Exxon in Alaska

A 90-year History

Exxon in Alaska, a special publication from Petroleum News

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Prudhoe Bay discovery

Exxon in Alaska
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MAILING ADDRESS:
PO Box 231647
Anchorage, AK 99523-1647
Phone: (907) 522-9469
Fax: (907) 522-9583

Email:
circulation@PetroleumNews.com
Web page:
www.PetroleumNews.com

To order additional copies of this special publication, contact Clint Lasley, Petroleum News general manager and circulation director, at clasley@petroleumnews.com

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Petroleum news

MARTI REEVE
SPECIAL PUBLICATIONS DIRECTOR

WESLEY LOY
CONTRIBUTING WRITER

GIL MULL
CONTRIBUTING WRITER

STEVE QUINN
CONTRIBUTING WRITER

STEVE SUTHERLIN
CONTRIBUTING WRITER

STEVEN MERRITT
PRODUCTION DIRECTOR

MAPMAKERS ALASKA
CARTOGRAPHY

KAY CASHMAN
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An almost invisible partner

Snapshots of ExxonMobil's activities in Alaska's oil and gas sector

By KAY CASHMAN

Publisher & executive editor, Petroleum News

In doing the research for this publication — snapshots of ExxonMobil's involvement in Alaska — we discovered several interesting things about the company and its predecessors:

• A little known fact is that ExxonMobil, like most oil and gas companies, has been in Alaska off and on since it opened its first field office in 1921.

• During that time, ExxonMobil has operated numerous exploration wells all over the state, and been a partner in many more wells.Turn to page 90 for a list of ExxonMobil-operated wells, most of them expensive exploration wells, drilled in almost all of Alaska's oil and gas prone regions, including the Cook Inlet basin; the Navarin, St. George and St. Matthew-Hall basins of the Bering Sea; the Alaska Peninsula and Bristol Bay of the North Aleutian basin; the Gulf of Alaska basin; the Norton Sound basin; the Yukon Flats basin; the Copper River basin; the Beaufort Sea, Brooks Range Foothills and North Slope.

Kay Cashman

• ExxonMobil seldom touts its accomplishments as a very active, non-operating partner in Alaska.

• The mega-major has always been well-funded and that made a huge difference in its partnership with Richfield Oil,ARCO's predecessor. All the other key players were leaving northern Alaska, but ExxonMobil's financial strength allowed the ARCO/Humble team to drill one last well — the Prudhoe Bay discovery well, a location that was selected by Humble geologists.

• ExxonMobil has been a leader in technological research and application in the oil and gas industry, especially in the Arctic.

• It takes a long-term view regarding its oil and gas projects, which results in consistency in investment decisions, first-rate project execution and applying best practices around the world.

• The company's organizational structure encourages the effective sharing of ideas, technology and best practices with its partners, which has made a huge difference in Alaska.

For example, in the design of the trans-Alaska oil pipeline challenges associated with the operation of a warm pipeline in an unsta-

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ExxonMobil map, wells

See page 88 for map showing ExxonMobil's current Alaska acreage; page 90 for all ExxonMobil-operated wells in state.

RDC salutes ExxonMobil for its first 90 years in Alaska

BY TOM MALONEY
RDC president


Tom Maloney

The Resource Development Council salutes ExxonMobil for 90 years of leadership in Alaska's resource industry. ExxonMobil has been a very active RDC participant for more than 35 years. RDC is guided by the Mission Statement of Growing Alaska through Responsible Resource Development to:

- Promote sound resource development in Alaska;
- Link diverse interests on resource issues;
- Sustain and expand a diverse membership; and
- Educate the public, policymakers, and students on resource issues.

Outstanding contributions

In the past several years, I have seen the outstanding community-based and technical contributions of ExxonMobil personnel led by Alaska production managers including Jim Branch, Jack Williams, Richard Owen, Craig Haymes and Dale Pittman.

You can count on ExxonMobil attending and sponsoring remote fly-ins to learn more about resource issues — from fishing in Dutch Harbor to tourism in Skagway, from forestry in Southeast Alaska to mining in the Interior.

ExxonMobil has been a leader in promoting resource education throughout Alaska. For example, my son and many other Alaskan youths have used AMEREF education kits on multiple school projects.

My work involvement with ExxonMobil began in early 1977. The Trans-Alaska Pipeline System, TAPS, started operations several months later. Exxon's Ed Patton was the first CEO of Alyeska Pipeline. I remember Ed and other leaders predicting tremendous long-term success for Alaska, based on its resource wealth.

It is amazing that TAPS has carried more than 16 billion barrels of oil to date. Ed and other visionaries conquered formidable technical, financial and other challenges. We look forward to TAPS carrying many more billions of barrels for decades to come.

Largest owner of Prudhoe

Although ExxonMobil has not operated an active North Slope field, it is the largest owner of Prudhoe Bay, a 36.4 percent interest. RDC wishes ExxonMobil great success with its Point Thomson field and other large gas and oil prospects. Alaska desperately needs the jobs, investment, and economic benefits that ExxonMobil and

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CASHMAN: *continued from page 7*

ble permafrost environment were solved by using ExxonMobil technology, elevating the pipe above ground and using pipes to transfer heat from below ground to the air in winter.

In 1990, ExxonMobil's heat pipe work on the trans-Alaska pipeline was recognized by the United States Space Foundation with an Outstanding Achievement Award for civilian applications of NASA technology.

Also, ExxonMobil's enhanced oil recovery technologies, including tailored well-stimulation programs, full-field reservoir simulation and special core analysis capabilities have been critical to increasing Prudhoe Bay conventional oil reserves by approximately 30 percent over initial estimates.

ExxonMobil continues to assess opportunities for additional recovery improvements at the production units in which it is a partner, but not an operator — Prudhoe Bay, where it is the largest owner; Kuparuk River; and Duck Island, which includes Endicott.

As a partner, ExxonMobil often pushed exploration and development. An example is Point McIntyre, in the Prudhoe Bay unit. Without two ExxonMobil geologists using new technology to look at the characteristics of the field, and a very aggressive company agent forcing operator ARCO to drill a third exploration well after two busts, the field might not have been developed for years.

In the aftermath of its 1989 oil spill, ExxonMobil doubled its commitment to safeguarding the environment and employees. In 1992, it developed a rigorous worldwide management system called the Operations Integrity Management System.

ExxonMobil is in the process of developing the Point Thomson oil and gas field on the eastern North Slope, where it will operate a producing field in Alaska for the first time.

Who knows where that will lead?

RDC: *continued from previous page*

other investors bring to the state.

In 1968, Exxon and its partners discovered the Prudhoe Bay field. In 9 years, the largest oilfield and pipeline projects in North America's history were built. Since then, ExxonMobil and others have invested tens of billions of dollars to upgrade facilities, expand gas handling, drill new wells, create jobs and contribute to communities. Oil companies like ExxonMobil have paid more than $108 billion in state royalties and taxes over the past 30 years. The $39 billion Permanent Fund and our individual dividends come from our oil wealth. The companies that take 100 percent of the risk to lease, develop, and operate oil facilities are private investors like ExxonMobil.

ExxonMobil has helped to create new industries in Alaska. All the original Prudhoe Bay modules were engineered and built outside Alaska — today, many Alaska firms in multiple locations are involved in modular engineering and construction, providing some of the highest-paid technical jobs in the state.

Great corporate citizen

ExxonMobil is a committed supporter of opportunities for Alaskans. For example, its major sponsorship of the Alaska Native Science and Engineering Program has benefited youth across the state. Such programs boost the success of Native youth — from middle school through attainment of a Ph.D. Many Alaska employers have benefited by hiring these talented young technical minds.

Alaskans love dog sledding and ExxonMobil is a leading sponsor of sled dog races. The company's Iditarod sponsorship has fostered enthusiasm for the sport worldwide. Teachers incorporate the Iditarod in lesson plans, developing skills such as statistical analysis.

Another 90 years-plus

RDC envisions major ExxonMobil involvement in Alaska for the next 90-plus years. RDC wants private investors, along with state and federal agencies, to work closely like a sled dog team. After all, it took two dozen mushers and months to bring a serum to Nome to save a community from diphtheria. Alaskans need to work together to stem our steep decline in oil production and create a new gas industry to benefit our collective future.

ExxonMobil takes on some of the world's toughest energy challenges. We need investors to keep liquids in pipelines. Our economic lifeline — TAPS — is running 70 percent below throughput of 20 years ago. RDC and its many member companies in mining, tourism, oil and gas, fishing, and forestry sincerely appreciate ExxonMobil's support.

On behalf of all RDC members, thank you, ExxonMobil.

MSI Communications President Laurie Fagnani has overseen numerous successful campaigns, including the defeat of the gas reserves tax initiative and the anti-mining initiative.

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COURTESY EXXONMOBIL

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Historical highlights

1911: Standard Oil of New Jersey (Jersey) becomes independent with dissolution of Rockefeller's Standard Oil Trust.
1911: Humble Oil formed.
1919: Jersey acquires majority ownership of Humble Oil.
1921: General Petroleum enters Alaska, opens field office.
1925-26: General Petroleum drills dry hole at Yakataga Beach.
1926: Socony (Standard Oil of New York) purchases properties of General Petroleum.
1950-55: Middle Eastern countries nationalize oil industry; companies look for new prospective areas, including Alaska.
1955: Socony-Vacuum changes name to Socony Mobil Oil.
1958-59: Humble drills Bear Creek well on Alaska Peninsula, a dry hole.
1959: Jersey buys remainder of Humble.
1959: Alaska becomes nation's 49th state.
1959: General Petroleum merges into Socony Mobil Oil.
1959: Socony Mobil drills first of four wildcats on Kenai Peninsula, all dry holes.
1959: General Petroleum drills Great Basins wells on Alaska Peninsula, both dry.
1961: State of Alaska petroleum revenues reach $26 million.
1965: Socony Mobil discovers Granite Point field.
1966: Socony Mobil Oil changes name to Mobil Oil.
1966-67: Humble drills Susie well with Richfield 60 miles south of Prudhoe, a dry hole.
1967: Mobil's Granite Point field goes into production.
1968: Humble, Richfield announce Prudhoe Bay oil discovery.
1969: America's second largest oil field, Kuparuk River, discovered on North Slope.
1970: Cook Inlet basin oil production peaks at 225,000 barrels per day.
1972: Jersey changes name to Exxon.
1975: Construction begins on Trans Alaska Oil Pipeline System, or TAPS.
1975: Hydrocarbons first discovered at Point Thomson with Alaska State A-1 well.
1976: Constitutional Amendment establishes Alaska Permanent Fund to receive "at least 25%" of petroleum royalties.
1977: Exxon and partners form Point Thompson unit.
1977: Construction of TAPS completed; Prudhoe Bay production begins.
1977: Alaska Permanent Fund receives first deposit of dedicated oil revenues: $734,000.
1978: Exxon conducts world's largest ice-strengths tests at Prudhoe Bay.
1978: Endicott oil field discovered in Beaufort Sea.
1980: Alaska's personal income tax repealed.
1981: Kuparuk River oil field begins production.
1981: State petroleum revenue exceeds $3 billion; annual budget exceeds $2.5 billion.
1984-85: Exxon drills in Beaufort Sea, Norton Sound and Bering Sea.
1987: Endicott field starts production.
1988: Production from North Slope oil fields peaks at 2.1 million barrels per day.
1988: Point McIntyre field on North Slope discovered.
1989: Mega oil spill in Prince William Sound.
1993: Exxon drills last exploration well in Alaska, the Thetis Island No. 1, today part of Pioneer's Oooguruk unit.
1993: Point McIntyre field starts up.
1994: Alaska becomes nation's top oil producer for part of 1994, only time Alaska beats Texas.
1998: Discovered by ARCO and Exxon, first Prudhoe satellite field, Midnight Sun, starts up.
1998: Exxon and Mobil merge.
1998: XTO (then Cross Timbers) enters Alaska.
2000: Prudhoe Bay unit owners realign equity in oil rim, gas cap.
2004: Alaska daily oil production drops under 1M barrels.
2005: State of Alaska declares Point Thomson unit in default.
2009: With SOA's consent, ExxonMobil spuds first of two Point Thomson wells; looks to produce 10,000 bpd of condensate by end of 2014.
2009: ExxonMobil acquires XTO, making it a subsidiary.
2009: Exxon partners with TransCanada on Alaska gas pipeline project.
2010: Alaska Permanent Fund reaches $33.3 billion.

Another photo of the crew. Those still identifiable are Slim Zufall (seated at left), and Art Titus, fourth from left.

Alaska: It's an old story to G.P. veterans who pioneered in America's newest state

The only thing new about Alaska as far as the Mobil companies are concerned is the Territory's newly-won status as the 49th state.

True, there is a renewed interest in exploration there by General Petroleum. True, there is a new storage terminal under construction at Ketchikan, but this is all part of doing the job. We've been there before, we're there now, and we plan to be there in the future. We'd like to find some oil there, too, and who wouldn't?

Reprint

Taken from "Doings In General" Volume 29, No. 7, September-October 1958. An in-house publication of General Petroleum, a part of Mobil.

General Petroleum is busy, for it holds leases on nearly 100,000 acres in southern Alaska — about 50,000 on the Kenai Peninsula near another company's discovery, and 50,000 more near the mouth of the Kuskokwim River. The company is actively exploring several areas in Alaska.

Back in 1925 and 1926 General Petroleum made an effort to find oil at Yakataga Beach, which was described by one of the members of the drilling crew as a place "where wonderful things happen and where men are men and hardships are taken with a smile."

General Petroleum's venture into this wild country in those days stretched over a period of two years because of many difficulties — the weather, of course, terrain and mechanical problems. At any rate, the company's well, Sullivan No. 1, became a 2,005-foot

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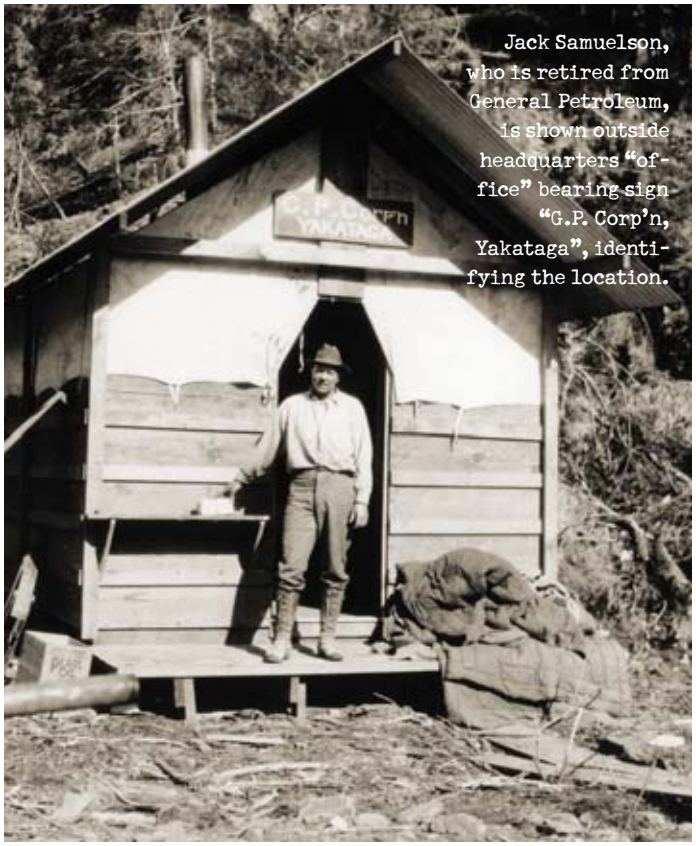

Jack Samuelson, who is retired from General Petroleum, is shown outside headquarters "office" bearing sign "G.P. Corp'n, Yakataga", identifying the location.

Winter settles in around General Petroleum's "tent city" headquarters at Yakataga. Note men sawing wood, which is neatly stacked under sheds for winter.

dry hole and the basis of many tall tales which have become taller with the passage of time.

One of the veterans of both years was Arthur W. Titus, who retired in 1957 as a division superintendent in General Petroleum's production department. Titus was a tool dresser on both expeditions and became quite an expert on the region.

Several years ago he went back to Yakataga and was asked to act as a guide and "spotter of landmarks" from aboard ship because of his knowledge of the region. He had in mind one particular arm of land which poked out into Icy Bay near Yakataga. He located the familiar Malaspina Glacier and knew he was close. He looked and looked for the landmark, but finally had to admit defeat. Apparently years of constant hammering by the elements had worn the arm away and it was no more. Titus, "the Alaska expert," took merciless ribbing from his friends for the disappearing landmark.

Some of the original members of that expedition are still in the industry or have retired recently. In addition to Titus, there are Carroll Wagner, now General Petroleum director of exploration; Max App, retired General Petroleum vice president and director of production; Bill Pettingell and R.M. ("Slim") Zufall, both still with General Petroleum; Jack Samuelson, formerly with General Petroleum.

Samuelson recalls hardships experienced with the expedition, both aboard ship trying to get to the drill site, and at the site itself.

"At Yakutat, 120 miles north of Juneau, we departed from the comforts of a modern steamer in exchange for the halibut boat Sunwing. This was a 50-foot gas boat which was purchased because chartered boats refused to tackle the ice. She proved to be one of the best buckers that could be found any place."

The experience left a lasting impression, for Samuelson remem-

On the ground in 1921

According to the book "Alaska: The 49th State," by Claus M. Naske and Herman E. Slotnick, in 1921 representatives from Mobil's General Petroleum came to Alaska to examine oil seepages at Cape Simpson, near Barrow, finding "two flows that encouraged their hopes of finding oil in quantities suitable for commercial production, but that did not happen for economic reasons — namely the discoveries of oil on the West Coast, particularly in California. But favorable geological conditions also existed in other parts of Alaska."

Other reports put General Petroleum geologists in an Alaska field office in 1921, and for the next few years in different parts of the state, their field work resulting in a decision to spud a well at "Yakataga Beach" in Icy Bay, which is part of the Gulf of Alaska.

bers every detail of the harrowing trip.

"Under a chilly moon and a freezing wind, the party left Yakutat headed for Icy Bay, a very appropriate name for the place. After a night of bad weather and every man willing to contribute his part to the feeding of the fish, morning found us heading into a bay completely covered with icebergs, little ones and others bigger than skyscrapers.

"This was in the first part of May and we were locked out by the ice, with the only hope that a westerly wind and an outgoing tide would scatter the ice so that a few leads could be found where the strong little craft and the scow she was towing would be able to wiggle into Mud Bay to unload the freight and men."

The scow hauled some freight and was to serve as a lifeboat if the need arose.

"God only knows what would have become of us if we had had to abandon the ship and use the scow," Samuelson says, "because no one calls in that isolated spot except pioneers looking for oil."

"A southeast wind with rain and snow continued to blow for six days. We had to find shelter on the southeastern shores of Icy Bay; waiting, and a the same time keeping close watch on change of weather so that the ice would not drift over and lock us in if the wind should change to a westerly. A strip of ice lay along the upper shore less than two miles wide, and it alone separated us from Mud Bay and our destination."

"On the sixth day the wind changed slightly, and orders were given to take a chance and break through, a task that looked rather impossible. The anchors on the boat and scow were lifted. We started into the ice, bucking, squeezing and squeaking, making very slow progress, sometimes heading for our destination and sometimes heading in the opposite direction trying to avoid some big icebergs we knew had the best of us."

"The crews, ready with pike poles and axes, hacked and chopped at the imprisoning mass to cut a channel through to the landing place. The men chopped madly. The boat was forced to its limit for the wind had changed."

"Then we all cheered as the last obstacle was reached — a final blow and shove sent us into the channel and landed us in Mud Bay. After days of waiting and fighting the mighty icebergs, the crews, tractors and oil field equipment were landed."

"The little boat was sent back to Yakutat with its crew to fight the same ice and storms trip after trip until the hundreds of tons of equipment needed for the expiation were landed on the beach."

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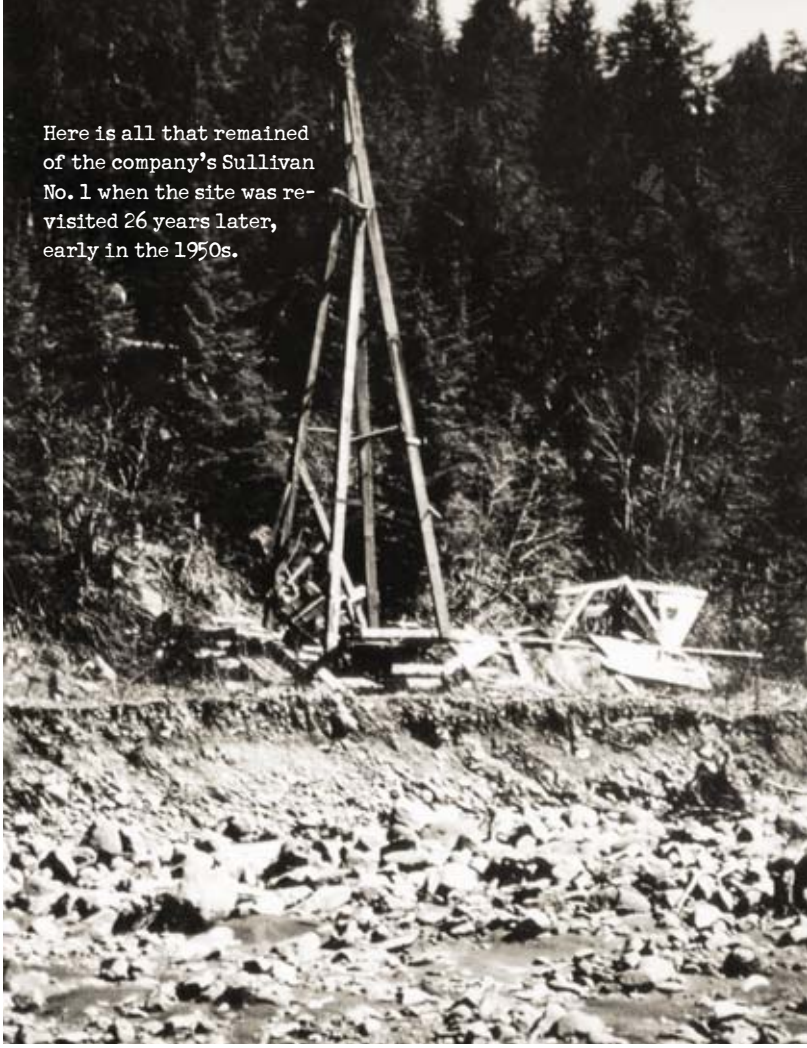

Here is all that remained of the company's Sullivan No. 1 when the site was revisited 26 years later, early in the 1950s.

1950s

COURTESY EXXONMOBIL

Humble drills deep at Bear Creek

In the summers of 1955 and 1956, Humble Oil conducted geologic fieldwork on the oil and gas potential of the Upper Triassic carbonates exposed on the western side of Shelikof Strait between Puale and Alinchak bays on the Alaska Peninsula. (Puale Bay used to be called Cold Bay.) The team also visited other Triassic outcrops along the east and west side of Cook Inlet.

The Humble field party was partly led by Bernold M. "Bruno" Hanson, a big, blustery geologist, who later gained a reputation as an independent oilman outside Alaska.

That effort led to a farm-in from Shell on Humble acreage along the Bear Creek anticline and the drilling of a 14,375-foot exploration well in 1958 and 1959.

Bear Creek No. 1 penetrated numerous hydrocarbon intervals between the surface and 8,200 feet, but not enough to warrant commercial production.

Humble subsequently abandoned exploration on the Alaska Peninsula, refocusing its efforts in interior and northern Alaska, per U.S. Geological Survey records.

***YAKATAGA**: continued from previous page*

"While the boat was making its dangerous trips, the men on shore were having their difficulties. Rivers had to be forded; miles and miles were traveled without roads or bridges."

"Two years of the hardest drilling imaginable resulted in failure."

"So the same problems had to be encountered again — in reverse — to remove the outfit. All of this for a dry hole."

And, in spite of the hardships involved at old Sullivan No. 1, the men still have a sentimental attachment for it.

"I saw the rig, with the supports still standing, the last time I was up there," Art Titus says. "I wanted to get a rope and give the whole works a big yank and let it fall. It looked kind of pitiful — barely able to stand up."

Oil prospectors don't give up. That's why the Mobil companies are still hopeful in Alaska.

1960s

Granite Point discovery was significant for Mobil

Mobil Oil press release
June 10, 1965

Mobil Oil Company has made a major oil discovery in the Cook Inlet, Alaska. Mobil Granite Point Number One, an offshore exploratory well, flowed at an average rate of more than 1,300 barrels per day, 42 API gravity, through a one-half inch choke during a test today.

The test was made through perforations at a depth of 8,700 feet from one of the several oil sands penetrated. A representative of the Oil and Gas Conservation Commission was present during the test, which was conducted in accordance with state regulations for qualification as a new field discovery well.

Located approximately 50 miles southwest of Anchorage, the discovery well is on a lease of 5,089 acres acquired by Mobil and Union Oil Company [today part of Chevron] and at a state competitive lease sale in July 1962, with a bonus of $608,003. Union now holds 25 percent interest in the lease.

Mobil and Union jointly hold a 3,520-acre lease, acquired at the same state sale, adjacent to the Granite Point lease upon which the discovery was made.

Mobil's Granite Point Number One is being drilled by Western Off Shore Drilling & Exploratory Company of Santa Fe Springs, Calif., from its offshore drilling barge WODECO Number 2. The well, spudded in on April 5, is scheduled to be drilled to 12,000 feet.

The Mobil well is the fifth significant industry oil discovery in Alaska and the fifth wildcat drilled by Mobil there since 1959. Mobil's four previous exploratory wells in Alaska were unsuccessful.

A sixth wildcat (Mobil-Atlantic) is now drilling on the Moquawkio reservation, six miles north of the Granite Point well. In addition to its exploratory drilling in the Cook Inlet, Mobil is participating in water seismic work in the Gulf of Alaska and also participated in an extensive seismic survey just completed on the Alaskan North Slope.

The company has conducted its own seismic surveys in the Bristol Bay Area and the Copper River Basin. Alone or in partnership with other companies, Mobil holds leases on 1,015,194 acres in Alaska.

Granite Point field, located in Alaska's Cook Inlet, began production less than two years after ExxonMobil discovered it in 1965. Development and drilling challenges included first-year ice — ice having experienced less than one year's growth — along with earthquakes, high tidal range and strong currents. The Granite Point platform, installed in 1966, was the first ExxonMobil installation of an offshore, ice-resistant platform and is still producing after almost 45 years of successful operation.
ExxonMobil photo

Granite Point expands to include seventh well

Mobil Oil press release
February 7, 1968

Mobil Oil Corporation has completed the seventh producing well on its offshore oil drilling and producing platform in the Cook Inlet of Alaska, bringing the total production from the platform to about 24,000 barrels a day. The seventh well flowed at the initial rate of 2,800 barrels a day.

Mobil is the operator for itself and Union Oil Company of California [today part of Chevron] and has 75 percent interest in the Granite Point lease on which the platform is located.

Development drilling on the Granite Point lease has been under way slightly more than a year. The first development well was brought in during May, 1967, at a rate of 2,200 barrels per day. With two rigs on the platform, drilling now is proceeding on the eighth and ninth wells.

Oil was discovered on the Granite Point lease in June 1965. The 5,000-acre lease is located 50 miles southwest of Anchorage, about three miles off the western shore of the Inlet. Mobil and Union paid the State of Alaska a bonus of $608,003 to acquire the lease in 1962.

Installation of the four-legged Granite Point platform was started in the Cook Inlet in July 1966, after its various parts and related equipment had been fabricated at several locations in the continental United States. Cost of the platform and dual eight-inch pipelines to shore was approximately $15 million.

At Granite Point shore facilities, oil from the platform is delivered to Cook Inlet pipeline for transporting 42 miles along the western shore of the Inlet to a marine terminal at Drift River. Mobil and four other companies share equal ownership in Cook Inlet Pipe Line Company. The 20-inch pipeline was completed in March 1967.

