Since 1916, Alaska has counted on NBA for stability. As Alaska's largest bank, NBA has always provided sure and steady growth — year after year. That tradition of strength and stability continues today.

**NBA... The bank with the strength to say yes.**

**National Bank of Alaska**

Member FDIC

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**Repeal of ELF could deal economy a severe blow**

Now is not the time to raise taxes on industry

With the ELF in mind, North Slope producers have launched expensive projects aimed at pushing back the decline of America's largest oil fields. Over a hundred new wells have been drilled to maintain throughput of crude into the Trans-Alaska Pipeline and hundreds of people are going back to work. Overall, ELF has been extremely effective in extending the life of the Prudhoe Bay field.

But, state officials and members of the Alaska House who want a partial repeal of the ELF claim the incentive is costing the industry $200 million a year. The incentive has not paid for itself and the ELF was not supposed to be a tax.

(continued to page 7)
The petroleum industry now accounts for 88% of all state revenues for Standard Alaska Production Company, said the ELF issue today centers around the key to additional production and state oil revenues. Abood stressed that ELF is the power to tax is the power to destroy, and raising industry on the altar of state spending, our elected officials will have to cut government back sooner or later, and they should start dealing the state’s economy a severe blow if it repeals the ELF.

The Crafty Member of the Ruling Body said “I know how to get the Ruling Body managed to provide them with the necessary social services like education for their children, police protection and civil justice.

Once upon a time a group of people lived in a land of the far north. They were a hearty, hardworking, resourceful people who eked out a living mostly from the sea, fish, timber and minerals. They didn’t have a lot of money, but their Ruling Body managed to provide them with the necessary social services like education for their children, police protection and civil justice.

One day a great goose, named ARCSAP, landed in the bleak northern edge of the territory. ARCSAP scratched around, built a huge nest, and began to lay golden eggs and give them to people. ARCSAP sustained herself on a special food called WOP, which was manufactured principally by companies in a land far away on the other side of the world.

The people gave the golden eggs to the Ruling Body and told it to use the gold to make their life better. The Ruling Body had never seen such wealth, and it was unsure about what to do. The advisors hired more advisors to advise it, and the original advisors became chief advisors. The new advisors decided there was so much gold that they too needed more advisors, so they became deputy-chief advisors and hired more advisors. The new advisors decided that they needed some studies done so they hired some outside consultants to study how to spend the gold. When the bill for the chief advisors and the deputy-chief advisors, the advisors and the outside consultants was given to the Ruling Body, they found out they had spent all the gold.

The Ruling Body was concerned because the gold was gone, and they had lots of studies on how to spend the gold to help the people, but now there had no gold. There was no ARCSAP’s neck and squeeze her real tight, she will have to lay more golden eggs. "But won’t that kill ARCSAP?" asked another member of the Ruling Body in one of its closed meetings. "No," said the Crafty Member, "ARCSAP can stand the tight noose for 10 years, after that time, when she starts to get old and weak we’ll keep her alive by the magic ELF formula."

As time passed, ARCSAP gave birth to smaller geese who also laid golden eggs. Kuppie laid medium-size golden eggs and Lizzie laid small golden eggs but both newborn geese were sickly and in ill health in spite of the strong WOP food. The Crafty Member of the Ruling Body knew what to do. He ordered that Kuppie and Lizzie be given the magic ELF formula. And sure enough the magic ELF formula worked amazingly well for Kuppie and Lizzie, and they became healthy. On the first year, the new WOP food also helped Kuppie and Lizzie.

With all the large golden eggs from ARCSAP, the medium-sized ones from Kuppie and the small golden eggs from Lizzie the Ruling Body had enough gold to pay the chief advisors, the deputy-chief advisors, the advisors, and the outside consultants and still do some things to make life better for the people. The Ruling Body gave gold to the people to invest in business, gold to pay their power rates and school levies, and of course, along with all the golden eggs, the Ruling Body hired more chief advisors, deputy-chief advisors, advisors, and outside consultants; the Ruling Body was able to hire so many people to advise it, the people began to neglect their mining, fishing and timber businesses.

