Sḷalliq

2011

A Message from Pete Slaiby

As I write to you, I am cautiously optimistic we will be conducting exploratory drilling beginning July 2012. Preparations are currently being made for the open water drilling season – a program that will create hundreds of jobs and finally start in motion a series of events that could eventually lead to an annual average of over 54,000 jobs for 50 years, new energy and new life for Alaska's economy and the Trans-Alaska pipeline.

Safety is, and always will be, the top priority in all Shell operations. Once again, we were able to demonstrate the benefits of having Shell assets in the region. Late last year, Shell was asked to assist in the rescue of the ocean-going freighter M/V Golden Seas that had lost power north of Atka Island. Shell had under contract the ice-class anchor handler Tor Viking II, which has about 200 tons of towing power and was the only vessel in the region capable of assisting. I am proud our team was able to help again in the time of need, something we will continue to do when our aircraft and vessels are onsite. This effort adds to the long list of rescues Shell has conducted in Alaska since re-entering the state in 2005.

2011 Operations

During the open water season of 2011, Shell once again could not drill on the leases it has spent five years and nearly $4 billion to access. That said, the 2011 season wasn't a total loss. Along with industry and government partners, Shell conducted significant scientific data collection offshore in both the Chukchi and Beaufort Seas. As highlighted in this edition, Shell is also advancing an important onshore environmental studies program.

Looking Forward to 2012

Despite the ongoing delay, we remain confident in our drilling expertise and Arctic experience. I've said it before, and it bears repeating: we would not consider operating in Alaska unless we could do so safely and responsibly.

We are undertaking significant modifications to the Kulluk, a conical drilling unit proposed for Beaufort Sea exploration. In addition, Shell is conducting modifications to the drillship Discoverer, which is scheduled for work in the Chukchi Sea.

In early 2012, we anticipate the completion of Hull 247, one of the most advanced and powerful U.S. built, non-military, icebreakers on the water. The vessel is being built to support offshore development in the Arctic and is the very first of its class to be built in the United States. We've also begun engineering of the capping and containment systems being developed specifically for Arctic operations.

In addition, Shell is working to gather approximately three dozen permits required to conduct exploration activities in the Beaufort and Chukchi Seas. We continue to work through the ongoing litigation against our plans. We strongly believe the plans and permits developed for the 2012 programs are robust and will withstand legal challenge.

As we move closer to the 2012 drilling season, we will continue working with local, state and federal stakeholders to address comments and concerns regarding our plans for 2012 and beyond. I look forward to continuing our conversation with you. For the most up to date information, please visit our website at www.shell.us/alaska.

Vice President
Shell Alaska

A Look at Shell's Onshore Environmental Studies Program

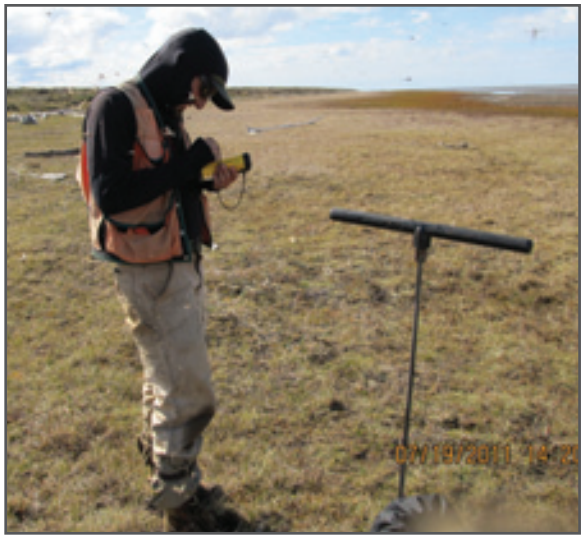
By Erling Westlien, Shell Environmental Scientist

The Western Arctic Caribou Herd, hunted for thousands of years, is the largest herd in Alaska and one of the largest in the world. This herd roams across 140,000 square miles of Alaska habitat ranging from the North Slope and the Brooks Range in summer to as far south as the lower Yukon River in winter. Estimated currently at approximately 400,000 individuals, the herd is a fundamental cultural heritage and subsistence resource to many northwestern Alaska residents. Understanding the ecological and social importance of the caribou is just one example of the many environmental issues that Shell's Onshore Environmental Studies Program is designed to do in Alaska.

Our commitment to sustainable development in Arctic Alaska requires that we integrate social and environmental concerns into our decision-making. As part of our Onshore Environmental Studies Program, we have conducted field surveys along the Chukchi Sea coast for the past two years. Our goal has been to review information on the seasonal occurrence, distribution, and abundance of land-based mammals and birds and to characterize or assess current habitat, culture resources and hydrological conditions. These are often called baseline science studies. We fully expect to conduct multiple years of these and other kinds of baseline science studies, both offshore and onshore, in parallel with our upcoming exploratory drilling program.

The better we understand the Arctic ecosystem and its various physical and biological components, the more effectively we can adapt our current and future activities in a way that best minimizes potential impacts.

Our onshore effort has been particularly focused on identifying high-priority species, sensitive habitats, and special areas such as caribou calving grounds and staging areas for migratory birds. Shell is currently considering options for land-based facilities and pipeline transitions that would support oil and gas development in the Beaufort and Chukchi Seas. The better we understand the Arctic ecosystem and its various physical and biological components, the more effectively we can adapt our current and future activities in a way that best minimizes potential impacts.



Aaron Wells, Senior Scientist with ABR, Inc. Environmental Research & Services, at a study site near Icy Cape, using a ruggedized handheld computer to record soil and environment data while surrounded by numerous mosquitoes. The frost probe in the foreground is used to assess depth to permafrost.