The first shipment of Mobil's Alaska crude reached Los Angeles Harbor Aug. 8, 1967 after being barged across the Inlet to a tanker dock at Nikiski on the Kenai Peninsula. The 31,000-ton tanker, Mobioil, lifted the first cargo of crude oil from the newly completed Drift River Terminal on Nov. 5, and now is on a regularly scheduled run between the Cook Inlet and the Los Angeles area where Mobil has a 110,000-barrel-a-day refinery.

With more than a million barrels of storage at Drift River, the pipeline company will add additional storage to handle the increasing Cook Inlet production. Cook Inlet pipeline also serves five other Cook Inlet offshore platforms.

Strike #1 at Susie for new partners

By PETROLEUM NEWS

In the summers of 1963 and 1964, at least six oil industry helicopter-supported field parties, including Richfield Oil (predecessor to Atlantic Richfield,) were fanned out across the North Slope.

The abandoned Navy camp and airstrip at Umiat, located on the Colville River in NPR-4, served as a base of operations. Wien Airlines had a station agent and several bush pilots based there, as well as three-day-a-week scheduled flights from Fairbanks on its route to Barrow.

In the summer of 1963, Richfield sent geologists Garnett Pessel and Gil Mull, two youngsters with several years of experience, to the North Slope to build on the data acquired by field parties in 1959 and 1960 and U.S. Geological Survey reports from the 1940s and 1950s.

Late in the season after two months of exploring, Pessel wrote a letter to Richfield's district geologist Ben Ryan, conveying their conclusions and describing a promising outcrop he had seen on the banks of the Sagavanirktok River.

"It was Cretaceous sand that just crumbled in your hand," Charlie Selman, Richfield's division geophysicist, said at a banquet in 1988. "He (Pessel) got all excited and wrote, 'If we can't find an oil field in something like this, I give up.'"

Selman added to Pessel's letter, recommending Richfield send a seismic crew up north.

COURTESY GIL MULL

Susie #1 well at midnight, with Nodwell vehicle in foreground

"As luck would have it," said Selman, "a drilling operation had been canceled somewhere else, so ... Jamison (Harry Jamison, Richfield's Alaska district manager in Los Angeles) got the funds to put a seismic crew on the North Slope."

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Exxon selects Prudhoe discovery well site

Humble Oil assumed an unusually active role as Atlantic Richfield's 50-50 partner on Alaska's North Slope in the 1960s

By STEVE QUINN
For Petroleum News

For years, Exxon subsidiary Humble Oil & Refining Co. was a footnote to Prudhoe Bay's history.

That's what happens to partners on an oil exploration and production project; they take a back seat to the field operator.

The operator, in this case Atlantic Richfield (predecessor to ARCO), gets the credit. The partner, in this case, Humble Oil, gets a passing mention.

It's an accepted way of life in the oil industry.

But the role Humble played on Prudhoe Bay's development as the company was being folded into what is now Exxon Mobil Corp. cannot be understated, according to those who worked on the North Slope of Alaska.

Humble brought money, technology, field expertise and some moxy from members of the exploration team to the lucrative partnership that helped produce the first discovery well.

Without this convergence, a dry hole might have been a final word, at least for a while. "When the time came to make a press release, Humble at the best was a small print," said Crandall Jones,

continued on next page

Partners Richfield Oil and Humble Oil move the Loffland Bros. drill rig from the Susie well north to drill Prudhoe Bay State No. 1 with a cat train in February 1967. Bob Jacobs, a pilot for Interior Airways, took the photo.

COURTESY GIL MULL

The Alaska Airlines Hercules C-130 airplane was a workhorse of the era because of its immense cargo capacity.

COURTESY GIL MULL

who served as Humble's Alaska division exploration manager following the discovery."It always stuck in our craw.

"Humble's engineers had a lot of input.They worked with ARCO very closely on what to do next.

"Everybody thought it all this was ARCO's doing. Humble selected the location of the discovery well," which led to ARCO's 1968 Prudhoe Bay discovery announcement.

Neither Jones nor other former Humble employees want to revise history or even grab ARCO's headlines; they simply want to fill in a few blanks.

That starts with the key discovery well.

"ARCO wanted to drill a well quite a few miles south of Prudhoe Bay," Jones said.

"Being the operator, they got a rig in there and drilled it pretty deep — 10,000 feet.

"And it was a dry hole.The question then was, where do we go from here."

That's where J.R. Jackson Jr., Humble's Alaska division exploration manager before Jones, entered the picture, said Jones and others of those years.

Jackson reviewed structural maps from seismic work previously completed. He detected what's known as an anticline, or a dome, almost football shaped.

If there were oil and gas — and they typically were together, Jones said — it would migrate to the dome and be trapped there.

So Jackson pleaded his case to Humble's board of directors in Houston, Jones said.

"They weren't hot on it, but he sold them," Jones said."He and

continued on page 22

Supporting Alaskans (and their dogs)

ExxonMobil contributes in several ways; in Alaska one way is dog sled races

By PETROLEUM NEWS

Throughout its history, ExxonMobil has had a tradition of contributing to the communities and economies in which it operates. In addition to revenues and taxes generated by its operations, the company contributes by utilizing local suppliers, contractors and vendors, and supporting community initiatives.

ExxonMobil has a long history of community support throughout Alaska, currently providing funding to about 40 non-profits.

Organizations also receive ExxonMobil support in the form of various employee volunteer efforts. In addition, the ExxonMobil Community Summer Jobs Program provides funding for paid internships to organizations throughout the state for students interested in pursuing a career with non-profit groups.

ExxonMobil has been the sole sponsor of the ExxonMobil Open Dog Sled Race since 1973. This event is held annually over a two-day period and attracts numerous international mushers.

Expanding in 2011

This year, 2011, for its 38th annual race, ExxonMobil and the Alaskan Sled Dog & Racing Association are expanding activities by including an invitational charity race featuring some of Anchorage's municipal leaders.

The event is open to the public, and includes a hospitality tent, refreshments, the chance to meet the mushers and an ExxonMobil Open poster to the first 1,000 guests (see Top Dog poster).

ExxonMobil has also been a continuous sponsor of the Iditarod

COURTESY BRITT COON

Dog Sled Race (see Iditarod 2011 poster) since 1978. This world-class, iconic Alaska event generates an international following, and many Alaska schools have students interactively track the geographic progress of the mushers along the Iditarod trail from Anchorage to Nome.

In 2009, ExxonMobil expanded its support to the Iditarod by sponsoring the Iditarod Education Program through a $1.25 million multi-year contribution. The program employs state-of-the-art GPS technology, video on demand and web-based learning tools to connect students to real-time race events. ExxonMobil is also working with the Iditarod Education Program to enhance its content and outreach further — within Alaska, throughout the United States and around the world.

Funding and leadership participation are also provided by ExxonMobil to various business, civic, educational and social organizations such as state and local Chambers of Commerce, the Alaska Support Industry Alliance, Resource Development Council, Alaska Council on Economic Education, Anchorage Alaska Economic Development Corporation, Junior Achievement and the Alaska Federation of Natives.

SUSIE WELL: *continued from page 18*

Great deal for Humble

Despite Richfield's growing enthusiasm for North Slope exploration, limited budgets probably would have quashed the company's oil hunting efforts in the Arctic were it not for a strategic partnership it entered with Humble, then a subsidiary of Exxon, in preparation to bid on leases in the State of Alaska's first North Slope lease sale in December 1964.

"That partnership has to have been one of the all-time great deals for Humble," said Mull, who went to work for Humble in 1967. "It bought into half of everything Richfield had done to that point (which included surface field mapping, seismic data, and federal leases Richfield had previously acquired) — all for $1.5 million in cash and an obligation to pay for another $3 million worth of seismic data."

In 1966, ARCO and Humble spent more than $4.5 million (in 1968 dollars) on the Susie No. 1 well, just north of the Brooks Range foothills on the Sagavanirktok River. The well had oil shows but not enough to be deemed commercial. The partners abandoned it on Jan. 9, 1967.

Still, from that great loss came one of the biggest triumphs in business history: The discovery of oil at Prudhoe Bay.

A tent camp and Bell G2 helicopter used by Humble Oil and Richfield Oil Co. geologists in their fieldwork on the North Slope during a mid-summer snowstorm.

COURTESY GIL MULL

***DISCOVERY WELL**: continued from page 20*

the exploration management team convinced them it was worth while to have one more try.

"That one more try was a discovery well. If it hadn't been for Humble, there may not have been any Prudhoe Bay."

Hank Repp, a field geologist for Carter Oil in the 1950s before it became part of Humble, says Jones' recollection is spot on.

"This was a real challenge, since in 1966 Humble joined with ARCO in the drilling of a very expensive dry hole in the foothills of the Brooks Range," Repp said.

"In spite of this failure J.R., was able to convince the management in Houston to jointly drill the Prudhoe Bay wildcat," Repp said. "They agreed to drill "one more" wildcat on the North Slope.

"Since ARCO was the operator, Humble's attitude was to remain as supportive of their decisions and yet provide as much technical and financial advice as needed. Crandall was very effective in dealing with ARCO at the time."

With the expertise, came money.

Humble nearly dropped out of Alaska exploration in the late 1950s. Richfield, though bullish on the North Slope, needed money as it prepared to bid on various leases.

It was to be part of the state's first North Slope lease sale, and it was December 1964.

Humble brought as much as $5 million to the table, including $1.5 million in cash before the lease sale.

Jamison shares credit with Exxon

Prudhoe Bay historians routinely identify H.C."Harry" Jamison as the central figure for discovering the Prudhoe Bay oil field.

Jamison, in the 1960s a young geologist with Richfield Oil, however, quickly identifies three people at Humble Oil, then controlled by Exxon but today part of it, as equally key figures in the discovery. They are JR Jackson, Dean Morgridge and Ken Fuller, Humble's Alaska team, which was located just across from ARCO's Los Angeles' offices.

It began with Jamison's sales pitch to these men that helped bring the two companies together.

Morgridge was a geologist who had long been bullish about the prospects of pursuing oil north rather than focusing on Cook Inlet to the south.

Jackson served as the office's exploration manager and is remembered for working with Humble's senior management and board in the company's North Slope pursuits.

Fuller was a geophysicist who brought depth to the technical discussions because information was sparse.

In addition to being short on geologic data, the North Slope was a tough sell to Humble's top management because they were still smarting over Humble's dry hole at Bear Creek on the Alaska Peninsula — a well that cost $7 million, at the time one of the most expensive wildcat wells in history.

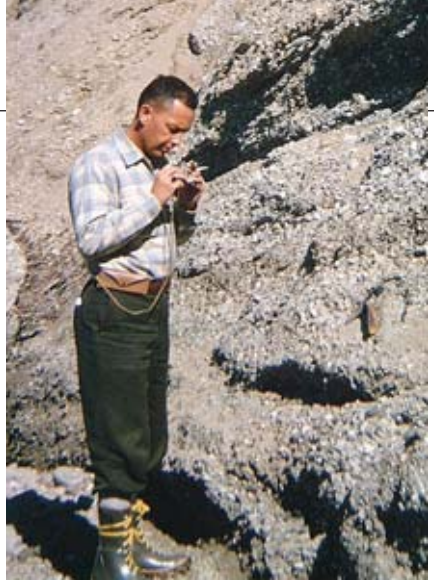
"Dean was quite knowledgeable about North Slope geology," Jamison said of Morgridge. "And JR trusted Dean's judgment.

Compared to today three men had very little data to haul up the corporate ladder.

"This was a risky, far out proposition for everybody concerned," Jamison said. "Most geologists and certainly management people were not capable of looking at paper records, and really understanding how they were put together. Ken was."

Their collective belief in the North Slope worked and by 1964, Humble had half of Richfield's interest in the North Slope — half the lease interests, half the geologic data, half the equipment. Half of everything.

—Steve Quinn



COURTESY GIL MULL

H.C. "Harry" Jamison is generally regarded as the Richfield Oil Co. executive most responsible for the discovery of the Prudhoe Bay oil field, though he steadfastly maintains that the feat was the best of team efforts.

"Humble brought a lot of money in, and had the financial wherewithal possible for exploring on a much more active basis," recalled Gil Mull, a geologist with Richfield who went to work for Humble before the Prudhoe discovery well was drilled.

"The infusion of cash brought in by Humble was pretty important because Richfield was pretty small and sort of under-capitalized."

Money also meant backing for more surveys.

"After the partnership came on, we ran seismic lines farther up north," Mull said.

"They were definitely participating in the field work, field interpretations. Both companies participated, providing personnel for it.

"Humble was definitely there with us. There were two of us from Richfield and two of us from Humble.

"We spent two full field seasons together doing seismic in the Brooks Range, and they brought a lot," Mull said.

With investment came an education on what it took for Humble's management team to do business on the North Slope.

A visit to northern Alaska from offices in Texas and California required several commercial flights and a charter.

Like many from the Lower 48 states, the first trip to the North Slope remains memorable.

Jones arrived after a long journey from Southern California.

"We took regular airline to Fairbanks, then we got on a charter — a twin otter — with two turbo props with about 15 seats," he said. "It was a magnificent flight.

"We flew over the Brooks Range and onto the North Slope. It had small lakes and quite a few rivers all flowing out of the Brooks Range and into the Arctic Ocean.

"We were up there in the summer time so the ocean was free of ice. It was a beautiful place.

"We landed on an airstrip near the discovery well. It was shut in. We didn't have any place to put the oil yet. They made the strip."

As he got to know Alaska, he saw the logistics challenge behind getting equipment to the Arctic.

"I had a feel of what went on; it was just harder and more expensive to do it," Jones said.

"You came through the Bering Strait and the Bering Sea, then into the Arctic Ocean in the summer. It was a window that didn't last too long.

"They were waiting for the ice to melt; when it melted then they could go on down to Prudhoe Bay, then tie onto shallow water.

"We also had cargo planes that you could load on an entire rig taken apart. It was much cheaper if you could plan ahead and go around the Bering Strait.

"We had to do everything we could to preserve the environment. We bent over backward.

"That was one of the key things: don't mess up the environment. I think we did a good job."

More than 40 years later, Jones still reflects on a task that some he believes takes for granted: getting the oil off the North Slope.

"The wells were shut in until we figured out how we would get the oil to market," Jones said.

"There was discussion about whether it would go through Anchorage or even Canada.

"I don't think anybody thought there was any other way of doing things. If you ask me, it was a remarkable piece of engineering."

Nominated to spend Christmas at Prudhoe Bay

Personal reflections from renowned Alaska geologist Gil Mull, who sat on the Prudhoe discovery well for ExxonMobil

By GIL MULL
For Petroleum News

It was totally unexpected; it was mid-December 1967, not long before Christmas, and there I was, suddenly on an airline flight from Los Angeles to Fairbanks, where I transferred to a bush flight heading for the Prudhoe Bay State No. 1 drill site.

Although ARCO was the operator on the well, Exxon's Humble Oil & Refining was a 50 percent partner in the well and wanted to have its own geologist there to observe operations and to assist the ARCO geologists with sample examination and evaluation of the stratigraphy encountered in the well.

The well was a rank wildcat, located 60 miles from the nearest well or outcrop control, so that prediction of the stratigraphy to be expected in the hole was based on seismic control and projections from what we had seen in our outcrop mapping during our summer field work.

I'm sure management had not originally planned to send me up as the Humble well site geologist, because I was a relatively inexperienced, recently hired junior geologist with less than six months with Humble. But, unexpectedly, my colleague Bill Schetter, who was the Humble well site geologist on the well, announced that he had accepted a college faculty position to teach geology, and suddenly the company needed someone to replace him.

I had had three years of field mapping experience with Richfield Oil (ARCO) in the Brooks Range and on the North Slope before I joined Humble and thus was familiar with the North Slope stratigraphy and the Prudhoe prospect. And, I also had well site experience as one of the ARCO well site geologists the previous winter on the Susie Unit No. 1 well — a dry hole in the foothills 60 miles south of Prudhoe Bay.

Thus, although my specialty was outcrop geologic mapping, I was nominated to spend Christmas on the North Slope for the second year in a row, to represent Humble and assist ARCO geologist Marv Mangus and his alternate Bill Pentilla.

Things were becoming interesting

As the bush flight crossed the Brooks Range and out onto

Prudhoe Bay State No. 1 drill site and winter airstrip, early February 1968.

COURTESY GIL MULL

the North Slope in the mid-winter darkness, a single light in the distance became visible — the rig lights at the Prudhoe Bay well site — our destination. The airstrip was a snow and ice strip on the tundra, and in the mid-day twilight the plane taxied up to an unloading ramp right outside the camp and the drill rig.

The camp consisted of two parallel rows of ATCO trailers strung together end-to-end and roofed over with sheets of plywood, and was about three quarters buried by drifting snow. The drill rig stood about 100 yards away at the east end of the camp.

Only a short time before my arrival, the well had reached the top of the Sadlerochit Formation (also known as the Ivishak Formation) at a depth of 8,208 feet, and things were beginning to become interesting. In the nearest outcrops 60 miles to the southeast in the Brooks Range, the Sadlerochit is hard dense sandstone, but at Prudhoe the bit penetrated porous sandstone and conglomerate.

And, even more interesting — although there had been some oil and gas shows higher in the well, methane gas readings in the drilling mud abruptly went off-scale in the Sadlerochit — which was a really encouraging sign. Inasmuch as there was no way of predicting with any level of confidence how thick this interval might be, drilling progressed slowly, we cut several cores, and wire-line logs were run in order to get a better idea of the reservoir quality of the sandstone and conglomerate.

continued on next page

Interior Airways Beech Kingair on parking apron outside Prudhoe Bay camp. This aircraft provided transportation for personnel to Fairbanks or Barrow for daily telephone drilling reports to the company offices.

COURTESY GIL MULL

Communication limited to radio

In the early stages of drilling at Prudhoe Bay, the only means of communication between the rig and the ARCO and Humble offices was by single side band HF radio — there were no telephones on this part of the North Slope and the nearest public telephone was at Barrow, 200 miles to the northwest.

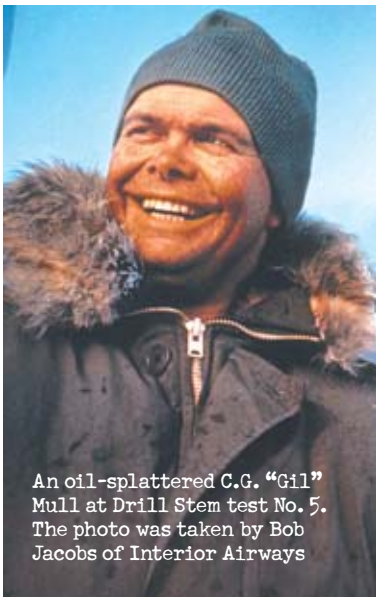
The daily drilling reports and geological reports were transmitted to the ARCO office in Anchorage on an open radio frequency that anyone could listen in on. On a few occasions when the single sideband radio signals were out, a ham radio operator who had his ham set there in camp was sometimes able to contact someone on the ham network. In these cases, the daily drilling and geological reports were relayed to the ham radio operator on the other end, whoever and where ever he was, who then placed a collect phone call to the ARCO office in Anchorage to relay the reports.

Inasmuch as the radio link was often unreliable, company management gave the drilling and geological personnel on the rig a great amount of autonomy to proceed using their best judgment. This was a level of autonomy that is unheard of today in an era in which satellites enable continuous communication between remote rigs and the headquarters offices. But in 1967, the management folks in Anchorage and Los Angeles, where the Humble office was located, knew that if they did not receive a daily report from the rig, it was undoubtedly due to poor radio signals, and assumed that things were OK at the rig. They knew that if the rig personnel needed help or advice, they would be contacted somehow.

A thousand mile daily commute

But after the well penetrated into the Sadlerochit Formation with its high gas readings in the drilling mud, it was obvious that things were getting more interesting by the day, and this sort of casual communication between rig and town came to a screeching halt.

Thus began a new daily routine. The first thing the geologists did in the morning was to update our sample logs and reports, and then picked up the daily drilling report from the tool pusher. Then one of us, usually me — leaving the ARCO geologist to monitor the drilling activity — hopped in the Interior Airways Beach Kingair that pilot Bob Jacobs was warming up.



An oil-splattered C.G. "Gil" Mull at Drill Stem test No. 5. The photo was taken by Bob Jacobs of Interior Airways

COURTESY GIL MULL

Depending upon the weather, we flew to either Barrow or to Fairbanks to phone the reports in to the offices in Anchorage and Los Angeles. When we flew to Fairbanks, this was a daily commute of over a thousand miles to make two or three telephone calls, and I was usually back to the rig by early afternoon.

By Christmas day, the well had penetrated over 350 feet of predominantly sandstone and conglomerate, accompanied by continued high gas readings in the drilling mud, and oil shows in some of the lower core samples.

This was a phenomenal thickness of potential reservoir beds and the decision was made to run an open-hole drill stem test (DST) to determine the flow capability of the lower 180 feet of the Sadlerochit Formation.

The test tool was opened early in the morning of Dec. 27, 1967, with a result totally unlike anything I had ever previously experienced in a drill stem test, or DST. In the tests that I had witnessed in the past on other wells, all that happened when the tester was opened was a weak puff of air flowing from the drill pipe, which then died to nothing. In this test, there was an immediate roar of high-pressure gas flowing to the surface, which was diverted to a flow pipe and ignited to make a flare that was up to 30 feet long blowing into the teeth of a headwind.

The gas flow was estimated at 1.25 million cubic feet per day (1.25 MMCF/D) through a 1/8 inch choke at a pressure of over 3,000 psi; this continued all day, with a rumble that shook the rig and resembled the sound of a jet plane overhead. The pressure was so great that after the test tool was closed late in the afternoon, the flare burned most of the night as the high pressure in the drill pipe bled down.

Looks like gas discovery

By the morning of Dec. 28, the gas pressure in the drill pipe was finally exhausted and at last the drill crew was able to begin to come out of the hole with the drill pipe and test tool.

But by that time, the bottom of the hole had begun to cave, and the 8,500 feet of drill string and DST tool could be moved only a few feet up and down. The tester and lower part of the drill string were stuck in the hole, and a fishing job was begun.

Although no wire-line logs were available for the lower part of the hole and the charts in the test tool could not be recovered, the test showed that the well had penetrated a high-pressure gas reservoir that was at least 385 feet thick, with no indication of either a gas-oil or gas-water contact.

It was beginning to appear that Prudhoe Bay might very well be a significant gas discovery. This was exciting, but oil, not gas, was the objective and the full significance of the discovery was going to have to await further drilling — and that was not going to occur until the fishing job was completed.

Clearly, there was going to be no need for geologists at the well site for some time, so I flew back to Anchorage and then on to the office in Los Angeles. The results of the DST were headline news in the Jan. 16 Anchorage Daily Times.

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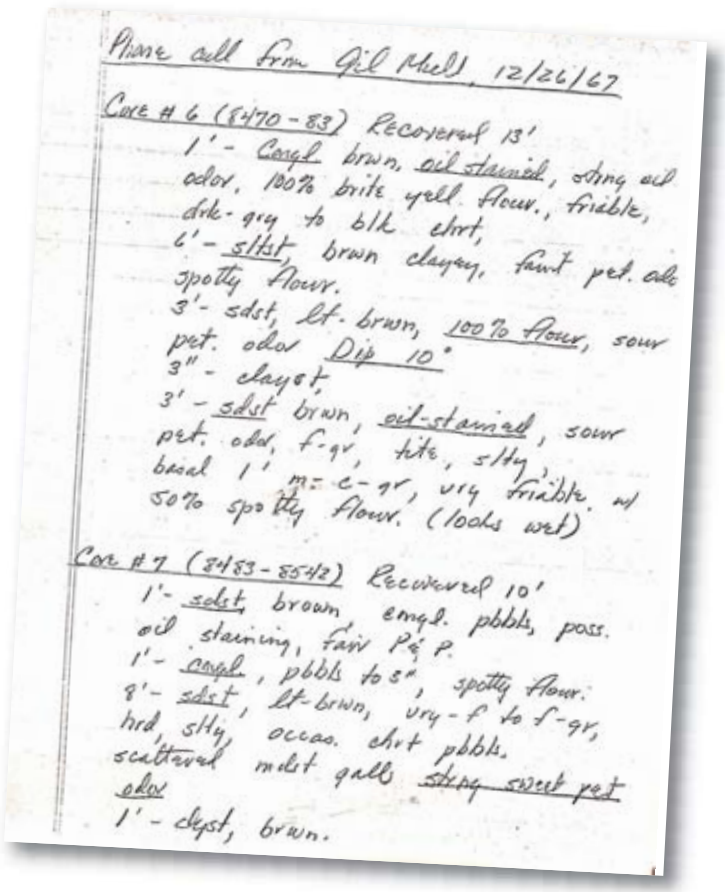

Phone call from Gil Mull, 12/26/67

Core # 6 (8470 - 83) Recovered 13'
1' - Congl brown, oil stained, strong oil odor, 100% brite yell flour., friable, dk-grey to blk chrt,
6' - sltst, brown clayey, faint pet. odor spotty flour.
3' - sdst, lt. brown, 100% flour, sour pet. odor Dip 10°
3" - clayst,
3' - sdst brown, oil-stained, sour pet. odor, f-gr, tite, slty, basal 1' m-c-gr, vry friable. w/ 50% spotty flour. (looks wet)

Core # 7 (8483 - 8542) Recovered 10'
1' - sdst brown, congl. pbbls, poss. oil staining, fair P & P.
1' - congl, pbbls to 3", spotty flour.
8' - sdst, lt-brown, vry-f to f-gr, hrd, slty, occas. chrt pbbls. scattered moist galls strong sweet pet odor
1' - clyst, brown.

Copy of hand copied drilling report telephoned to Humble office in Los Angeles, describing oil staining in samples and plans for drill stem test of the Sadlerochit Formation. Courtesy Gil Mull.

Flare of burning gas at drill rig during drill stem test of Sadlerochit formation; first tested flow of gas from Prudhoe Bay field, late afternoon of Dec. 27, 1967. High pressure gas flow estimated at 1.25 million cubic feet of gas per day. Note drifting snow in foreground.

COURTESY GIL MULL

Anchorage Daily Times
January 16, 1968

NORTH SLOPE WELL STRIKES GAS

Top Of The Times

City Checks Huge Losses Of Fuel Oil

Arctic Wildcat Find Reported As 'Substantial'

Sportsmen Seek Okay For Veloon

Side-track to oil

After several days of unsuccessful attempts to free the stuck drill string and test tools, the decision was made to side-track the lower part of the original hole and drill around the stuck fish. This took a couple of weeks, and when drilling into new geology resumed in late January, Hank Repp, one of the Humble senior geologists, went back as the Humble well site geologist.

The base of the Sadlerochit sandstone and conglomerate interval was finally reached at 8,670 feet — an interval thickness of over 460 feet with about 300 feet net sandstone and conglomerate as potential reservoir beds. Even more significantly, the lower 40 feet of the sandstone was oil saturated, and no oil/water contact was encountered.

After wire-line logs were run, a string of casing was set through the Sadlerochit and drilling continued into the underlying Lisburne Formation, which was found to consist of hard limestone with interbedded brown, porous, oil saturated dolomite.

Another open-hole drill stem test in the top of the Lisburne

recovered light oil that flowed intermittently with a high volume of gas. This test showed that the Lisburne was also an oil reservoir, but the flow of gas suggested that there was communication with the overlying Sadlerochit Formation, which was behind casing.

During the DST, some of the high-pressure gas from higher in the well was apparently bypassing the cemented casing and into the lower part of the hole, where it flowed with the oil from the Lisburne.

The level of excitement on the well was increasing. Although the rate of oil flow during the test could not be measured, the discovery of oil in the well was headline news in the Feb. 16 Anchorage Daily Times.


Anchorage Daily Times
February 16, 1968
ARCTIC SLOPE WELL STRIKES OIL
Top Of The Times
Minority Leaders Attack Shuffling Of Agency Chiefs
'It Looks Good,' Says Richfield, At Prudhoe Bay
Heavy Fight Is Continuing For Citadel

Mull, Pentilla back on well

When drilling in the Lisburne resumed after that drill stem test, ARCO geologist Bill Pentilla and I were back on the well, which was then drilling in dense limestone with more beds of brown oil-stained dolomite.

