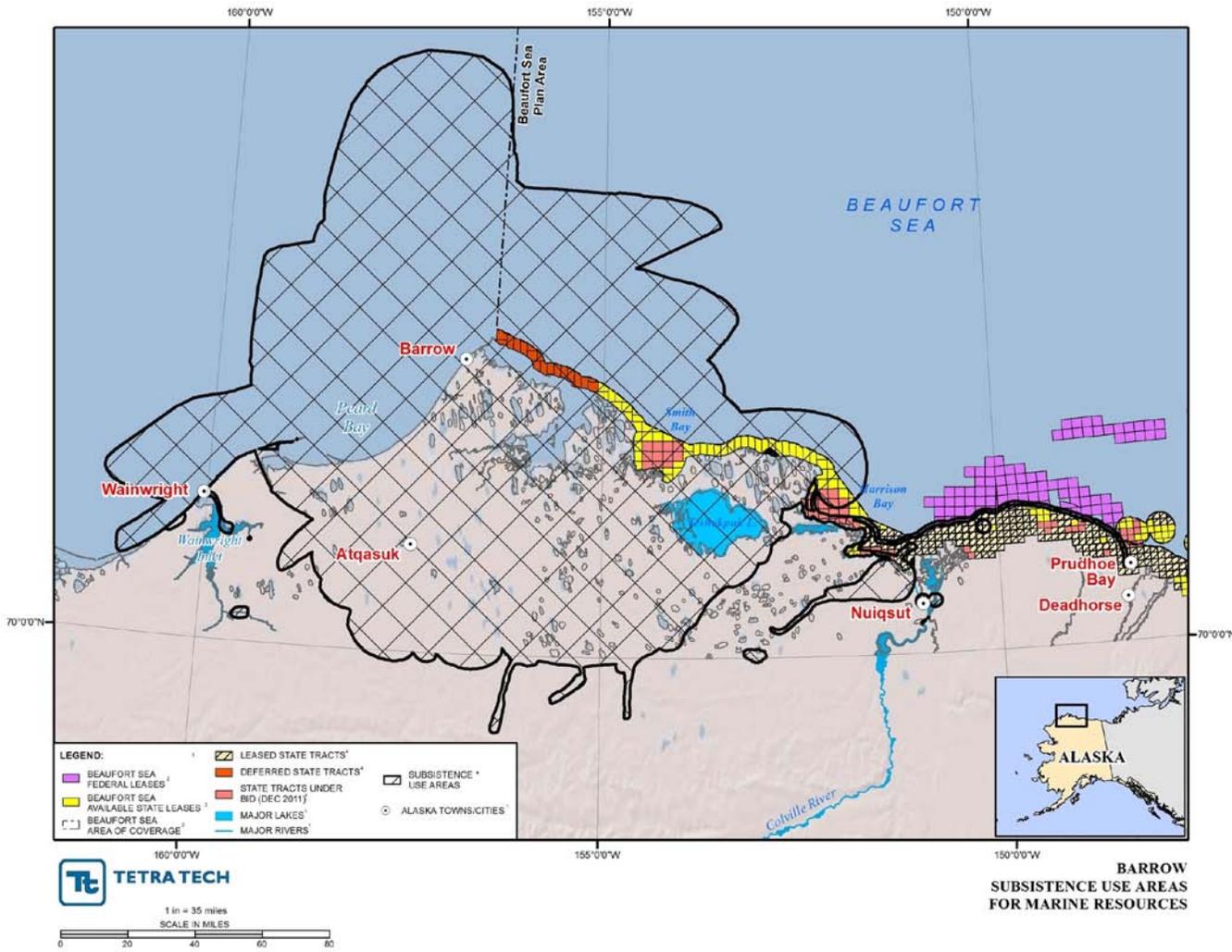
EPA acknowledges the importance of clearly articulating the potential risks associated with the discharges associated with oil and gas exploration activities, and recognizes that even the perception of contamination could produce an adverse effect by causing hunters to avoid harvesting particular species, or from particular areas. Reduction of subsistence harvest or consumption of subsistence resources due to lack of confidence in the foods quality or safety could produce an adverse effect on human health. Discharge of drilling fluids and drill cuttings could potentially cause a bioaccumulation of metals in benthic communities, and those discharges, as well as the discharges of non-contact cooling water, could potentially cause avoidance behavior in marine mammals. Since both discharges have the potential to impact subsistence resources and/or influence subsistence harvest activities, the Beaufort and Chukchi general permits include monitoring requirements and additional conditions to evaluate the potential impact of the discharges and to ensure no unreasonable degradation of the marine environment. The requirements of the permits are discussed in further detail below in Section X.