The Study Area

Studies are being conducted on the Beaufort Sea coastline near Point Thomson, and a larger area along the Chukchi Sea extending from near Point Franklin to the vicinity of Point Lay. The smaller Point Thomson study area encompasses about four miles of coastline and includes Duchess, North Star and Mary Sachs Islands and the western portion of Flaxman Island. The Chukchi study area is much larger. It includes more than 170 miles of shoreline between Peard Bay in the north and Kasegaluk Lagoon to the south and extends approximately 60 miles inland. This article is focused on the Chukchi study area.

It Can be Difficult to do Science in the Arctic

We have been conducting onshore studies along the Beaufort and Chukchi coasts since 2006 and have always anticipated delays due to coastal fog and other weather in which we choose not to fly. We take the safety of our team members very seriously, and so we don't fly unless conditions are very good. In 2010, during August and early September, weather limited the field teams. Despite the reduced time in the field, many scientists took advantage of the extra time in Barrow to speak with local residents and even give a science presentation at the library.

Several positive changes were made to the 2011 program based on the lessons learned from the previous year. The most important change was to set up the field base station in Wainwright, closer to the study area. We also shifted the study to mid-July. Residents and our subsistence advisors said there would be significantly less potential for impact to subsistence hunting if the program were conducted in July. So we did.

The field team arrived in Wainwright on July 16 and left on July 25. The team consisted of biologists, hydrologists, environmental scientists, and an archaeologist. The team also included a dedicated safety specialist and field logistics coordinators provided by Olgoonik Fairweather LLC, the prime contractor for the project. Henry Nowicki, the on-site Shell Representative, was responsible for ensuring that our contractors achieved Shell's safety and environmental requirements and honored Shell's commitment to avoid subsistence hunting activities while still obtaining good scientific information. His efforts were supported by a dedicated team of Operations, Logistics, Health and Safety, and Regulatory Affairs experts in our Anchorage office.

As expected in the Arctic, changing weather patterns complicated logistics at times, as personnel had to be extracted earlier than planned to avoid no-fly conditions, but operations were only suspended completely for one day due to weather. As in previous years, a Bell 412 helicopter was used to access most study sites.

For the first time, the field team used the M/V Tukpuk, out of Wainwright, to transport crews to sites. The M/V Tukpuk is a 5-Star U.S. Coast Guard certified marine landing craft currently owned and operated by Olgoonik Oilfield Services. The M/V Tukpuk was used to transport science teams to nearshore locations near Point Franklin at times when weather prohibited the safe operation of the helicopter.

The M/V Tukpuk is designed to make beach landings along the Chukchi coast.

The project helicopter is the only way to readily access many study sites.

All field activities were conducted under the conditions determined through consultation with representatives from the villages of Wainwright, Point Lay and Atqasuk, and in compliance with the authorizations or permits required by the North Slope Borough and other government agencies.

Consultation is Key

For the last two years, when we are in the field, we have worked hard to share our plans with nearby villages on a daily basis. For example, maps of the operational plan were posted daily in common areas throughout the village to show the location of the project's upcoming activities. Contact telephone numbers were included so that possible disruptions in subsistence activities could be reported to Shell and the project team.

Another important component of our communication efforts has been daily conference calls with subsistence advisors. These calls are important because they provide an opportunity to coordinate our plans and avoid impacting subsistence activities. The advisors have a key role by acting as a representative of their village to Shell and as a channel of information from the residents. Based on the information provided by the subsistence advisors, field plans were often changed to avoid disrupting areas being hunted. The names of these subsistence advisors are shown below. We gratefully acknowledge their participation in the program and thank them for their efforts.

Residents were often curious about the studies we were conducting. Of particular interest, of course, was the large project helicopter. The pilots and aircraft mechanic often allowed children to view the helicopter up-close and a few times to even sit inside the aircraft.

Subsistence Advisors:

Bert Akootchook – Kaktovik

Lorraine Akpik – Nuiqsut

Raymond Lambrecht – Barrow

Michael Tagarook – Wainwright

Sophie Henry – Point Lay

Isaac Killigvuk – Point Hope

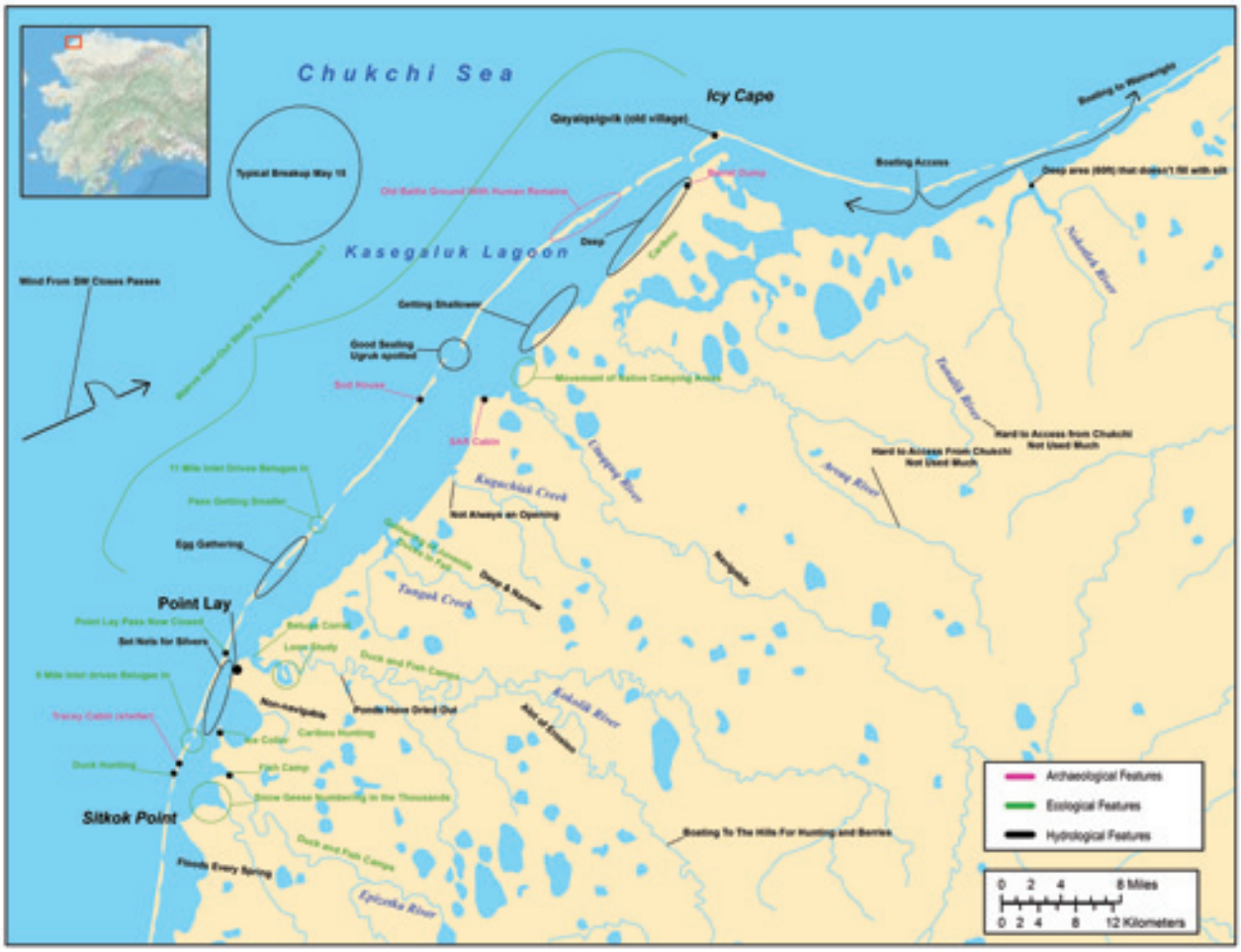
Arlene Thomas – SA Administrator

Incorporating Traditional Knowledge

For the last two years, before beginning our summer onshore fieldwork, Shell staff visit Point Lay and Wainwright to introduce the project's scientists to the community. The trips typically include small meetings with a handful of invited Elders and experienced hunters as well as large village meetings open to all. These meetings provide an opportunity to listen to residents' knowledge and values about the environment, and equally important, to share with the community the results of our previous year's work.

The map shown below highlights much of the important archaeological, ecological and hydrological traditional knowledge that has been gathered during these visits. These maps are an important part of the baseline studies process. Examples of information include parts of Kasegaluk Lagoon that have been getting shallower or deeper, passes through the barrier islands that have been getting smaller, and sections of river bank that have been eroding.

Shell scientists and our contracted experts have found it very useful to have these direct conversations with locals so that our conclusions can be examined and validated. Sharing the results of our assessment studies on habitat resources, cultural resources, and hydrology, and describing to the community what it is that we are learning, particularly in the context of traditional knowledge, is a critical part of Shell's overall Alaska Environmental Studies Program.



A visual representation of certain features identified during traditional knowledge workshops.

Erling Westlien, Arlene Thomas, and Nora Itta at a traditional knowledge session in Point Lay.

Habitat Assessment

The complexity of habitat along the Chukchi coastline is tremendous and has been categorized within the study area into 18 unique landcover classes. The use of landcover classifications helps us standardize habitat assessment efforts. Examples include Barrier Island, Coastal, Lowland, Riverine and Upland habitat types. Coastal zone habitats occur mainly around river deltas where storm surges have driven seawater inland, producing areas of salt-killed tundra and partially vegetated Coastal Barrens and Coastal Wet Sedge Tundra with salt-tolerant plant species. Beyond the coastal zone, Lowland Moist Sedge-Shrub Tundra occurs in low-lying areas, often dominated by low and dwarf shrubs. Riverine Barrens exist on active channel deposits along several of the large rivers in the areas, and are barren or partially vegetated with plant species that are specialized in colonizing recently disturbed areas. Upland Tussock Tundra occurs across broad areas on gently sloping uplands and low ridges and is characterized by an abundance of tussock-forming sedges.

This complex mixture of habitat types supports a rich diversity of marine and coastal birds. One hundred species of marine and coastal birds are known to occur in the area, and as many as 42 species breed there. Four species are protected by the Endangered Species Act: the spectacled eider, Steller's eider, yellow-billed loon and Kittlitz's murrelet. Shoreline habitats, like Coastal Barrens and Coastal Wet-Sedge Tundra, are important foraging habitats for staging shorebirds, geese, and certain ducks. The abundance of waterbirds using the lagoon and lagoon-edge habitats is greatest during the fall migration. Thousands of shorebirds feed on invertebrates in the mudflats and salt marshes of Kasegaluk Lagoon and Peard Bay. Lowland habitats, on the other hand, are more important for nesting red-throated and pacific loons and for brood-rearing groups of geese, ducks, and shorebirds.

Important land mammals in the area include caribou, grizzly bears, wolves and arctic foxes. The study area is used by caribou from both the Western Arctic Herd and the Teshekpuk Herd. The smaller Teshekpuk Herd uses the northern Chukchi coast more than the Western Arctic Herd. The study area is at the edge of the normal range of the Western Arctic Herd and use of the area by this herd occurs mostly during fall migration from mid-August to late November. Up to 30,000 Western Arctic Herd caribou, however, have wintered in the Wainwright-Atqasuk-Umiat area, including portions of the study area, for many years since the mid-1980s.

The study area is outside the main calving range of any herd, but some low density calving has been seen between Wainwright and Atqasuk within 10 miles of the coast. Coastal habitats and Riverine Barrens are important insect-relief habitats for caribou due to their lower temperatures and higher winds, although the study area is not thought to be highly used for insect-relief habitat. The greatest annual use of the study area occurs during the fall migration when important foraging habitats, including Lowland Moist Sedge-Shrub Tundra and Upland Tussock Tundra, are used. A few caribou winter in the study area, and they forage primarily in areas with abundant lichen and shallow soft snow, such as some areas of Upland Tussock Tundra.

