

= Trans @-@ Alaska Pipeline System =

The Trans @-@ Alaska Pipeline System ( TAPS ) includes the trans @-@ Alaska crude @-@ oil pipeline , 12 pump stations , several hundred miles of feeder pipelines , and the Valdez Marine Terminal . TAPS is one of the world 's largest pipeline systems . It is commonly called the Alaska pipeline , trans @-@ Alaska pipeline , or Alyeska pipeline , ( or the pipeline as referred to in Alaska ) , but those terms technically apply only to the 800 miles ( 1 @,@ 287 km ) of the pipeline with the diameter of 48 inches ( 122 cm ) that conveys oil from Prudhoe Bay , to Valdez , Alaska . The crude oil pipeline is privately owned by the Alyeska Pipeline Service Company .

The pipeline was built between 1974 and 1977 after the 1973 oil crisis caused a sharp rise in oil prices in the United States . This rise made exploration of the Prudhoe Bay oil field economically feasible . Environmental , legal , and political debates followed the discovery of oil at Prudhoe Bay in 1968 , and the pipeline was built only after the oil crisis provoked the passage of legislation designed to remove legal challenges to the project .

The task of building the pipeline had to address a wide range of difficulties , stemming mainly from the extreme cold and the difficult , isolated terrain . The construction of the pipeline was one of the first large @-@ scale projects to deal with problems caused by permafrost , and special construction techniques had to be developed to cope with the frozen ground . The project attracted tens of thousands of workers to Alaska , causing a boomtown atmosphere in Valdez , Fairbanks , and Anchorage .

The first barrel of oil traveled through the pipeline in 1977 , and full @-@ scale production began by the end of the year . Several notable incidents of oil leakage have occurred since , including those caused by sabotage , maintenance failures , and bullet holes . As of 2010 , the pipeline has shipped almost 16 billion barrels ( 2 @.@ 5 × 10<sup>9</sup> m<sup>3</sup> ) of oil .

= = Origins = =

Iñupiat people on the North Slope of Alaska had mined oil @-@ saturated peat for possibly thousands of years , using it as fuel for heat and light . Whalers who stayed at Point Barrow saw the substance the Iñupiat called pitch and recognized it as petroleum . Charles Brower , a whaler who settled at Barrow and operated trading posts along the arctic coast , directed geologist Alfred Hulse Brooks to oil seepages at Cape Simpson and Fish Creek in the far north of Alaska , east of the village of Barrow . Brooks ' report confirmed the observations of Thomas Simpson , an officer of the Hudson 's Bay Company who first observed the seepages in 1836 . Similar seepages were found at the Canning River in 1919 by Ernest de Koven Leffingwell . Following the First World War , as the United States Navy converted its ships from coal to fuel oil , the importance of securing a stable supply of oil became important to the U.S. government . Accordingly , President Warren G. Harding established by executive order a series of Naval Petroleum Reserves ( NPR @-@ 1 through -4 ) across the United States . These reserves were areas thought to be rich in oil and set aside for future drilling by the U.S. Navy . Naval Petroleum Reserve No. 4 was sited in Alaska 's far north , just south of Barrow , and encompassed 23 @,@ 000 @,@ 000 acres ( 93 @,@ 078 km<sup>2</sup> ) . Other Naval Petroleum Reserves were embroiled in controversy over government corruption in the Teapot Dome Scandal .

The first explorations of NPR @-@ 4 were undertaken by the U.S. Geological Survey from 1923 to 1925 and focused on mapping , identifying and characterizing coal resources in the western portion of the reserve and petroleum exploration in the eastern and northern portions of the reserve . These surveys were primarily pedestrian in nature ; no drilling or remote sensing techniques were available at the time . These surveys named many of the geographic features of the areas explored , including the Philip Smith Mountains and quadrangle . These efforts are summarized in .

The petroleum reserve lay dormant until the Second World War provided an impetus to explore new oil prospects . The first renewed efforts to identify strategic oil assets were a two pronged survey using bush aircraft , local Inupiat guides , and personnel from multiple agencies to locate reported seeps . Ebbley and Joesting reported on these initial forays in 1943 Starting in 1944 , the U.S. Navy

funded oil exploration near Umiat Mountain , on the Colville River in the foothills of the Brooks Range . Surveyors from the U.S. Geological Survey spread across the petroleum reserve and worked to determine its extent until 1953 , when the Navy suspended funding for the project . The USGS found several oil fields , most notably the Alpine and Umiat Oil Field , but none were cost effective to develop .