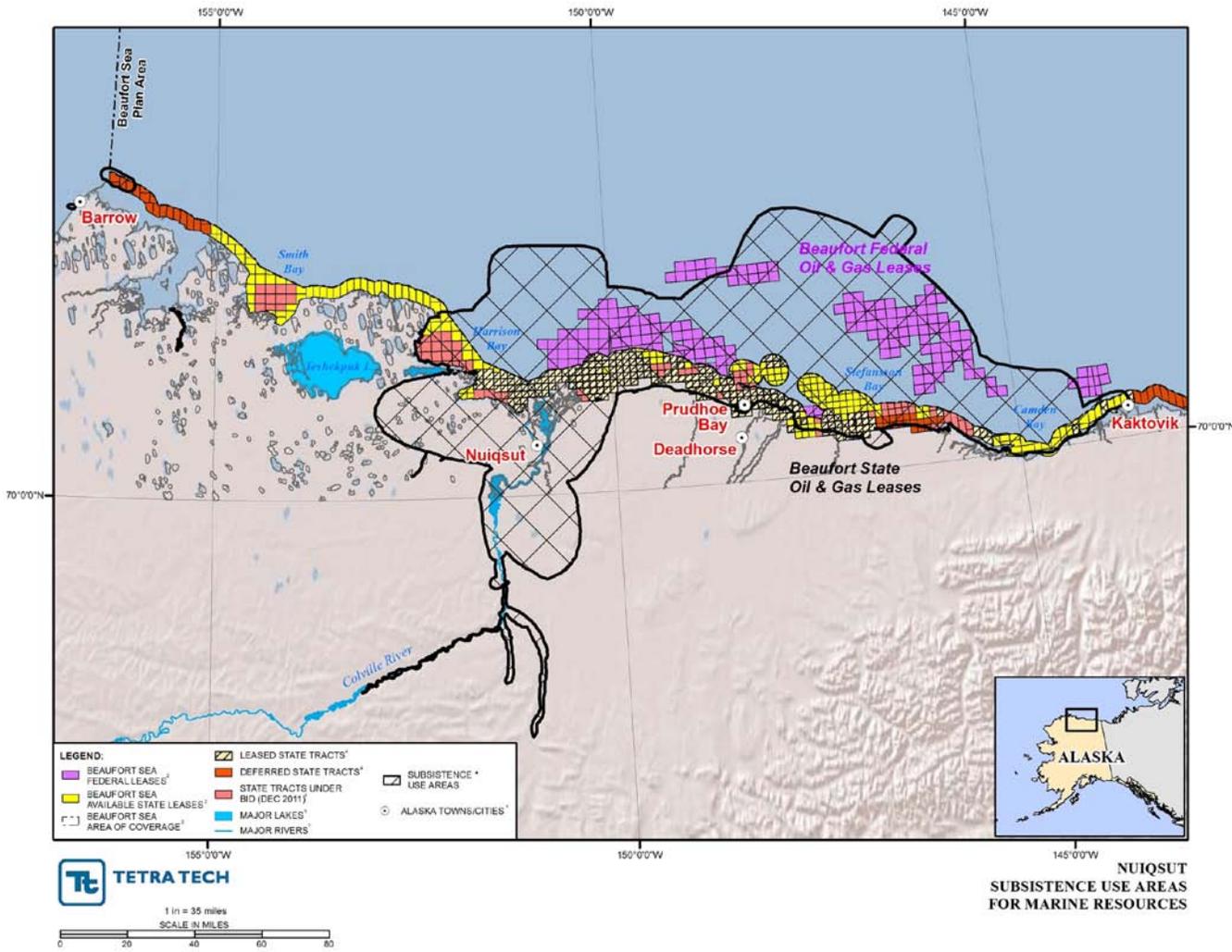


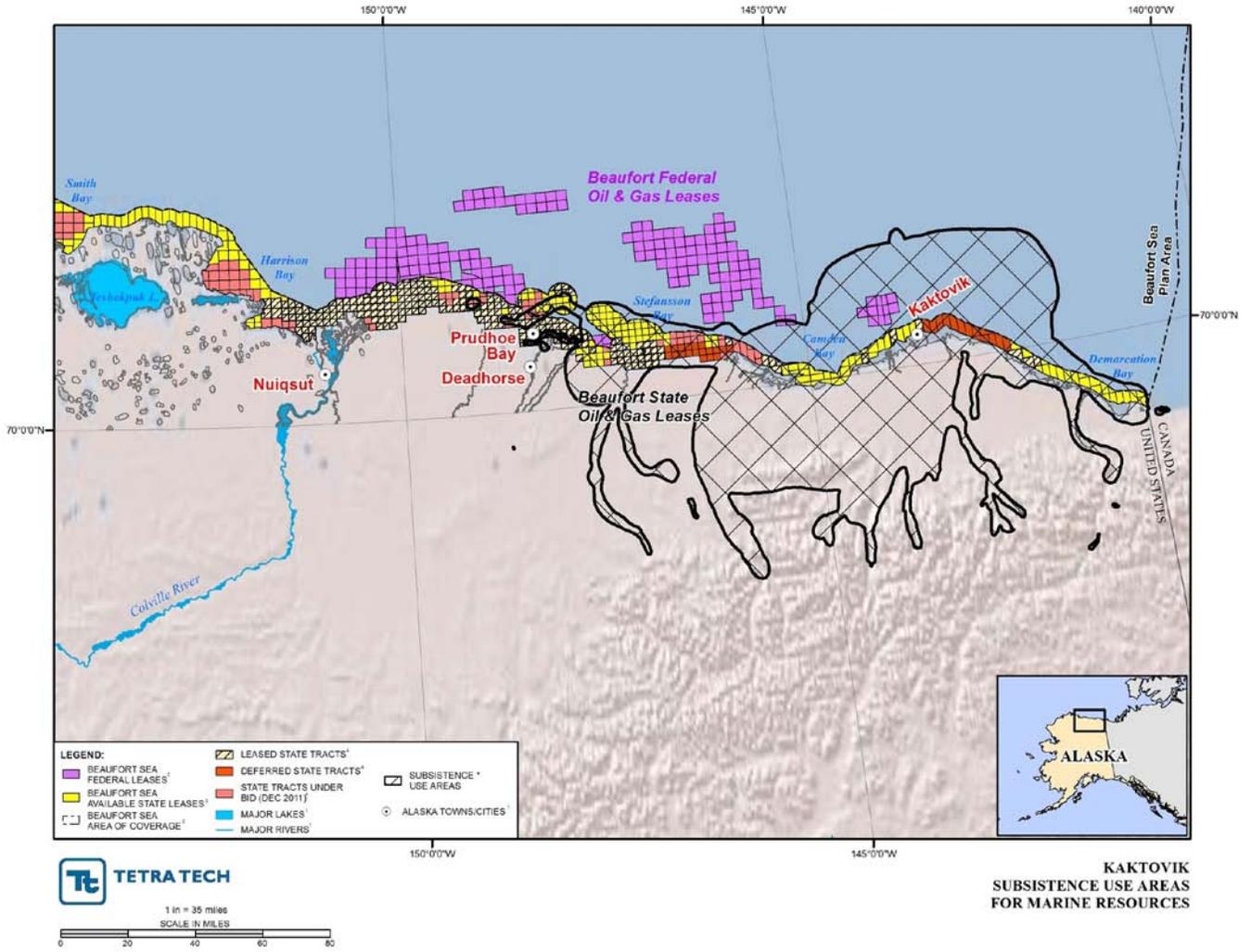




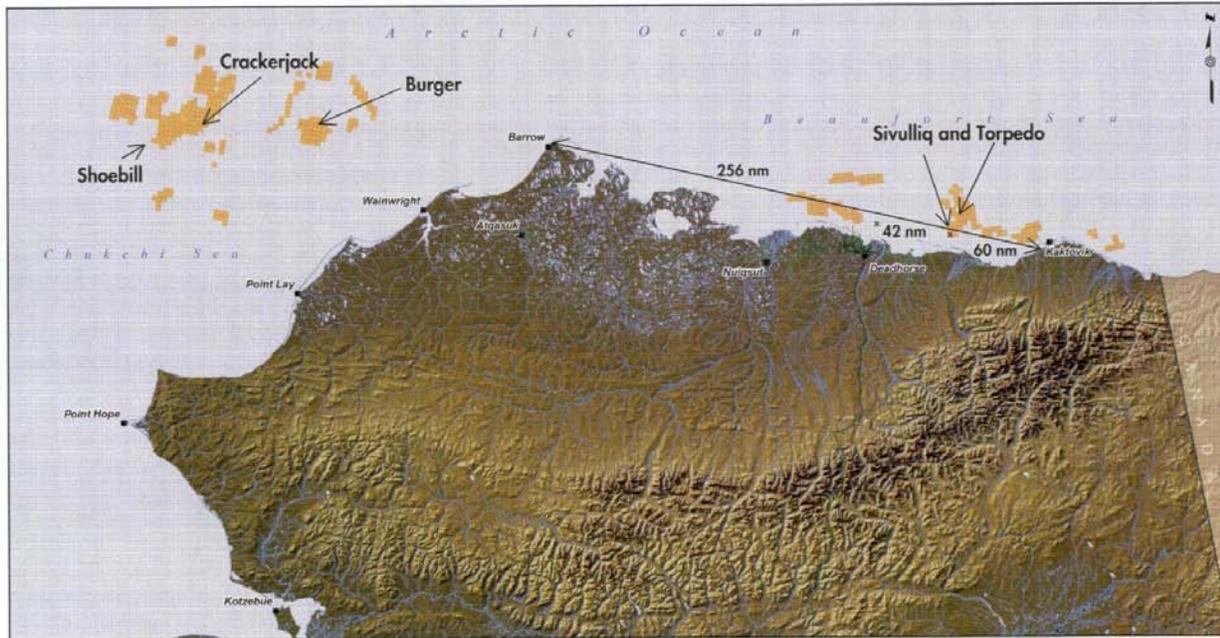








The following map depicts the approximate distances from Shell’s proposed lease locations to nearby Chukchi communities. The existing federal leases in the Chukchi Sea are approximately 70 miles or farther from the nearest coastal community.



Burger to Barrow	140 miles	Cjack to Barrow	212 miles	Sbill to Barrow	230 miles
Burger to Wainwright	78 miles	Cjack to Wainwright	145 miles	Sbill to Wainwright	162 miles
Burger to Point Lay	92 milts	Cjack to Point Lay	121 milts	Sbill to Point Lay	129 milts
Burger to Point Hope	206 miles	Cjack to Point Hope	192 miles	Sbill to Point Hope	180 miles

V. Description of Discharges and Estimated Volumes

The following thirteen (13) discharges are proposed to be authorized under the Beaufort and Chukchi general permits, subject to the permit terms and conditions.

Discharge 001 – Drilling Fluids – The circulating fluid (mud) used in the rotary drilling of wells to clean and condition the hole and to counterbalance formation pressure. The Beaufort and Chukchi general permits propose to only authorize the discharge of water-based drilling fluids.

Drill Cuttings

The particles generated by drilling into subsurface geologic formations and carried out from the wellbore with the drilling fluid. Examples of drill cuttings include small pieces of rock varying in size and texture from fine silt to gravel. Drill cuttings are generally generated from solids control equipment and settle out and accumulate in quiescent areas in the solids control equipment or other equipment processing drilling fluid (i.e., accumulated solids).

Discharge 002 – Deck Drainage

Any waste resulting from deck washings, spillage, rainwater, and runoff from gutters and drains, including drip pans and work areas within oil and gas facilities.

Discharge 003 – Sanitary Waste

Human body waste discharged from toilets and urinals located within oil and gas facilities.

Discharge 004 – Domestic Waste

Materials discharged from sinks, showers, laundries, safety showers, eye-wash stations, hand-wash stations, fish cleaning stations, and galleys located within oil and gas facilities.

Discharge 005 – Desalination Unit Waste

Wastewater associated with the process of creating freshwater from seawater.

Discharge 006 – Blowout Preventer Fluid

Fluid used to actuate hydraulic equipment on the blowout preventer.

Discharge 007 – Boiler Blowdown

Water and minerals drained from boiler drums to minimize solids build-up in the boiler.

Discharge 008 – Fire Control System Test Water

Water that is released during the training of personnel in fire protection, and the testing and maintenance of fire protection equipment.

Discharge 009 – Non-contact Cooling Water

Water that is used for non-contact, once-through cooling, including water used for equipment cooling, evaporative cooling tower makeup, and dilution of effluent heat content.

Discharge 010 – Uncontaminated Ballast Water

Harbor or seawater added or removed to maintain the proper ballast floater level and ship draft and to conduct jack-up rig related seabed support capability tests (e.g., jack-up rig preload water).

Discharge 011 – Bilge Water