Cultural Resource Assessment

The Chukchi coastline contains numerous onshore archaeological, traditional Iñupiat, and paleontological sites, many of which may have remains worthy of documentation and protection.

Since many of these cultural resource sites are located on private Native allotments, we examined them from the air using high-resolution aerial photography supplemented with low-level oblique aerial photos taken from the project helicopter. The 2010 and 2011 field programs have proven the usefulness of combining high-resolution aerial photography with low-altitude aerial reconnaissance as a means of quickly documenting historic sites that have structures such as sod house ruins large enough to be visible from the air. We fully expect to use this technique in future cultural resource studies. This technique allows Shell to accurately document and map the precise locations of sod house ruins and other important historical features. Many of these sites have never been accurately mapped and only a few along the Chukchi coast have been formally evaluated in the past thirty years.

The sites are quite varied, ranging from Tunalik sites that are potentially 10,000 years old, to relics of the Cold War like the remains of Distant Early Warning (DEW) Line sites at Point Lay and Wainwright.

The density of archaeological sites is significant in the Chukchi study area; although only a small corridor along the coast, this boasts a high density of cultural sites including old hunting camps, old villages, and hunting grounds.

Atanik, first documented in 1838, contains shelter cabins, a cemetery, sod house ruins, bones, ice cellars and a whaling settlement. The site represents a place of important historic and current events, namely a jumping-off point to important hunting grounds. Atanik and its associated historic district were placed on the National Register of Historic Places in 1980.

Nunagiak Mound A

Nunagiak is a remarkable place and one of the most important archaeological sites along the Chukchi Sea coast. Located north of Wainwright, the most prominent feature at this site is a large house mound, one of thirteen at the site. While only two upright whale jaw bones now remain (one having fallen in the recent past), the mound is visible from a great distance. House mounds are the result of constructing multiple houses, one on top of the other, over very long periods of time. The jaw bones at Nunagiak came from large adult bowhead whales and were likely used as a storage rack or other practical structure. Whale bones, especially jaw bones, were favored because of their structural and symbolic value. The site now lies on a Native Allotment and so was examined only from the air.

Although the complete history is unknown, archaeological studies in the 1930s and 1940s demonstrated that the Nunagiak site was occupied by prehistoric peoples from the Birknik and Thule periods – direct ancestors to modern day Iñupiat. Surprisingly, there was also a Punuk period house located at the site which may represent occupation by prehistoric peoples from Saint Lawrence Island and the Siberian coast to the south. Waves attacking the site from the adjacent lagoon have destroyed one of the mounds completely and have eroded a portion of the largest one. According to project archaeologist Rick Reanier: "There is a pressing need for scientific excavations to be conducted here before all evidence of the earliest occupations is lost forever."

At the historic village of Siraagruk, houses were constructed entirely with commercial whaling ships' timbers, but using Native architecture and construction techniques, with the boards placed against one another, unfastened, in the traditional style.

The cultural resources assessment has compiled both historical and archaeological background information that will be shared with the appropriate agencies and used by Shell to guide future studies.

Hydrology Assessment – It's All About Water

Hydrology is the study of water, including its movement and distribution across the land, and geomorphology is the study of land and the physical processes that shape it. In other words, hydrologists learn why water acts the way it does, and geomorphologists learn why the land looks the way it does. The hydrologists and geomorphologists working for Shell are very interested in characterizing the physical processes of the coastline and rivers and how they have changed over time.

Their efforts include assessing river conditions, such as the width and depth of various river systems, describing the vegetation along the stream banks, as well as the sediment material carried by the streams. Many of these measurements will help describe the depth, width and velocity of the water during floods and help to evaluate the likelihood for erosion along the stream bottom and stream banks. In addition to the river sites, these scientists visited a number of locations to evaluate erosion rates along the coast and at the mouths of many larger rivers that flow into the Chukchi Sea.

Again, the objective of all these measurements and observations is to characterize the existing conditions and physical processes of the coastal and river resources. Their efforts have also included the development of an inventory of major river drainage systems and unique coastal features, calculations of potential peak flood discharges, and estimates of coastal stability or erosion throughout the study area.

Review of the available scientific information, much of it generated more than 15 years ago, has highlighted significant and accelerated changes in the coastal systems in the last 10 years, presumably due to the effects of changes in sea ice. Traditional knowledge obtained from the interviews in Point Lay and Wainwright did provide valuable information with respect to observed hydraulic changes of the coastal and river hydrologic systems and how these changes are impacting the lives of coastal residents.

In addition to the time spent along the rivers or on the beaches, important analytical work and research also occurs in these scientists' offices. For example, erosion rates are being assessed by comparing aerial photos from 1979 and 1985 to 2008 and mapping various shoreline locations between these two time periods. This is being done because erosion rates are known to vary considerably along the coast. The mapping allows Shell to determine areas that have had the largest amount of shoreline retreat. In 2011, scientists visited some of these locations to observe actual conditions on the ground and thus validate and verify their estimates.

In 2012, the hydrologists intend to continue much of the same work but also begin to evaluate hydrological conditions during spring break-up – a difficult time of year to be in the field. Of particular interest to the hydrologists is the difference in river processes between the areas north and south of Wainwright compared to watersheds draining farther south near Icy Cape and Point Lay. They also want to better understand how these river systems change as you go inland from the shoreline. According to Jim Aldrich, an arctic hydrologist, "the key to this effort will be to rapidly assess river and floodplain size and shape at as many locations covering as wide an area as possible that time

and weather allow." These same scientists are also considering where to establish a number of benchmarks along the coastline and certain barrier islands so that they can begin to document and quantify rates of shoreline and island erosion. "It will be very helpful to have a trustworthy series of benchmarks from which to evaluate future coastal morphological change," says John Atkinson, a geomorphologist on the team. In addition, Shell and these scientists will continue to talk with local residents to expand our understanding of the region and how it is changing.