By the end of the first week of March, we had drilled and cored over a thousand feet of Lisburne that contained a number of thin beds of oil-saturated dolomite. Another drill-stem test was run, to test a 320-foot interval in the lower part of the Lisburne. This test was a spectacular success.

About 20 minutes after the test tool was opened, the light flow of air from the drill pipe was followed by gas to the surface and then in about two hours oil began flowing to the surface.

Oil flowed for 7 hours at a measured rate of 1,152 barrels of oil per day (1,152 BOPD); this test confirmed beyond any question that Prudhoe Bay State No. 1 was a significant oil and gas discovery.

In addition to the oil saturated dolomite beds in the Lisburne, the Sadlerochit Formation was clearly an even better reservoir unit with as much as 300 feet of net sandstone and conglomerate in an interval about 460 feet thick.

And more importantly, there was no indication of an oil-water contact in either the Sadlerochit or Lisburne. The wire-line logs, core data, and drill stem test data indicated a gas column of about 420 feet in the Sadlerochit, and no way of knowing the height of the oil column.

Sag River confirmation well

Evaluation of the drilling results to this point clearly indicated to ARCO and Humble management that additional evaluation was necessary. A second well was going to be needed to determine the lateral extent of the Sadlerochit reservoir beds and to find the oil-water contact to determine the height of the oil column. A drill rig that BP and Sinclair Oil had used to drill a dry hole near the Colville River west of Prudhoe Bay was brought along the coast by cat train over a winter road on the sea ice.

And, clearly, more detailed seismic data was needed.

Thus began a major mobilization of equipment unlike anything seen before in Alaska. In mid-March, while drilling continued at Prudhoe Bay No. 1, a massive airlift began and two Alaska Airlines C-130 Hercules cargo planes began flying around the clock from Fairbanks. The Prudhoe well site was a beehive of activity as about every two hours, night and day, another Hercules would taxi into the ramp just outside our sleeping trailer and offload another 40 tons of equipment. On some occasions, two Hercs were on the ramp at the same time.

The planes flew in thousands of feet of drill pipe and casing, thousands of

continued on next page

Oil flow from drill stem test No. 5 in Lisburne Formation, measured 1,152 barrels of oil per day, March 15, 1968.

COURTESY GIL MULL

How Prudhoe Bay was named

The first mention of the name "Prudhoe Bay" was a brief entry in the journal of British explorer Sir John Franklin, dated Aug. 16, 1826. Franklin saw the bay during an expedition by boat down the Mackenzie River in Canada (the river flows from south to north) and then west along the Arctic coast.

The name honors a fellow naval officer and explorer-scientist, Captain Algernon Percy, Baron of Prudhoe.

The word "prudhoe" itself is a Saxon term meaning "proud height," and a Prudhoe castle was built in the 12th century on a hill overlooking the river Tyne in Northumberland, England.

sacks of drilling mud and cement, seismic equipment, seismic camps, trucks and construction equipment to build a second drill site (figure 10), and all of the supplies needed to support another large camp for the drilling of the second well. This location, named Sag River State No. 1, was to be near the banks of the Sagavanirktok River, seven miles southeast of the Prudhoe Bay drill site and, based on the available seismic data, was predicted to be three to four hundred feet structurally lower than Prudhoe Bay State No. 1.

By May, drilling at the Prudhoe Bay well had ended and the well was undergoing a very detailed testing program. Meanwhile, the Sag River drill site had been completed and drilling was progressing rapidly.

Hank Repp, Dean Morgridge, and I took turns as the Humble well site geologists, working with ARCO geologists Marv Mangus, Bill Pentilla, and Bob Anderson (no relation to R.O. Anderson).

In some ways, this well was even more interesting than the Prudhoe Bay discovery well. By early June, the top of the Sadlerochit was reached and was being evaluated by almost continuous coring. Most of the Sadlerochit was within the oil column, and some of the sandstones and conglomerates appeared to have even better reservoir quality than at Prudhoe Bay.

C 130 Hercules cargo plane unloading equipment on ramp outside the camp sleeping quarters at Prudhoe Bay during massive equipment mobilization following announcement of major oil discovery in late March 1968.

COURTESY GIL MULL

Anchorage Daily Times

March 13, 1968

PRUDHOE WELL: 1,152 BARRELS

Top Of The

Kennedy Hints He May Run Against LBJ

Gas, Oil Flow 'Encouraging' To Two Firms

More than 500 feet thick

Security was very tight, and only the geologists were supposed to see the rocks that were being extracted from the core barrels, but one 20-foot core was particularly memorable. Usually, a solid cylinder of rock came out of the core barrel and was laid out in trays to be examined in detail. But in this case, with the core barrel hanging vertically in the derrick, when the core bit was removed from the barrel, out poured a pile of unconsolidated sand, gravel, and oil — which flowed through openings in the derrick floor and into the rig cellar. The porosity and permeability of this interval was fantastic. The entire drill crew soon saw and knew exactly what we were finding.

The Sag River field confirmation well showed that the Sadlerochit reservoir interval was over 500 feet thick, with at least 300 feet of net reservoir-quality sandstone and conglomerate, and a 400-foot oil column below a gas cap that was also about 400 feet thick.

The drilling and test data from the Prudhoe Bay State No. 1 and Sag River State No. 1 wells, along with the seismic maps of the area were given to the consulting firm DeGolyer and Mac-

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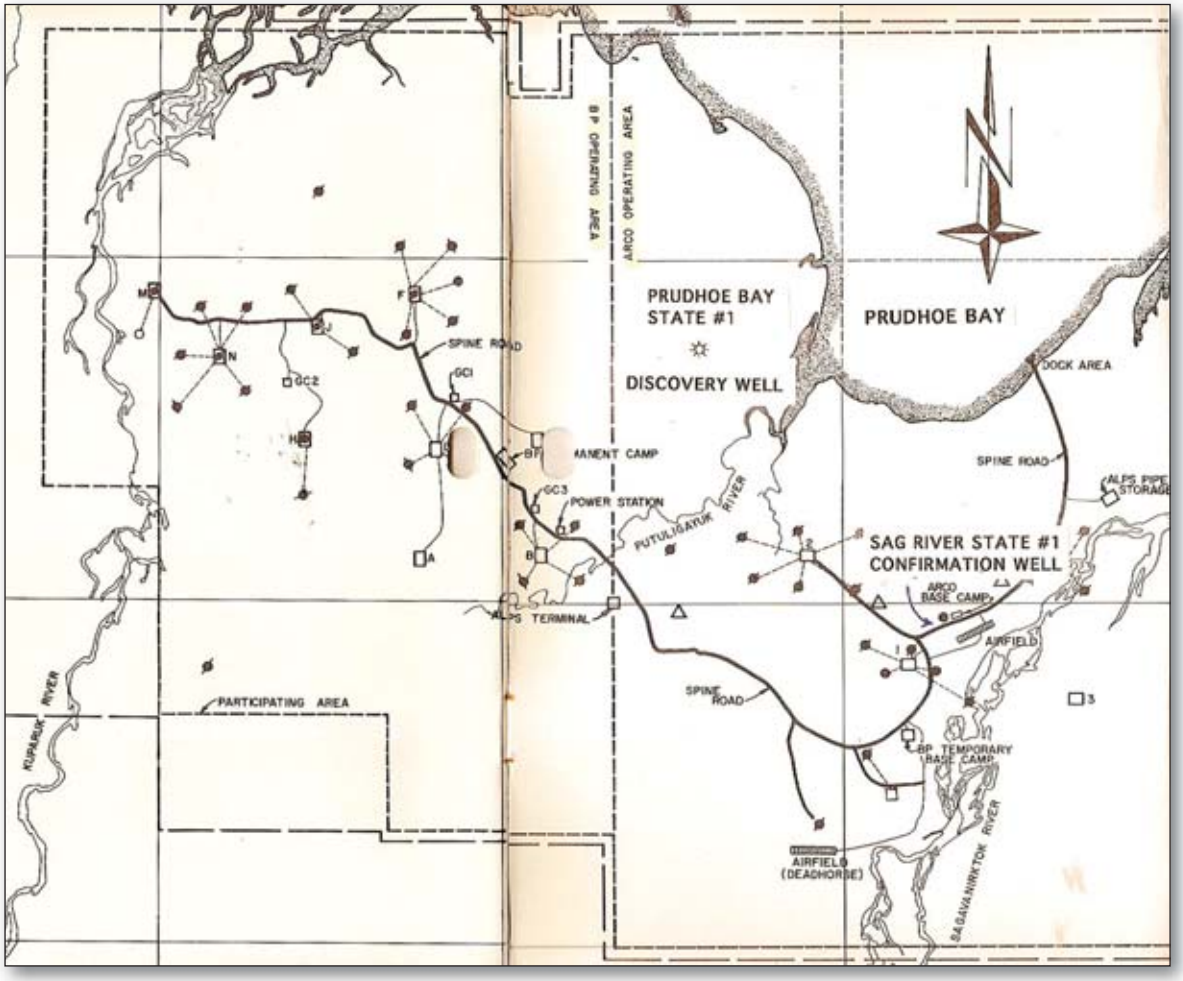
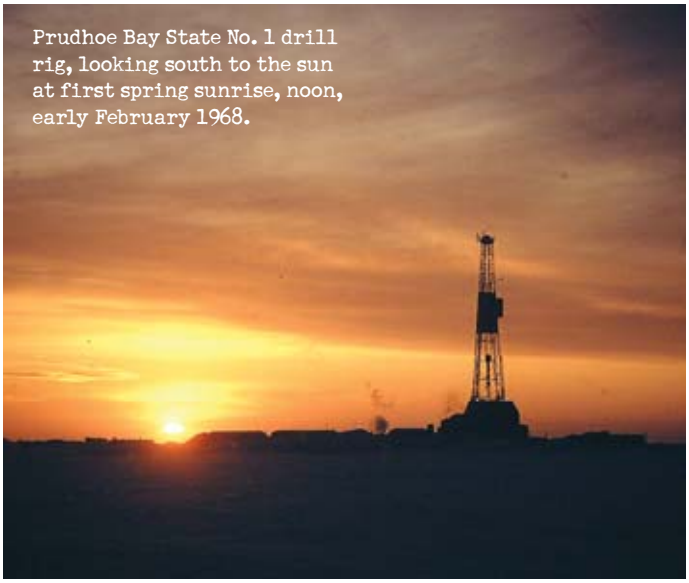


COURTESY GIL MULL



Prudhoe Bay State No. 1 drill rig, looking south to the sun at first spring sunrise, noon, early February 1968.

COURTESY GIL MULL

Naughton for an independent evaluation of the significance of the discovery.

And on July 18, ARCO and Humble released the results of this independent evaluation, which estimated that Prudhoe Bay contained between 5 billion and 10 billion barrels of oil, which would make it the largest oil field in North America.

But by the time the announcement made the headlines, my field partner Howard Sonneman and I were back in the Brooks Range for another season pounding on rocks and making geologic maps.

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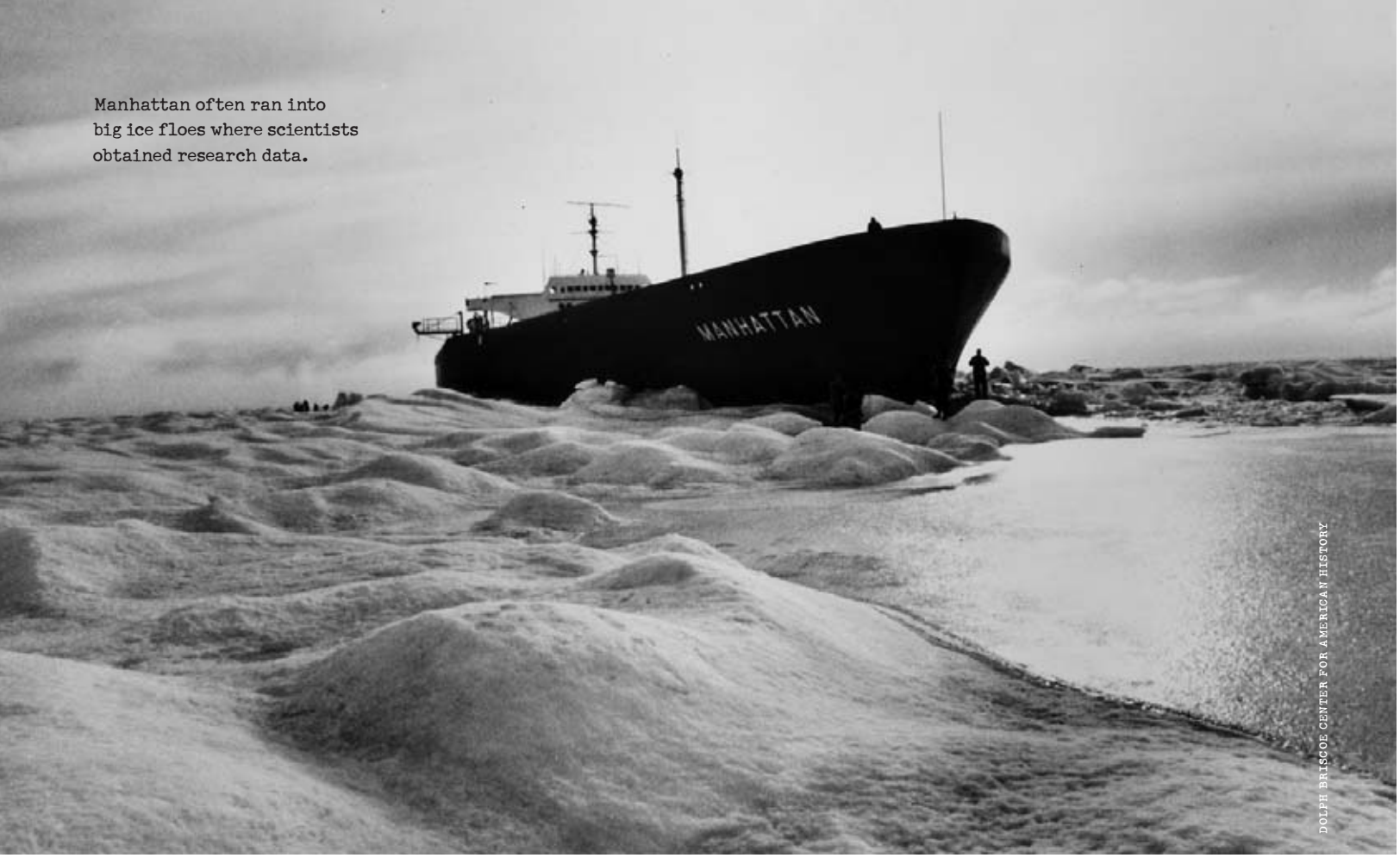

Manhattan often ran into big ice floes where scientists obtained research data.

DOLPH BRISCOE CENTER FOR AMERICAN HISTORY

Passage to Prudhoe

Author shares impressions of 10,000 mile voyage of SS Manhattan from Pennsylvania to Alaska, via the Northwest Passage

By BERN KEATING
The Humble Way, fourth quarter 1969

Petroleum News editor's note: Oil transport was one of the key challenges associated with commercializing a remote field such as Prudhoe Bay. To explore the feasibility of an Arctic marine transportation system, ExxonMobil's Humble Oil & Refining led the world's first voyage of a commercial tanker, the SS Manhattan, through the Northwest Passage in late August of 1969.

I planted my felt-lined boots atop a six-foot ice hummock, surveyed the grim desert of the Canadian Arctic Archipelago about me, and thrilled to the heady knowledge that I was the first person ever to stand on one of the last bits of untrammeled land on our planet.

Aboard the SS Manhattan, I had examined charts of Viscount Melville Sound which showed vast areas where no ship had ever passed to take soundings. Our radar fixes on landmarks showed little-known islands such as this one to be as much as six miles from where our charts placed them.

Standing on this bit of virgin earth, I savored the kind of sensation which Neil Armstrong must have felt when he stepped onto the moon.

It was September and winter had arrived in the Arctic. The sun rose late, skimmed low across the edge of the sky and set early so that daylight hours passed quickly — fiery sunrise lasting till noon followed by flaming sunset and darkness.

Rarely was the snow a reasonable white. Its sunny surfaces glowed with orange light while deep purple masked its shadowy slopes.

Skimming into the atmosphere at low angles and bouncing from snowbank to cloudbank and back, the sunlight played weird tricks with the scenery.

Two and sometimes three coastlines seemed to loom over nearby islands in shimmering layers of mirage.

Broken ice took on fantastic shapes — submarine conning towers, bears, walrus, musk oxen, igloos — anything the imagination might conjure up.

Compasses useless due to solar storm

At night great sheets of northern lights twisted and coiled overhead. A solar storm had driven the magnetic pole miles

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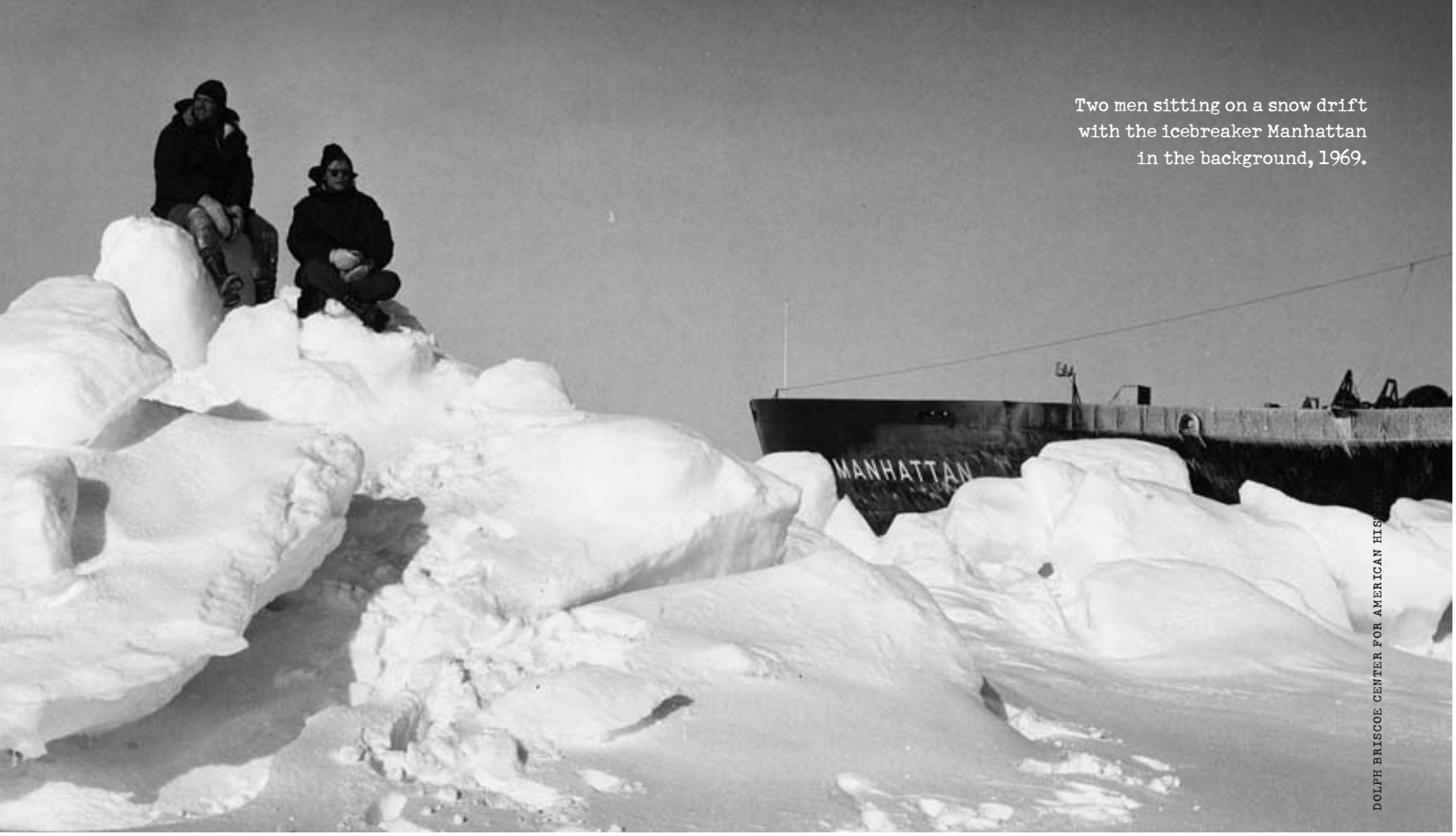

Two men sitting on a snow drift with the icebreaker Manhattan in the background, 1969.

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***MANHATTAN**: continued from page 34*

from its normal site so that our magnetic compasses were useless. In that harsh world, even the familiar sun, the source of all life, was hostile.

And yet the ice was dotted as far as I could see with men who had asked to be transported to this hostile world. Obscured below the waist by blowing snow, they happily pursued the esoteric craft of their infant science of ice studies. Just now, they were drilling holes through that monstrous floe, in some places 14 feet thick, and testing cores of ice for strength and salinity.

In the distance rested the immense bulk of the Manhattan and the potbellied shapes of Canadian and American icebreakers, the ships which had brought these men to this rendezvous with history.

The events that led to our improbable presence in that remote and uncomfortable corner of the planet began in 1968 when Humble Oil & Refining Company with Atlantic Richfield Company discovered a vast oil field on the North Slope of Alaska. Experts have recently estimated it to contain as much as 10 billion barrels of oil, making it almost twice as large as any other known oil field in North America.

But the market for most of that oil is America's East Coast. Between producer and consumer, as the snowy owl flies, lie more

than 3,200 miles of muskeg, tundra, and forest — frozen in winter, soggy in summer, difficult to cross in any season.

As an alternative, there's the Northwest Passage through the icy waters across the top of North America. Could a tanker be outfitted as an icebreaker to bring out the oil by this route?

Humble's Marine Department decided to find out.

A task force under the direction of engineer Stanley Haas conducted exhaustive studies and analyses of ships and ice. They eventually concluded the idea of an icebreaking tanker was theoretically feasible. Accordingly, Humble leased the Manhattan, of 115,000 deadweight tons, the biggest and most powerful tanker under the American flag.

Shipwrights went to work outfitting the vessel with an icebreaking bow that extended its length to 1,005 feet and adding a belt of armor around the waterline to protect the thin inner haul. A corps of engineers and ice scientists was assembled and an elite crew of sailors was recruited from Humble's fleet. Careful plans were made to make the Northwest Passage, a 470-year-old dream, practical reality.

When I joined the crew in the shipyard in Chester, Pa., under the blazing August sun, cranes were swinging aboard sleds, parkas, insulated boots, thermos bottles, sleeping bags, rifles, hand warmers, snowmobiles, ear muffs — all part of the 8,000 items of stores and provisions for a modern Arctic expedition.

We sailed the next day on August 24, 1969, with a complement of 35 shipyard hands, welders, riggers and engineers still attending to last minute details. Next day, at Delaware Capes, tugs arrived with barges containing the Manhattan's fuel order of 184,000 barrels of bunker oil for its engines and those accompanying icebreakers.

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Master of the Manhattan, one of Humble's veteran seamen, Captain Roger A. Steward, 51, assisted by two staff captains, was responsible for taking the SS Manhattan on its maiden voyage through the Northwest Passage.

Zigzagging between icebergs

Most of the shipyard personnel went home with the tugs. But some stayed and worked virtually without sleep on the 678-mile ride to Halifax, Nova Scotia. Here, we made our first stop en route to the Northwest Passage.

Beyond Halifax, which lies on the 45th parallel, halfway from the Equator to the North Pole, air and water temperatures dropped sharply.

By September 1, in Davis Strait between Greenland and Baffin Island, the Manhattan was zigzagging between majestic icebergs gliding southward on the Arctic Current. We changed from summer gear to woolen shirts and windbreakers. At night I lay awake listening to chunks of ice clunking down the ship's sides.

Shortly after sunrise observers went aloft in one of our two helicopters. They reported exciting news. The notorious Baffin Bay sea-ice pack — a drifting killer that crushed and sank 500 whaling ships during the 19th century — lay only a few miles westward. It offered an opportunity to give the Manhattan its first trial by ice. So, the big ship's master, Captain Roger Steward, turned off course and headed for the waiting pack.

For hours, the Manhattan bashed through immense floes, shattering ice six to ten feet thick. The ship put on a dazzling show of power, hurling great chunks of ice and spray into the air. Foreign observers with experience in Siberian, Greenlandic, and Baltic ice fields admitted their previous skepticism about the Manhattan's icebreaking ability had been considerably diluted.

But they warned that fields of ice packed solid by heavy wind pressure awaited us in the channels of the Canadian Arctic Islands. Such conditions would offer far more resistance to our passage than the free-floating ice of the Baffin pack, they pointed out.

We steamed on to Thule in Greenland through a metropolis of icebergs spawned from Northwestern Greenland's glaciers. The sea was a museum of weird ice sculpture — cocked hats, horned Viking helmets, skyscrapers, butterfly-roofed auditoriums, skulls. They passed in silent procession, shooting flashes of cold light from crystal-hard surfaces. Even the most phlegmatic of us confessed an eerie feeling that the bergs possessed some kind of inhuman intelligence and a cold, alien malevolence.

Sailed for Lancaster Sound

On September 4 at Greenland, divers from our Canadian icebreaker escort, John A. MacDonald, swam beneath the Manhattan and reported her hull and screws undamaged by the tussle with the Baffin pack.

With this heartening news, we sailed for Lancaster Sound

continued on next page

A $40 million gamble on the Northwest Passage

Excerpt from Time magazine, Sept. 5, 1969, edition: In order to sell the Alaska oil at competitive prices, Humble and its partners must find an economical way to bring it down south.

The Northwest Passage could provide the answer. If the Manhattan's journey is a success, the way would be open to haul North Slope crude to the U.S. for 60 cents a barrel less than the cost of piping the oil from Prudhoe Bay to the ice-fee southern Alaska port of Valdez for shipment to the Pacific Coast. This would not only make North Slope drilling practical and profitable, but would encourage development of Alaska's huge deposits of iron, sulfur, copper and other minerals.

The Manhattan expedition could provide other benefits as well. By opening up the Northwest route for commercial shipping, it would cut the distance between New York and Tokyo by 3,320 miles and save shippers both time and money.

Note: Later Humble said the entire Manhattan project ran closer to $50 million.

where the Northwest Passage begins. Most of us felt the insouciant self-confidence enjoyed only by the innocent. Our ice veterans reserved their huzzas.

Halfway through the Canadian Archipelago in Viscount Melville Sound, we hit the first ice field which had been compacted under wind pressure. We soon discovered that the veterans were justified in withholding their enthusiasm.

Amid what one of them called "the aroma of evaporating euphoria," the Manhattan thrashed helplessly for hours. Squeezed by wind-driven ice eight feet thick and abraded by a snow cover that acted like sandpaper in setting up friction against its long, flat sides, the great ship ground to a halt.

The Johnny Mac, with its fat midsection, suffered less from snow friction. It came to our rescue, cutting a channel beside us to relieve pressure against the Manhattan's sides.

With freedom to move, we crunched forward once again, only to slow inexorably to a stop. Again the doughty Johnny Mac broke us loose. And again we hurled ourselves at the ice.

With increasing experience, the Manhattan's officers learned what their huge craft could do in ice. They relied less and less upon assistance from the Canadian icebreaker. In time, they were taking the tanker through the frozen sea with a sureness that restored the confidence of the timid and converted the skeptics permanently to the conviction that the Manhattan would succeed.

The season advanced rapidly as we inched westward through the heavy pack.

One morning the plastic frame of my sunglasses snapped with a loud report when I stepped from the warm galley into the numbing cold of the poop deck. Changing film in a camera became a race against frostbite, and occasionally I had to abandon the effort when a balky camera kept my hands exposed so long that tears swam into my eyes from the pain.