Water which collects in the lower internal parts of the drilling vessel hull.

Discharge 012 – Excess Cement Slurry

Excess cement slurry will result from equipment washdown after cementing operations. Excess cement slurry is discharged intermittently while drilling, depending on drilling, casing, and testing program and problems.

Discharge 013 – Mud, Cuttings, Cement at the Seafloor

Materials discharge at the surface of the ocean floor during construction of the mudline cellar, during the early phases of drilling operations before the riser is installed, and during well abandonment and plugging.

A. Beaufort General Permit Estimated Discharge Volumes

EPA estimates that 18 to 34 exploration wells could be drilled during the five-year term of the Beaufort general permit (2012-2017). Furthermore, EPA developed estimated discharge volumes on a per well basis using information submitted in Notices of Intent (NOIs) by Shell Exploration, Inc. (Shell) for potential exploration well projects in the Beaufort Area of Coverage. The NOIs were submitted under the Arctic GP. Discharge estimates are summarized in Table 5, which includes total volumes and daily discharge rates to the extent such information could be derived from the NOIs.

Table 5 – Beaufort Estimated Discharge Quantities

	Discharge Quantities^[a] <i>(bbl/well)</i>
Water-based drilling fluids and drill cuttings (001) ^[a]	5,071 ^[b]
Deck drainage (002) ^[b]	244
Sanitary wastes (003)	1,022 ^[b]
Domestic wastes (004)	11,390 ^[b]
Desalination unit wastes (005)	5,390
Blowout preventer fluid (006)	42
Boiler blowdown (007)	0
Fire control system test water (008)	0
Non-contact cooling water (009)	2,187,000
Uncontaminated ballast Water (010)	212 ^[b]
Bilge water (011)	652 ^[b]
Excess cement slurry (012)	50
Muds, cuttings, and cement at the seafloor (013)	2,791

[a] Average estimated quantities based on Shell's NOIs for exploration activities in the Beaufort Sea.

[b] Shell's NOIs indicated zero discharge in Camden Bay at the Sivulliq and Torpedo prospects.

Based on data provided in the NOIs and a maximum estimate of 18–34 new wells, approximately 91,280 – 172,400 bbls of water-based drilling fluids and drill cuttings (Discharge 001) will be discharged within the Beaufort general permit Area of Coverage during the five-year permit term. Additionally, approximately 2,790 bbls of cuttings per well will be discharged at the seafloor from construction of the mud-line cellar (MLC) and the tophole section (26-in hole section) of the well (Discharge 013), with a total of 50,220 – 94,860 bbls estimated to be discharged over the five-year permit term.

Modeling data indicates that the muds and cuttings would settle within a radius of 3,280 ft from the discharge location. The cuttings generated from each well would deposit in a thin layer across approximately 62 acres of seafloor. The completion of a maximum of 34 wells over the duration of the 5-year permit would result in the coverage of approximately 2,100 acres of the sea floor by the solid

components compared to the size of the 33.76 million-acre total Area of Coverage. Under these assumptions, solids discharges would affect about .0032 percent of the seafloor in the Beaufort general permit Area of Coverage.