What the Future May Bring

Shell's investments in research and technologies in Alaska, such as these onshore environmental studies, are yielding valuable scientific and technical information. Useful information on species distributions, ice and ice movement, weather, migratory patterns and habitat, land use, and subsistence activities that we obtain today will be included in the exploration and development plans of tomorrow. We are also able to incorporate experience and expertise based on the work we do elsewhere, including in other Arctic and sub-Arctic regions. In 2008, for example, Shell and Wetlands International, an eNGO whose mission is to sustain and restore wetlands, their resources and biodiversity, initiated a joint project to study the impact of the oil and gas industry on tundra and permafrost across the circumpolar north, including the protection and restoration of wetland habitats. The study was designed to help support operations in tundra and permafrost environments, which are susceptible to damage by operations on and below ground. This partnership is continuing to find engineering and ecological solutions to avoid long-term impact and improve industry practices. We look forward to continuing this kind of work in Alaska and using the information to manage potential future development activities in ecologically sensitive areas.

The fieldwork we conducted out of Wainwright in July 2011 was a great success and next year's plans are currently being developed. We are in the process of seeking the required permits to move forward. At this time, we plan to continue the same kinds of studies conducted during the last two years, but possibly increase the number of studies and expand that area of study.

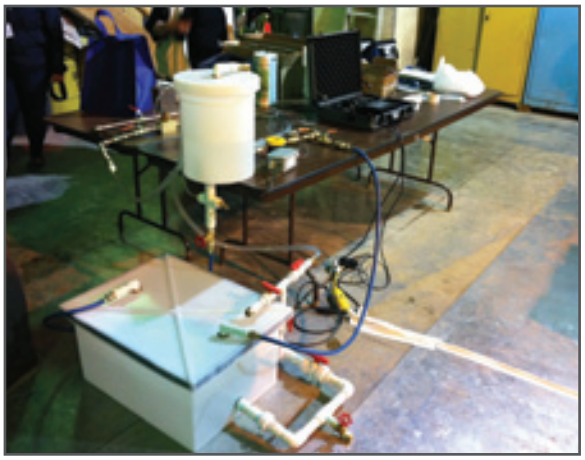
Our success in Alaska demands that our operations and studies include a solid scientific foundation built with local knowledge and traditional knowledge. We will continue to do this by combining Shell's skills and experience with those from the region.

Barrow Career Day

In January 2011, Shell as a member of the Alaska Process Industry Careers Consortium (APICC) volunteered to participate in the Barrow Career Fair day held at the Ilisagvik College in Barrow, Alaska. The plan was to ship up APICC's Process and Energy Industry Mobile Briefcase which consists of a series of tanks, valves, piping, automated controllers and indicators which is all controlled by a Programmable Logic Controller (PLC). This unit would be set up to be able to demonstrate what a process system looked like and allow the students to have hands-on learning on how it all worked.

The briefcase was scheduled to arrive in Barrow on the Wednesday night plane. We wanted to get it up early to be able to set it up to make sure everything worked and would be prepared for 9:00 AM Friday morning when the first bus load of students was scheduled to arrive. Due to the bad weather, the 150-lb. package did not arrive but we felt confident that when it arrived on Thursday we would have plenty of time to get it set up. On Thursday, several planes came and went but still the briefcase did not arrive. The last flight into Barrow on Thursday was scheduled for a 7:30 PM arrival, where Herschel Frantz and Craig Blanchard of Shell went to meet additional team members, including Laurie Becwar (Shell), Rick Adams (UAA), and Todd Bergmann (APICC). As we stood waiting for the baggage to arrive, the bad news arrived shortly after that: the briefcase was not on that plane.

Immediately Craig, Herschel and Rick started discussing an alternate plan, not wanting to disappoint the students. Many ideas were discussed, from using straws and cups, to going to the local NAPA store to purchase materials in order to create some type of model. Herschel, being a local from Barrow, suggested he call his uncle, Mr. Ben Frantz, who is the General Manager at the Barrow Utilities & Electric Cooperative Inc. Herschel made that call, and Ben agreed to meet with us. We informed him what we were looking to do, and off we went to the Barrow Utilities water treatment facilities. Once we arrived, it was like "kids in a candy store." We were able to locate enough valves, pumps, piping and tanks to be able to make a manual-operated simulator. We had it all loaded in the SUV by 10:00 PM on Thursday night and were back in business. We were able to get our "simulator" up in time for the 9:00 AM class on Friday morning. The briefcase finally arrived at 10:30 AM the next morning, and by that afternoon, we were able to show students both the manual and automatic process simulators.



The Process and Energy Industry Mobile Briefcase represents an industry tank farm with all the automated controls to demonstrate how automation helps keep a process system in the proper parameters.

Looking ahead, Shell Oil weighs options for Arctic production platform

Arctic Sounder Interview with Brian Miller

July 20th | Alex DeMarban

Some opponents of oil and gas drilling in the Beaufort and Chukchi Seas say the Arctic's merciless conditions will guarantee a blowout if Shell Oil ever gets the chance to drill. Shifting ice, strong currents, brutal cold and ice ridges as tall as three-story buildings will be no match for modern engineering, they say.

Shell sees things differently.

Brian Miller, the oil company's project development manager for Alaska, describes below how a production platform would work, if the company is allowed to conduct exploratory drilling and then develop producing wells.

The platform would use "brute-force" engineering, including a stadium-sized base on the seafloor, a large single leg, perhaps steel, that's strong enough to resist ice, and a facility high above the water to avoid those deadly ridges.

The Arctic Sounder: Could you tell me about the oil platform? Is it cutting edge?