Arrows with so much gold the chief advisors, deputy-chief advisors, advisors and outside consultants, the Ruling Body had no reason to worry about the amount of golden eggs. At the end of about nine years, the makers of the WOP food in the far away land decreed a massive reduction in the strength of the food. When they decreased the strength of the food, ARCSAP, Kuppie and Lizzie, became very ill, and the amount of golden eggs (large, medium and small) was greatly reduced. The Ruling Body faced a very serious problem because it didn’t have enough gold to pay all the chief advisors, the deputy-chief advisors, the advisors and the outside consultants. When the Ruling Body asked the advisors and consultants what to do, the advisors said “Make ARCSAP, Kuppie and Lizzie produce more gold! Then you can pay us and do all the wonderful projects we have advised you to do for the good of the people." The Crafty Member of the Ruling Body said “If we don’t give the magic ELF formula to ARCSAP, she’ll produce more golden eggs, and we can use the magic ELF formula to make the WOP food that makes the people produce more golden eggs." At that time, the keeper of the geese burst into the closed meeting of the Ruling Body and said “the decrease in the strength of the WOP food manufactured in the far away land has made ARCSAP, Kuppie and Lizzie very weak. If we don’t give them the magic ELF formula, I think they will die.”

ARCSAP: The Fabled Golden Goose

Valdez refinery still alive

Four proposed amendments to the Omnibus Trade Bill which would have eliminated all exports of Alaska crude and halted the construction of a new Valdez refinery were killed recently by members of the U.S. House and Senate Conference Committee negotiating a final trade bill. Congressman Don Young was pleased with the Alaska congressional delegation’s success in killing the amendments, but expressed disappointment that the export limit, which labeled discriminatory and unjustifiable, was not included.

The compromise will allow Alaska to export 50,000 barrels of North Kuppersud crude to Canada and continue to export Cook Inlet crude abroad. However, Bonner was unsuccessful in passing an amendment which would limit refined exports to no more than 50 percent of the average annual oilfield output for new refineries in Alaska. The 50 percent limit places an export ceiling of 70,000 barrels per day for new refineries.

Resource Development

The Resource Development Council (RDC) is Alaska’s largest privately funded nonprofit economic development association. The RDC fights for Alaska’s natural resources in an orderly manner and to create a broad-based, diversified economy while protecting and enhancing the environment.

Cast of Characters

• ARCSAP – Prudhoe Bay Oilfield
• Kuppie – Kupkaruk
• Lizzie – Lisburne
• Ruling Body – Alaska
• Legislature
• WOP Food – World Oil Price
• Magic ELF formula
• Geese keeper – Alaska Oil Industry
• Crafty Member – Unnamed past member of the Legislature, any similarity to Legislators living or dead is purely coincidental.
The Resource Development Council strongly opposes the Alaska Center for the Environment's proposal to create a new primitive land use classification for state land. "Clearly the Alaska Constitution is at odds with this proposal," said Benji Day, the council's executive director. "The RDC made the same point in its brief submitted to the state's courts in these matters."

The long and hard-fought battle to open the Arctic National Wildlife Refuge to oil and gas exploration was finally destined for defeat in June, and the outcome may depend largely on the pressure government officials and congressional leaders apply to their associates in the Lower 48 to convince Congress to act favorably toward Alaska development.

While pro-development forces are encouraged by recent trends in the House, congressional sources warn that a possible showdown on the House floor in June is likely to end in a very close vote. As a result, the next several weeks are critical with respect to the environmental community's effort to encourage business associates, and members outside Alaska to change the minds of congressmen opposed to development.

The specific areas of environmental forces to fudge from their position of total Wilderness designation for the Coastal Plain of the refuge is a counterpart to their same efforts and frustration results. One congressman called the RDC "a scandalous operation." "There's something wrong with all of this," he said, "and it's not thelaw or the harvesting operations."

Unfortunately, Alaskans know all too well about the lack of permanency in congressional commitments to Alaska. What is happening on the regulation of the fishery is but another example of how environmental lobbyists manipulate Congress, and in the process, destroy the very economic backbone of their own state. The House order appeals for money from out of state to convince their members of the same. The people of Alaska know little or nothing of the real issues in Alaska.