B. Chukchi General Permit Estimated Discharge Volumes

For the Chukchi general permit, EPA estimates that 24-42 exploration wells could be drilled in the five drilling seasons during the five-year permit term (2012-2017).

The estimated discharge volumes per well were developed based on NOIs submitted under the Arctic GP by Shell, ConocoPhillips Alaska, Inc. (COP) and Statoil USA E&P Inc. (Statoil) for potential exploration well projects in the Chukchi Area of Coverage. Discharge estimates are summarized in Table 6.

Table 6 – Chukchi Estimated Discharge Quantities

	Discharge Quantities <i>(bbl/well)</i>
Water-based drilling fluids and drill cuttings (001) ^[a]	7,693
Deck drainage (002) ^[b]	478
Sanitary wastes (003)	1,100 ^[c]
Domestic wastes (004)	9,343 ^[d]
Desalination unit wastes (005)	7,990 ^[e]
Blowout preventer fluid (006)	42 ^[f]
Boiler blowdown (007)	390 ^[g]
Fire control system test water (008)	110 bbl/month ^[h]
Non-contact cooling water (009)	2,700,000
Uncontaminated ballast Water (010)	168 ^[i]
Bilge water (011)	622
Excess cement slurry (012)	50 ^[j]
Muds, cuttings, and cement at the seafloor (013)	3,747

[a] Quantities include combined average drilling fluids and drill cuttings quantities from 26 NOIs received from Shell, ConocoPhillips, and Statoil.

[b] Based on Shell's and Statoil's NOIs. ConocoPhillips' NOIs provided an estimated volume of bbl/season (3,400 bbl/season), with season defined as a 100-day drilling season.

[c] Based on Shell's and Statoil's NOIs. ConocoPhillips' NOIs provided an estimated volume of 4,000 bbl/season.

[d] Based on Shell's and Statoil's NOIs. ConocoPhillips' NOIs provided an estimated volume of 11,800 bbl/season.

[e] Based on Shell's and Statoil's NOIs. ConocoPhillips' NOIs provided an estimated volume of 50,000 bbl/season.

[f] Based on Shells' NOIs. Statoil and ConocoPhillips provided a jackup rig-specific estimated volume of 5 bbl/well.

[g] Based on Statoil's NOIs. ConocoPhillips' NOIs provided an estimate of 200 bbl/season. Shell's NOIs indicated zero discharge of this wastestream.

[h] Based on Statoil and ConocoPhillips NOIs. Shell's NOIs indicated zero discharge of this wastestream.

[i] Based on Shell's NOIs, which include volumes associated with drilling vessels. Statoil and ConocoPhillips' NOIs include volumes of 115,000 bbl/well and 33,400 bbl/well, respectively, which are specific to jackup rigs.

[j] Based on Shell's NOIs. ConocoPhillips and Statoil's NOIs include volumes of 800 bbl/well and 1,000 bbl/well, respectively.

To date, there have only been five exploratory wells drilled in the Chukchi Sea, and discharge data are not available from those historical wells. Based on the NOIs submitted by Shell, ConocoPhillips, and Statoil, the estimated average discharge volume of water-based drilling muds and drill cuttings is approximately 7,693 bbls per well.

Based on an estimated maximum of 24–42 new wells that could be drilled in the Chukchi Sea, approximately 184,632 – 323,106 bbls of water-based drilling fluids and drill cuttings will be discharged within the Chukchi general permit Area of Coverage during the five-year permit term. Additionally, 3,747 bbls of cuttings per well will be discharged at the seafloor from MLC and construction of the tophole section of the well, with a total of 89,928 – 157,374 bbls estimated to be discharged over the five-year permit term.

Again, based on modeling data, it is assumed that the cuttings would settle within a radius of 3,280 ft from the discharge location. As such, the cuttings generated from each well would affect approximately 62 acres). The completion of a maximum of 42 wells over the duration of the 5-year permit would result in the coverage of approximately 2,604 acres of the sea floor by the solid components compared to the size of the 33.76 million-acre total Area of Coverage. Under these assumptions, solids discharges would affect less than 0.01 percent of the seafloor in the Chukchi general permit Area of Coverage.

VI. Summary EPA's Tribal and Public Involvement Activities

In May 2009, EPA issued the North Slope Communications Protocol establishing communications guidelines to support meaningful involvement of North Slope communities in EPA decision-making. The goal of the protocol is to improve the agency's effectiveness in working with North Slope communities.

EPA is implementing the protocol during development of the Beaufort and Chukchi general permits by undertaking a robust tribal and public involvement process. Prior to each of the meetings and/or outreach activities, EPA sent numerous letters, and email reminders to the community contacts. EPA's tribal and public involvement activities include the following and are summarized, by date, in Table 7.

- Early information meetings with Northwest Arctic and North Slope coastal communities (Translation services were provided by EPA in Nuiqsut)
- Quarterly presentations at the Alaska Eskimo Whaling Commission (AEWC) meetings
- Regular coordination with the North Slope Borough (NSB)
- Project updates through email, fax and mailing (Village Corporations, City Councils, Alaska Native Corporations, Tribal Governments, AEWC, Environmental Organizations, NSB, NWAB, and other interested parties)
- Technical Workshops – Early Air/Water outreach, ODCE workshops
- Government-to-government consultation meetings

- Public meetings and hearings
- Traditional Knowledge (TK) workshops in Barrow, Point Lay, Nuiqsut, and Kaktovik. Communities were given multiple opportunities to participate. Point Hope declined involvement and Wainwright did not respond to multiple requests.

Table 7 – Summary of Tribal and Public Outreach Activities

Type of Outreach Activity	Date(s)	Description
Early NPDES Program Information Sessions	May 28-29, 2009	Kotzebue and Barrow (participants from other North Slope and Northwest Arctic Borough communities also attended)
Project Presentation	March 1, 2010	Barrow – North Slope Borough Assembly
Information Availability	September 2009 and February 2010	Water program information availability sessions along with Air permit hearings and public meetings in Point Hope, Wainwright, and Barrow
Project Information Meetings	March 29, 2010	Kotzebue – Kotzebue IRA
		Kotzebue – Northwest Arctic Borough community
		Point Hope – Point Hope community
	March 31, 2010	Barrow – Native Village of Barrow
		Barrow – North Slope Borough staff
		Barrow – Barrow community
	April 1, 2010	Barrow – AEWB
		Wainwright – Wainwright community
	April 6, 2010	Nuiqsut – Nuiqsut Tribal Council
		Nuiqsut – Nuiqsut community
April 7, 2010	Kaktovik – Kaktovik community	
April 8, 2010	Barrow – Inupiat Community of the Arctic Slope	
April 9, 2010	Point Lay – Point Lay community	
Project Information Conference Calls	May 25, 2010	City of Gamble
	June 17, 2010	Sivuqaq, Inc.
Project Presentations at AEWB Quarterly Meetings	July 22 – 23, 2010 October 19 – 20, 2010 December 8 – 19, 2010 December 13, 2011	AEWB commissioners
Ongoing Coordination with NSB Staff and Consultants	February 17, 2010 March 31, 2010 May 6, 2010 August 31, 2010 October 20, 2010 October 28, 2010 January 7, 2011	Face-to-face meetings and/or teleconferences with: <ul style="list-style-type: none"> • NSB Law Department • NSB Planning Department • NSB environmental consultants
Project Information Updates	September 2009 March 2010 September 2010 Summer 2011	Transmitted via email to project mailing list and posted on EPA website
Traditional Knowledge Interview Workshops (Stephen R. Braund & Assoc.)	September 2010	Point Lay (2 trips; 6 workshops; 8 participants)
	October 2010	Kaktovik (2 trips; 5 workshops; 11 participants)
		Nuiqsut (1 trip; 3 workshops; 32 participants)
	December 2010	Barrow (1 trip; 6 workshops; 22 participants)