Polar bear tracks

At first, ice parties journeying away from the ship carried rifles grudgingly and only from a sense of duty. Grudgingly, that is, until the morning we awaked after a night stopped in the ice to find the tracks of a polar bear circling the ship several times. At one point, the half ton brute had mounted an ice blister just below the main deck and had stretched to sniff the enticing aroma from the galley — or was it from cabins where the crew lay sleeping?

As we neared the western end of the channel through the archipelago, our officers debated which of two routes to take into the Beaufort Sea.

We could follow McClure Strait along the northern coast of Banks Island or the Prince of Wales Strait around its eastern and southern coast. The McClure Strait route offered the most severe challenge, for westerly winds blow ice from the polar pack into the Strait where it piles up into a 220-mile stretch of tangled and storm-wracked floes. No ship has ever fought through McClure Strait from the east into the teeth of those westerly winds. But the Manhattan was there for research. And our officers had become so confident in the great ship's strength that they chose to attempt the more difficult passage in hopes of achieving a historical first.

Into the wilderness of McClure Strait ice we went.

But on September 11, after fighting 120 miles into the rugged pack, the Manhattan became beset once again. Around us was a solid sheet of ice 12 feet thick. It was hummocked

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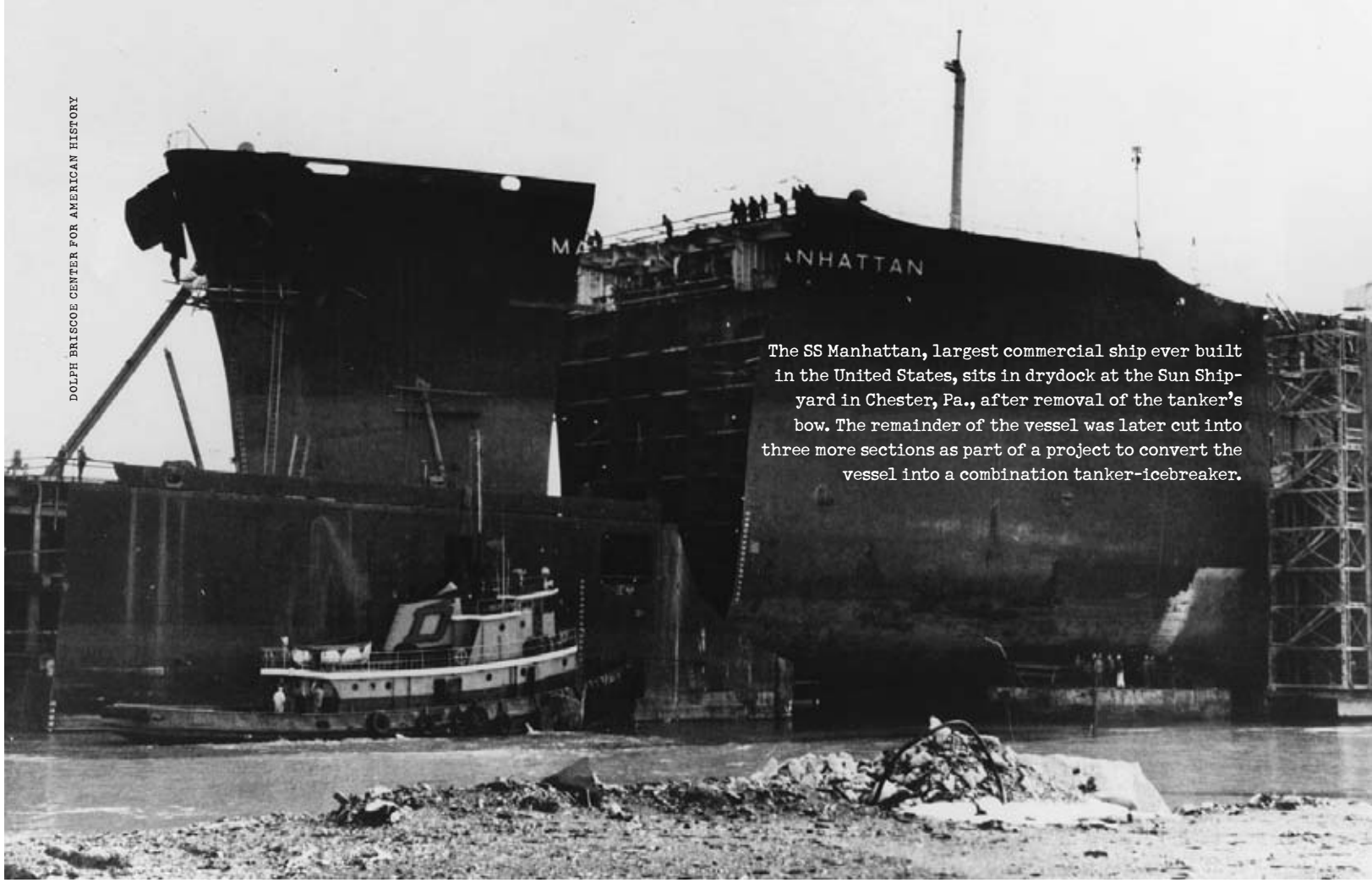

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The SS Manhattan, largest commercial ship ever built in the United States, sits in drydock at the Sun Shipyard in Chester, Pa., after removal of the tanker's bow. The remainder of the vessel was later cut into three more sections as part of a project to convert the vessel into a combination tanker-icebreaker.

Voyage receives award

In 1972, the Offshore Technology Conference Achievement Awards for Companies, Organizations and Institutions recognized Humble Oil & Refining Co. for its 1969 voyage through the Northwest Passage with its ice-breaker/oil tanker.

The SS Manhattan was the first commercial ship to traverse the Northwest Passage, thereby contributing to marine history and technology and to scientific knowledge of the Arctic. The voyage also stimulated the interest of governments and commercial enterprises in developing the Far North.

***MANHATTAN**: continued from page 38*

with ridges of hard polar ice indicating occasional thicknesses up to 100 feet.

Aerial reconnaissance by laser beam, infrared photography, and side-scanning radar carried by Canadian and U.S. Coast Guard airplanes showed worsening conditions for 80 miles ahead. In view of these reports, our officers decided further efforts in McClure Strait were unwarranted.

They carried out the difficult job of turning around, for a ship as long as three football fields needs plenty of room even in the open sea.

Then we sought out a lead of weak ice that showed up on the airborne radar scanners. With airplanes and helicopters scouting ahead, the Manhattan returned the distance in ten hours which it had taken two days to cover upon entering McClure Strait. Our conning officers had acquired such skill in the newborn art of ice navigation by big ships that they seldom called on the Johnny Mac for help.

A sidestream of polar ice from McClure Strait flows halfway through Prince of Whales Strait, and this pack was waiting for us as we turned south. For 70 miles the ship fought through a massive field of thicker ice than the one that stopped us in McClure, but the Manhattan plowed unaided.

At 2:34 o'clock on the afternoon of September 14, the Manhattan's bow broke through the far side of the Prince of Wales Strait ice pack and into open water.

A pod of seals stared at us in amazement and circled around the ship. On the snow-covered slopes of Victoria Island to the east, a herd of musk oxen briefly watched our passage and resumed grazing what appeared to be a bank of frozen gravel devoid of any herbage. Caribou roamed the crest of the coastal hills.

From the helicopter, I spotted five polar bears going about their perpetual nomadic ramblings on the ice. (By then, only the most ardent of the scientists wandered on the ice beyond rifle range; and none of the crew did.)

But for all the wildlife, not one trace did we see of human presence: no buoy, cabin, tower, lighthouse, radar beacon, sledge, dog, or boat.

1,000 miles left to Barrow

Now only chunks of weirdly eroded and mud-spattered ice floated in the 1,000 miles of sea that separated us from Point Barrow, Alaska.

Still, there was reason for caution. The Beaufort Sea ice pack lay to the north, and in September, wind and current normally begin moving it southward. Dozens of vessels, tardy about escaping the autumnal Beaufort Sea, have been crushed between shoals and advancing ice.

So we skimmed along the southern edge of the pack, making westing exactly along the 71st parallel.

Lookouts kept one eye on the windsock and the other peeled for the first sign of southward movement of Beaufort Sea ice.

At Prudhoe Bay, Alaska, site of the great oil strike, we steamed inside a 45-mile-long string of gigantic ice islands stranded on the 25-fathom curve, indicating a thickness of over 150 feet.

The hazards of navigating so close to shore to avoid the ice were brought home when a great swirl of muck in our wake send the horrified bridge gang racing to the fathometer. It showed that we had just crossed an uncharted pinnacle reaching

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The SS Manhattan makes its way through the Northwest Passage to Alaska.

Scientists from the SS Manhattan checking ice along the route to Alaska.

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***MANHATTAN**: continued from page 40*

within 12 feet of our keel.

But the polar pack held off, the shoal water deepened, and on September 20, Captain Steward dropped the hook off Barrow.

We had arrived at the northernmost point of the United States, the western end of the Northwest Passage, 5,113 miles from our starting point on Delaware Capes. The Manhattan had made it, the first merchant vessel in history to transit the Northwest Passage.

At this moment, engineers and economists are processing the data our task force gathered.

Meanwhile, the Manhattan has returned again to the Arctic to gather information on the ship's performance in new winter ice. Later this year, experts will arrive at an answer as to whether it is economically feasible to move oil through the Northwest Passage by icebreaking tanker. If their decision is favorable, the Manhattan may have been the forerunner of commercial traffic that could transform the world's shipping patterns as profoundly as Columbus' Santa Maria in 1492. And so the trip may have been of epochal importance in the world of commerce.

But, for me, the voyage was memorable, not for its economic significance, but because it was one of the last great adventures left on this shrinking globe. The Manhattan took us where few men had ever been, showed us landscapes seldom exposed to human wonder, let us breathe air as pure as the dawn of time, and brought us before herds of animals so innocent of man that they did not flee.

They don't make places like that anymore.

Our thanks to ExxonMobil: Alaska explorer, producer and longtime partner

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Oil's great adventure: Voyage of SS Manhattan

In a recent (1970) interview, J. Kenneth Jamieson, board chairman of Jersey Standard, answered some of the questions raised by the voyage of the icebreaking oil tanker SS Manhattan through the Northwest Passage to Alaska. (Jersey Standard started out as Standard Oil of New Jersey after the Rockefeller monopoly was broken up by the U.S. government in 1911. Jersey owned Humble Oil & Refining, eventually totally absorbing its identity and in 1972 changing the company name to Exxon.)

Q&A

Q: The first crossing of the Northwest Passage by a commercial vessel has attracted worldwide attention. How do you assess its importance?

A: I see it as one more step forward in an adventurous business. In the search for oil and for new technology in exploration, production, transportation, and refining, the oil industry has continually pushed forward the frontiers of knowledge as well as the frontiers of the physical world.

J. Kenneth Jamieson

Q: The voyage has been hailed as a success. Does this mean that a fleet of icebreaking tankers will be built?

A: The voyage was a technical success and a great triumph of marine engineering and seamanship. The Manhattan was a research vessel, and evaluation of all the data it brought back is still under way. Whether tankers will be used to move Alaska's North Slope oil through the Northwest Passage to the East Coast of the United States depends on economics — on the cost per barrel for this form of transportation and related facilities. We are still working out the answer.

Excerpted from the Spring 1970 issue of The Lamp

Q: What are the alternatives?

A: A 48-inch diameter pipeline is going to be built from the North Slope to the Gulf of Alaska. From there, tankers will carry the crude to West Coast refineries. To expand the market beyond the West Coast, the industry is evaluating alternatives to the Northwest Passage. One is to move the oil by tanker from the Trans Alaska Pipeline's southern terminal to Puget Sound, Washington, and then across the United States by pipeline. Another is to build a pipeline across Canada to the United States. Other proposals include tanker transportation tied into a Panama pipeline, tanker transportation around Cape Horn to the East Coast, and even submarine tankers.

Q: How can Humble, Jersey Standard, and the other companies that participated in the Manhattan's voyage justify this $40 million expenditure?

A: It's about the same as drilling 20 dry holes in a frontier area — you risk money to make money. We needed the data collected on this voyage in order to estimate the cost of tanker transportation from the North Slope. Building pipelines or building tankers and their terminals will represent an investment of billions. And if we find, for example, that tankers can move oil from the North Slope to the East Coast at a lower per barrel cost than a pipeline can do it, that might save the companies involved many millions of dollars a year. Only by keeping transpiration and other costs

as low as possible had the oil industry been able to hold down product prices over the years.

Q: What impact will North Slope oil have on world markets for crude?

A: Probably none. We expect to sell North Slope oil in the United States rather than in Europe or Japan, where it could not compete with lower-cost foreign oil. The North Slope discovery may be the biggest in North America, but the Middle East still has 70 percent of Free World reserves as we know them today.

Q: How will North Slope oil affect U.S supply and reserves?

A: The North Slope discovery could possibly equal existing U.S. proved reserves. But even this will not be enough to meet the increasing demand forecast for the 1970s. Continued exploration for oil in the United States is essential for our future security and growing energy needs.

Q: Will North Slope oil affect U.S. product prices?

A: Not in the long term. Expanding markets will absorb all the oil the industry can supply. Humble expects its North Slope crude to be priced competitively in the domestic market. Of course, a drastic lowering of U.S. oil import controls — which I do not expect at this time — could change the price structure and delay the development of North Slope oil. But according to the best present estimates, Humble expects to be moving its North Slope crude to the West Coast by 1973 and east of the Rockies soon thereafter.

Q: What could the opening of the Northwest Passage mean to Canada?

A: If the Northwest Passage becomes a commercial sea route around North America, it could benefit the Canadian north as much as Alaska. It would provide a means of transporting oil which might be discovered in northern Canada and other minerals might be developed.

Q: Are there any broader lessons to be learned from the Manhattan's voyage?

A: It certainly tells us something about the price of progress. Only a healthy industry operating in a favorable business environment could afford to invest $40 million in this important undertaking. Let's not forget that this was a privately financed project. Both the U.S. and Canadian governments provided icebreakers and observers, but there were no subsidies asked or granted. Yet the result is likely to promote world commerce and open new regions to development and settlement. The Manhattan carried a fine group of scientists, engineers, sailors, and businessmen who were recruited from private companies and engaged in the same kind of profit-seeking venture that sent 15th century explorers across the world's oceans in search of new trade routes. I think it was a truly great accomplishment.

If the Northwest Passage becomes a commercial sea route around North America, it could benefit the Canadian north as much as Alaska. It would provide a means of transporting oil which might be discovered in northern Canada and other minerals might be developed.

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Alternatives to a pipeline

In addition to tanker transport, jumbo aircraft, submarines, railcars, eight-lane highway, blimps proposed

By PETROLEUM NEWS

Several months before Richfield (would become ARCO) and Humble (owned by Exxon) discovered Prudhoe Bay in 1968, a low-profile team of engineers from Humble was sent north to gather information to determine the feasibility of a pipeline from Alaska's North Slope to deliver hydrocarbons to market.

In October of 1968, after the Prudhoe discovery had been announced, Humble, Atlantic Richfield (Atlantic Refining and Richfield had merged), and Sohio (purchased by British Petroleum, or BP) formed a joint venture to organize, design and build a trans-Alaska oil pipeline.

In February 1969, the new enterprise, called the Trans-Alaska Pipeline System, or TAPS, announced its plans to build the pipeline. At the time it preferred a route from Prudhoe Bay to tidewater at the Gulf of Alaska. Alyeska Pipeline Service Company was formed in August 1970, to handle its design, construction, operation and maintenance.

A number of permitting and legal issues intervened to deter the pipeline, which are well-chronicled in other publications that did not allow pipeline construction to begin until 1975.

During that six-year drama, Humble, ARCO and Sohio reviewed alternatives to the proposed pipeline that would satisfy requirements of the National Environmental Policy Act.

Consequently, almost every facet of transportation was suggested: an 115,000-ton, 43,000-horsepower ice breaker/supertanker (SS Manhattan); specially designed Boeing jumbo aircraft; nuclear submarines; and an extension of the Alaska Railroad.

The oil tanker program, using the SS Manhattan, was the only alternate form of transport that was actually deemed possible and tested. Sponsored by Humble and supported by Sohio and ARCO (see SS Manhattan section in previous pages), the program cost $50 million and was ultimately deemed in impractical for transporting oil from the North Slope to market.

Boeing Co. suggested a fleet of giant airplanes, each with a 747-type engine, 478-foot wing span and 83-foot tail. That suggestion was quickly determined to be impractical, partly because unpredictable weather conditions would interfere with consistent transport, not to mention the huge amount of air traffic it would generate.

V. MALIK

James Roscow, author of "800 Miles to Valdez," recorded several off-the-wall suggestions as alternatives to a pipeline, including a fleet of 60,000 trucks moving oil down an eight-lane highway through Alaska, from Prudhoe Bay to the coast. Pictured here (to assist the imagination) the eight-lane Delhi-Gurgaon Airport Expressway.

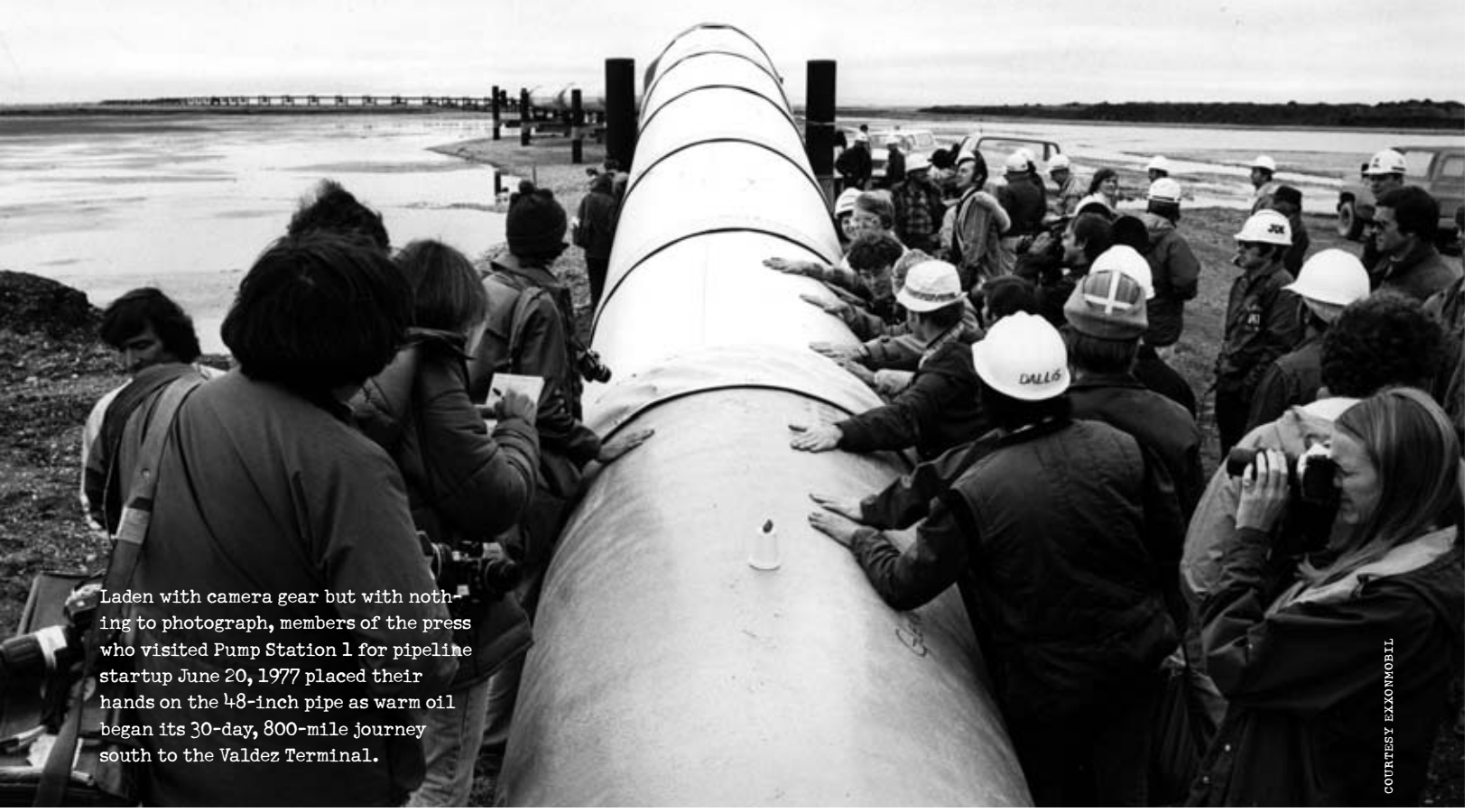
Nuclear subsea tankers (submarines) were suggested by General Dynamics Corp., but loading, costs and navigational problems sunk the idea before it got afloat.

An extension of the Alaska Railroad would have allowed companies to load oil into tanker cars and send them rolling south, but the sheer volume involved derailed that possibility.

James Roscow, author of "800 Miles to Valdez," recorded several off-the-wall suggestions: Physicist Dr. Edward Teller's suggestion that a deepwater harbor be cleared on the North Slope for a nuclear submarine by using nuclear explosions; a fleet of 60,000 trucks moving oil down an eight-lane highway through Alaska; and oil-carrying blimps.

Suggestions for improvements on the pipeline itself included building the pipeline big enough to accommodate man-operated tractor trains carrying the oil in drums and stringing "the whole thing from 50-foot towers like a high-tension electrical system."

Petroleum News' favorite alternative: A human bucket brigade passing pails of North Slope crude hand-to-hand from Prudhoe Bay to Valdez.



Laden with camera gear but with nothing to photograph, members of the press who visited Pump Station 1 for pipeline startup June 20, 1977 placed their hands on the 48-inch pipe as warm oil began its 30-day, 800-mile journey south to the Valdez Terminal.

COURTESY EXXONMOBIL

TAPS revisited in 1984

Exxon's in-house magazine looks back at trans-Alaska oil pipeline construction, politics, impact

By WALTER K. WILSON

The Lamp, Fall 1984
(This is an abbreviated version.)

Passengers on cruise ships calling at Valdez on Alaska's south coast this summer may have caught a glimpse of sea otters in the bay as the oil tanker was maneuvered to a loading dock of the Alyeska Pipeline Service Company marine terminal. Ashore, a travel agency offered bus tours to the terminal — six miles around the bay from downtown Valdez — and north along the Richardson Highway to points where elevated sections of the 48-inch, 800-mile pipeline can be viewed from the roadside.

Excerpted from the Fall 1984 issue of The Lamp

One of the state's prime tourist attractions … the Trans Alaska Pipeline System (TAPS) has now been operating for seven years. Each 24-hour day, roughly 1.7 million barrels of oil from Alaska's North Slope are pumped through the line. …

Ten years ago the huge construction project that was ultimately to transform Alaska's economy was just getting under way. Six years earlier, in the summer of 1968, a well drilled jointly by … [Atlantic Richfield and Humble Oil, part of Exxon] had confirmed the existence of the largest reservoir of crude oil ever found in the U.S. The field, at Prudhoe Bay, 250 miles south of the Arctic Circle on the shores of the Beaufort Sea, had recoverable reserves estimated at 9.6 billion barrels.

Within a year, plans were announced for a Trans Alaska Pipeline. Alyeska Pipeline Service Company was formed on August 14, 1970, to handle its design, construction, operation and maintenance.

Construction could not start until the U.S. Department of the

Interior (DOI) issued a permit allowing Alyeska to proceed. Before this could happen, the TAPS owners were required to show DOI they could build the pipeline without undue impact on the environment. … DOI held public hearings in 1971, and amassed 37 volumes of testimony from oil company representatives and others.

Pipeline faced opposition

The project faced stiff opposition from environmental groups and others who, in April 1970, filed suit to prevent construction. Their overriding fear was that building the pipeline would open vast wilderness areas to development. They were concerned with the impact of the proposed pipeline on fish, birds and migrating animals, such as the caribou. They were also apprehensive about the possibility of oil spills, disturbance of the permafrost … and problems of erosion.

DOI prepared a comprehensive, nine-volume environmental impact statement which concluded that with proper construction and operation, the pipeline could be built with minimum risk to the environment.

Nevertheless, the environmental suits lingered in the courts. Finally, following the start of the Arab oil embargo in 1973, Congress passed special legislation to resolve the impasse and in November 1973, President Nixon signed a measure authorizing construction of the … pipeline. In January of 1974, Secretary of the Interior Rogers Morton gave his approval. A month later, Alyeska began awarding contracts and construction began in April.

Price tag $9 billion

Costing $9 billion to complete, TAPS was constructed with 420 miles of pipe above ground, and 380 miles buried underground where the soil is more stable. The pipeline crosses 44 roads, some 835 rivers and streams, and three mountain ranges — rising to its highest elevation at the 4,700-foot Atigun Pass of the rugged Brooks Range. Its construction required nearly 1,350 federal, state and local technical permits.

In addition to installing the 800 miles of pipe, crews built a 360-mile, all-weather highway from the Yukon River to Prudhoe Bay, eight pump stations, a pressure relief station, and the marine terminal at Valdez. …

Meanwhile, the State of Alaska constructed the 2,300-foot E.L. Patton Bridge over the Yukon River (named for the Exxon engineer who was Alyeska's president during design and construction of the pipeline.)

COURTESY EXXONMOBIL

Dr. William J. Darch, president of Alyeska Pipeline Service Company, and Derrick Dunn, Alyeska Startup Commissionary manager, stand by the pig launcher at Pump Station 1.

More than 70,000 men and women were involved in the pipeline project at one time or another during construction. Work proceeded around the clock, sometimes in temperatures as low as minus 60 degrees Fahrenheit, in winds that dropped the chill factor to minus 115 degrees Fahrenheit — and through the short but broiling summers that brought out great clouds of Alaska's infamous mosquitoes.

Start-up June 1977

With the start-up of TAPS on June 20, 1977, Alyeska moved from its role in managing the largest privately financed construction project in history to operating the engineering marvel it had wrought.

Frank G. Turpin, vice president of Exxon Research and Engineering Company, became Alyeska's president in 1978. "Most companies tend to build up slowly," he observed recently. "We found ourselves almost overnight operating a $9 billion investment." …

In the 1980s, Turpin says, the emphasis has been on increasing the efficiency of TAPS by reducing the cost of its operation. Throughput has increased from 700,000 barrels daily in the early stages of operation to nearly 1.7 million barrels a day this year. At the same time, operating costs have fallen from $250 million in the first full year of operation (1978) to around $200 million this year. The roster of 1,900 employees in 1978 now stands at just under 1,000 men and women.

Further efficiencies will be made possible by a new $12 million supervisory control and data acquisition computer to be installed at the Valdez operations center by

continued on next page

COURTESY EXXONMOBIL

A mid-summer snowfall earlier in the week didn't slow the first flow of crude oil through the trans Alaska pipeline. Listening to the oil pass overhead are, from left, Henry Mowell, Harry Robertson, and Mike Jens.

the end of this year. The new system will enable pipeline controllers located at Valdez to obtain much more information faster.

The computer is also designed to monitor injection of the Drag Reducing Agent (DRA), a substance that has been a basic part of TAPS operation since 1979, About 5,000 gallons of the DRA are injected daily into the pipeline. By improving the pump ability of the crude oil, DRA substantially increases the throughput of the system.

McPhee: humbling perspective

The immensity of Alaska brings a humbling perspective to any human project or endeavor in the state. In his 1978 book, "Coming Into the Country," John McPhee wrote: "The celebrated Trans Alaska Pipeline is, in scale, comparable to a thread laid across Staten Island." And Alyeska's Frank Turpin notes that the pipeline's right of way and related facilities occupy a mere 14.28 square miles of Alaska's 568,412 square miles. …

Alaska is currently celebrating the 25th anniversary of its statehood with considerably higher expectations than attended its entry into the Union — thanks in large part to the economic benefits that have flowed from the development of its petroleum resources. …

But the outlook wasn't quite as optimistic in 1969 when a major legal obstacle to TAPS construction was a freeze on virtually all Alaskan land transactions because of land claims of Alaskans. That hurdle was removed in 1971 when Congress passed the Alaska Native Claims Settlement Act.