Brian Miller: In some respects, it is cutting edge. In other respects, it is just a case of brute-force engineering.

Shell has studied platforms in this area since the early '80s, so to a certain extent there's nothing really new here, and in fact, we have several people on our team who worked on Shell development opportunities in the early '80s and we've got drawings of platforms that were designed back then that honestly look fairly similar to what we're talking about now.

But no one has done it in an area quite like the Alaska Arctic. You mentioned Hibernia (oil platform off eastern Canada). Their main concern is icebergs. We don't have icebergs. But we do have a very cold environment with ice and you can have first-year ice, new ice that year that can pile up into rubble piles and also create these underwater keels of ice that would hit against the platform. That's a little different than what you'd have at Sakhalin (an oil platform off Russian coast), though they do have first-year ice too.

But we also have multiyear ice and that tends to be stronger ice because the salt has migrated out of it and it's a stronger, freshwater crystal, so that is really our main design, is for a large piece of multiyear ice hitting the platform.

The platforms we're looking at, it's probably steel. We can also look at concrete too, but steel has its advantages. And that is really kind of a practical extension of the gravel island that Shell and others have used in the Beaufort Sea in shallower water. The problem is when you get out into the 100 feet of water that we have in most of our areas, in the Beaufort or even 150 feet of water or more in the Chukchi, building a gravel island is impracticable, because you need so much gravel and it becomes so big. And the gravel islands have issues from wear of the ice cutting against the island itself, so there's maintenance issues. So I like to look at these as steel islands. They're just a structure that basically resists the ice forces, which are extremely large, resists those by its own mass and then the foundation that it has connecting it to the seafloor.

AS: So it is attached to the seafloor?

It is sitting on it, but what we do is we look at the strength of the soil and we look at the loading from the ice, and it's just like any other structure, whether it's a dam or a building, or a bridge. It's pretty much just down to structural engineering...As that ice force hits against the structure, that puts a lateral force that the foundation needs to resist.

So the foundation, we can have

these things we call skirts, which are typically plates that extend below the structure and go into the soil, and that allows us to engage stronger layers of soil, although in general we have really good strong soil in the Beaufort, and it's even stronger in the Chukchi.

We have taken geotechnical samples. We have a database of all the (soil) samples that have been collected in the Arctic, and we have collected ourselves some fairly shallow samples around some of our development areas. So it's helped us understand what kind of soil strength to expect. So we have a pretty good idea now, between the ice forces and the soil strength and how the ice breaks against the structure, between all those we have a pretty good idea of what we need to do. We've been studying this for 30 years. I hear people say we're rushing into this, but to us it just doesn't feel like we're rushing after 30 years.

We've also taken different structural geometries, sometimes they are shaped like a cone, so that makes the ice get bent up and break… under its own weight. We've also looked at structures that are vertical walls. They just have vertical walls and the ice is crushed against the structure. Those structures have different performances. We're not at a point to pick which kind of method, but we've studied both of them.

AS: What's new about this (type of platform)?

I would say the fact that we have multiyear ice there and the long winter season, which really means a short open-water season, so we need to make sure we bring a completed structure up there, so all of our construction needs to be completed somewhere else as much as possible. We don't want people working up there in winter if we can avoid it.

But from the environmental aspect, it's really the fact that we have multiyear ice in the Beaufort. In the Chuckchi, not so much. There's a much smaller chance of having any multiyear ice.

Ice-Strengthened Production Platform – Conceptual Design

So some of the things we're doing now to understand that better, there's a whole range of methods of collecting data. For example, we're putting buoys on the ice in the winter that are tracked by satellite and we're able to see how the ice is moving. Sometimes (the ice will) stay in one place for weeks on end, and then it might move fairly long distances, maybe 50 miles in three days, so that helps us understand how the ice moves.

We have used devices like a sophisticated piece of equipment called an upward looking sonar, basically a sonar system set near the sea floor – it's buoyant and floats up a little bit – and it looks up through water and it sees the ice, so it can tell us how thick the ice is and how fast it is moving and how high the waves are. And we have done ice overflights, to understand where we are seeing multiyear ice. There are people with 20 to 30 years of experience in the Arctic and they go on these flights and help us identify where they see this multiyear ice. And we do see less of it these days than what we saw in the 80s.

AS: (Information about the) current and trajectory of water and ice, that's one thing USGS calls a gap (in what drilling decision-makers know about the Arctic). Is this what you're talking about?

It could be. For right now, most of that data is internal to Shell, so we probably haven't done the best job of getting it communicated out there…But I know one of our goals of setting up the Science Advisory Panel (in an agreement with the North Slope Borough) is to get this stuff out to others. And we do use local traditional knowledge. When we go out on the helicopters to place the buoys, we always take local Natives who help us understand how the ice looks, where are there good places to land, and we have procedures to make sure we have thick enough ice to land on. So we have included a lot of people in that process, whether people on the planning committee, or whether it's the North Slope Borough or Richard Glenn (with ASRC). But I think we probably haven't done a good job at putting that out, and one of the reasons is Shell spent a lot of money gathering (that information) and like other companies, we're certainly not one to give it away. But we are working with the scientists on the North Slope to bring all that together.

AS: So the diagram I'm looking at makes it look like the platform would have the ability to move up and down to avoid the ice. I was thinking it had some kind of ability to move up and down to avoid two- and three-story ice ridges.

No, in fact, the more passive we can make our systems up there, the more reliable they are. The platform is a fixed structure. It does have a certain height above the sea level and it can be quite high.

We have done model tests of these platforms in tanks, particularly in Finland. They do a lot of Arctic testing. They make scale-ice. Alaska Natives say it's not the same (kind of ice), but in a scale world it behaves similarly to what the ice does, so we take the platform and we freeze up the surface, spread this ice on it and create this simulated ice. This is how they create ice breakers and ships and things like that, and they push the structure to it, which is kind of the same thing as the ice moving against the platform and they're able to study how the ice breaks into forms.