The Anchorage Times, March 31, 1988

Showdown approaching, "full court press" needed to open ANWR leasing

Environmentalists ignore data

A high critically report card of Alaskan North Slope oil operations focused on showing that the industry did not provide any scientific evidence that major environmental damage has occurred at Prudhoe Bay as a result of industry operations, according to Bill Wade, president of Arctic Alaska, Inc. Wade, responding to the report by several environmental groups, pointed to industry's successful track record and consistently improving technology over the past decade. "That is proof that oil exploration and production can be done in an environmentally compatible way on the North Slope," Wade stated.

"We have worked closely with state and federal authorities to make sure that operations on the North Slope meet or exceed established guidelines," Wade said. "This report indicates that industry continues to improve its environmental record. Secondly, this report shows that the environmental problems on the North Slope have been built with the benefit of the Prudhoe Bay experience. Also, this report indicates that the spread of oil spills on the North Slope, Alaska's most environmentally sensitive areas, was built on gravel pads, most spills never reach the underlying tundra. After the fact, the Environmental Protection Agency fed the spills resulting from oil production occurred. The 10 percent which spilled onto the tundra was completely cleaned up with minimum disturbance to the land."

The company also noted that less than one percent of the surface acreage at Prudhoe Bay is affected by industry operations directly affected by oil field pads, roads and gravel sites. Even though some wildlife habitat has been lost, wildlife populations on the North Slope continue to grow.

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Fable has two endings ...

(continued from page 2)

The Ruling Body now had to make a decision, and at this point, our story has two different endings.

ONE

The Ruling Body took the advice of the Crafty Member and its advisors and didn't give the magic ELF formula to ARCSAP or the other geese. This caused the WOP to force the WOP food to be made in the far away land was stronger. The Ruling Body could no longer afford so many chief advisors, the deputy chief advisors, the advisors and outside consultants, so they fired many of them. Those people all went back to live where they came from. The northern people used the time of reduced golden egg production to re-learn how to mine, fish and log, and therefore the Ruling Body was a decision made to the golden eggs.

After awhile, when the WOP food got a little stronger, ARCSAP began to produce golden eggs. The help of the Ruling Body helped them keep. And they also hatched ANWR which produced many larger golden eggs and the people of the north and why they had killed ARCSAP and the other geese.

Tongass tampering

There was no surprise whatever as the House Interior Committee voted to repeal a 1980 federal law regulating timber harvesting in the Tongass National Forest on the west side of Southeastern Alaska.

The legislation is one major goal of the environmental lobbies. They have made it a national crusade — and, naturally, used it as a marvelous fund-raising tool for their own organizations. The Tongass campaign is propounded by their same efforts and same fund-raising goals to prevent any oil and gas exploration on the coastal plain of the Arctic National Wildlife Refuge in northeastern Alaska.

Fortunately, the battle isn't over — on either issue, as a matter of fact. But the vote in the House committee poses a new challenge to the environmental forces in trying to carve its own destiny.

Many congressmen, said to regard Alaska as less than a state with a residential preserve and zoo.

Couple that attitude with the disturbing trend that the people of the north and why they had killed ARCSAP and the other geese. This causes the powerful king at Washdc didn't really understand the

- The Ruling Body believed the geese keeper and gave ARCSAP the magic ELF formula and allowed Kuppie and Lizzie to continue the golden egg production to re-learn how to mine, fish and log, and therefore the Ruling Body was a decision made to the golden eggs.

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By Joseph R. Henri

Editor's Note: The Proceedings of the "What Alaska Can Do For America" conference will soon be available at a cost of $20 per copy. The 200-page document includes a thorough executive summary, the text of each speaker's presentation and a list of all conference attendees. Call RDC at 276-0700 to order this useful conference attendee and technical guide to the '87 All-Alaska Expo.

The stirring insights, the evocative phrases, the learned disser-
tationary knowledge, the erudite, the incisive, the telling of the dozen speakers, and the gathering of 400 Alaskans, was held in Anchorage February 26-27. I personally had thought of some of those who spoke. It is understandable that this should be so; it is not dismaying.