This legislation provided 40 million acres of land and $962.5 million as compensation for the land claims of Native Alaskans. …

The act also established 12 regional corporations to administer the land and organize profit making ventures for the benefit of Native people.

Cook Inlet Region Inc. (CIRI), of which Roy M. Huhndorf has

Pipeline cost jumps by billions

When the Prudhoe Bay leaseholders initially proposed the pipeline in 1969, the estimated cost was $900 million, and the pipeline was targeted for completion by 1972. Five years of political battling got in the way of timely completion, in itself contributing to the final cost of the line.

By January 1970, the projected cost had risen from $900 million to $2 billion.

In October 1973, Alyeska Pipeline Service Co. released a new cost estimate of between $3.1 billion and $3.5 billion, noting those amounts could increase by $1 billion.

In 1974, Alyeska released its most detailed cost estimate to date: $5.982 billion.

By 1975, the year construction began, that number had again risen, this time to $6.4 billion — $3 billion of which was due to inflation, while another $2 billion was due to environmental costs.

During the second year of construction, in July 1976, the project's cost estimate was increased to $7.7 billion, reportedly due largely to material and freight costs and contingency estimates.

The final construction cost was $8 billion, but did not include interest on investment loans, the cost of improvements and repairs, additional pump stations built between 1977 and 1980, or upgrades after 1977.

The percentage of the pipeline owned by various companies has changed over time, but as of 2009, the primary owner was BP, which controls 46.93 percent of the line. The second largest owner is ConocoPhillips Transportation Alaska Inc. with 28.29 percent, followed by ExxonMobil at 20.34 percent, Koch Alaska Pipeline Company at 3.08 percent, and Unocal Pipeline Company at 1.36 percent).

—Wikipedia.com information was used in the above

The State of Alaska constructed the 2,300-foot E.L. Patton Bridge over the Yukon River. It was named for the Exxon engineer who was Alyeska's president during design and construction of the pipeline. The bridge was not completed until October 1979; until then, traffic utilized a series of ferries across the river. Additional pump stations also were constructed between 1977 and 1980, as oil flow increased.

been president since 1975, is the most profitable of the regional corporations. With about 6,500 shareholders and close to 2.5 million acres of land centered on the Cook Inlet basin, the corporation early defined its basic businesses as natural resource development — coal, oil, minerals and real estate, with some selective involvement in oil-related service industries. …

CIRI has also been involved in a number of land exchanges with the state and federal governments — trading CIRI land which the government wants to preserve for environmental purposes for equivalent-size tracts that CIRI can put to economic use. In one such exchange, CIRI acquired Camp Lonely, an old Distant Early Warning line facility in northern Alaska. CIRI hopes to manage the camp as a service and support base for further oil exploration in the Beaufort Sea.

Says Huhndorf: "About a third of our revenues come from royalties and other participations in oil and gas development. An additional third is generated from services performed mainly at Prudhoe Bay, with the final third coming from a combination of interests and real estate developments. Without question, the high level of economic opportunity here today is largely driven by what oil companies have been doing in our state for 20 years."

One basic concern for Alaska's Native population is that their cultural heritage and way of life not be sacrificed as a result of resource development programs, says Huhndorf. Many of them have entered the cash economy and want jobs and training, but many also fear the impact that mining and oil development might have on fish and marine mammals and on land animals in areas around their villages. …

Long before the first gravel was moved for the construction of the haul road that runs along the pipeline, or the first section of pipe was installed, extensive studies and tests were made of the terrain, flora and wildlife along the pipeline's proposed right of way. Scientists and engineers analyzed the geology and climatic factors along this corridor. They considered resource and environmental risks, developed re-vegetation programs, and recommended appropriate equipment and materials to be used in construction and operation of the line. Along with federal and state wildlife advisors and archeologists, they surveyed every foot of the 800-mile right of way to take into account such ecological features as animal migration zones, fish spawning streams, animal dens, feeding and nesting areas, as well as archaeological sites.

In the summer of 1984, after seven years of harmonious coexistence of the pipeline system with Alaska's complex terrain, flora and teeming wildlife, the environmental issue no longer incites much passion or controversy.

Ben L. Hilliker left Alaska's Fish and Game Department in 1972 to join Alyeska as biological coordinator. He is now that company's manager for environmental protection and government reports.

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COURTESY EXXONMOBIL

Pipe for the trans Alaska pipeline is lowered into a ditch near the Atigun Pass of the Brooks Mountain Range.

Exxon's Ed Patton's role in oil pipeline

Engineer played many roles in getting line built, including liaison, lobbyist; warned in 1970 that Native claims needed solving

By STEVE QUINN
For Petroleum News

If discovering oil on Prudhoe Bay wasn't tough enough, the oil companies still had to find a way to ship the sweet crude to their customers.

The choices were few, really.

With Prudhoe Bay icebound for most of the year, the oil would have to go to an open water port by pipeline.

Destination: Valdez on the Prince William Sound from Deadhorse by way of the Atigun Pass and Fairbanks.

The job of overseeing construction of that pipeline fell squarely on the shoulders of Exxon's Edward Patton.

Patton, an engineer, would head the pipeline company formed in 1969, having already built the company's massive oil refinery in Benicia, Calif.

Former colleagues say Patton's engineering expertise ultimately became secondary in getting the 800-mile pipeline under way.

He became a liaison, a lobbyist and a listener.

This called for working directly with federal lawmakers and agencies, state lawmakers and their bureaucrats and Native Alaska leaders


ED PATTON

Important role as mediator

His words and actions were closely watched and heeded by Alaska business and civic leaders.

Indeed one public declaration in the fall of 1970 may have awakened people to the pipeline realities.

Meanwhile Alaska's pipeline drama was set against the backdrop of an emerging global energy crisis set off in the Middle East with an oil embargo in1973.

Former Alyeska consultant Jack Roderick marveled at the transition Patton underwent.

Roderick chronicled the nexus between oil and politics in his book, "Crude Dreams," and discussed Patton's role.

"He was no longer an engineer; he was a mediator, and he was good at it," Roderick said in an interview. "He was an even-tempered guy — unflappable.

"He had a personality to do it. I think it was very hard on him, though. I know it was hard on his wife.

"People were coming at him from all angles.

"I don't think he liked it very much some times, but he simply took it in stride."

Patton accepted his post, but chose to live in Bellevue, Wash., where he and his family could enjoy sailing in their time off. Patton opened the office in October 1970.

It also enabled Patton to shuttle back and forth between Seattle and Washington, D.C., Juneau, or Anchorage more efficiently.

Having a headquarters in Washington upset state business leaders and lawmakers, who pushed for greater company presence.

It may seem like a petty complaint, but headquarters for state projects remains a touchy subject even today as the state and oil companies work toward building a natural gas pipeline.

Project delays

Less than one year after ARCO, Exxon and BP officially announced plans to build a pipeline from the North Slope to a terminal facility in Valdez, Patton faced delays.

Pipeline ordered from Japan had already arrived and would sit in Valdez, Deadhorse and Fairbanks for another four years.

Rusting pipes were just a small problem emerging in Alaska.

In "Crude Dreams," Roderick writes:

"Local businessmen, expecting work on the pipeline to begin no later than 1971, had borrowed heavily and could no longer meet their financial obligations. Bankruptcies grew in number. Already concerned about the pipeline's delay, BP Chairman Eric Drake suggested that crude oil from the North Slope might be taken to market by submarine."

During the delay, federal and state lawmakers, regulatory agencies, and respective lawyers in legal disputes worked to settle issues surrounding guidelines, permitting and ownership.

Patton was on the front lines for much of it, meeting lawmakers and testifying in committee hearings.

Topics ranged from who should own the pipeline — the state or the oil companies — in Juneau and whether the pipeline should be built at all in Washington, D.C.

Native claims issue

Historians and former colleagues consider Patton's most pointed comments to have come in the fall of 1970.

During the delay, Patton stunned the Anchorage Chamber of Commerce with a September 1970 speech about resolving the Native land claims.

continued on next page

PATTON: *continued from previous page*

"Everybody was upset with the delays," Roderick said in an interview. "He got up in front of the Anchorage Chamber and told that group what they didn't want to hear.

"He said the land claims have to be settled if the pipeline is going to be built.

"Suddenly here is Ed Patton, head of Alyeska pipeline saying, 'Don't blame the Natives. Get on board and help solve the problem.'

"Because he said it, it forced business and the industry to lend support for a settlement, although some were still reluctant.

"Patton was the CEO, the head man — the most visible connection Alaska had to the pipeline — and they paid close attention to what he said."

Fifteen months later, President Richard M. Nixon signed the Alaska Native Claims Settlement Act.

This gave Alaska Natives the right to choose 44 million acres of land, plus a cash settlement of about $1 billion. Half of that sum was to come from oil production royalties.

Another former colleague, Harry Jamison, recalled watching Patton take measured approaches to his work.

Jamison began his North Slope work as a geologist with Richfield Co. before it became ARCO and worked for Alyeska as a government affairs officer in the early 1970s while Alyeska worked to get its permits from various agencies.

At the time, Jamison, considered a key to successful Prudhoe Bay development, was on loan from ARCO.

He recalls Patton's work, not just for his technical knowledge, but his ability to work with groups of diverse interests.

"He was the driving force behind putting the company together in a way you wouldn't expect," Jamison said.

"He fought the political battles, the technical battles, and the environmental battles that ensued," he said.

"We had a lot of them — no question about that — and he handled it well."

The trans-Alaska pipeline zigzags across the barren snow-covered North Slope.

COURTESY EXXONMOBIL

TAPS REVISITED: *continued from page 53*

Says Hilliker: "It was a large question mark in many peoples' minds in those days: could we in fact build the pipeline without causing irreparable damage to the tundra or the permafrost? What effect would it have on the moose and caribou passages and on Dall sheep (a species of white-coated sheep found wild in the mountains of Alaska and northern Canada) at lambing time? What impact would the pipeline's stream and river crossings have on fish spawning and passage?

"We had to take those issues one at a time, work with federal and state regulators and environmental experts to resolve them and then, during construction, demonstrate that Alyeska was doing what it said it would do. It was a learning process on all sides." …

Hilliker notes that the caribou and moose populations have actually increased, and neither of these species seems afraid to pass under the elevated pipeline. The Dall sheep population is as high as it was before the line was built, perhaps higher. …

In 1984, … [Exxon's] experts are still as busy — and as optimistic — as ever. This year, the company's drilling rigs are active in the Beaufort Sea, in Norton Sound and in the Bering Sea.

For Exxon, and all other oil companies operating there, Alaska's frontiers remain new and bright with promise.

Drilling and more drilling in Alaska

After the 1968 discovery of Prudhoe Bay, the predecessors of ARCO Alaska (ConocoPhillips today), BP and ExxonMobil began development drilling in the field.

Of the 23 wells that had been completed by the end of the summer of 1969, nine had been drilled by BP, seven by ARCO-Humble, four by Mobil-Phillips, two by Standard Oil of California (Chevron) and one by Hamilton Brothers.

Along with drilling came the construction of field facilities, in-field pipelines and gravel roads, and the like. First oil flowed down the trans-Alaska oil pipeline in 1977.

But the predecessors of today's ExxonMobil, Exxon and Mobil, were also exploring for other Alaska oil fields — on the North Slope and elsewhere, including the federal waters of the Gulf of Alaska and Lower Cook Inlet.

Pictured on these three pages is the Alaskan Star semi-submersible drilling rig that Exxon used for its drilling program in the western Gulf of Alaska in 1977 and 1978, where it drilled four wells, all dry holes.

Exxon and Mobil partnered with ARCO and others to drill two Continental Offshore Stratigraphic Test wells, generally referred to as C.O.S.T. wells, during the same period in the northeastern Gulf of Alaska.

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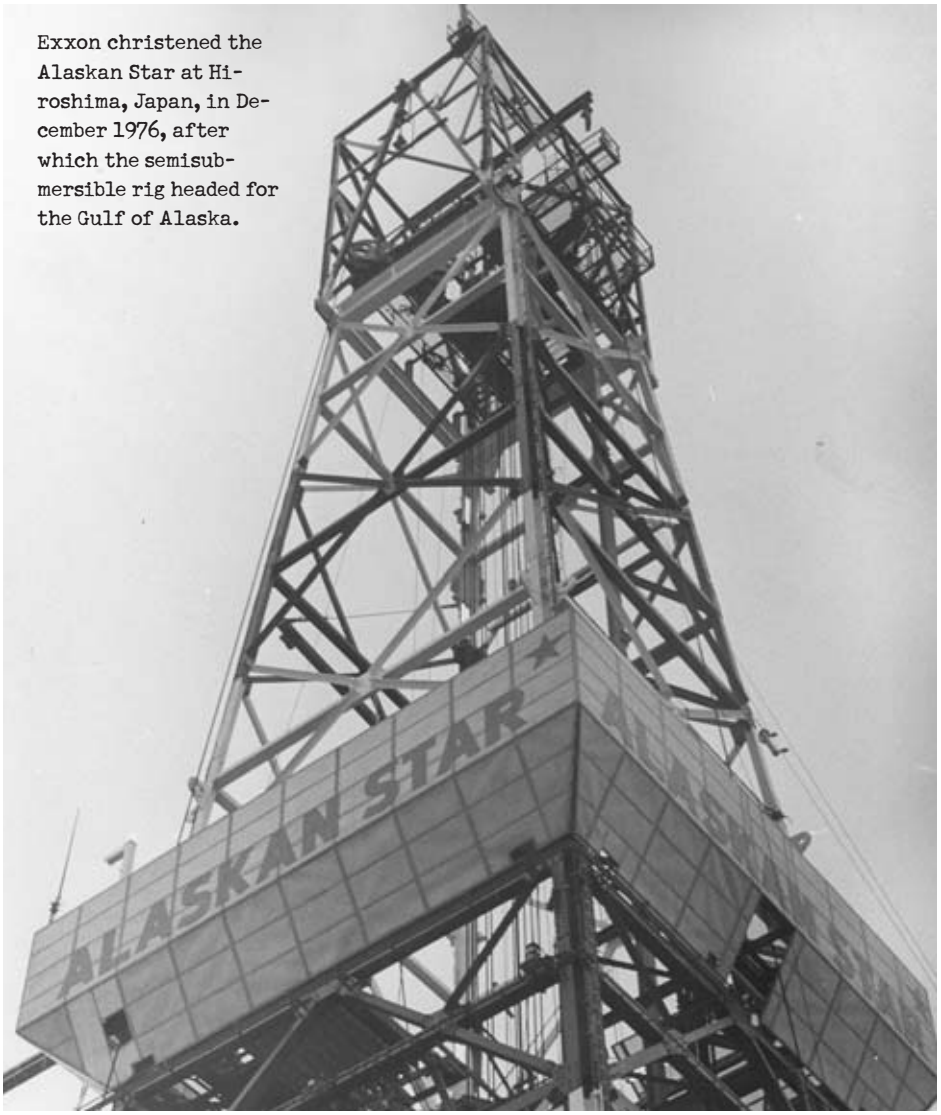


Exxon christened the Alaskan Star at Hiroshima, Japan, in December 1976, after which the semisubmersible rig headed for the Gulf of Alaska.

COURTESY EXXONMOBIL

1970s

Oil find at Gwydyr Bay

On April 4, 1975, Mobil Oil announced a new oil discovery at the "Gwydyr Bay South No. 1 wildcat well located about three miles north of the Prudhoe Bay oil field on Alaska's North Slope," on a lease (ADL47468) owned 50-50 with Standard Oil of California, which later became Union Oil, then Unocal, and now is part of Chevron.

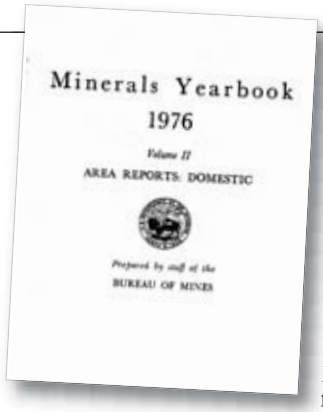
Per Mobil's press release, "Oil flowed on production tests at the rate of 2,300 barrels per day on one-half inch choke from perforations in the Sadlerochit formation. The test was drilled to 12,237 feet."

Mobil said in its release that it had no reason to believe the new discovery was "another Prudhoe Bay field" and that additional appraisal drilling would be required to determine its size and commercial significance.

That lease was never developed, but today is still held by ExxonMobil and Chevron, and is part of the Beechey Point unit, operated by Brooks Range Development Corp., which has in recent years drilled exploration wells near Mobil's well to determine the viability of Mobil's discovery.

COURTESY EXXONMOBIL

Seward was almost an oil town



Oil exploration in the Gulf of Alaska started in September 1976 at location Maria near Yakutat. The semisubmersible rig Sedco 706 spudded in the first well for Arco, Shell, and Texas Eastern and Offshore Development. Arco also is moving the Ocean Ranger from the Bering Sea to the Gulf of Alaska to drill a second exploratory hole. There are three more semisubmersible rigs scheduled for the Gulf by 1977.

The Sedco 708, Aleutian Key, and the Alaskan Star are all expected to be in operation early in 1977.

The Sedco 706 left San Francisco for Alaska in August and started drilling in September. There are 10 units in the Sedco 706 series, and operations with rigs over the past 5 years in the upper North Sea have proved the capability of these types of rigs to function safely in the Gulf of Alaska. The rig was leased to Arco, Shell, and Mobil Oil Co. [predecessor to ExxonMobil] and will be serviced from Yakutat which will be developed as a base for other Gulf of Alaska operations.

Exxon christened the Alaskan Star at Hiroshima, Japan, in December. The semisubmersible rig will join two other rigs in the Gulf of Alaska early in 1977. Crews will be trained aboard the new vessel when it arrives in Seward.

There are three more semisubmersible rigs scheduled to join those already in the Gulf by the spring of 1977. Sedco 708 will be drilling for Sun Oil Co., the Aleutian Key for Gulf Oil Co., and a second rig which is presently under construction will be drilling for Exxon.

Seward is expanding rapidly as a result of offshore activity in the Gulf.

Three major service companies proposed building facilities in the city, and others are proposing construction of dock facilities to handle the large supply boats that will be used to service the semisubmersible rigs in the Gulf of Alaska.

Exxon has leased about 50 acres for storage, and supplies will move through the Alaska Railroad docks to supply boats.

For more see: http://digital.library.wisc.edu/1711.dl/EcoNatRes.MinYB1976v2

PHOTOS COURTESY EXXONMOBIL

Exxon and contractor staff are pictured here in Seward, where Exxon's 1977-1978 western Gulf of Alaska drilling program was staged. The company used the Alaskan Star semi-submersible drilling rig for that program, drilling four wells, all of which were dry.

MORE DRILLING: *continued from page 56*

None of the wells were successful, their individual costs ranging from $15 million to $23 million.

Exxon conducted two surveys in 1975, one in Lower Cook Inlet and one in the western Gulf.

In addition to a temporary office in Seward, Exxon's Anchorage office had 14 full-time people working just on its Gulf of Alaska/Lower Cook Inlet operations.

The photos are courtesy of ExxonMobil; the captions were the originals written by Exxon at the time.

Drilling disappointments, successes

North Slope yields discoveries, but other undeveloped basins do not show same promise

By PETROLEUM NEWS

Early exploration of many of the North Slope's late 1960's and 1970's oil discoveries began in the mid-1960s with seismic and lease acquisition.

The first Point Thomson lease, for example, was issued in September 1965 Socony Mobil (Mobil and then ExxonMobil) and Phillips (ConocoPhillips).

The West Staines State No. 1 and No. 2 wells on that lease were completed in 1970.The discovery well would not be drilled until the mid-70s.

Point Thomson is not yet in production (see page 66), but the other three oil and gas units in northern Alaska in which ExxonMobil is currently an active partner, are in production today:They are Prudhoe Bay, discovered in 1968; Kuparuk, discovered in 1969; and Duck Island (Endicott), discovered in 1978.

The Endicott oil field, 15 miles east of Prudhoe Bay in the Beaufort Sea, would become the first offshore oil field to go into production in the U.S.Arctic.

But Exxon, Mobil and other companies would continue to explore in other basins around Alaska, all undeveloped, in the 1970s and 80s.

Basins in the Bering Sea outer continental shelf were of special interest to Mobil and Exxon, leading to an extensive effort to acquire 2D seismic data — according to the U.S. Minerals Management Service about 271,000 line miles of data were acquired between 1970 and 1985 from the Norton, St. Matthew Hall, Navarin, St. George and North Aleutian basins of the Bering Sea.

The seismic data confirmed the existence of substantial thicknesses of Tertiary strata in the basins.And large geologic structures offered enticing possibilities for petroleum traps.

Developing Prudhoe Bay

COURTESY CROWLEY

Meanwhile, development of the Prudhoe Bay gets underway with a vengeance in 1969. Crowley's second sealift, in 1970, carried 187,000 tons of cargo to the giant oil field. It was the largest commercial sealift in maritime history.The 400 foot barges were towed 4,000 miles from Washington's Puget Sound to Alaska's Beaufort Sea.

Enthusiasm about the possibility of establishing a significant offshore oil province led to a series of MMS lease sales.

Between 1976 and 1983 ARCO, with funding from several companies, drilled six Continental Offshore Stratigraphic Test wells in the basins to obtain information about the basin geology.

In a flurry of activity in 1984 and 1985 several companies drilled exploration wells in the basins: Exxon drilled three wells and ARCO drilled three wells in the Norton Basin; Mobil, Exxon, ARCO, Chevron, Shell and Gulf Oil drilled nine wells in the St. George Basin; and Amoco, Exxon and ARCO drilled eight wells in the Navarin Basin.

With the exception of some promising shows onshore in the North Aleutian basin, explorers' hopes were dashed when the companies found little or no oil potential in these basins, mainly because of a lack of suitable oil-prone source rocks.

Beechey Point Gwydyr Bay ice test

COURTESY EXXONMOBIL

Setting standards for Arctic design

For 45 years ExxonMobil has been committed to northern technology research, development

By PETROLEUM NEWS

Exploration activities in the Beaufort Sea are challenged by a short open water season and multiyear ice. Multiyear ice that has survived at least one melt season may be much thicker than first-year ice, and typically continues to grow over time.

To address these challenges, ExxonMobil undertook significant efforts to develop ice design criteria for exploration and production structures; an effort that actually began 45 years ago with Mobil's offshore, ice-resistant Granite Point platform, installed in Alaska's Cook Inlet basin in 1966.

In 1973, ExxonMobil built the world's largest ice-test basin in Calgary to study interactions between ice and offshore structures. Five years later, at Prudhoe Bay, the company conducted the world's largest ice-strength characterization tests on level ice.

Due in part to the knowledge gained from these studies, Exxon has participated in drilling 44 shallow-water exploration wells in the Canadian and Alaska Beaufort Sea since the early 1970s. The wells were drilled using gravel island, ice island, caisson retained island or CRI, concrete island drilling system or CIDS, Molikpaq and single steel drilling caisson or SSDC systems. Exxon says it is the only company that has application experience with all of them.

Exxon pioneered the use of gravel islands for exploration drilling activities, installing the world's first gravel island in the Canadian Beaufort Sea in 1973 and completing the deepest-water gravel island in 1980.

The company developed industry standards for gravel island technology in the Arctic and held the first industry-wide seminar on the topic.

In addition to its work with gravel islands, Exxon also led an ice island experiment in the Alaska Beaufort Sea from 1978 to 1979. The results of that experiment led to the development of spray-ice construction methodologies and criteria for efficient and cost-effective implementation.

In 1989, Exxon built the world's largest ice-spray exploration island, Nipterk P-32, in an area of the Canadian Beaufort Sea outside the protection of the barrier islands, where significant daily ice movements are common.

In 1981-82 Exxon drilled two wells offshore the North Slope at Beechey Point, utilizing a gravel island.

The CRI structure, which requires less gravel than a traditional

COURTESY EXXONMOBIL

gravel island and is less expensive and faster to install, was developed by Exxon and used in the Beaufort Sea in 1983.

In order to further reduce construction costs, the company also developed a reusable gravity-based structure called CIDS, first used in 1984, and again in 1985, at the Antares prospect in Alaska's Beaufort Sea.

That drilling was followed by use of CIDS at the Orion prospect, also off Alaska in the Beaufort.

Exxon used the heavily instrumented Molikpaq structure, a steel caisson filled with granular material, during Canadian Beaufort Sea exploration. In the winter of 1985-86, Molikpaq experienced the most severe ice conditions any man-made structure had ever sustained, including multiyear ice up to seven meters (21 feet) thick. The data collected on this structure significantly enhanced Exxon's ice-load calculation methods and design criteria.

Between 1986 and 1987, Exxon drilled two exploration wells in Alaska's Beaufort Sea using the SSDC — an ice-strengthened, converted supertanker that rests on a mobile steel platform, allowing for year-round drilling.

The combination of extensive, fundamental studies of ice mechanics, ice-data collection and its unique operational experience has provided Exxon with the unparalleled expertise in ice load calculations that it has subsequently applied in other Arctic environments.

Editor's note: Although none of the Beaufort Sea wells mentioned above proved commercial, in 1978 another leaseholder, Standard Alaska Production Company, struck oil at Endicott, where Exxon also held leases (see Exxon press release on page 73).

The long wait for Point Thomson

Exxon discovers rich North Slope field in 1970s, but technical challenges, lack of gas line preclude development, spawn court fight

By WESLEY LOY
For Petroleum News

Former Alaska Gov. Wally Hickel included a colorful anecdote about the Point Thomson oil and gas field in his 2002 book, "Crisis in the Commons: The Alaska Solution."

It was January of 1990, only a few weeks after Hickel took office for his second hitch as governor. The year before, the tanker Exxon Valdez had run aground in Prince William Sound, spilling nearly 11 million gallons of crude oil.

Hickel had a morning meeting in Juneau with Exxon's top executives at the time, Lawrence Rawl and Lee Raymond.

"When they finally came into my office, I got to the point," Hickel wrote.

"'Larry,' I said, 'I want Point Thomson back.' I said it just as clean, simple, and direct as if I had told one of my sons, 'Eat your oatmeal.' I watched his eyes, because the eyes reflect the mind, just at the face reflects the heart.

"Very clearly, without animosity, Rawl said, 'Governor, could you give us a little time?'

"'Sure, Larry, I'll give you time, but you know the terms of the lease.'"

Hickel, who died in 2010, was among a long line of Alaska governors who have banged their heads against the brick wall that is Point Thomson.

The field is located on state acreage along the remote Beaufort Sea shoreline some 60 miles east of Prudhoe Bay. Although Exxon discovered Point Thomson with wells drilled in the late 1970s, it has yet to produce any oil or natural gas. It remains one of the largest proven, undeveloped fields not only in Alaska but in North America.

That's a tremendous frustration for Alaska politicians and economic development boosters, who see Point Thomson as a potential goldmine of taxes, royalties and jobs.

The major stakeholders in Point Thomson — ExxonMobil, BP,

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SURFACE SYSTEMS

PERFORMANCE

POINT THOMSON ALASKA

Cameron Provides Completion Equipment for Point Thomson Project

Cameron has provided a suite of completion products for the Point Thomson Project that are designed to meet the harsh conditions of northern Alaska and to incorporate Cameron's commitment to this important market. Cameron systems for this project include:

- *Test Well Wellhead*
- *Test Well Christmas Tree*
- *Test Well Single Well Control Panel*
- *Production Well Wellhead*
- *Production Well Christmas Tree*

Cameron has been in operation in Alaska since the 1950s and the Anchorage CAMSERV™ Aftermarket Services facility is specifically geared toward meeting the needs of the Alaskan market. With Cameron's worldwide network of manufacturing, sales and service locations, Alaskan customers can be assured they will receive their equipment when they need it, where they need it.

This combination of services readily available in Alaska provides substantial cost savings, as well as timely delivery, ensuring that all of our customers receive Cameron performance in extreme conditions. For more information visit us at www.c-a-m.com.