ODCE Technical Workshops	June 15, 2011 June 16-17 2011	Anchorage (Environmental Non-Profit Groups) Barrow (NSB, AEWC, ICAS, NVB, NS Communities)
Public Meetings & Hearings	March 12-16, 2012	<u>Public meetings</u> : Kotzebue, Point Hope, Barrow, Nuiqsut, Anchorage <u>Public hearings</u> : Barrow, Anchorage

VII. Summary of Input/Concerns Heard from Communities

The Traditional Knowledge data collection (SBR&A, 2011) effort for the Beaufort and Chukchi general permits included data that correlated with the concerns that were outlined in the EcoHealth Journal Contribution titled, “Inupiat Health and Proposed Alaskan Oil Development: Results of the First Integrated Health Impact Assessment/Environmental Impact Statement for Proposed Oil Development on Alaska’s North Slope” (Aaron Wernham, October 2007). These concerns include:

Subsistence – Food Insecurity/Hunger:

- Displacement of hunters away from productive areas
- Displacement/dispersion of animals
- Reduced populations of subsistence species
- Concern regarding bioaccumulation in subsistence species

Sociocultural

- Loss/degradation of traditional subsistence use areas
- Fear of contaminants
- Fear that development may ultimately engulf the subsistence way of life, with profound implications for health and well-being
- Subsistence impacts lead to breakdown of kinship/community sharing networks
- Subsistence impacts lead to difficulty in transmitting cultural axioms to youth
- Increasing economic disparities within villages

The observations, concerns, and recommendations gathered during the TK workshops for the Beaufort and Chukchi general permits are summarized below.

A. Knowledge, observations and concerns related to the displacement and availability of whales and other marine mammals:

- Marine species might avoid areas in the vicinity of the discharges which could lead to the deflection of marine mammals and other marine resources resulting in a loss of subsistence resources available. The majority of the concerns focused on the potential effects of drilling fluids and drill cuttings on displacing marine resources.
- The hunting season is shorter than it used to be and residents have fewer opportunities to harvest what they need. Additionally, the period of time to spend with young men has been shortened because of the change in ice conditions.
- Even though some areas might be protected (e.g., by particular discharge limits or deferral areas) the marine mammals travel through both the Beaufort and Chukchi

Seas, and should be protected with a standardization of discharge practices across all areas.

- The Sivulliq prospect is located within prime bowhead habitat.
- Unpredictability of currents and their ability to transport chemicals long distances, which could lead to the deflection of marine mammals, particularly the bowhead whale.
- Discharges' disproportionate effect on seals because of their year-round presence.
- Offshore activities cause subsistence resources to move away from the community, resulting in increased risk to hunter safety.

B. Knowledge, observations and concerns related to the effects of contaminants on dietary patterns:

- Toxicity of the discharges, including impacts to newborn animals that might be especially vulnerable and human and wildlife effects from barium and barite in drilling muds.
- Food chain impacts and potential volatile reactions when high temperature drilling mud comes into contact with cold water. Food chain effects of drilling fluids and muds through krill and other small species. Concerns about effects on plankton which could affect larger organisms in the ocean.
- Drilling muds left at shore-based sites inhibiting vegetation growth.
- Boiler blowdown discharges could increase the pH and temperature of the receiving water.
- Effects of chlorine and caustic soda use, resulting in oxygen depletion.
- Observation regarding sick marine wildlife, which is believed to be attributed to oil and gas discharges.
- Potential impacts to sensitive species such as clams, which are important for food resource for walrus.
- Bilge water discharges may introduce invasive species, which will affect resident marine life, such as local krill that are said to have 5 times higher fat content than other parts of Alaska.

C. Knowledge, observations and concerns related to perceived contamination:

- Increased health issues and that contamination already exist in the food chain.
- Contamination of subsistence resources could result from the wastewater discharges. This might cause hunters to change their subsistence use practices; for example, hunting less marine mammals.
- Marine resources will travel through a discharge plume and the health effects from consuming such a marine mammal after it has spent time in the discharge area.
- Contamination in Burbot in the Colville River Delta near Nuiqsut.⁵

⁵ Agency for Toxic Substances and Disease Registry Health Consultation: Review of Burbot Samples determined that the Burbot are safe to eat, for additional information see http://www.atsdr.cdc.gov/HAC/pha/USARmyUSACEUmiatAFS111303-AK/USArmyUSACEUmiat_HC111303.pdf

- D. Knowledge, observations and concerns related to tainted subsistence foods:
- Fish taste changes associated with oil and gas activities.
 - Changes in ability to gather seaweed with fish eggs at Cross Island, which are attributed to the extreme water activity in the area of Prudhoe Bay.
 - Tainted subsistence resources that might travel through a discharge plume.
- E. EPA's ability to enforce the general permits, monitor compliance, and how the communities should be engaged in that process:
- Enforcement and compliance of the permits, including EPA oversight and expressed interest of local involvement in the monitoring of the permitting activities.
 - Use local monitors. Three types of monitoring are needed: (1) local and outside observers; (2) inspections; and (3) testing of all discharges, including random sampling.
 - Share results with communities.
- F. Many concerns are expressed regarding how local communities are being represented in the permitting process. The communities perceive a lack of information about the discharges. Finally, the communities feel they are not being listened to regarding their requests for zero discharge. Recommendations include:
- EPA should communicate every year, be transparent, share information and work with the communities.
 - Respect traditional knowledge.
 - EPA should give more information about these general permits and more time for community to formulate comments and feedback.
 - EPA should travel to the villages to describe the nature of the discharges. Need for educational funds to inform local residents of what is being discharged and how to contain oil spill.
 - Encourage companies to work together to share infrastructure resources (pipelines, ice roads, etc.).
- G. Recommendations for discharge requirements included:
- Restrict discharges in bowhead feeding areas and subsistence use areas.
 - Apply zero-discharge policy. Traditional practice of the Inupiaq is to not discharge anything that is man-made into the ocean. Respondents indicated that technology is available for alternative discharge practices such as injection of discharges into Underground Injection Control wells.
 - Restrict discharges further from shore, up to 25 miles out, although some requested doubling that distance.
 - Restrict discharges to areas the deep ocean (greater than 450 feet) and impose a 20 mile buffer zone from shore (beyond furthest currents that come into Barrow).
 - Protect critical habitat areas. Avoid discharges 10-15 miles from shore to avoid feeding areas. Marine mammals, such as seals and walruses, use near-shore as feeding grounds, where there are abundant clam beds. Areas where clams

identified should be restricted because of their sensitivity to foreign toxins. Peard Bay and right along Barrow include buffer zone because of currents.