After all, we invited learned and important people from distant places, not only to hear us, but so that they could gain better understanding of us — of Alaska, her abilities and poss-

abilities. By being with us and of us for two intensive days, the out-of-town experts caught the contagion of the Alaskan resource development enthrallism. The attendees learned, and so did the speakers. And all those present learned from each other, fortified each other, took fresh resolves for economic growth and develop-
ment in the gaining presence of each other.

There were two very good days. They were capped off, high-
tended, and summed up in the closing session by Dr. William Fansler Wood, President Emeritus of the University of Alaska, and tireless, irrepressible ambassador of the economic well-being of Fairbanks, and reality of all Alaska. Bill Wood is the father of the modern University of Alaska.

In reflecting on Robert Horton's keynote address, Dr. Wood expressed the shock reaction of most of us to the Chairman of BP America's observation that Alaska has very little the world wants, and very little that is "utterly indispensable unless Alaska can find ways to produce the things the world wants at a price competitive with non-Alaskan producers."

Robert B. Horton, outgoing Chairman and Chief Executive Officer of BP America, asserted that the assets and potential contributions to America is its bright minds.

During the past four decades, Alaska has fallen into and stayed in the category of "high-cost producers." Our resources have been so vast, our enormous mass so thinly populated, our sparse to non-existent infrastructure throughout the length and breadth of the land, our arctic and sub-arctic climates, high cost of living and resultant high labor costs, our lack of cohesion in the common purpose of productivity, and our bona fide, rewarding economic structure fulfilling all legitimate human desires — except warm, bawdy, year-round sunshine — has all contributed to our undesirable, "high-cost" profile. Dr. Wood and Chairman Horton reflected that we have not fully developed, utilized, or re-
tained the young people or our state who could effectively work at reducing our "high-cost" problem through technology and better effective. Robert Horton reminded us that "bright minds are the greatest competitive advantage in the world."

Our Resource Development Council Education Foundation was formed to educate Alaskans and Americans in general about the resources and advantages of Alaska. Dr. Wood and Governor Cooper have proposed legislation in the Alaska House of Represen-
tatives, H.B. 500 and 591, which will contribute to the proof of Alaska's bright minds, helping us achieve the competitive advan-
tage of young, energetic, eager and intelligent Alaskans. On a long range basis, this better education must be one of our primary goals.

What about the rest of the effort? How can we "produce the things the world wants at a price competitive with non-Alaskan pro-
ducers?" The Canadian provinces seem to offer examples of what to do. For example, British Columbia has a well developed road network with a developed hydro-electric system, a well developed coal mining industry, producing vast tonnages for export and local consumption, a timber industry which is a major economic base of that province, people who make their home there, a sizeable output of placer gold, hard-
rock gold, and other hardrock minerals. In a word, British Columbia has an enviable resource development economy. The Canadian federal government has also encouraged its citizens in developing the country. Over the years, British Columbia has had a plan, and it has stuck to it well enough to contribute to the growing wealth of that province.

By contrast, Alaska has had a number of projects, but hardly any overall plan. As Dr. Horton said, "Walt Disney is important to us, "we're too busy with projects that we don't have any programs and we have no priority guidelines and no policy, but we have projects." The saga doctor observed that "we concentrate upon distribution of regulatory and commodity pricing uncertainties. President Henri listens."

In 1988, Alaskan employers received a record 25% average increase in workers' compensation Insurance premiums after a 14% average increase the previous year. The skyrocketing prem-
iums is the result of the Workers Compensation Reform Act of 1985 which was designed to kill the measure or will result in increased costs to employers with no resulting increase in benefits to injured workers. The bill drafted by the labor-management task force and passed by the Senate has been endorsed by chambers of commerce around the state, labor unions and employers. Main opposition to the bill has been from the legal community and attorneys who earn significant incomes from the present workers' compensation system.

Alaskan employers are urged to write or call their elected rep-

resentatives to encourage them to support the workers' compensa-
tion reform bill as passed by the Senate. The very high cost of the compensation reform bill is needful in spite of the resultant lowering of Alaska's business competitiveness and to save Alaskan jobs.

Workers' Compensation Reform

By Stephen M. Rehrberg, CMA

The Senate, recognizing the importance of this legislation to both business owners and labor, passed the workers' compensa-
tion reform bill unanimously with only minor technical corrections. The reform measure is designed to improve the efficiency of the Workers' Compensation system by cutting down on red tape and electronic claims procedures, result-
ing in a loss of jobs for Alaskans.