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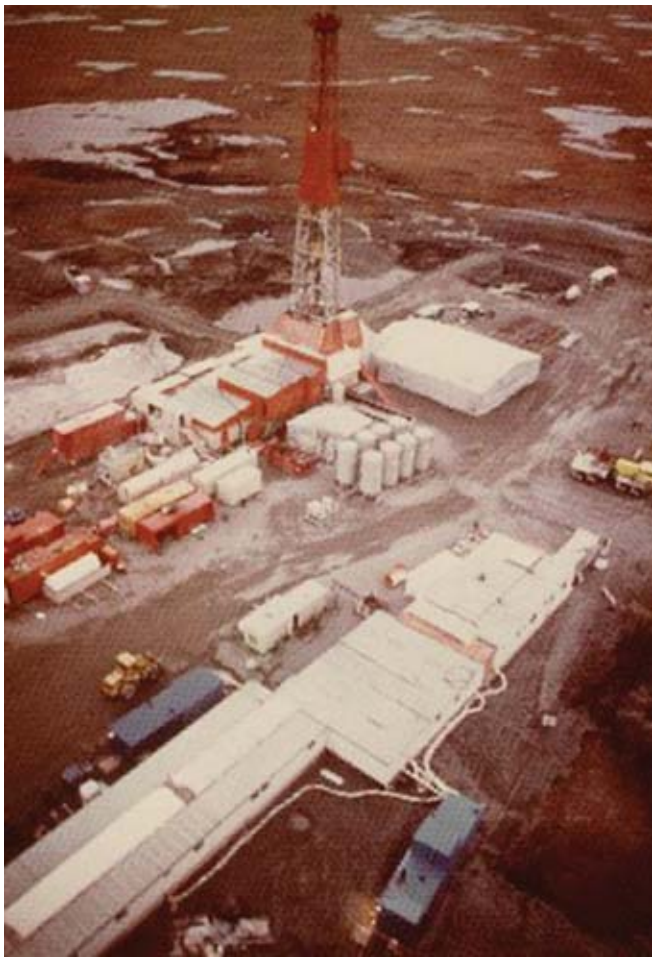

COURTESY EXXONMOBIL

Chevron and ConocoPhillips — have their reasons for not yet developing the field, chief among them the lack of a North Slope natural gas pipeline.

Today, Point Thomson is bound up in a court fight with the state, which is trying to break up the Point Thomson unit and reclaim the acreage. But even as the legal struggle continues, lawyers for the state and the companies are trying to talk out a settlement. And drilling resumed at Point Thomson in 2009 after years of inactivity.

Many believe it's critical to lift the cloud from Point Thomson, as the field is estimated to hold 8 trillion cubic feet of natural gas regarded as critical for supporting a proposed, multibillion-dollar gas line.

Field's early history

The first leases at Point Thomson date back to 1965. The Point Thomson unit was formed in 1977, the same year oil from the giant Prudhoe Bay field began flowing down the 800-mile trans-Alaska pipeline.

Hydrocarbons were first discovered in the Point Thomson area in 1975 with the Alaska State A-1 well, which tested a zone of the lower Tertiary Flaxman sand and flowed at a rate of 2,507 barrels of oil per day and 2.2 million cubic feet of gas.

A second discovery well, the Point Thomson Unit No. 1, was drilled in 1977 and conducted flow tests in the Lower Cretaceous Thomson sand. One test yielded 2,283 barrels of oil per day and 13.3 million cubic feet of gas.

Six more wells would be drilled over the next seven years to delineate the two Point Thomson discoveries. In the process, other hydrocarbon reservoirs were encountered.

In 1994, BP and Chevron drilled the Sourdough No. 2 well target-

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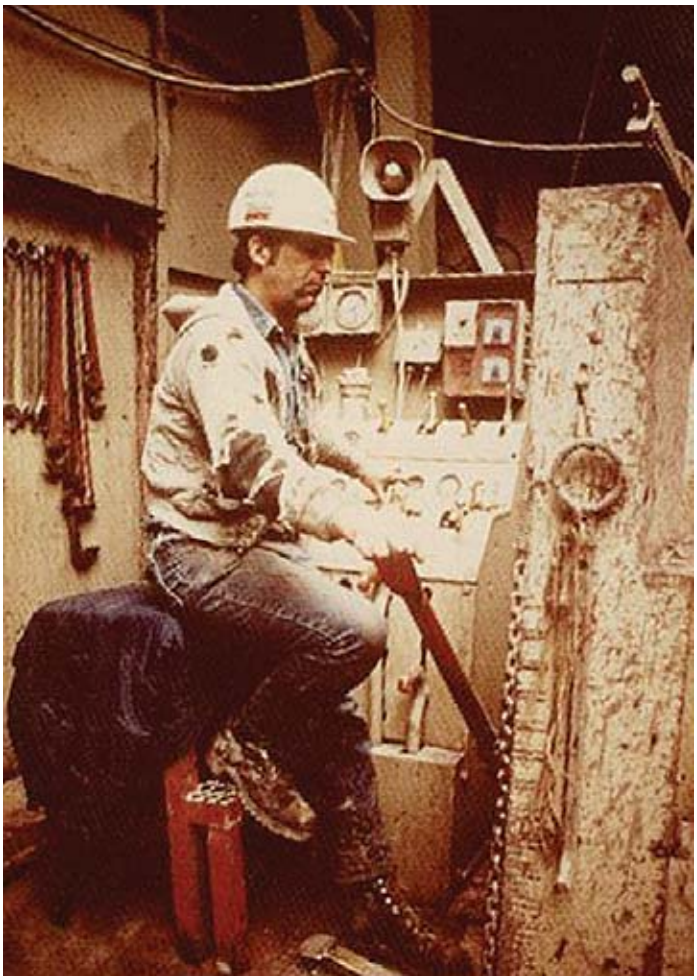

COURTESY EXXONMOBIL

Gambling on Point Thomson

On Sept. 8, 1969, Kingdon Hughes called and asked if I had seen an article about the North Slope acreage sale that would be held on Sept. 10. He wanted to know what I thought about putting a group together to bid on some leases.

I said, "Let's do it."

That afternoon myself, King Hughes, Ed Leede, Clyde Pine, Bill Kennedy, Deane Stoltz, president of Tipperary Oil and Gas, and Tipperary's landman Phil Whittsett, and others met in Bill Kennedy's office in Midland, Texas.

Bill called his partner Fred Chambers in Houston, and discussed joining in on the bidding. Fred was against it, so Bill declined.

We had no geologic data to support our bid. We just decided to gamble.

King flew to Anchorage Sept. 9. Not having time to type our bids before leaving (it took time to raise the required 10 percent), he used Western Airlines' typewriter in the Seattle/Tacoma airport.

King turned in our bids a half hour before the sale started on Sept. 10.

We bid $262 per acre, or $66,200, on tract 145, and won it. We unsuccessfully bid on two other tracts.

We farmed out our interest in tract 145 to Simasko, who assigned it to Exxon.

In 1977, Exxon drilled the Point Thomson Unit No. 1 well on the lease, which was a Thomson Sand discovery.

—Richard Donnelly

ing Brookian sands of the Canning formation in the southern portion of the Point Thomson unit, and followed up with the Sourdough No. 3 well in 1996. In a 1997 press release, BP announced a discovery of potentially 100 million barrels of recoverable oil.

Altogether, 17 wells were drilled within the boundaries of the Point Thomson unit between 1975 and 1996.

State officials certified seven wells as "capable of producing oil or gas in paying quantities," a legally significant designation. The seven are: Alaska State A-1, Point Thomson Unit No. 1, Point Thomson Unit No. 2, Staines River State No. 1, Alaska State C-1, Alaska State F-1 and Sourdough No. 2.

PetroTel Inc., a Plano, Texas, consultant, conducted a resource assessment and field development study for the state in 2008. The firm summed up Point Thomson this way:

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Point Thomson in August 2008, as ExxonMobil barged equipment and supplies to the remote and vacant site along the Beaufort Sea coast in preparation for drilling.

COURTESY EXXONMOBIL

"Well log and production or drill stem test data indicate that much of the Point Thomson area is underlain by the Cretaceous (Neocomian) Thomson sand that contains abundant natural gas and hydrocarbon liquids in the form of gas condensate, ranging from 35º to 45º API gravity. In addition to gas and condensate, the Thomson sand also contains a thin and potentially discontinuous oil-rim at the bottom of the reservoir interval that has tested oil as high as 18º API gravity. The Point Thomson area contains the potential of hundreds of millions of barrels of oil in the shallower Tertiary Brookian reservoirs. Another potential productive reservoir is composed of carbonates and bedded metasedimentary strata in the 'Pre-Mississippian' basement below the Thomson sand reservoir."

The push for development

When it was first formed effective Aug. 1, 1977, the Point Thomson unit included 18 state oil and gas leases covering 40,768 acres.

The unit ultimately would grow to 45 leases encompassing 106,201 acres. That was the size of the unit when the state, in December 2006, declared the unit was terminated — an action which remains in dispute in court.

In terms of ownership, 25 lessees took a working interest in the Point Thomson unit, with four companies holding the great majority. The state calculates ownership based on surface acreage. ExxonMobil, the unit operator, holds 52.58 percent; BP 29.19 percent; Chevron 14.31 percent; and ConocoPhillips 2.82 percent. The minor unit owners hold the remaining 1.09 percent.

The unit operator is obliged to submit a periodic plan for exploration or development to the state. The initial plan of exploration covered a five-year period.

In the early years, up to 1983, Exxon and other companies drilled several wells within the unit and the state approved plans of development routinely, often without comment, according to a 2005 analysis of the unit history by a law firm representing the Alaska Gasline Port Authority. The authority, an organization that today counts Fairbanks North Star Borough and the city of Valdez as members, has promoted development of a natural gas pipeline and has accused the major oil companies of "warehousing" gas at Point Thomson.

After 1983, Exxon began to propose plans of development that didn't include further drilling. Exxon cited the lack of a North Slope gas pipeline as a reason to throttle back on Point Thomson.

According to the Port Authority, Exxon told the state on Oct. 28, 1983: "Sufficient drilling has been accomplished to establish within reason the area and potential commerciality of the field. Further development prior to commencement of construction of a pipeline to market would constitute economic waste through premature expenditure of funds which otherwise could be utilized for exploratory or development activity on other Alaska areas and leases. Additionally, wells drilled and suspended far in advance of commencement of sustained production frequently deteriorate physically to the extent of requiring expensive reworking or even redrilling."

Kay Brown, the state's oil and gas director, on Nov. 29, 1983, approved what was the seventh plan of development for Point Thomson, without a drilling requirement. A succeeding director, Jim Eason, also approved plans — extending into 1996 — that didn't include drilling provisions.

But state officials were beginning to grow tired of waiting for production from Point Thomson — if not the field's gas, then at

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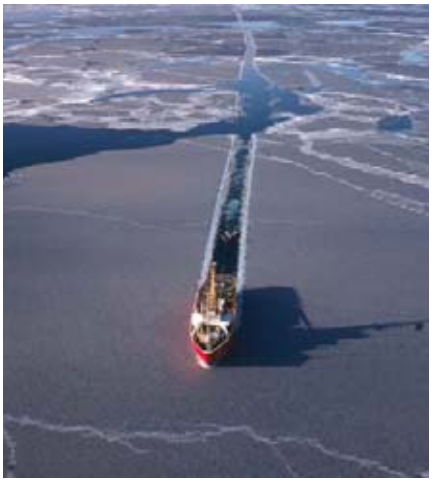

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least its substantial reserves of petroleum liquids, which could be sent down the trans-Alaska oil pipeline.

Eason, in an article published in the Anchorage Daily News on Dec. 4, 2006, recalled how he had planned to get tough with Exxon at the tail end of Hickel's term in 1994.

"It was the only decision that I ever took to the governor," Eason said. "We were going to give them an ultimatum: They needed to produce."

But time ran out on the Hickel administration before a formal move was made to retake Point Thomson.

The Point Thomson drill site in July 2010, as work continued on two development wells.

COURTESY EXXONMOBIL

Halting hopes for gas cycling

Amid the state's rising discontent over Point Thomson, hopes rose for a project to develop the field's petroleum liquids.

This would be done by bringing gas to the surface, processing it to capture the "condensate" or gas liquids, and then pumping the dry gas back downhole for storage.

Producing these liquids first, as opposed to a quick gas "blowdown," has important practical advantages for a field such as Point Thomson, the PetroTel study said.

"The majority of the proven hydrocarbon resource in the Thomson sand is contained in the form of gas with entrained liquids known as a retrograde condensate," the study said. "Retrograde condensate reservoirs tend to be deeper and have higher pressures and temperatures than conventional reservoirs. Due to the abnormally high pressures and temperatures, the fluid in a retrograde condensate reservoir does not behave like those in conventional oil and gas reservoirs."

Rapid production of gas from such a reservoir, and the resulting loss of pressure, will cause vaporized hydrocarbon liquids to condense and clog pore space, PetroTel said. The result is that

"hundreds of millions of barrels of condensate will become trapped in the reservoir and never be produced."

On May 16, 2002, Exxon's Alaska production manager at the time, Jack Williams, told a Resource Development Council audience the company was working with regulators on a potential gas cycling project to produce up to 75,000 barrels per day of Point Thomson liquids.

The next year, however, Exxon said the gas cycling project was not economic and would not be pursued.

On Sept. 30, 2005, a landmark decision came down from Mark Myers, then the state's oil and gas director. He found that the Point Thomson unit agreement was in default because of ExxonMobil's failure to submit an acceptable plan of development.

Myers didn't mince words in his assessment of the company's 22nd plan of development, which proposed additional studies to determine whether a commercially viable production plan could be devised for the field.

"Failure to develop and produce known hydrocarbon accumulations deprives the State of incremental revenue, economic activity and jobs," Myers wrote. "Should the PTU terminate, the area could be re-leased and unitized again under an acceptable unit plan of development that includes commitments to develop and produce the underlying hydrocarbon accumulations.

"Continuing this 30-year record of non-development and delay of an oil and gas lessee's obligations to develop and produce its oil and gas leases makes a mockery of the statutory, regulatory and contractual protections for the State as owner of the oil and gas estate. Therefore, the 22nd POD is unacceptable."

Mike Menge, the state's natural resources commissioner under Gov. Frank Murkowski, would uphold the Myers decision.

Litigating, drilling, talking

Since 2005, the companies and the state have engaged in a fight for control of Point Thomson both administratively and in the courts. ExxonMobil and its partners have shown no inclination to surrender an asset worth potentially billions of dollars.

Here are the most significant events of recent years:

• On April 22, 2008, the state natural resources commissioner at the time, Tom Irwin, terminated the Point Thomson unit. The unit designation is important because it keeps alive old leases that otherwise would expire.

• On May 8, 2009, with Irwin's permission, ExxonMobil spudded the first of two wells on a pair of Point Thomson leases. The company said the wells were part of its "unconditional commitment" to start producing 10,000 barrels a day of condensate from Point Thomson by the end of 2014.

• On Jan. 11, 2010, ExxonMobil, BP, Chevron and ConocoPhillips scored a major victory when Superior Court Judge Sharon Gleason of Anchorage reversed Irwin's unit termination.

So where do things stand today?

The state appealed aspects of Gleason's decision to the Alaska Supreme Court, where for several months the case has stood idle as the two sides attempt to negotiate a settlement.

ExxonMobil, on Oct. 27, 2010, announced it had finished drilling the two "development wells," but has since stacked its rig for transport out of the field. The company is seeking a U.S. Army Corps of Engineers wetlands permit for its proposed gas cycling project.

Negotiations continue, with ExxonMobil executives and Alaska Gov. Sean Parnell publicly agreeing on this much: It's time to settle the Point Thomson affair.

Kuparuk goes online Dec. 13, 1981

Getting there is half the fun – or challenge – could have been field's motto

By PETROLEUM NEWS

The Kuparuk oil field was discovered in 1969 when Sinclair Oil and Gas, which would soon become part of ARCO, and BP drilled the Ugnu No. 1 well, which tested 1,056 barrels per day of oil from the Kuparuk formation.

The well was named after the nearby Ugnuravik River. That name is carried today by the shallowest and most viscous of North Slope oil formations.

Compounding the confusion, Kuparuk delineation wells were called "West Sak," another shallow formation, although they were Kuparuk formation wells.

The discovery was a surprise and led to a reevaluation of the area's geology.

1979 development begins

Although Kuparuk was discovered in 1969, shortly after Prudhoe Bay to the east, it wasn't until early 1979 that ARCO announced it was proceeding with field development.

The initial drilling and development program, for the first processing facility, associated drill sites and pipeline, was tagged at about $350 million (some sources say $450 million). Average daily production of some 60,000 barrels per day was expected by 1982 and, with additional investment, and production of 100,000 bpd by 1984.

Because Kuparuk was developed later than Prudhoe Bay it benefited from newer technology.

ARCO said this was the first phase of what could eventually become a $1 billion investment among several companies holding leases in the Kuparuk field; the initial effort, however, was exclusively by ARCO on its leases.

ARCO Chairman Robert O. Anderson said the company was moving ahead because it felt Alaska's negative investment climate, created chiefly through adverse tax policies, showed some sign of improvement. Oil prices were also on the rise.

Anderson also said that further development beyond the initial phase would depend on the economics of the project and the future investment climate in Alaska.

Exxon and Mobil, among others, wanted to see the entire field developed.

The first phase, exclusively ARCO, targeted 20 square miles. At the same time, ARCO put together a long-range plan for Kuparuk and was working with owners of adjacent acreage, such as Mobil and Exxon, to agree on a development plan for the Kuparuk River unit. It amounted to a tenfold expansion, costing billions of dollars, and covered some 200 square miles.

Delay had one benefit

Because Kuparuk was developed later than Prudhoe Bay it

Exploration drilling at Kuparuk

JUDY PATRICK

Exxon receives national award for safe offshore drilling

Excerpted from the August 1986 issue of The Exxon Manhattan

In recognition for conducting its Outer Continental Shelf (OCS) oil and gas operations with concern for environmental protection, human safety and technological advances, Exxon Corporation has been awarded the 1985 SAFE Award (Safety Award for Excellence) by the Department of Interior's Minerals Management Service (MMS).

Exxon was chosen as the 1985 SAFE winner because of its exemplary record for offshore operations. All Exxon's offshore operations, including Western Division's Hondo platform and the Exxon Santa Ynez, contributed to the company's outstanding record. During the second semiannual inspection period in the Alaska Region, Exxon had a 100 percent compliance record (in 100 visits to Exxon's Alaska operations, inspectors issued no incidence of non-compliance citations), and in two districts in the Gulf of Mexico Region, Exxon earned perfect ratings as well.

1987

Offshore Alaska production begins at Endicott

Exxon press release

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October 3, 1987, the first offshore Arctic production of crude oil began at the Endicott Field, 15 miles east of Prudhoe Bay in the Beaufort Sea. Exxon Company, U.S.A. owns 21 percent interest in the field, where geologists and engineers estimate 350 million barrels of oil can be recovered from one billion barrels contained in the reservoir two miles beneath the earth.

The field is expected to be fully operational by year-end, with average daily crude production of 100,000 barrels, ranking Endicott among the top10 U.S. oil producers. Oil currently is being produced from drilling and production facilities located on two artificial, gravel islands, which are two-and-a-half miles offshore.

An above-ground pipeline carries the oil from the field via a causeway which joins the islands to the mainland. The Endicott Pipeline, in which Exxon Pipeline Company holds 21 percent interest, connects with the Trans Alaska Pipeline System.

That system transports the oil to Valdez, Alaska, for shipment by tanker to the lower 48 states.

Exxon USA purchased its Endicott leases in 1969 and 1982 for $87 million. In 1984, Exxon USA effectively doubled its ownership in Endicott to the current 21 percent by purchasing the majority of Arco Alaska's interest.

The field was discovered in 1978 by another leaseholder, Standard Alaska Production Company, which owns 57 percent share in the field. Amoco and Union Oil Company of California also are major leaseholders. Standard operates the jointly shared drilling and production facilities for the field.

In 1984, the field's development costs were estimated to be $2.2 billion. "Good engineering and good project management, along with favorable market conditions, brought the cost down to $1.1 billion," says Dave Smith, coordinator of the Alaska Interest Production Engineering organization for Exxon USA. "The successful efforts to reduce costs in no way jeopardized the environmental protection aspects of the project. In fact, the Endicott development incorporates innovative environmental protection safe-guards and practices."

Employees from Exxon USA, Exxon Production Research Company and Exxon Research and Engineering Company worked with Standard in turning the prospect into a producing oil field ahead of schedule and under budget. "From a project management standpoint, it represents one of the industry's best efforts in Alaska," Smith says.

Editor's note: Endicott is in the Duck Island unit. Key Arctic offshore technical challenges included a short open-water season and severe ice conditions in the winter. To address the issues of severe ice, currents and ice scouring, two gravel production islands were built. These were the first applications of ExxonMobil's gravel island technology for offshore Arctic production.

benefited from newer technology.

Most obvious was the reach of drilling rigs — which dramatically reduced the size of drill sites.

In 1970, a Prudhoe Bay drill site was 65 acres and from that 65 acres drill rigs could access a subsurface area two miles across.

A 1980 Kuparuk drill site was 24 acres and rigs could access an area three miles across.

By 1985, Kuparuk drill sites had dropped to 11 acres, but the subsurface reach was five miles across.

The reservoir was also different: Kuparuk is at about 6,300 feet, compared to 8,000 to 9,000 feet at Prudhoe Bay. Although the sizes of the reservoirs are about the same, the "pay" at Kuparuk was about 50 feet compared to nearly 600 feet at Prudhoe.

Based on remaining recoverable reserves, ARCO estimated in 1981 that Kuparuk was the second largest field in the United States, behind Prudhoe. Ultimate recovery, with successful waterflood, was expected to range between 1.2 billion and 1.5 billion barrels of oil.

Project, challenges continue to grow

Getting there is half the fun — or challenge — could have been the motto for initial construction at Kuparuk.

First there were the sealifts and the struggle to get facilities modules to the North Slope in the short window each summer when there was an opening in the ice.

Initial Kuparuk facilities came in on three sealifts: The 1979

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More than one culprit in 1989 oil spill

If DEC had heeded Exxon, harm to environment, wildlife would have been less

By STEVE SUTHERLIN
For Petroleum News

Exxon Corp. wanted to burn freshly spilled oil from the 1989 tanker spill in Prince William Sound, but a slow response by the Alaska Department of Environmental Conservation blew the opportunity to destroy a significant amount of the oil that killed thousands of birds and animals and oiled 1,300 miles of pristine shoreline.

"We wanted to burn it, and use dispersant around the edges," said a long-time, reliable Petroleum News source who was working for Exxon in Alaska at the time and has only recently agreed to go on the record.

But in order to burn the oil Exxon needed an open burn permit from the Alaska Department of Environmental Conservation, or ADEC.

Exxon officially took control of the cleanup operation from Alyeska Pipeline Service Co. on Saturday, March 25, a day after its tanker Valdez had run aground on Bligh Reef in the early morning of Friday, March 24. Alyeska operates and maintains the Trans Alaska Pipeline System, commonly called TAPS, which transports North Slope crude oil 800 miles to the marine terminal in the Port of Valdez, which it also operates and maintains. Alyeska is, and was in 1989, largely owned by BP, Exxon and ConocoPhillips (which purchased ARCO Alaska assets in 2000), the primary producers of North Slope oil.

Eleven million gallons of oil (257,000 barrels) gurgled out of the stricken tanker within hours of its grounding on the reef. Due to unseasonably calm weather, the oil was floating in a thick sheet close to the Exxon Valdez.

The longer the oil was exposed to the water, however, the harder it would be to burn. Time was of the essence.

Prince William Sound weather was known for being finicky and brutal. Weather reports showed a storm moving in. Exxon was in a race against the clock and the clouds. It asked ADEC for a permit to burn all the spilled oil.

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EXXON VALDEZ: *continued from page 74*

Rather than issuing an open burn permit, ADEC Commissioner Dennis Kelso, part of Democrat Gov. Steve Cowper's administration, demanded Exxon conduct a test burn to demonstrate the effectiveness of in-situ burning.

"Kelso required test burning; Exxon did it and it worked," the source told Petroleum News in a June 2010 interview.

Coast Guard, NOAA: test burned 98% of the oil

The test burn was very successful, eliminating about 98 percent of the oil on the water, the National Oceanic and Atmospheric Administration, or NOAA, the U.S. Coast Guard and others reported.

The residue from the test burn was easy to pick up, NOAA said in a report on the spill.

Based on the success of the test, Exxon asked permission to proceed immediately with large-scale burning, but ADEC held back.

Saturday turned to Sunday.

Sunday evening a violent storm blew in, dispersing and scattering the oil for miles.

"The chance to burn it was gone," said PN's source. "We went into mitigation mode."

His statements were corroborated in the pages of "The Exxon Valdez Oil Spill: A Report to the President, from the Dept. of Transportation and the Environmental Protection Agency."

"Burning the oil was possible and was done," the DOT and EPA report says. "Apparently, it was not continued because of a misunderstanding between Exxon and the State of Alaska over the conditions under which burning could proceed. By the time the misunderstanding was worked out, the opportunity had passed."

But PN's source said there was no misunderstanding that he was aware of. There was, and this is corroborated in press reports, concern from environmentalists and people living a few miles from the burn area about air pollution, resulting in indecision from the Cowper administration.

Oil spread far and wide

The violent weather closed out other mitigation opportunities as well, such as dispersants. Following the storm, the oil was a thin, widely spread slick, accompanied by globs of oil and water that had been churned into a mousse consistency.

"The oil degraded," PN's source said, rendering dispersant and burning ineffective.

The mousse sank into the water, exacerbating kelp-entanglement problems that plagued what few skimmers were on the scene.

A catastrophe was launched.

The oil spread 460 miles from Bligh Reef to the tiny village of Chignik on the Alaska Peninsula, oiling 1,300 miles of shoreline, 200 miles of which were heavily or moderately oiled (meaning the impact was obvious), per the Exxon Valdez Oil Spill Trustee Council.

No one knows how many animals died as the result of the spill, but according to the Trustees "carcasses of more than 35,000 birds and 1,000 sea otters were found after the spill," considered to be a small fraction of the actual death toll. The "best estimates: 250,000 seabirds, 2,800 sea otters, 300 harbor seals, 250 bald eagles, up to 22 killer whales, and billions of salmon and herring eggs."

Back to Day 1: chain-of-command issues

Alyeska's state-approved spill contingency response plan was very clear as far as boom containment was concerned, but for oil recovery it relied on skimmer ships to scoop the crude out of the water. The Valdez, however, had spilled vastly more oil than anticipated by the authors of the plan.

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

Compounding the inadequacy of the plan, Alyeska's main response vessel was out of service for repairs. It had to be quickly readied to sail, and reloaded with booms and skimmers. It would not arrive at Bligh Reef in anywhere near the prescribed five-hour response time.

In general, Alyeska was poorly prepared for the task at hand.

"Alyeska's performance fell far short of the promises made to the nation ...," the Anchorage Daily News, or ADN, said in a 20th anniversary review of the spill, adding that the company had promised state of the art equipment and personnel, which it didn't deliver.

"For much of the 12 years of its existence, Alyeska chose not to replace aging and outdated spill equipment with more sophisticated skimming and booming systems," said ADN. "It discarded an oil storage barge to save money and disbanded a special oil spill team."

Because Alyeska's spill response capability was woefully inadequate Exxon officially took over control of the response at noon on day two of the spill.

As operator of the stricken tanker and the responsible party, federal and state shipping laws supported its decision to lead the cleanup. A well-heeled partner in Alyeska and TAPS, Exxon could call on its worldwide resources which far exceeded those of Alyeska or other North Slope producers.

The next step in the chain of command: The Coast Guard is the lead federal response agency for oil spills occurring in coastal waters and deepwater ports. It is tasked with monitoring for safety and compliance with federal regulations — and assisting in oil spill cleanup, when necessary.

The State of Alaska was the next link. ADEC had approved Alyeska's oil spill response plan; in fact Kelso had signed off on the latest version just months before the March 24, 1989, spill.