- Icy Cape and Omalik Lagoon should be off limits to discharges.
- Two shoals (Harold and Hannah) located substantial distance from Point Lay should be restricted.
- Open ice conditions – walrus are traveling and feeding when they are moving on the ice. Concerns about walrus and beluga feeding (mid-June to mid-July). Do not allow discharges during open water seasons and along migration routes.
- Consider restricting discharges during subsistence harvesting seasons and in subsistence use areas and around the hunting grounds.
- Seals don't like to swim in muddy water; the distance hunters travel in search of seals depends on turbidity of water offshore from the lagoon. Drilling mud discharges when sea ice is present cause mud to collect on icebergs, infecting the marine environment, and diverting seals from the area.
- There was a mass algae bloom several years ago with brown substance which many residents believed to be associated with oil and gas activities.
- Prohibit discharges during the molting season to protect migratory species.
- Require wastewater treatment on board.
- Analyze what is in mud before discharging. More pre-discharge experiments of discharge pollutants with seawater and dissemination of data to community.
- Ensure bilge water is contaminant free prior to discharge.
- EPA should consider effects of wind and currents on discharges and the timing of discharge in relation to wind patterns and size of of currents. Concerns were also expressed about discharges coming close to shore, the weight of muds, and how far they can be carried.
- Non-biodegradable products, such as plastics, should not be discharged.

H. There were many concerns expressed through the TK process, particularly concerns regarding cumulative impacts, that are not related to wastewater discharges proposed to be authorized by the Beaufort and Chukchi general permits. These concerns are outside the scope of EPA's Clean Water Act authority and are not discussed further in this analysis. These concerns include:

- the effects of noise from increased barge and other vessels traffic, helicopters, seismic activities, ice breakers and ice management activities;
- solid wastes disposed by the barges and other vessels in the area;
- oil spill response capabilities and planning;
- infrastructure that will be developed in the event that the exploration activities result in long-term oil production;
- multiple stressors from other industrial activities, particularly on Nuiqsut;
- changes to the environment and how additional impacts may cause important habitat areas to be lost;
- climate change and effects on subsistence;
- significant decreases in sea ice began 10 years ago and persists today;
- any additional impact from discharges would cause further damage to marine resources;

- lack of sea ice has made subsistence activities more expensive and dangerous; and
- the difference in restricted areas between the Chukchi and the Beaufort Sea lease sales, including a request for a deferral line in the Beaufort Sea similar to the one that is in place for the Chukchi Sea.

VIII. Summary of Potential Impacts of EPA's NPDES Permitting Actions

A. Persistence and Bioaccumulation

Preparing the MLC, which do not require the use of drilling fluids, accounts for approximately one-half of cuttings discharged. Consequently, only half of the drill cuttings volume would be created using drilling fluids. Modeling and studies show that the deposition of drill cuttings is generally limited to the immediate discharge area (within 100 m [328 ft] of the outfall). The solids within the drilling fluids are predicted to accumulate to a thickness of approximately 0.4 - 1.2 mm in the core area of the deposition zone. Because the solid components of drilling fluids generally have smaller particle sizes, they are predicted to deposit at a greater distance from the outfall (up to 1,250 m [4,100 ft]) compared to the cuttings.

Components of concern in drilling fluids include trace metals and specialty additives used within the drilling fluid systems. Metal concentrations in the water column and sediment at were measured in recent studies at ten locations near two exploratory wells that were drilled in 1985 and 1986 (Hammerhead) in the Beaufort Sea, and at 19 background stations. Surface and subsurface sediment concentrations of aluminum, iron, cadmium, mercury, vanadium and zinc were at background values at all ten locations, while concentrations of silver, chromium, copper, lead, and selenium were above background concentrations at one Hammerhead station. However, sediment concentrations for cadmium, mercury, zinc and silver were all below sediment quality criteria.

In the Chukchi Sea, a study of the Burger and Klondike lease blocks included future drill locations as well as two former exploratory drill sites. The study found that all sediment concentrations of silver, aluminum, cadmium, chromium, iron, manganese, and zinc were at background values; however, concentrations of barium were elevated at three sampling sites located at the historic drill sites at stations approximately 0.2 nautical mi from the original discharge location (Battelle Memorial Institute et al., 2010). The study noted slight elevations in concentrations of lead at two sites, and elevated concentrations of copper and mercury at one site located at historic drill sites, which is consistent with the presence of residual barite. Metal concentrations at all sites were below sediment quality criteria.

Heavy metals, such as mercury, cadmium, arsenic, chromium, and lead may bioaccumulate depending on their chemical speciation. Existing data are not adequate to quantify the potential bioaccumulation from exposure to exploratory oil drilling operations. Available data suggest, however, that because the bioavailability of trace metals from barite is quite low, the bioaccumulation risks are also expected to be low

Discharges other than drilling fluids and cuttings (i.e., sanitary and domestic wastes, deck drainage, blowout preventer fluid, desalination unit waste, fire control system test water, non-contact cooling water, ballast water, bilge water, boiler blowdown, excess cement slurry, and drilling fluid, cuttings, and cement at seafloor) are not expected to carry pollutants that bioaccumulate or persist in the marine environment.

B. Water Column Effects

The solid component of drilling fluids, as well as cuttings would increase turbidity within the immediate vicinity of the discharge across the entire water depth (from the outfall to the seafloor). As discussed above, most cuttings would settle within approximately 100 m (328 ft). Solids associated with the drilling fluids would settle a greater distance from the outfall; depending on current speed, the thickest deposition of drilling fluids (0.4 mm [0.16 in]) may settle as far as 1,400 m (4,600 ft) from the discharge point. Increased water column turbidity due to discharge of drilling fluids and cutting could affect the amount of sunlight available for photosynthetic activity by phytoplankton. While the photosynthetic capacity of these organisms may be reduced when passing through a discharge plume, the areal extent of the plume is limited. Likewise, time spent within the plume is brief (approximately 34 minutes based on a current speed of 0.16 ft/sec). Exposure to suspended sediments by salmonids has the potential to cause short and long-term irritation to fish gills, but fish may avoid the plume altogether (Bash et al., 2001).

The limited size of the plume, based on a maximum discharge volumes from estimated exploration wells, in comparison to the general permits' areas of coverage, would result in very limited, short-term exposure. The effects of solids from the discharges within the water column are estimated to be approximately .0032 and less than 0.01 percent, in relation to the Beaufort and Chukchi areas of coverage, respectively.