The Resource Development Council represents Alaskan em-
ployers and Alaska's labor unions met as a combined labor-man-
agement task force to study and recommend changes in the work-

ers' compensation statutes. The goal of the task force was to reduce the cost of workers' compensation in Alaska, but not at the expense of the injured worker. Specialists from inside and outside Alaska were consulted. Representatives from the State Division of Insurance and Workers' Compensation assisted in task force deliberations and the review of claims costs. The result of the labor-
management task force work was a carefully crafted, balanced and fair reform legislation introduced concurrently in the Senate by Senator Tim Kelly, SB332, and in the House by Representative Dave Donley, HB352.

The All-Alaska Expo featured a variety of exhibits. At left, Easy Gilchrist of the Alaska Oil and Gas Association makes a strong pitch for opening ANWR to Rod Koone of the Port of Tacoma while RDC board member Rex Bishop listens. At right, Mayor Elring Johnson of Cordova makes his case for the new highway to Cordova.

Contrary to the example of British Columbia, Alaska has no infrastructure program. Once in a while we do something; more often we talk about something for a long great time through a series of studies covering years, and then drop the project. Susitna Dam is a perfect example. That generating capability was first ready to go in 1952, under the presidency of Harry S. Truman. The succeeding Eisenhower Administration announced a hydro-
electric policy of "no new starts," and that was the first time that the Susitna Dam was abandoned. Southwestern Alaska would not be in an abject depression today had we had the fortitude and resourcefulness to proceed with Susitna. As Bill Wood said, "We circle the wagons and shoot one another . . . no matter how good the idea is, three meetings later it is dead."

Alaska has a very large income, including almost $1 billion per which the Permanent Fund earns. With creativity and in-
genuity, our vast income could support capital improvements based upon a long-range plan of economic development. Unless we adopt a highly intelligent and forceful plan, and pursue it vigorously, in reason and out, Alaska's economic future cannot be expected to substantially improve.

Conference speaker Dr. Charles Elbing of the Center for Strategic International Studies, Washington D.C., reminded the conference the crude oil reserves of the world had increased by 27% during 1987, the OPEC countries alone having added 165 billion barrels. OPEC holds 82% of the world's proven oil reserves. Unless the American government and the Alaskan government encourage investment in oil and gas through lower taxes, reduced regulatory and statutory barriers, and by granting lax credits, actual oil and gas development, we cannot rationally expect oil and gas to give Alaska a new bonanza. America's foreign trade imbalances dictate great attention to a larger volume of domestic production to decrease our nation's trade deficit. The OPEC oil will be chancy and we are in danger of becoming grossly dependent.

There is so much that must be done in the 49th state to give its citizens a good economy; there is so much that can be done here to give the United States the resources it needs, the foreign trade exports it desires, and substantial added leverage in the U.S. Treasury through the expansion of Alaskan commerce and industry. Alaskans are a bright people; we are well educated as a group; but we are divided and of many counsels as to how to proceed. RDC's 1988 conference has given us a thumbnail sketch of a good plan. I hope we are competent enough and resolved enough to capitalize on the ideas, to do the hard work and spend the long hours it will take to adopt a workable economic develop-
ment plan, and to begin to see the fruits of our labors in the near future.
A Study of Bowheads
(Continued from page 5)
about 0.12 to 5.7 miles, and at three different directions from the ship (port side, bow aspect, and starboard side). Sound levels were measured in various frequencies in the range of 20–1000 Hertz (cycles per second). The frequency range was chosen because bowhead call frequencies are predominately in this range.

In general, the noise level was found to increase as hydrophone depth increased. Noise levels along the port and starboard sides were comparable and slightly higher than levels on the bow.

In general, the rate at which sound levels diminished with increasing distance from the drillship was not rapid and was less than expected (based on previous studies in the Canadian Beaufort Sea), but certain components of the sound that apparently originated at or near the drillship did decrease at the expected rate. A significant level of sound apparently generated by a support ship with damaged propellers may have biased these acoustic results.