But the height of the deck…it's the same way we designed platforms in the Gulf of Mexico or anywhere else in the world we have waves. We can have waves 75 feet tall and we have to make sure the deck of the platform stays out of the waves. So we're used to designing decks that are a long ways out of the water. In this case ice is even less forgiving than waves, so we really do not want the ice to ever come in contact with the deck above. So we would put it high and it could be in the range of 50 to 100 feet above the water's surface.

We're still deciding what this needs to be. Some of it depends if we're crushing ice and the ice doesn't rise as high. Or if we're lifting it up with a cone-shaped structure the ice comes up higher.

AS: Are the legs of the platform like a four-legged stool?

So you said you (reviewed some of the platforms) in Sakhalin. Those tended to have four legs that went down through the ice. But that's first year ice, and it's not very thick. Here we have a much more severe condition with the multiyear ice, so we don't feel four independent legs is good. This thing is like a large mono-leg structure, so it's all one big leg.

These structures can be quite large. The base of the structure can be something on the order of 300 or 400 feet or more in diameter, so I kind of envision this thing being a little like a small football stadium or a big basketball arena.

The base of it can be 300 or 400 or more feet, so you have a tremendous amount of surface area. You can have these plate skirts that can be extending, it could be 5 feet deep, or if we really needed it, it could go as deep as 20 feet into the soil.

The structure itself weighs at least 100,000 tons...We fill those structures with ballast, so we could have, just in the bottom of the structure, something on the order of 10 feet of concrete to create weight, and we would add water to it because one of the critical design events is it needs to float and needs to be stable, so we can tow it from wherever we built it, up through the Bering Strait and around to its location. So it's no small task to have something that has to resist the ice and be able to float in another condition to get to its location.

AS: So that's what the hollow leg would allow and you fill it with ballast?

Yes, you have some ballast in there anyway to give it stability, it could be concrete, or sometimes we used material like an iron material they use in cruise ships and we use in some of our floating structures. But this is so big we can put whatever we want in it. Concrete is pretty inexpensive, so we can put a lot of that in it. So when we get it to location, we'd open up valves, and allow it to submerge and sit on the bottom. At that point we can add lots of water to preload it, and make sure we have weight on the bottom. So the total amount of weight on the bottom ends up being a lot. So one of the things we hear people say is, "You can't be serious. You think you can put something out there and think it will survive?"

But we've worked on this design for about 30 years. It's been accepted by industry, the MMS (now BOEMRE) has identified it and used it in their environmental impacts as one of the leading possibilities. If we see something better, we might pick it. But at this point, we think (what we have) is very good, and our opinion has not changed over the last 30 years.

AS: How much would it cost?

It's a multibillion dollar (project), much like our other development options. People say, "How do we know you won't put these all over the place up there?"

Well that's why. They're just too expensive and the ability to do directional drilling, that's improved a lot over the years. These are expensive structures, and if you say I just want one well, you still need a really big thing, so you might as well try to really consolidate and concentrate your facilities. You don't want to be moving people around, so it's a lot better for us to put a limited number of structures there.

Nalukataq: Celebrating the Gift of the Whale

Nuiqsut, Alaska

A huge smile spread across Dora Leavitt's face. In spite of all the hard work, and not having slept the night before, she could not have been happier. Dora, her sister Doreen, and the rest of the Edward Maniksaq Nukapigak whaling crew in Nuiqsut were hosting their Nalukataq or blanket toss to celebrate the gift of the whale.

Leavitt stood among dozens of massive pots of caribou and goose soup. "Here, have some meat and how about a homemade doughnut," she said reaching across the table into a white plastic bag filled with fresh baked goods. Behind the bag were boxes of pilot bread and beyond that tubs of candy. Under the table sat cartons filled with fresh fruit. "This isn't half of it," said Leavitt as she went to grab more white fish and whale.

Nuiqsut does not have a spring whale hunt, so the community celebrated its fall harvests in June. It was one of dozens of Nalukataq celebrations across the North Slope. As part of the Iñupiat celebration, the host whaling crews cook and bake for days. The homemade food supplements the rich bounty of whale to be divided among community residents.

"We give whale out at Thanksgiving and Christmas, and this is the last of the whale," said Leavitt.

Shell employees were invited to attend a number of spring Nalukataq celebrations including Nuiqsut, Wainwright, Barrow, Point Lay, and Kaktovik. Although employees were unable to attend all of the celebrations, the company shared fresh fruit and candy with each community.

"This was my first year to experience Nalukataq," said Carol Theilen, a Project Superintendent for Shell. "It was a touching celebration. Everyone's basic need for food – for sustenance – for life was being met. I felt not just like an invited guest, but like an adopted member of the community."

Every hour throughout the day a new part of the whale was brought to the crowd and handed out. With grateful hands, residents collected baggies full of heart, frozen meat, kidneys, intestines, fermented whale and the maktak.

"It's the celebration that brings people together," said Leavitt.

After all of the food is handed out and dessert served, the community gets ready to take part in the blanket toss. Leavitt explains that the blanket is made out of bearded sealskin sewn together and then connected to four ropes at each corner. She urges the young men to grab a handle and pull. Her husband Eric is quickly propelled into the air and throws a bag of candy into the crowd.

The blanket toss celebration ends with traditional Iñupiat dance long into the night, all part of a centuries long tradition to celebrate the gift of the whale.

Shell Receives SeaLife Center Award for Dedication to Science

The Alaska SeaLife Center, Alaska's only combined public aquarium, research facility and ocean wildlife rescue center, honored Shell Alaska with an Alaska Ocean Leadership Award during its Marine Gala, held this January. The Center established the awards as an annual opportunity to recognize outstanding achievements related to ocean sciences, education and resource management in Alaska.