ADEC officials were distressed that Exxon had taken over spill response command from Alyeska.

"The owner companies' unilateral decision to make the hand-off from Alyeska to Exxon the second day threw several years of planning and expectation to the wind," ADEC said in its final report in the spill.

Once oil was on the water the state had little power to intercede. It did, however, have two major power levers over the situa-

tion: controlled burning, which required an open burn permit from ADEC, and the use of chemical dispersant agents, which were conditionally allowed, but in some areas only with approval of ADEC.

Plan called for burning

According to PN's inside source, the Exxon Shipping Co. spill response plan in place on the day of the Exxon Valdez spill directed the spill commander to burn any spill over 1,000 gallons, and use dispersant for the balance.

Chemical dispersants were highly controversial. The state had conditionally "pre-approved" the use of dispersants, but required that the benefit from using them must exceed any environmental risk. Thus the Coast Guard and ADEC wanted to test their effectiveness before allowing use on a wide scale.

The flap about dispersants grabbed much of the attention, but PN's source insists that burning was Exxon's primary and most desired response once it had assessed the situation and Alyeska's response capabilities.

When asked at the time about concerns that burning and dispersants would create long-term damage, Exxon Shipping President Frank Iarossi told CBS News, "There is no way we will handle this spill with all the skimmers in the world, and we need to say that right out openly. We must have at our disposal all the tools possible."

The oil around the Exxon Valdez was ripe for burning. It had been processed for market, meaning it was stripped of water, gas and other impurities. North Slope crude is relatively heavy and not as unstable as lighter crude, so it dissipated slowly and stayed in place on the surface of the water around the grounded tanker, avoiding mixing with salt water.

ADEC not to blame, it says

In a departure from most accounts of the March 25 test burn, Kelso told the U.S. House Subcommittee on Water Power and Offshore Energy Resources in a May 1989 oversight hearing that the state did not hinder Exxon whatsoever in its ability to burn the oil or use dispersants.

In the hearings Rep. Peter Defazio asked Kelso to explain reports that the state had dawdled while the chance to burn went by.

"We also heard (the oil) could have been burned but because of objections by a small village and by environmental groups objections on air quality, that the state, after a successful burn, because of smoke problems prevented further burning," Defazio said.

"The state approved a burning permit; there was an initial burn that was done," Kelso said, likely referring to the test burn and the open burn permit that was issued too late — and possibly to later small burns that were attempted after the storm had spread the oil far and wide.

Kelso went on to say that ADEC actions had not affected the success or failure of Exxon's burn plans.

"The permit was still good," he said. "They then tried to initiate a sustained burn which was unsuccessful. The burn failed not because of the lack of permission to go forward. It failed because of the physical limitations on maintaining that burn in the spill."

"So ADEC never prohibited or delayed further burning?" Defazio asked.

"Eventually that permit expired and I don't know if they requested ...," Kelso said.

"Is that after we experienced the high winds or the consistency of the slick change?" Defazio asked.

At that point, Larry Dietrick, ADEC director of the Environmental Quality Division interjected.

U.S. NAVY

U.S. Navy Mechanized Landing Craft (LCMs) are anchored along the shoreline as Navy and civilian personnel position hoses during oil clean-up efforts on Smith island.

"There were burn tests," Dietrick said. "It was getting at this time frame when getting the material to burn was getting no longer successful."

Defazio changed the subject, asking Kelso, Dietrick and other ADEC staff to discuss the accuracy of conflicting dead bird and otter counts. With many subjects to cover, each congressman had a limited time for questions. Dispersants had claimed a large share of previous discussion.

In other testimony, Coast Guard Commander Steve McCall of the Port of Valdez didn't recall impediments in the way of Exxon's oil burning.

continued on next page

EXXON VALDEZ: *continued from page 77*

"What about the open burning: Were there earlier requests that were denied?" Defazio asked McCall. "Were there requests at the test burning to do more extensive burning that was denied?"

"As far as I know, there has not ever been an application to burn oil that has been denied. The initial burn they did Saturday, the 25th worked apparently very well, however, it was done in the dark so it was very difficult to monitor," McCall said. "Any additional tests, there was no delays from the government side in allowing them to do it. The wind kicking up and moved things around, which made getting equipment out there a problem because of the sea state and the weather they were involved in.

"Once the wind churned it up and created a mousse, if not a full mousse, or enough water in the oil made igniting it impossible, so events overran the ability of the equipment to handle it."

Permits not issued on time

Industry testimony in the same hearings, however, indicated that Exxon was prepared to burn, but a lack of timely issued permits stymied the plan.

According to Iarossi's testimony to the subcommittee, McCall had said in a taped press briefing that Exxon had been cleared only for tests of burning and dispersants.

In testimony, Theo L. Polasek, Alyeska vice president of operations, confirmed that burning was a key response approach in a 1987 report added to the Alyeska oil spill plan which considered a large spill of 200,000 barrels, or 8.4 million gallons, a figure approaching that of the actual 1989 spill of 260,000 barrels.

Rep. George Miller of California asked Polasek if Exxon was prepared to burn on a large scale, and Polasek said yes.

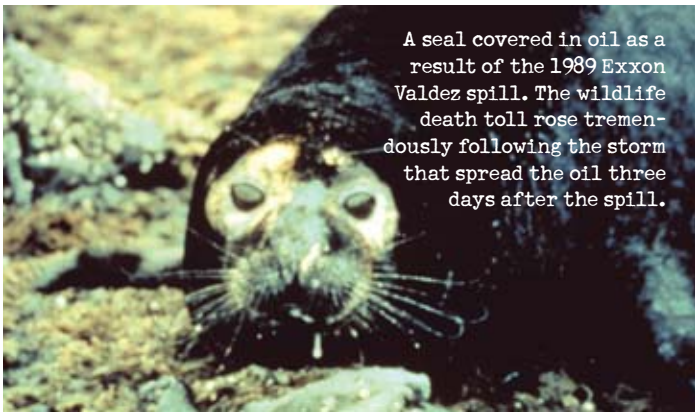
"I think the first day we had about 500 feet (of boom) and then we had 2,600 feet that was flown in from Seattle," Polasek said, confirming what PN's inside source said.

Bill Stevens, the president of Exxon at the time, told that subcommittee that the approved oil spill contingency plan emphasized the importance of the early use of dispersants and of open burning.

In EPA and DOT's report to the president the tone is hardly congratulatory to any of the parties — taking Alyeska, the State of Alaska, Exxon and the federal government to task for not being prepared for a spill of the magnitude of the Exxon Valdez — but in the end the presidential report largely corroborates the testimony of Alyeska and Exxon executives.

It said ADEC took a day just to issue a permit for the test burn.

"On the first day of the spill, Exxon requested an open burn permit from the State of Alaska. The state responded the following day



A seal covered in oil as a result of the 1989 Exxon Valdez spill. The wildlife death toll rose tremendously following the storm that spread the oil three days after the spill.

COURTESY NOAA

by authorizing an effectiveness test for burning the spilled oil, and the test was conducted toward evening of that same day. Approximately 12,000 to 15,000 gallons were burned. Disagreements arose between Exxon and the State of Alaska about the success of this operation.

"Although the oil burned satisfactorily, there were questions about residual smoke. Some residents several miles from the burn site reported irritated eyes and throats. No further tests were conducted. The ADEC took the position that it was not opposed to burning as long as communities were not harmed and their residents were notified of an upcoming burn. The weather changed by the evening of the third day, making conditions unfavorable for another burn."

Exxon "did not receive authorization to use dispersants, other than for two tests, until the end of the three-day period, Sunday evening, March 26," Stevens said in testimony to the subcommittee.

Exxon also "did not receive permission to use open burning until mid afternoon of the same day," he said, adding, "We are confident that had we obtained prompt permission to use dispersants and open burning the environmental damage from the spill would have been significantly mitigated."

A moot point?

Exxon hasn't tried to correct the record with respect to the lost opportunity to burn off spilled oil, because legally and practically, the matter was a moot point, said PN's source for this story.

"Exxon had taken responsibility," he said. "There was nothing to be gained by prolonging the conflict."

After the storm, the oil remaining on the surface had spread to roughly the same coverage as latex paint — 200 square feet per gallon, the source said.

ADEC, in its final report on the spill, said it actively encouraged burning.

Other sources don't agree.

Phyllis A. Leber, Department of Chemistry, Franklin and Marshall College, said in her report, "A Case Study of the Exxon Valdez Oil Spill of 1989," that Exxon got equipment to the site in time to mount an effective burning program, but was limited to a test burn only.

"The delay was critical because as time passed the more flammable components of the oil were evaporating and the remaining oil was more inclined to develop into the water-oil emulsion or 'mousse' that would resist burning," she said. "ADEC opted not to provide the permit for additional controlled burns."

Spill historian Art Davidson, in his book "The Wake of the Exxon Valdez," said that Exxon tried to mount a three-pronged attack to retrieve the oil from Prince William Sound: burning, skimming and using dispersants.

Davidson said Exxon scrambled to get burning equipment on site.

"At the time of the grounding, there was only 500 feet of fire boom in Alaska, hardly enough to make an appreciable difference." he said."However, by noon Saturday, Exxon had transported another 2,500 feet of fire boom to Valdez, and a test burn was scheduled for that evening."

On Saturday night, Exxon had booms enough to run four simultaneous burns, he said.

"If its permit came through in time, Exxon could work through the night, burning off approximately 50,000 gallons (nearly 1,200 barrels) per hour," Davidson said, adding that it wasn't until Sunday evening that Exxon got word the state had finally granted a permit for controlled burning.

Exxon official frustrated

Iarossi expressed his frustration with the response pace at the Sunday evening press briefing in Valdez.

"We have been so frustrated today — just as frustrated as everyone else — at the pace of recovery, and the reason for that frustration is that we have been limited to mechanical pickup (skimmers). It's not gonna do the job. ... It is the slowest, least effective, tool. That's why it was so important to get the state's permission to burn, and so important to get the permission of all the authorities to begin to use dispersants," which PN's inside source at Exxon explained multiple times were going to be used for the "1 to 2 percent of the oil that couldn't be burned because it had already mixed with salt water — the oil on the edges."

Uncontained burning 'inefficient and risky'

Sources told Petroleum News that Exxon had considered using boom to move oil away from the stricken tanker, setting it adrift on the light breeze, and burning it — controlling the edges with aerial dispersant spraying. With this technique, the burning could have progressed faster and problems such as degeneration of the fire-resistant boom could have been avoided. Theoretically, half of the oil on the water could have been burned with this method before the storm set in.

However according to a in-situ burning expert Exxon brought in to address the Valdez spill, the notion that half the oil could have been burned is too optimistic given the limitations faced by the responders.

Prior to the Exxon Valdez grounding, Al Allen had worked on the cleanup of spills such as the 1969 Santa Barbara blowout, the 1974 Mizushima tank failure in Japan, and the 1979 Ixtoc blowout off Mexico.

"Uncontained burning would have been inefficient and risky, and was not seriously considered," Allen said. "It's risky burning without containment."

Allen said the area where the oil spilled was too confined to safely cut burning oil adrift.

"Farther off shore and farther from other vessels would have been another story, but at Bligh Reef it would not have been an appropriate measure," he said. "We had to consider safety, timing, approvals, proximity to other vessels, proximity to shore, proximity to trees or other flammables, and impact on other life."

Allen said serious limitations made burning a challenge. The oil was all in one batch, the weather turned bad, the oil was close to shore, and there was short time to respond.

In the 2010 BP blowout in the Gulf of Mexico, the oil was farther out to sea, and it was surfacing in predictable amounts each day, rather than having been dumped on the water all at once.

EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL

Burning the Exxon Valdez oil presented more of a challenge.

"We had only limited access to fire boom and a two and one-half day burn window," Allen said. " It's not inaccurate to say we could have done three to five burns per day, perhaps 10 to 12 burns over two days at 700 to 1000 barrels each — perhaps a total of 12,000 barrels."

Other uncertainties cloud the ability to estimate, Allen said, such as whether the fishermen could have been trained to efficiently handle the boom in such a short time frame.

"If we had had more boom, more time..."

Allen said responders in Prince William Sound now are much better prepared to burn off spilled oil by dint of better training and better equipment.

"Today it's a totally different story," he said. "It's a whole new ball game now, much improved."

Exxon Valdez: The aftermath

Spill legacy includes new safeguards and enhanced response capabilities

By STEVE SUTHERLIN
For Petroleum News

On March 24, 1989, the tanker Exxon Valdez ran aground in Prince William Sound in Alaska. Loaded for a five-day run to Long Beach, Calif., the 987-foot ship held 1,264,164 barrels of North Slope crude. The ship's hull was ruptured, spilling 257,000 barrels of its cargo onto the sea.

The Valdez, in service for three years, was the newest, best-equipped ship in Exxon's fleet. Its captain, Joseph Hazelwood, was a 19-year Exxon Shipping veteran.

On March 25, Exxon took responsibility for the spill.

Exxon launched a cleanup, and voluntarily compensated Alaskans and businesses that claimed direct damages. According to Exxon, it spent more than $3.8 billion on compensation, cleanup efforts and settlements and fines.

The aftermath of the Exxon Valdez oil spill was not all negative. The spill altered oil transport activities in Prince William Sound forever, holding the industry to a higher bar.

The cleanup was declared complete by the State of Alaska and the U.S. Coast Guard in 1992. Litigation continued until June 2008, when the U.S. Supreme Court set maximum punitive damages of $508 million in the Exxon Valdez case.

"The Valdez oil spill was a tragic accident and one which the corporation deeply regrets," ExxonMobil Chairman and CEO Rex W. Tillerson said in a statement following the ruling. "We know this has been a very difficult time for everyone involved. We have worked hard over many years to address the impacts of the spill and to prevent such accidents from happening in our company again.

"In the aftermath of the Valdez accident, we redoubled our long-time commitment to safeguard the environment, our employees and the communities in which we operate," Tillerson said.

"We have worked hard over many years to address the impacts of the spill and to prevent such accidents from recurring," Exxon said on its website. "Our current maritime performance reflects this commitment."

The scope of the spill was inventoried in a November 1994 report — the Exxon Valdez Oil Spill Restoration Plan. The report was issued by the Exxon Valdez Oil Spill Trustee Council, which was formed to oversee restoration of the injured ecosystem funded by a $900 million civil settlement.

"That spring the oil moved along the coastline of Alaska, contaminating portions of the shoreline of Prince William Sound, the Kenai Peninsula, lower Cook Inlet, the Kodiak Archipelago, and the Alaska Peninsula," the report said, "Oiled areas include a National Forest, four National Wildlife Refuges, three National Parks, five State Parks, four State Critical Habitat Areas, and a State Game Sanctuary.

The 1989 spill led to federal legislation mandating a phase-in of double-hulled tankers, to replace single-hulled vessels such as the Exxon Valdez. Pictured here is the Polar Discovery.

COURTESY BP

"Oil eventually reached shorelines nearly 600 miles southwest from Bligh Reef where the spill occurred."

New precautions in place

The aftermath of the Exxon Valdez oil spill was not all negative. The spill altered oil transport activities in Prince William Sound forever, holding the industry to a higher bar.

The Exxon Valdez spill triggered new federal and state legislation which heightened regulatory oversight of spill prevention and response in Valdez, Prince William Sound, and all of Alaska, including inland waterways.

Single-hull tankers have become a relic in the Valdez trade, as an outcome of the 1989 spill.

The spill led to the Oil Pollution Act of 1990 — federal legislation mandating a phase-in of double-hulled tankers, to replace single-hulled vessels such as the Exxon Valdez.

SERVS

Valdez harbor boasts the headquarters of the Ship Escort/Response Vessel System, an organization formed shortly after the Exxon Valdez spill. SERVS, a unit of Alyeska Pipeline Service Co., provides spill response and tug escorts for oil tankers hauling Alaska North Slope crude oil out of Prince William Sound. SERVS also provides oil spill response services for the oil terminal and for the shippers that operate the tankers. The SERVS control room also maintains contact with vessels in Prince William Sound, employing the same types of automatic vessel identification system and ice radar as the Coast Guard to monitor tankers on the water.

Each tanker has a two tug escort, with one tug tethered to the

tanker's stern — poised to drag the tanker out of harm's way. The tug stays with the tanker all the way out to Hinchinbrook Entrance. On the tanker's bridge, a professional pilot assists the tanker crew to navigate the route between Valdez and Bligh Reef.

In October 2010, the two-tug system in Prince William Sound was officially extended. The Coast Guard Authorization Act of 2010 (H.R. 3619) mandates that two tugboats must continue escorting oil-laden tankers through Prince William Sound, even if the ships have double hulls. Dual escorts previously were required only for single-hull tankers.

The oil industry for years has escorted laden tankers through the sound with two tugs, which can tow or nudge the ships should they lose power or otherwise get into trouble. If there was a question about whether dual tugs will continue after the tanker fleet became 100 percent double hulled, H.R. 3619 answered it.

The SERVS escort tugs carry skimmers and boom, to serve as the first line of response in the event of a spill.

Fishing vessels played a major response role in the spill. Many in 1989 felt the fishing fleet could have done more, and fishermen were frustrated that they were not allowed to do more, especially in the early hours of the spill.

Fishing fleet preparedness

Today, SERVS provides a framework for the fishing fleet to maintain preparedness, and to be included as a primary part of any spill response effort.

State and federal authorities now require Alyeska to maintain a large fleet of fishing vessels to help clean up oil spills. Crews take part in periodic training on tasks like deploying boom and skimming oil.

In 1989, spill response consisted of just a barge, three skimmers and 2.5 miles of boom. On-water storage was 5,000 barrels.

In 2010, the program encompassed roughly 350 boats from Cordova, the primary fishing port in Prince William Sound, along with the ports of Valdez, Whittier, Seward, Homer and Kodiak. More than 200 of the vessels are based in Prince William Sound. SERVS fishing vessel training is held twice a year.

SERVS in 2010 maintained a 50-mile supply of various types of boom, 108 skimmers providing a total of 59,000 barrels per hour of oil recovery capacity and nine oil recovery barges which together provide 900,000 barrels of on-water storage capacity.

SERVS tugs and response barges provide mobile platforms for deploying equipment to a response site.

The many elements of spill response are united under the incident command system — a system of standard crisis response organizational protocols and procedures for organizations potentially involved in Prince William Sound oil spill response, including shippers, the Coast Guard and the state.

The organizations participate in coordinated major annual oil spill drills involving hundreds of people.

SERVS also periodically tests the deployment of equipment at remote sites such as salmon hatcheries. SERVS stages equipment at five salmon hatcheries and five remotely located response sites in Prince William Sound. SERVS also has recognized sites with high environmental sensitivity which are covered by specialized oil spill response plans.

Ice Radar

In its report on the 1989 oil spill, the National Transportation Safety Board recommended installing a radar system near Bligh Reef to spot icebergs and monitor vessel traffic. A factor in the spill was that the Valdez deviated from the standard shipping lanes to avoid ice that other vessels had reported.

DAVID PREDEGER/ALYESKA PIPELINE SERVICE CO.

The Nanuq, one of two enhanced tractor tugs operated by Alyeska Pipeline Service Co., is tethered to the stern of the oil tanker American Progress as it heads for the open ocean beyond Prince William Sound. Alyeska's new emergency prevention priority requires tug operator Crowley Marine Alaska to keep a line attached to oil tankers under way through the Sound.

"After the spill, evidence continued to mount about the threat posed by icebergs," the Prince William Sound Regional Citizens' Advisory Council told Petroleum News. "An empty tanker struck an iceberg in the Sound in 1994 and suffered over $1 million in damage. And a technical study in the mid-1990s identified icebergs as one of the major remaining threats to tankers in the Sound."

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ALYESKA PIPELINE SERVICE CO.

A better 'mousetrap' for inland oil spills, pictured here is a versatile, fast-water booming tool, the BoomVane, which can be used to both recover and deflect spills in fast-moving rivers and streams.

The council, the Coast Guard, Alyeska and other stakeholders finally succeeded in installing ice radar in 2002 on Reef Island, which overlooks Bligh Reef, the navigational hazard the tanker Exxon Valdez hit in 1989. The radar scans the waters from Reef Island west to Columbia Bay, where the Columbia Glacier calves icebergs that can drift into shipping lanes. The ice radar feeds a display to the Valdez operations base for SERVS.

The U.S. Coast Guard has added staff to augment the increased radar coverage in the sound.

In 1989 a radar system scanned Port Valdez, the Valdez Narrows and the Valdez Arm of Prince William Sound, as far as Rocky Point. Tracking vessels outside of radar coverage required ship-to-shore radio communications and plotting.

Now the Coast Guard maintains radio contact with tankers and will alert a tanker crew if the tanker starts to stray off course. The Coast Guard also imposed a system of marine speed limits in the sound.

Watchdog: Prince William Sound Citizens Advisory Council

The Prince William Sound Citizens' Advisory Council is a congressionally sanctioned nonprofit, formed after the Exxon Valdez oil spill. It keeps watch over the Alyeska Pipeline Service Co. oil terminal and tanker operations at Valdez and in Prince William Sound.

The council reviews oil spill preparedness plans and conducts scientific and technical studies.

The industry, under a 1990 contract with Alyeska, provides the bulk of the council's annual budget of more than $3 million, supporting a staff of 18 in Valdez and Anchorage. The council has advocated safeguards such as continued tug escorts for tankers and tighter standards for air and water pollution around the terminal. The council will remain in force as long as oil flows through the trans-Alaska oil pipeline.

The council has 19 member organizations including local governments, commercial fishing, environmental groups, Natives, and recreation and tourism groups from across a region stretching from Prince William Sound to Cook Inlet to Kodiak Island.

By law, the council is subject to periodic Coast Guard re-certification.

The council is made up of the communities of Chenega Bay, Cordova, Homer, Kodiak, Port Graham, Seldovia, Seward, Tatitlek, Valdez and Whittier; the Kenai Peninsula and Kodiak Island boroughs; the Oil Spill Region Environmental Coalition; Chugach Alaska Corp.; the Alaska State Chamber of Commerce; Cordova District Fishermen United; the Kodiak Village Mayors Association; Prince William Sound Aquaculture Corp.; and the Alaska Wilderness Recreation and Tourism Association.

KUPARUK GOES ONLINE: *continued from page 73*

sealift brought in the warehouse, shop, vehicle storage and hanger. Workers were still installing those in the spring of 1980, along with doing piling work for modules and laying more gravel in advance of the 1980 sealift, which would bring in the permanent base camp, sewage and power facilities. Final facilities for initial production only arrived in the summer of 1981.

In the winter of 1979-80 six development wells were drilled along with two exploratory wells to confirm more high-potential Kuparuk areas.

As part of the expansion, three additional facilities (central processing facilities 2 and 3, and the seawater treatment plant) were installed to meet Kuparuk pipeline capacity of 200,000 bpd in 1986 — a big change from an original projection of 60,000 bpd.

One of the challenges of developing Kuparuk was getting there from Prudhoe, Prudhoe being the connection to the Dalton Highway, known as the Haul Road, and initially the necessary connection to West Dock for module delivery, although Kuparuk later had its own dock facilities at Oliktok Point.

At spring breakup in 1980, culverts at ARCO's $5 million Kuparuk River crossing washed out, temporarily closing the Kuparuk Spine Road — a road needed to move sealift modules to the field.

A temporary river crossing had to be in place by August to move 1,000-ton equipment-bearing modules. If the river crossing wasn't ready ARCO planned to move the equipment overland in the winter.

Jim Weeks, who headed the Denver-based Kuparuk project group which designed, constructed and installed Kuparuk facilities, told the ARCO Spark that three of the 12 culvert sections gave way June 9 and over the next four days the rest of the culvert sections collapsed into the Kuparuk River.

Kuparuk River a stumbling block

In a 2001 interview with Petroleum News, Weeks talked about the bridge problem — and about the challenges of getting Kuparuk developed.

Jim Weeks, first project manager for Kuparuk

"From the start, Kuparuk had … the reputation of being the down-to-earth, low-cost, sort of get-it-done-cost-effectively oil field," said Weeks, the first project manager for Kuparuk. "That was our mandate.

"We developed a lot of new technology at Kuparuk, and we broke the paradigm that you couldn't start something up in the same year you shipped it," Weeks said.

The sealift was due in August 1980 and materials for Kuparuk, including the power plant, would have to go across the Kuparuk River. A bridge was needed. Weeks said plans were under way the previous fall, but permits didn't come through until after freeze-up — and the gravel that would be used for fill already had ice crystals in it.

When the Kuparuk River floods at breakup, it becomes three miles wide. "We couldn't justify building a three-mile bridge, so what we did is build a bridge on the main channel" with two low-water crossings on either side. Even the central bridge would be expensive, so they chose the type of "massive, corrugated culverts used for train tunnels." The culverts were backfilled with compacted gravel.

At spring breakup in 1980, culverts at ARCO's $5 million Kuparuk River crossing washed out, temporarily closing the Kuparuk Spine Road – a road needed to move sealift modules to the field.

"The actual strength that held the load up on the top of the bridge was not the culvert but the gravel," Weeks said. The gravel was key — it pushed against the sides of the culverts, giving them the strength they needed.

"But when we built the bridge the backfill was frozen. You can pound on ice all day long and it's not going to compact," Weeks said.

At breakup, the gravel started to thaw out, the ice crystals melted "and the gravel lost its ability to push against the side shells of the pear-shaped culverts, and they collapsed."

Weeks and Kuparuk operations manager Landon Kelly purchased all the surplus 48-inch Alyeska Pipeline Service Co. pipe they could find in the state and used it to install a temporary bridge to meet the August sealift.

Permanent bridge needed

After getting the temporary bridge in place to meet the sealift, a permanent bridge was required before oil production could begin.

Because of the strength of the Kuparuk River breakup, pilings for a permanent bridge were massive: 42 inches in diameter, so big they could not be made in the United States, they had to come from Japan, lashed to the deck of a ship because of their diameter and 80-foot length.

At Kuparuk, 54-inch holes, 100 feet deep, were drilled for the pilings, but the ship encountered a storm in the Gulf of Alaska and some of the pilings went overboard.

Without the pilings in place water would fill the holes at breakup and thaw them out and the holes would collapse.

The Japanese could get them more piling, but not until September or October, and the holes needed to be saved: they held a contest.

John Larson, an ARCO engineer, suggested using some of the surplus 48-inch pipe ARCO had bought for the temporary bridge, cutting the pipe into 15-foot lengths and putting a cap on each section.

Weeks said they hung a section of pipe into each hole, insulated the area between the 48-inch pipe and the 54-inch hole and backfilled. "We essentially put a plug in the top of the hole and froze it back in place," Weeks said. Forty holes were saved. The replacement pilings came in and were put in during the fall of 1981, allowing startup to take place at the field.

With employees working around the clock the field started up three months ahead of schedule, on Dec. 13, 1981.

Kuparuk ownership

ExxonMobil officials say their company has been an active partner in the development and production of the Kuparuk unit from the start.

Today, core area working interest owners at Kuparuk are ConocoPhillips, 52.12468 percent; BP, 37.02472 percent; ExxonMobil 5.8 percent; and Unocal, part of Chevron, 4.9506 percent.

Third time's the charm

Thanks to Exxon's influence, Point McIntyre started producing oil in 1993

By STEVE QUINN & KAY CASHMAN
For Petroleum News

Drill rig at Point McIntyre, 2009.

COURTESY BP EXPLORATION (ALASKA) INC.

ExxonMobil has a reputation for making sound business decisions when it comes to oil and gas development, which sometimes makes it pushy with its partners about getting petroleum resources out of the ground and to market as soon as the technology and economics match the geology of a prospect. If Exxon hadn't been so pushy, Alaska's Point McIntyre field, the largest North American oil discovery of the 1980s, might not have been developed as soon as it was.

After Gulf Oil drilled two dry holes in the North Slope prospect in 1977, it sold the majority of its interest in the 5,000-acre Point McIntyre prospect, leaving ARCO the new operator.

ARCO had no interest in drilling another well on the acreage, but by 1985, its partner Exxon did.