In addition to the hydrophone monitoring system, an array of five anchored acoustic buoys was installed about 6.8 miles east of the Hammerhead site and operated for nine days in September until it was destroyed by ice.

The acoustic-buoy system was designed for two purposes: (1) to test the feasibility of tracking bowheads through the study involving drillship operations described in the article beginning on page 1. Whales were shown by blue symbols. The straight blue lines indicate the routes flown by an aircraft with observers aboard to spot the whales. Five flights, each covering all these routes, were flown between September 11 and October 20, 1985.

This map shows the locations of migrating bowhead whales sighted during the study involving drillship operations described in the article beginning on page 1. Whales are shown by blue symbols. The straight blue lines indicate the routes flown by an aircraft with observers aboard to spot the whales. Five flights, each covering all these routes, were flown between September 11 and October 20, 1985.

New LPRC officers for 1988
New officers of the Lease Planning and Research Committee were elected at the December 1987 meeting and took office on January 1, 1988, for one year. They are Mike Golas of Amoco, Chairman; Georges Chateau of Elf Aquitaine, Vice Chairman; and John Ruser of Shell, Secretary-Treasurer.

The LPRC also elected the following Advisory Subcommittee members: JoAnn Bonn of Exxon, Rich Ogar of ARCO, Walt Spring of Mobil, and Mike Ust of Unocal. Outgoing officers are Rich Ogar, Chairman, Chuck Enze of Shell, Vice Chairman, and Mike Golas, Secretary-Treasurer.

The 11 oil companies that are members of the LPRC publish Alaskan Update.

A Study of Bowheads and a Drilling Site in the Beaufort Sea

Among several recent studies by oil companies of bowhead whales in Alaskan offshore areas is a 1985 investigation of underwater noise from a drillship operation and the location of whales in relation to the drillship site during their fall migration.

The study took place at and around an exploratory well drilled by Unocal in 1985 at the Hammerhead prospect about 13 miles north of Flanman Island in the central Alaskan Beaufort Sea. This was the first well drilled in the Alaskan Beaufort Sea by a drillship, although drill ships have been working in the Canadian Beaufort Sea since 1976.

The ice-strengthened drillship Camros Explorer H and several support vessels were on the site.

Air Quality at North Slope Oil Fields in Alaska

The quality of air in the vicinity of oil fields on Alaska's North Slope, including Prudhoe Bay, always has been far better than federal and state standards for the area, according to two publications by Standard Oil and ARCO, operators of Prudhoe Bay Oil Field.

Government data summarized in these publications also refute recent allegations by some environmentalist groups that the oil industry has created severe pollution there, comparable to that in large U.S. cities.


Following in this article are reviews of several aspects of North Slope air quality discussed in these publications, including:

- government standards for emissions on the North Slope and elsewhere;
- sources of emissions;
- monitoring of ambient air quality;
- comparisons of Prudhoe Bay air quality with other U.S. areas;
- the phenomenon called arctic haze.

Government Standards for Air
North Slope air quality must meet standards set by both the federal government and the State of Alaska.

In 1970, Congress passed the Clean Air Act, which established national ambient air quality standards. The U.S. government sets standards for allowable levels of ambient amounts of six pollutants:
- nitrogen oxides
- carbon monoxide
- ozone
- sulfur dioxide
- total suspended particulates
- lead
Natural gas is one of the cleanest-burning fuels available. It contains no lead. During combustion, it produces no significant amounts of carbon monoxide, ozone, sulfur dioxide, and particulates. The only pollutants that it can emit in actual emissions and (2) ambient air is burning fuels available. It contains no compliance with national standards: (1) tested for pollutants. During combustion, it produces undesirable quantity are nitrogen oxides. Levels at Prudhoe Bay are well below the North Slope, a third-party independent Environmental Protection Agency. On presentative of the Alaska Department of Environmental Conservation (ADEC) usually has been present as a monitor. Gas-fired turbines produce most of the nitrogen oxides required by the Standard Oil publication previously cited, a chart shows how stack tests of Prudhoe Bay turbines with existing home power have determined that nitrogen oxides are well below the maximum levels allowed.