C. Benthic Habitat Effects

Lethal and sub-lethal adverse effects on benthic organisms would generally result from burial under the rapidly accumulating sediments. Studies have been conducted to compare natural sediment deposition to drill cuttings at similar levels and found reductions in the number of species, species abundance, biomass, and diversity with increasing thickness of the cuttings. While the specific cause for these changes was not identified, one potential cause could be due to increase in oxygen demand resulting from an organic component (particularly glycol) in drilling fluids, or less likely, the effect of chemical toxicity or exposure to trace metals.

Specifically, the researchers investigated the benthic environment near the Sivulliq prospect in the Beaufort Sea, an area that experienced exploratory drilling in 1985. Their study found that after 20 years, the benthic communities and sediment characteristics in the area affected by drill cuttings generally resembled the surrounding area in terms of biological and chemical characteristics, although some study plots did display elevated concentrations of certain metals. Another study on the recovery of benthic organisms following exploration drilling found recovery likely to within 4 to 24 months after the termination of discharges (Currie and Isaacs, 2004). The available literature indicates that effects are likely to occur within a limited area; and that the extent and duration of effects would be limited.

Demersal- and bottom-feeding sea ducks and guillemots occur in dispersed flocks within the region and may feed within the Beaufort and Chukchi general permits' areas of coverage. The areas affected by the discharges are within the depths reached in the normal process of feeding by these species. Based on the limited size of the affected areas compared to the entire permits' areas of coverage, relatively few birds are expected to feed on or rely specifically on prey potentially affected or buried by drilling discharges.

Walrus and gray whale are seasonal feeders within the areas of coverage. Both of these species forage in the benthic environment with walrus creating troughs and gray whales creating pits in the seafloor

(Nelson et al., 1994). Combined, these species are responsible for large-scale disturbances of the seafloor and will eventually feed through or within the sediments created by the authorized discharges. The consumption of contaminated prey within these sediments could result in the ingestion of metals (i.e., cadmium or chromium) by individual animals with bioaccumulated metals in their prey or present in the sediments themselves. Based on past data, feeding in these areas is unlikely to result in any adverse effects to these species, even at the individual animal level. However, additional monitoring on site-specific exploratory drilling operations are needed to substantiate the past data.

D. Human Health Effects

Exposure to contaminants through consumption of subsistence foods and through other environmental pathways is a well-documented concern. Concern has also been expressed over animals swimming through domestic or sanitary wastes as well as discharge plumes containing drilling fluids, cuttings, and other effluent (SRB&A, 2011). Concerns have also been voiced about krill and other small species taking up drilling fluids and then passing contaminants up the food chain (SRB&A, 2011).

Domestic and sanitary discharges account for a very small proportion of the overall discharge volume and are treated using marine sanitation devices (Section VI summarizes the discharges). These discharges would essentially be undetectable beyond 100 meters (e.g. state-authorized mixing zone). Species of interest from a subsistence standpoint are expected to spend minimal amounts of time, if any, within the areas of discharge mixing because of its relatively small size and the proximity of the outfall to the drilling operations. Based on details presented in the preceding discussions on the effects of drilling fluids and cuttings, including those on bioaccumulation, persistence, and effects on biological resources, the discharges under the Beaufort and Chukchi general permits are unlikely to create pathways that could result in direct or indirect impacts. However, additional monitoring on site-specific exploratory drilling operations is needed to substantiate past data regarding potential bioaccumulation effects in benthic communities. The general permits require environmental monitoring at each drill site to add to existing data sets.

Community members from four North Slope villages provided traditional knowledge observations and comments about nearshore physical and biological habitats, marine resources, and subsistence use areas. Community members also shared their concerns about the potential effects of oil and gas related discharges to subsistence areas. These concerns are summarized above and fall into several broad categories: (1) effects of discharges on the health and availability of marine resources (e.g., marine mammals); (2) ramifications of multiple stressors, including discharges, on the sustainability of the subsistence areas and potential effects within the food chain; (3) whether the EPA would adopt a zero-discharge policy regarding potentially harmful discharges; and (4) how the EPA would monitor potential marine impacts resulting from exploration facilities operating under the general permits. A number of participants called for the permits to require zero discharge of effluent while others suggested that the permits prohibit discharges within 25 miles of the shoreline to adequately protect subsistence these resources (SRB&A, 2011). EPA is adding several permit provisions to address community concerns and input.

EPA acknowledges, as noted previously, the importance of clearly articulating the risk related to these discharges as even the perception of contamination could produce an adverse effect by causing hunters to avoid harvesting particular species or from particular areas. Local concerns about drilling activities might result in reduced consumption of subsistence resources. Reduction in the harvest or consumption

of subsistence resources could produce an adverse effect on human health. However, considering the nature of the discharges, the effluent limitations, treatment requirements, and the environmental monitoring programs required at each drilling site, the discharges authorized under the Beaufort and Chukchi general permits are not anticipated to pose a threat to human health.

IX. Determination of Potential Disproportionate or Adverse Effects

Discharges under the proposed Beaufort and Chukchi general permits are not expected to have a disproportionately high and adverse human health or environmental effect on minority or low-income populations living on the North Slope, including coastal communities near the proposed exploratory operations. In making this determination, EPA considered the potential effects of the discharges on the communities, including subsistence areas, and the marine environment. The draft Ocean Discharge Criteria Evaluations (ODCEs) for the proposed Beaufort and Chukchi general permits offer additional detail on EPA's analyses of impacts to the marine environment.

The proposed Beaufort and Chukchi general permits implement existing water pollution prevention and control requirements, including applicable water quality standards, to ensure compliance with applicable CWA requirements, including the prevention of unreasonable degradation to the marine environment. The draft Beaufort and Chukchi ODCEs evaluate the potential for significant adverse changes in ecosystem diversity, productivity and stability of the biological communities within the general permits' areas of coverage and surrounding biological communities. The ODCEs evaluate environmentally significant or sensitive areas that are necessary for critical stages of marine organisms, the roles of these areas in the larger biological community and the vulnerability of these areas to potential discharges. And the ODCEs evaluate the potential for loss of esthetic, recreational, scientific and economic value that might be unreasonable in relation to the benefits derived from the discharges.

The ODCEs also evaluate the threat to human health through the direct physical exposure to discharged pollutants and indirect threats through consumption of aquatic organisms exposed to pollutants discharged under the proposed permits. Human health is directly related to the subsistence practices of native people living in the North Slope. Subsistence areas and related subsistence activities provide food and support cultural and social connections within North Slope communities. EPA solicited and considered the information obtained from residents and participants in the traditional knowledge workshops related to these important factors. These factors were a part of the overall evaluation framework of the entire ODCEs and permits development processes.