Shell Alaska was presented the "Stewardship and Sustainability Award" – an award highlighting an industry initiative that demonstrates the highest commitment to sustainability of ocean resources.

"Through the efforts of Shell and its many partners, a better understanding of the Alaskan Arctic offshore is emerging, further enabling critical decision-making and responsible management of this critical resource," said Michael Macrander, Environmental Team Leader, Shell Alaska.

Since returning to Alaska in 2005, Shell has engaged in an aggressive environmental studies program in the Arctic offshore. Shell has worked in a collaborative manner with a wide range of stakeholders, including industry partners, such as ConocoPhillips and Statoil, local, state, and federal governments, universities, and non-government organizations to share resources and facilitate the further development of our understanding of the Arctic marine ecosystem.

Shell has taken the lead in the development and implementation of new technologies, including unmanned aerial systems, acoustic recorders, and integrated ecosystem studies to advance capacities to work in this challenging offshore environment. Shell fosters and funds such diverse research as computer assisted identification of marine mammal calls, greatly enhancing the capacity to utilize acoustic sampling technologies, satellite tagging, ice and weather forecasting and physical oceanography.

Jason Brune with the Resource Development Council presents the Ocean Stewardship and Sustainability Award to Shell representative Susan Childs, as Molly McCammon, Executive Director of the Alaska Ocean Observing System looks on.

"It's an honor to be recognized by the Alaska SeaLife Center for our efforts to further our understanding of Alaska's ocean resources," said Pete Slaiby, VP, Shell Alaska. "Recently, Shell entered into a five-year collaborative science agreement with the North Slope Borough Mayor's office that will enable local stakeholders to pursue robust scientific programs. Shell's program of scientific study in the Arctic is far-reaching and diverse in scope, and we are proud to be recognized as one of the scientific leaders in the Alaska offshore," Slaiby added.

The Alaska SeaLife Center, known for generating and sharing scientific knowledge to promote understanding of Alaska's marine ecosystems, is considered one of the most prominent cold-water rehabilitation and research centers in the world.

Alaska SeaLife Center®
windows to the sea

University of Alaska Fairbanks Makes Impression at Shell Eco-Marathon

For the first time in the history of Shell Eco-Marathon, an Alaska team participated in the competition to build the most fuel-efficient car possible. As expected, the Alaska team made a lasting impression. Not only did they build their car in two weeks, compared to many teams that began planning months in advance, they also transported their car to the competition held in Houston, Texas, in four pieces of carry-on luggage.

The Shell Eco-Marathon challenges students to design, as well as build and drive their cars. In the past, contestants have achieved more than 2,500 miles-per-gallon. Cars at the events are powered by a range of sources, including conventional gas and diesel, solar, biofuels, and hydrogen. For the first time, "plug-in" electricity was included as a category, which is where the team from UAF competed.

Team UAF received the award for the farthest traveled and they earned a reputation for being scrappy and clever. They went through the discarded parts of other teams to find materials to fabricate parts of their own car. They placed sixth out of 12 teams in their category.

The ECO challenge team, (l-r): Curtis Smith, UAF alumnus and Shell Alaska employee, with UAF students Allan Spangler, Ryan King, and Craig McKenzie.

Being Prepared: Shell's Response Assets Make a Difference in Alaska

On Friday, December 3, 2010, Shell was asked to assist in the rescue of the ocean-going freighter M/V Golden Seas that had lost power north of Atka Island. The M/V Golden Seas was full of contaminant cargo and several hundred thousand gallons of bunker fuel oil. With 20 crew on board and limited power to its main engines, the Golden Seas was in danger of encountering rocks within hours.

Shell was immediately contacted for possible use of the ice-class anchor handler Tor Viking II – the same vessel Shell contracted to tow the Kulluk drilling unit to Dutch Harbor in the summer of 2010. The Tor Viking II has about 200 tons of towing power and was the only vessel in the region capable of assisting the M/V Golden Seas.

On December 4, the Tor Viking II attached to the M/V Golden Seas in 27-foot swells and began towing her to Captains Bay near Dutch Harbor. Both vessels safely arrived in Dutch Harbor on Tuesday, December 7.

Shell's close working relationship with the Coast Guard, federal agencies and DEC played a critical role in not only preventing an environmental catastrophe, but a human tragedy that became all too real to Alaskans two years ago when the M/V Selendang Ayu ran aground – killing six crew members, tearing the freighter apart and forcing a Coast Guard helicopter into the water.

Assisting with the rescue of the M/V Golden Seas is just one example of Shell's commitment to positively impacting the communities in which we work.

Quick Facts:

- Tor Viking II Built in Norway in 2000
- Length: 274.61 feet; breadth is 59.06 feet
- Berths for up to 23 persons
- Owned by Trans Viking Icebreaking and Offshore Associates
- Managed by Viking Supply Ships A/S, Kristiansand, Norway

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Community Meetings

Shell is committed to sharing its Alaska offshore plans with Alaskans. We believe our success in the region depends a great deal on the partnerships we form with the people living in the North Slope and Northwest Arctic Boroughs.

During 2011, Shell conducted a series of meetings in a number of Alaska communities. Shell staff opened the conversation with presentations on a variety of topics related to exploration. Experts were on hand to answer questions during kiosk sessions on drilling, science, oil spill prevention and response as well as economic benefits. Employees presented an overview of planned operations for 2011 and 2012. If you were unable to attend one of the sessions, you can find the presentation materials at www.shell.us/alaska.

Shell plans to continue to visit communities again to discuss 2012 operations and future opportunities.

Communities Shell visited:

- Kaktovik
- Nuiqsut
- Barrow
- Wainwright
- Point Lay
- Point Hope
- Kivalina
- Kotzebue
- Kiana
- Savoonga
- Gambell

Contact Shell

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or email to:
alaska@Shell.com

A website containing information about Shell's activities in Alaska is also available at:
www.shell.us/alaska