Ambient air monitoring: Again the Environmental Protection Agency sets monitoring procedures and requires stack special monitoring before new facilities can be installed. For example, the EPA required a monitoring program in 1979–80 before granting permits for new facilities at Prudhoe Bay. At that time, all pollutants were found to be well below national limits, with the exception of a one-time exceedance for particulates. This isolated event was attributed to wind-blow dust caused by high winds, not to equipment emissions. Several years after the 1979–80 monitoring, the ADEC took over responsibility for air-quality permitting in Alaska. The ADEC, in consultation with the EPA, decided to require post-construction monitoring. This began in 1986 and extended into 1987.

Both a "near-field" monitoring station and a "far-field" state monitoring station exist in Prudhoe Bay and Kuparuk oil fields. The near-field stations were placed at the maximum source of impact on air quality, and the far-field stations were several miles downwind of facilities. Charts on the opposite page show the results of measurements taken at Prudhoe Bay for the main pollutant of concern, nitrogen dioxide, as well as ozone, sulfur dioxide, and particulates. In all cases, the charts show that Prudhoe Bay concentrations were well below the national standard (limit). Koparuk results were similar.

Lead was not measured because it is not a factor at Prudhoe Bay. The ADEC did not require monitoring of carbon monoxide for the 1986–87 Prudhoe Bay study, but carbon monoxide was measured in a 1979–80 program (see data in next section).

Comparison of Prudhoe Bay Air with That of Large Cities: An examination of the ambient air quality concentrations at Prudhoe Bay shows that none even approaches the levels in large cities. The national standard for carbon monoxide is 9 parts per million (ppm) for an 8-hour period. New York City,

Los Angeles, Washington, D.C., Denver, and Anchorage regularly exceed this with levels as high as 17, 22, 16, 28, and 30, respectively. Prudhoe Bay, maximum concentrations measured have not exceeded 1 ppm (this data was collected in the 1978–80 monitoring program).

The national hourly standard for ozone is 250 micrograms per cubic meter. New York City, Los Angeles, Washington, Denver, and Anchorage do not exceed this standard. New York has reached as high as 198. Los Angeles bases its standard at 78. Washington can reach 125 and Anchorage 73. However, the maximum Prudhoe Bay concentration is below 16.

The national standard for sulfur dioxide is 365 micrograms per cubic meter (24-hour maximum). New York, Los Angeles, Washington, Denver, and Anchorage do not exceed this standard. New York has reached as high as 198. Los Angeles bases its standard at 78. Washington can reach 125 and Anchorage 73. However, the maximum Prudhoe Bay concentration is below 16.

The national standard for nitrogen dioxide is 100 micrograms per cubic meter. New York, Los Angeles 118, Washington 74, and Denver 94. Anchorage levels are so low that the EPA was not even monitoring. Monthly average concentrations at Prudhoe Bay are below 15.

Arctic haze: The phenomenon called arctic haze is another air-quality issue that has been widely examined recently. Arctic haze was first described in 1956, long before any North Slope oil facilities were built. A process for "fingerprinting" emitters of arctic haze has shown that haze comes from industrial pollution produced in Europe and Asia. Smelting and coal combustion are sources of the haze. The Ural Mountains industrial complex in the U.S.S.R. has been suggested as the source. Noise at the detectors identifies central Eurasia as the primary winter source and Europe as the spring source. Also, because the haze is found at high altitudes over Prudhoe Bay, scientists believe that non-Arctic sources are not contributing.

During an offshore flight at Prudhoe Bay in 1985, NGA found a contribution to the haze from oil and gas production facilities. Air emission data gathered at the ground then did not match the arctic haze "fingerprint."
This is the thirteenth in a series of articles designed to answer basic questions about the petroleum industry. These articles may be photocopied for distribution or use in schools. Back issues are available.

The fluid that comes out of an oil well usually is a complex mixture of crude oil, gases, water, and a small amount of sediment (solids). Before the oil can be shipped to refineries by pipeline or tanker ship, it must be separated from the other fluid components, measured, and tested. In addition, the non-oil components must be used or disposed of in ways that are both economical and safe for the environment.

For the separation process, a system of treatment facilities and holding tanks is required. The process is summarized in the chart on the opposite page and is described in the following sections.