The proposed Beaufort and Chukchi general permits reflect EPA's evaluation of threats to subsistence peoples on the North Slope. Several precautionary measures were included in the permits to ensure no unreasonable degradation occurs during exploratory drilling activities. The proposed Beaufort and Chukchi general permits also impose a robust environmental monitoring program to gather relevant information about potential effects of the discharges to Alaska's Arctic waters. Additionally, EPA has the authority to make modifications or revoke permit coverage if it identifies a basis to conclude that discharges will cause an unreasonable degradation to the marine environment. EPA considered various issues and concerns related to environmental justice and the potential for disproportionate effects on communities and residents engaged in subsistence activities. EPA has determined that the discharges authorized by the proposed general permits will not cause unreasonable degradation of the marine environment. Therefore, EPA concludes that there will be no disproportionately high and adverse human health or environmental effects on minority or low-income populations residing on the North Slope.

X. Permit Requirements and Conditions

EPA evaluated and incorporated the communities' concerns, observations and TK information in the development of the ODCEs and general permits. Appendix A of EPA's technical Fact Sheet summarizes the changes EPA is proposing to make to the draft Beaufort and Chukchi general permits, compared to the Arctic GP. The following are examples of the general permits' terms and conditions that address the issues and concerns resulting, in part, from the EPA's community outreach efforts:

- Eliminate the authorization to discharge non-aqueous drilling fluids and associated drill cuttings (i.e., only water-based drilling fluids and cuttings are authorized);
- Prohibit the discharges of water-based drilling fluids and drill cuttings under the Beaufort general permit during active bowhead hunting activities in the Beaufort Sea, unless authorized in writing by EPA. If the permittee proposes to discharge this waste stream during this period, it must demonstrate (1) storage capacity is not available on the drilling facility during this period, and (2) land-based disposal options are not feasible;
- Require an alternatives analysis before authorization is granted for discharge of water-based drilling fluids and drill cuttings, sanitary, and domestic wastes to stable ice in the Beaufort Sea area of coverage;
- Require an inventory of chemicals added to each wastestream, where in the drilling process they are used, and establish limits on chemical additive concentrations;
- Require Environmental Monitoring Programs (EMP) at each drilling site during four phases of the drilling activity, i.e., pre-, during-, immediately after-, and 15 months after drilling ceases. The EMP must include:
 - completion of an initial drilling site assessment, including a physical sea bottom survey, to ensure the exploratory facility is not located or anchored in a sensitive or unique biological area;
 - assessment of the benthic community impacts and conduct bioaccumulation studies, if the permittee is authorized to discharge water-based drilling fluids and drill cuttings (Discharge 001), to evaluate potential food chain effects from the discharges; and
 - assessment of the plumes in the vicinity of the discharges and collect observations of potential marine mammal deflection during periods of maximum discharge of cooling water and water-based drilling fluids and drill cuttings.
- Screen for effluent toxicity of certain waste streams and conduct whole effluent toxicity (WET) monitoring for those waste streams if: (1) the initial screening indicates the potential for toxicity, or (2) the discharges exceed 10,000 gallons in a 24-hour period and if chemicals are used;
- Limit drilling to 5 wells per lease block, except upon the EPA's review and authorization for discharges from the additional wells; and

- Prohibit all discharges in areas with water depths of less than 5 meters.

To protect the regional biological communities, the Beaufort general permit prohibits discharges of water-based drilling fluids and drill cuttings in the following areas:

- Open-water restrictions:
 - at depths greater than 1 meter below the surface of the receiving water between 5 and 20 meters isobaths;
 - within 1,000 meters of river mouths or deltas; or
 - within state waters unless a zone of deposit (ZOD) is authorized by the Alaska Department of Environmental Conservation (DEC).
- Unstable or broken ice restrictions:
 - within 1,000 meters of river mouths or deltas; or
 - shoreward of the 20 meter isobaths, unless (a) the discharge is prediluted to a 9:1 ratio of seawater to drilling fluids and cuttings, and (b) the permittee conducts environmental monitoring.
- Stable ice restrictions:
 - below the ice and shall avoid, to the maximum extent possible, areas of sea ice cracking or major stress fracturing unless authorized by EPA; and
 - below ice within state waters unless a ZOD has been authorized by DEC the permittee conducts environmental monitoring.

The Chukchi general permit contains the following seasonal restrictions on the discharges of drilling fluids and drill cuttings:

- Open-water restrictions. The permittee is prohibited from discharging at depths greater than 1 meter below the surface of the receiving water between 5 and 20 meters isobaths as measured from the MLLW during open water conditions.
- Unstable or broken ice restrictions. The permittee is prohibited from discharging shoreward of the 20 meter isobaths as measured from the MLLW during unstable or broken ice conditions except when the discharge is prediluted to a 9:1 ratio of seawater to drilling fluids and cuttings.
- Stable ice restrictions. The permittee is prohibited from discharging below stable ice and must avoid, to the maximum extent possible, areas of sea ice cracking or major stress fracturing unless authorized by the Director.

Both the Beaufort and Chukchi general permits contain limitations, sampling, and monitoring requirements specifically for each discharge. Please refer to the permit documents, Fact Sheet, and the ODCEs for each permit for additional information. Project documents can be viewed and downloaded at: <http://yosemite.epa.gov/r10/water.nsf/npdes+permits/arctic-gp>.

Finally, throughout the permit development process, EPA maintained regular communication with the North Slope communities and stakeholders through quarterly update newsletters, in-person

presentations, workshops, and meetings. During these proceedings, EPA heard concerns about EPA follow-up and continued involvement, including compliance monitoring, once the permits are issued.

EPA acknowledges the communities' concerns that a comprehensive compliance and enforcement program is a critical component of a robust and effective NPDES permitting program. EPA is working to enhance transparency and public accountability regarding compliance and enforcement performance for all regulated facilities, including oil and gas exploration facilities. For example, EPA is implementing electronic reporting of compliance data as a means to improve the ability of communities and the public to monitor compliance with NPDES permits. Interested persons can also find compliance and enforcement information about regulated facilities on EPA's Enforcement and Compliance History Online (ECHO) website at <http://www.epa-echo.gov/echo/>. The ECHO system provides for fast online searches of EPA data for regulated facilities that integrate self-reporting, inspection, violation and enforcement data for the NPDES permit program and other federal environmental laws. In addition to these tools, EPA will continue to look for comprehensive and effective ways to inform the communities about the compliance status of facilities permitted under the Beaufort and Chukchi general permits.

XI. Conclusions

This EJ analysis is developed by EPA in compliance with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, and related memoranda and directives. Through the process of developing the proposed Beaufort and Chukchi general permits, EPA afforded persons and communities fair treatment and meaningful involvement. The input and substantial concerns received by EPA were considered and incorporated as permit terms and conditions to achieve environmental protection for all communities as allowed under the CWA. The proposed Beaufort and Chukchi general permits will ensure no unreasonable degradation will occur, and EPA's continued presence will also ensure communities to stay involved and informed after the general permits are issued and in effect.