Exxon's interest stemmed from a smart company policy of having every geologist who joined a regional team revisit the area's geology; essentially build a new geologic base map for Exxon's leases.

"Two new Exxon geologists had just completed logging school and brought fresh, innovative theories to the drawing board," Stu Gustafson told Petroleum News in a 2010 interview. A geologist by education and often mistaken for a landman or exploration manager, Gustafson was a scout for Exxon in Alaska from 1979 until 1995 when the company closed its exploration office in the state.

JUDY PATRICK

Stu Gustafson

The two geologists "saw something different" in the Point McIntyre well logs, Gustafson said. "There was an awful lot of gas for the type of rock. This isn't just gas, they said: This is gas and oil.

"Anytime a new geologist is assigned to an area they've got to go through and do their own regional geological base map," Gustafson said. "In other words, don't assume everyone else in the past got it right. They looked at the logs for Point McIntyre wells No. 1 and 2, and said, 'we've got a great prospect here.'"

By that time ARCO and Exxon held 90 percent of the two Point McIntyre leases, each with half, but ARCO was the operator, so Exxon shared its information and asked ARCO to drill a well, this time with a new target.

"Gulf had gotten stuck in first well, when they finally got free, they pulled out of hole, and blew through the pebble shale and the Kuparuk. They were targeting the Saddlerochit, Prudhoe Bay's main producing formation; that was the most desirable target at the time. So they drilled another one. They drilled right through it again: Their mud was too heavy."

ARCO said no to drilling in 1985, but offered to sell its Point McIntyre interest to Exxon.

"Exxon liked the prospect, but not that well," Gustafson said.

Exxon asked for a well again in 1986. The answer was still no.

In 1987, ARCO, tired of being badgered, said no to drilling, but was willing to sell its share of Point McIntyre to Exxon. Unfortunately its asking price was too high.

ARCO finally agreed to drill a Point McIntyre well, targeting the Kuparuk, if Exxon secured controlling interest in the prospect's leases by the end of the year.

So in mid-1987, Exxon signed a purchase agreement with Chevron, which had acquired Gulf, for Chevron's percent inter-

est, giving Exxon 53 percent of Point McIntyre.

Four days to get their approval

Exxon seemed to have everything in place when Gustafson took a late December call from his company's headquarters in Houston.

He learned Exxon had to get approval to buy Chevron's interest from three Alaskans — Clifford Burglin, Thomas Miklautsch and Chuck Hamel — who held 2 percent of the Point McIntyre leases AND had the veto power on any sale of Chevron's eight percent interest.

Exxon had to secure the three signatures at a time when there were no cell phones, overnight delivery service or e-mails to expedite deals.

Gustafson had four days to get all three to agree, and he was nowhere near Alaska when he got the word. Rather, he was enjoying time with his family in Florida.

"We were supposed to close the deal and at the 11th hour, Chevron said 'we can't sell to you without 100 percent consent from these three people.'

"We had already told ARCO we were going to get controlling interest but if we couldn't get Burglin, Miklautsch and Hamel to agree, we wouldn't have it by the deadline."

Hamel an easy sell, Miklautsch not

Gustafson said Hamel, then living in Washington, D.C., was an easy sell, taking advantage of the airline industry's counter-to-counter service to forward his signed document to Exxon.

Burglin, too, agreed verbally, but Miklautsch proved challenging.

Burglin and Miklautsch were not on speaking terms at the time. To make things worse, Miklautsch was purposefully living off the radar in a California hotel.

Even though Gustafson told him that Burglin had agreed to Chevron's sale to Exxon, Miklautsch wanted Burglin to call him before he would sign off on the deal.

After successfully imploring Burglin to call Miklautsch — it took four phone calls from Gustafson — Exxon had its deal.

Getting Burglin's signature

Here's what Gustafson remembers about working with Burglin:

"Cliff Burglin and I always got along quite well, so I called Cliff, and Cliff said 'I knew you would be calling.'

"I told him, 'the best way to beat us is to join us. If it's good for us, then it's great for you.'"

Entrusting a colleague to bring the paperwork to Miklautsch, Gustafson boarded a red-eye to Fairbanks.

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Exxon sees hope for Alaska exploration

On Aug. 3, 1993, the New York Times ran a short piece in its company news section that basically said:

Exxon Corporation has modest plans to seek new oil on Alaska's North Slope, the company's Alaska manager said yesterday. "Alaska clearly is a place where there's hope of additional discoveries and production, so we remain vitally interested in participating here," Michael Smith, head of Exxon USA's Alaska office, told the Anchorage Chamber of Commerce.

Last winter, Exxon drilled its first exploratory well in Alaska since 1986, at Thetis Island, a state-owned site. A second exploratory well is planned by 1995 at Thetis Island, Mr. Smith said.

The 1993 well, Thetis Island No.1, was drilled in partnership with Anadarko Petroleum and Japex, and was certified by the State of Alaska as capable of producing in paying quantities.

It was the last exploration well Exxon ever drilled in Alaska.

Exxon's working interest in the lease, ADL 379301, was sold to Anadarko. The lease is currently part of Pioneer Natural Resources' Oooguruk unit.

Exxon stops exploring

Exxon's Alaska-Pacific Division's exit from exploration in Alaska was, in part, connected to the 1989 oil spill in Prince William Sound.

As negative feelings toward the company grew in the years following the spill, company executives were reportedly concerned about the difficulties if permitting wells in Alaska.

Despite Smith's positive comments about exploration, local officials were told by headquarters that the 1993 well couldn't be drilled without 30 percent of the costs being carried by new partners — hence Anadarko and Japex — which was unusual for the cash-rich Exxon.

There was a lot of dissatisfaction in the company, too, about the most recent exploration well it had drilled in late 1985 in the federal waters of Alaska's Beaufort Sea, 20 miles northwest of BP's disastrous Mukluk well. The Orion well, one of Exxon's Alaska-Pacific Division geologists claimed, would have 400 feet of pay. It turned out to be a complete bust with 44 feet of pay. Not something company leadership was pleased with after conducting an internal technical audit.

All that plus the $385 million cost of the CIDS unit (see page 60) drove Exxon's decision to halt exploration in Alaska.

—Kay Cashman

"Cliff picked me up at the airport and we went to his house for a bite to eat," Gustafson recalls. "He kept talking and talking and I had a package in front of him to sign. I told him, 'I'm going to need to get a hotel room because I'm going to miss my flight.'

"He finally called his daughter who was a notary, and she came over. He pulled the package out and said, 'I don't have to read it. You and I both know what it says.' He signed it and hauled me out to the airport. That's how we did business back then."

Gustafson a straight shooter

Burglin's son Brian remembers Gustafson as being a straight shooter who brought credibility to the deal.

"He was more like me in that he was the landman, but he got to go on drilling locations and on the rigs, so he had a good feel for everything from start to finish," Burglin said.

"The bigger companies like that, he's just a landman and that's all they do," he said. "Stu was pretty hands on. It made him more down to earth. He didn't have the air that I work for the biggest oil company in the world.

"He got his hands dirty working. I think that made him unique."

Exxon eventually bought Burglin, Miklautsch and Hamel's two percent interest in Point McIntyre.

The Point McIntyre oil field, which lies northwest of Prudhoe Bay, on and off shore, was discovered in March1988 by the ARCO-Exxon Point McIntyre No. 3 well.

The discovery well was tested at a sustained rate exceeding 2,500 barrels of oil per day.

The field, which was originally estimated to hold 800 million barrels of oil with 400 million barrels recoverable, went online in 1993.

By mid-2009 Point McIntyre had produced more than 415 million barrels of oil.

Under the radar

Looking back, what does Gustafson think of Exxon?

"Exxon's strength is doing its job well; on time and on budget and, most of all, without fanfare," he said.

"We had the largest discovery in the 1980s for North America, but Exxon didn't need for anybody to know that. Even when they are the operator, they prefer to work under the radar."

Editor's note: Stu Gustafson returned to Alaska as a consultant with independent Armstrong in 2001 to help develop the Oooguruk, Nikaitchuq and Tuvaaq prospects. He is best known in Alaska for his ability to work with locals and move projects quickly and efficiently from lease acquisition to development.

Miller, Krohn describe geology

The Point McIntyre … hydrocarbon reservoir is the early Cretaceous age Kemik sand. ….

The field was discovered by conscientious re-evaluation of all the available data in the area. Previously drilled wells had been abandoned and interest in the area waned until careful re-mapping identified the hydrocarbon potential.

The field is a low-side fault trap on the north side of a large splay of the Prudhoe Bay Fault. The Kemik sand is present only on the low side of the trapping fault and is not generally preserved on the high side of the fault in the field area. The trap is sealed updip by juxtaposition of the Kemik reservoir sands against Jurassic Kingak shales in the footwall of the fault.

Although the structure is not complex, it was difficult to map correctly in depth because of large long-period static problems in the seismic data. This is due to rapid lateral changes in near-surface velocities caused by changing permafrost thickness near the shoreline. Impedance modeling of the seismic data also helped define the areal extent and quality of the reservoir interval.

The Kemik sand became a new producing reservoir on the North Slope of Alaska. These sands are age equivalent to the Kuparuk "C" sands which produce in the Kuparuk Field to the west. The depositional environment is interpreted to be a near shore marine facies with excellent reservoir characteristics. Point McIntyre field is an excellent example of a major oil field discovered in an overlooked and subtle trap.

—Abbreviated version of "Geology and History of Discovery of the Point McIntyre Field, North Slope, Alaska" by ExxonMobil's Keith R. Miller & Steve Krohn for AAPG 2009 Arctic Conference and Exhibition in Moscow, Russia.

Shareholders OK merger with Mobil

At Exxon's Annual Meeting, held at the Wyndham Anatole Hotel in Dallas, Texas, on May 27th, 1999, shareholders voted in support of the Board's recommendations on the proxy proposals, including the proposed Exxon Mobil merger. Exxon shareholders voted 99.3 percent in favor of the historic merger agreement. Chairman Lee Raymond said the shareholder vote represents an important milestone in the Exxon Mobil merger. He also noted that several conditions, including regulatory reviews, must be completed before the merger can be accomplished. Exxon and Mobil previously announced that they anticipate regulatory reviews of the proposed merger will be completed by about the end of the third quarter.

Mobil shareholders also met on May 27, 1999, at the Fairmont Hotel in Dallas, Texas, to conduct Annual Meeting business and vote on the proposed Exxon Mobil merger. Mobil shareholders voted 98.3 percent in favor of the merger.

—June 1999 Annual Meeting Report, Exxon Perspectives

Exxon partners with TransCanada in gas line

By KRISTEN NELSON
Abbreviated story from June 14, 2009, Petroleum News

TransCanada has a partner in the Alaska gas pipeline project, announcing June 11 that it has reached an agreement with ExxonMobil to work together on the project. TransCanada will be the majority partner.

ExxonMobil, a major working interest owner at Prudhoe Bay and the operator at Point Thomson, is the largest owner of North Slope natural gas. The other major owners, BP and ConocoPhillips, are partners in the competing Denali gas pipeline project.


Petroleum News

Exxon joins line

Local doubts on bay

Investing in the Arctic

"ExxonMobil and TransCanada have the experience, expertise and financial capability to undertake this project," said ExxonMobil Production Co. President Rich Kruger. "We have on-the-ground knowledge of Alaska and Canada, experience working in the Arctic, a strong history of technology and innovation, and the proven ability to build and operate projects of enormous scale in the most challenging environments."

Tony Palmer, TransCanada vice president of Alaska development, said that TransCanada and ExxonMobil will jointly advance all aspects of the project, while TransCanada and Foothills will remain the AGIA, or Alaska Gasline Inducement Act, licensees. The companies will jointly staff project teams; Palmer said TransCanada would take the lead on the pipeline while ExxonMobil will take the lead on the gas treatment plant.

Best way to advance pipeline

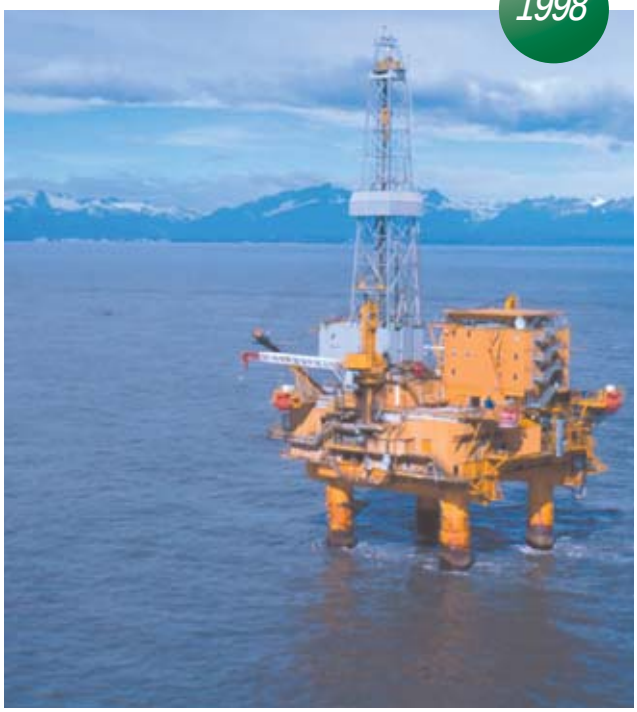
Martin Massey, ExxonMobil Production Co.'s U.S. joint interest manager, said ExxonMobil is eager to work with the State of Alaska so the company can become a full participant in the AGIA license.

Massey said ExxonMobil did an analysis, evaluated a number of options and determined that aligning with TransCanada and progressing the project under AGIA provided the best chance of success and the best opportunity to bring all the parties together.

Alignment between all parties — the North Slope producers, TransCanada and the State of Alaska — will be required for project success, Massey said, but TransCanada and ExxonMobil can advance the project for many years.

ExxonMobil is not asking the state to enter fiscal discussions now in order for ExxonMobil to align with TransCanada, he said, but predictable and durable terms are required, and AGIA is the vehicle to address those terms. For ExxonMobil to become a full participant in the license would require dealing with issues of predictable and durable fiscal terms, Massey said.

1998


COURTESY XTO

XTO enters Cook Inlet, Exxon buys XTO

In 1998, Cross Timbers Oil (later renamed XTO Energy) purchased producing properties in the Middle Ground Shoal field from Shell in exchange for $40 million in stock, including two platforms set in 70 feet of water with 39 active wells (as of 2006). The Cook Inlet field was in decline, producing about 3,600 barrels of oil a day,

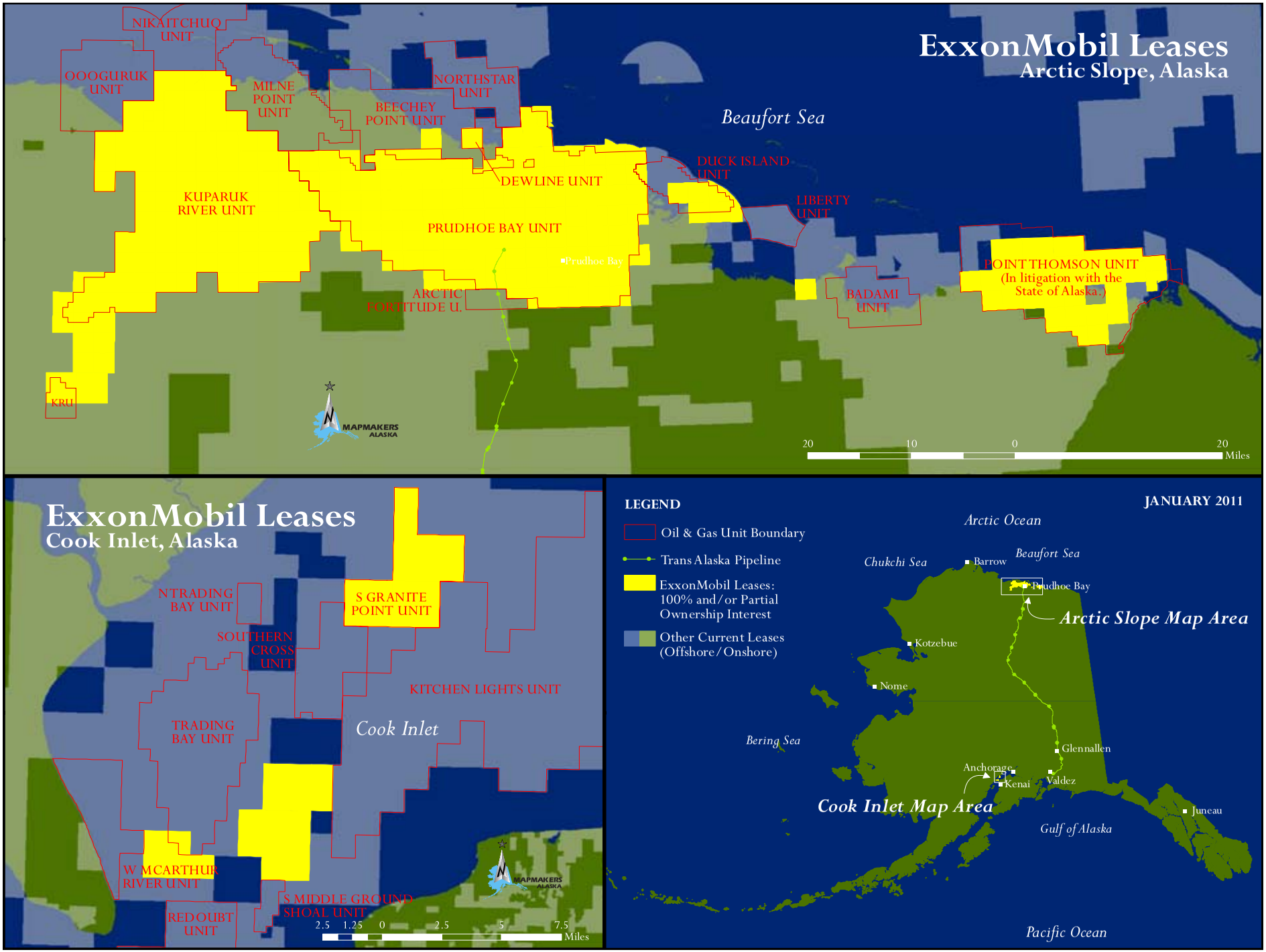
Since that time XTO has done sterling work in maintaining oil production at the field, and in increasing the field reserves — from 12 million barrels to 24 million barrels

XTO has developed new reserves by, among other things, directional drilling in the west flank, where the strata are essentially tipped on end. The company has also maintained production through coiled drilling work on production wells, injection well workovers and artificial lift optimization. (Reservoir pressure is maintained by injecting filtered water from Cook Inlet.)

In 2008, Middle Ground Shoal was producing at a rate in the range of 3,000 to 4,500 barrels per day.

In 2009, ExxonMobil acquired XTO in an all-stock deal, making XTO a subsidiary.

At the end of 2010, Middle Ground Shoal was still producing from 28 wells with a total daily average of 2,585 barrels a day.


ExxonMobil Leases
Arctic Slope, Alaska
NIKAITCHUQ UNIT
OOOGURUK UNIT
MILNE POINT UNIT
BEECHEY POINT UNIT
NORTHSTAR UNIT
Beaufort Sea
DUCK ISLAND UNIT
DEWLINE UNIT
KUPARUK RIVER UNIT
LIBERTY UNIT
PRUDHOE BAY UNIT
Prudhoe Bay
POINT THOMSON UNIT (In litigation with the State of Alaska.)
ARCTIC FORTITUDE U.
BADAMI UNIT
KRU
MAPMAKERS ALASKA
20 10 0 20 Miles
ExxonMobil Leases
Cook Inlet, Alaska
NTRADING BAY UNIT
S GRANITE POINT UNIT
SOUTHERN CROSS UNIT
KITCHEN LIGHTS UNIT
TRADING BAY UNIT
Cook Inlet
W MCARTHUR RIVER UNIT
S MIDDLE GROUND SHOAL UNIT
REDOUBT UNIT
2.5 1.25 0 2.5 5 7.5 Miles
LEGEND
Oil & Gas Unit Boundary
Trans Alaska Pipeline
ExxonMobil Leases: 100% and/or Partial Ownership Interest
Other Current Leases (Offshore/Onshore)
JANUARY 2011
Arctic Ocean
Chukchi Sea
Barrow
Beaufort Sea
Prudhoe Bay
Arctic Slope Map Area
Kotzebue
Nome
Bering Sea
Glennallen
Anchorage
Kenai
Valdez
Cook Inlet Map Area
Juneau
Gulf of Alaska
Pacific Ocean

ExxonMobil's Alaska wells

A well history from 1926-2010

DATE SPUD	DATE COMPL.	WELL NAME	OPERATOR	GEO. AREA	CLASS
6/26	10/27	SULLIVAN MOBIL 1	GENERAL PET.	GULF OF AK B.	EXPLORATORY
11/81	3/82	BEECHY PT 1	EXXONMOBIL	ARCTIC OCEAN	EXPLORATORY
3/67	7/67	GRANITE PT ST 31-14RD	EXXONMOBIL	COOK INLET B.	DEVELOPMENT
12/81	3/82	BEECHY PT 2	EXXONMOBIL	ARCTIC OCEAN	EXPLORATORY
11/84	1/85	ANTARES 1	EXXONMOBIL	ARCTIC OCEAN	EXPLORATORY
1/85	4/85	ANTARES 2	EXXONMOBIL	ARCTIC OCEAN	EXPLORATORY
11/85	12/85	ORION 1	EXXONMOBIL	ARCTIC OCEAN	EXPLORATORY
7/85	7/85	CASCADE 1	EXXONMOBIL	BERING SEA	EXPLORATORY
7/85	8/85	YELLOW PUP 1	EXXONMOBIL	BERING SEA	EXPLORATORY
6/84	7/84	TETON S 1	EXXONMOBIL	BERING SEA	EXPLORATORY
8/85	8/85	CHUGACH 1	EXXONMOBIL	BERING SEA	EXPLORATORY
7/84	8/84	CHUGACH 1	EXXONMOBIL	BERING SEA	EXPLORATORY
8/85	10/85	REDWOOD 2	EXXONMOBIL	BERING SEA	EXPLORATORY
6/85	8/85	REDWOOD 1	EXXONMOBIL	BERING SEA	EXPLORATORY
9/84		BERTHA 1	EXXONMOBIL	BERING SEA	EXPLORATORY
9/84		TUSTUMENA 2	EXXONMOBIL	BERING SEA	EXPLORATORY
6/84		TUSTUMENA 1	EXXONMOBIL	BERING SEA	EXPLORATORY
3/78	7/78	GRIZZLY 1	EXXONMOBIL	GULF OF AK B.	EXPLORATORY
3/77	7/77	SETTER 1	EXXONMOBIL	GULF OF AK B.	EXPLORATORY
1/78	3/78	MARMOT 1	EXXONMOBIL	GULF OF AK B.	EXPLORATORY
7/77	1/78	RACOON 1	EXXONMOBIL	GULF OF AK B.	EXPLORATORY
7/59	9/59	GREAT B.S 1	GENERAL PET.	BRISTOL BAY B.	EXPLORATORY
10/59	11/59	GREAT B.S 2	GENERAL PET.	BRISTOL BAY B.	EXPLORATORY
12/63	3/64	SALMONBERRY LK UNIT 1	EXXONMOBIL	COPPER RIVER B.	EXPLORATORY
3/64	5/64	NINILCHIK UNIT 1	EXXONMOBIL	COOK INLET B.	EXPLORATORY
4/65	8/65	GRANITE POINT 1	EXXONMOBIL	COOK INLET B.	EXPLORATORY
9/66	5/67	TOWER 1	EXXONMOBIL	COOK INLET B.	EXPLORATORY
1/67	4/67	STARICHKOF ST 1	EXXONMOBIL	COOK INLET B.	EXPLORATORY
5/67	7/67	GRANITE PT ST 33-13	EXXONMOBIL	COOK INLET B.	DEVELOPMENT
7/67	10/67	TOWER 2	EXXONMOBIL	COOK INLET B.	EXPLORATORY
7/68	10/68	MOQUAWKIE 2	EXXONMOBIL	COOK INLET B.	EXPLORATORY
11/68	4/69	KUPARUK ST 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
5/69	8/69	W KUPARUK ST 3-11-11	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
4/69	5/69	HEMI ST 03-09-11	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
5/69	9/69	KADLER ST 15-09-16	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
5/69	8/69	HURL ST 5-10-13	EXXONMOBIL	NORTH SLOPE	EXPLORATORY

DATE SPUD	DATE COMPL.	WELL NAME	OPERATOR	GEO. AREA	CLASS
6/69	8//69	N KUPARUK ST 26-12-12	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
2/70	8/70	W STAINES ST 18-09-23	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
2/70	9/70	MIKKELSEN BAY ST 13-09-19	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
7/70	8/70	KUPARUK ST 33-11-12	EXXONMOBIL	NORTH SLOPE	DEVELOPMENT
3/70	6/70	KUPARUK ST 7-11-12	EXXONMOBIL	NORTH SLOPE	DEVELOPMENT
4/70	8//70	KUPARUK ST 24-11-12	EXXONMOBIL	NORTH SLOPE	DEVELOPMENT
11/70	1/71	W TYONEK 1	EXXONMOBIL	COOK INLET B.	EXPLORATORY
10/70	12/70	W MOQUAWKIE 1	EXXONMOBIL	COOK INLET B.	DEVELOPMENT
4/72	9/72	ECHOOKA UNIT 1	EXXONMOBIL	B. R. FOOTHILLS	EXPLORATORY
1/73	6/73	BELI UNIT 1	EXXONMOBIL	B. R. FOOTHILLS	EXPLORATORY
8/73	10/73	GRANITE PT ST 33-23	EXXONMOBIL	COOK INLET B.	DEVELOPMENT
3/74	7/74	CANNING RIV U BLK A 1	EXXONMOBIL	B. R. FOOTHILLS	EXPLORATORY
1/74	2/74	W KADLEROSHILIK U 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
3/75	9/75	ALASKA ST A 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
12/74	4/75	CANNING RIV UNIT B-1	EXXONMOBIL	B. R. FOOTHILLS	EXPLORATORY
11/74	4/75	GWYDYR BAY SOUTH 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
3/75	5/75	W STAINES ST 2	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
4/75	5/75	KUPARUK 9-11-12	EXXONMOBIL	NORTH SLOPE	DEVELOPMENT
2/76	4/76	KUPARUK 30-11-13	EXXONMOBIL	NORTH SLOPE	DEVELOPMENT
3/77	12/77	PT THOMSON UNIT 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
2/78	8/78	PT THOMSON UNIT 2	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
1/79	7/79	PT THOMSON UNIT 3	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
10/78	3/79	DUCK IS UNIT 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
	7/79	STAINES RIV ST 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
9/79	1/80	DUCK IS UNIT 2	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
2/5/80	4/80	GWYDYR BAY ST UNIT 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
4/80	12/80	PT THOMSON UNIT 4	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
12/80	7/81	ALASKA ST C 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
3/81	12/81	DUCK IS UNIT 3	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
11/81	2/82	ALASKA ST D 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
1/81	2/81	PRUDHOE BAY UNIT TR MP 31-11-13	EXXONMOBIL	NORTH SLOPE	DEVELOPMENT
5/81	5/81	KUPARUK 28243 1	EXXONMOBIL	NORTH SLOPE	DEVELOPMENT
11/81	5/82	ALASKA ST F 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
9/82	12/82	S MCARTHUR RIV 1A	EXXONMOBIL	COOK INLET B.	EXPLORATORY
	8/83	ALASKA ST G 2	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
3/84	6/84	ALASKA ST J 1	EXXONMOBIL	B. R. FOOTHILLS	EXPLORATORY
3/93	4/93	THETIS ISLAND 1	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
1/01	2/01	ALASKA ST A 2	EXXONMOBIL	NORTH SLOPE	SERVICE
	8/10	PTU 15	EXXONMOBIL	NORTH SLOPE	EXPLORATORY
	7/10	PTU 16	EXXONMOBIL	NORTH SLOPE	EXPLORATORY

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