The Separation Process
The first step is to separate the liquid components from the gaseous by passing the well fluid through a separator system. In the first chamber of the system, well fluid is swirled to make oil-laden liquid particles collect on the walls. In addition, gravity causes oil-laden liquid to drop to the bottom of the chamber. The separated gases rise and are removed.

The separated gases still contain some small oil and water particles, so they must be swirled again in another chamber of the system to remove as much oil and water as possible.

The separated liquid also still contains some oil and gas. However, flares have been installed at a number of facilities to serve as a safety relief system should a potentially dangerous situation develop like fire, power loss, or equipment failure. Then high-pressure hydrocarbon gases being processed must be discharged and burned in a flare.

Flares burn gas at high temperatures in the open air and leave very little or no ash residue. They have combustion efficiencies of up to 98%.

Under ordinary combustion conditions, flares produce little or no visible smoke. When they are used during facility start-up or emergency situations, they may emit black smoke, which is unsightly but of little harm to air quality. The blackness results when gas is incompletely burned, leaving carbon particles, not harmful pollutants. In addition, situations that produce black smoke rarely take place and then for a brief time.

In the gas separation process, small quantities of other gases may be removed along with natural hydrocarbon gas. Some of these like carbon dioxide are natural components of air and may be released into the atmosphere. Or, these gases may be reinjected into a subsurface rock formation along with reinjected natural gas.

In some fields, a gaseous component is hydrogen sulfide, which at certain concentrations is very toxic to human beings. It also is very corrosive to metals. Whenever this gas is present in well fluids, all subsurface and surface systems are especially designed to protect against its various hazards.

Disposal methods for water removed from well fluids depend on several factors, including salinity and geography. Usually, separated water contains many salts dissolved from the formation rock and may be as salty as sea water. For this reason, in some offshore areas, this water may be treated and then safely pumped into the sea.

In other offshore areas and most onshore areas, separated water is treated and reinjected into subsurface rock formations, sometimes the oil-bearing formations. On Alaska's North Slope, part of the separated water is treated and

Q&A

How Do They Prepare Crude Oil for Transport to Refineries by Pipeline or Ship?

However, flares have been installed at a number of facilities to serve as a safety relief system should a potentially dangerous situation develop like fire, power loss, or equipment failure. Then high-pressure hydrocarbon gases being processed must be discharged and burned in a flare.

Flares burn gas at high temperatures in the open air and leave very little or no ash residue. They have combustion efficiencies of up to 98%.

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A Study of Bowheads

(Continued from page 1)

A drillship is a self-propelled vessel which is designed to serve as an offshore platform for drilling oil wells. It is outfitted with a drilling rig and all other necessary equipment. For arctic waters, the hull is “ice-strengthened with extra steel to resist the forces of sea ice.

Six oil companies funded the drillship study. Contractor LGL Ltd. and subcontractor Greenridge Sciences Inc. carried out the study.

Objectives were to determine:
- the location of whales in relation to the drilling site,
- underwater noise levels and characteristics generated by the drillship operation,
- variations in noise levels over time.

Whales were monitored by aerial surveys and an acoustic system. The study could not cover actual well-drilling noise at the Hammerhead site because the federal government prohibited drilling in that area during the first fall whale migration began. But the drillship and support vessels were still on site involved in well testing during the early part of the migration, so some useful information about the noise characteristics of drilling operations could be gathered.

In addition, the drillship and support vessels moved east to the Corona site during the middle and end of the migration. At the Corona site, well preparation activity was permitted during the migration.

The aerial surveys of whale locations extended far enough east to include the location in Anchorage.

In the fall migration, bowheads move from their summer feeding grounds in the Canadian Beaufort Sea westward to the Chukchi Sea and then south to their wintering grounds in the Bering Sea.

The study took place between August 27 and October 20, 1985. Acoustic monitoring went on between August 27 and September 15. Aerial surveys were conducted between September 5 and October 20.

The first bowheads in the study area were spotted September 11. Observers from the National Marine Fisheries Service officially declared that the fall migration began September 24.

The study report is entitled Bowhead Whales and Underwater Noise near a Drillship Operation in the Alaskan Beaufort Sea, 1985. The project is listed as #330 in a research record book maintained by the Alaska Oil and Gas Association in Anchorage.

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