Four years after the Navy suspended its survey , Richfield Oil Corporation ( later Atlantic Richfield and ARCO ) drilled an enormously successful oil well near the Swanson River in southern Alaska , near Kenai . The resulting Swanson River Oil Field was Alaska 's first major commercially producing oil field , and it spurred the exploration and development of many others . By 1965 , five oil and 11 natural gas fields had been developed . This success and the previous Navy exploration of its petroleum reserve led petroleum engineers to the conclusion that the area of Alaska north of the Brooks Range surely held large amounts of oil and gas . The problems came from the area 's remoteness and harsh climate . It was estimated that between 200 @, @ 000 @, @ 000 barrels ( 32 @, @ 000 @, @ 000 m<sup>3</sup> ) and 500 @, @ 000 @, @ 000 barrels ( 79 @, @ 000 @, @ 000 m<sup>3</sup> ) of oil would have to be recovered to make a North Slope oil field commercially viable .

In 1967 , Atlantic Richfield ( ARCO ) began detailed survey work in the Prudhoe Bay area . By January 1968 , reports began circulating that natural gas had been discovered by a discovery well . On March 12 , 1968 , an Atlantic Richfield drilling crew hit paydirt . A discovery well began flowing at the rate of 1 @, @ 152 barrels ( 183 @. @ 2 m<sup>3</sup> ) of oil per day . On June 25 , ARCO announced that a second discovery well likewise was producing oil at a similar rate . Together , the two wells confirmed the existence of the Prudhoe Bay Oil Field . The new field contained more than 25 billion barrels ( 4 @. @ 0 × 10<sup>9</sup> m<sup>3</sup> ) of oil , making it the largest in North America and the 18th largest in the world .

The problem soon became how to develop the oil field and ship product to U.S. markets . Pipeline systems represent a high initial cost but lower operating costs , but no pipeline of the length needed had yet been constructed . Several other solutions were offered . Boeing proposed a series of gigantic 12 @-@ engine tanker aircraft to transport oil from the field , the Boeing RC @-@ 1 . General Dynamics proposed a line of tanker submarines for travel beneath the Arctic ice cap , and another group proposed extending the Alaska Railroad to Prudhoe Bay . Ice breaking oil tankers were proposed to transport the oil directly from Prudhoe Bay .

In 1969 , Humble Oil and Refining Company sent a specially fitted oil tanker , the SS Manhattan , to test the feasibility of transporting oil via ice @-@ breaking tankers to market . The Manhattan was fitted with an ice @-@ breaking bow , powerful engines , and hardened propellers before successfully traveling the Northwest Passage from the Atlantic Ocean to the Beaufort Sea . During the voyage , the ship suffered damage to several of its cargo holds , which flooded with seawater . Wind @-@ blown ice forced the Manhattan to change its intended route from the M 'Clure Strait to the smaller Prince of Wales Strait . It was escorted back through the Northwest Passage by a Canadian Coast Guard icebreaker , the CCGS John A. Macdonald . Although the Manhattan successfully transited the Northwest Passage again in the summer of 1970 , the concept was considered too risky . A pipeline was thus the only viable system for transporting the oil to the nearest port free of pack @-@ ice , almost 800 miles ( 1 @, @ 300 km ) away at Valdez .

= = Forming Alyeska = =

In February 1969 , before the SS Manhattan had even sailed from its East Coast starting point , the Trans @-@ Alaska Pipeline System ( TAPS ) , an unincorporated joint group created by ARCO , British Petroleum , and Humble Oil in October 1968 , asked for permission from the United States Department of the Interior to begin geological and engineering studies of a proposed oil pipeline route from Prudhoe Bay to Valdez , across Alaska . Even before the first feasibility studies began , the oil companies had chosen the approximate route of the pipeline . Permission was given , and teams of engineers began drilling core samples and surveying in Alaska .

Because TAPS hoped to begin laying pipe by September 1969 , substantial orders were placed for steel pipeline 48 inches ( 122 cm ) in diameter . No American company manufactured pipe of that

specification , so three Japanese companies ? Sumitomo Metal Industries Ltd . , Nippon Steel Corporation , and Nippon Kokan Kabushiki Kaisha ? received a \$ 100 million contract for more than 800 miles ( 1280 km ) of pipeline . At the same time , TAPS placed a \$ 30 million order for the first of the enormous pumps that would be needed to push the oil through the pipeline .

In June 1969 , as the SS Manhattan traveled through the Northwest Passage , TAPS formally applied to the Interior Department for a permit to build an oil pipeline across 800 miles ( 1 @, @ 300 km ) of public land ? from Prudhoe Bay to Valdez . The application was for a 100 @-@ foot ( 30 @.@ 5 m ) wide right of way to build a subterranean 48 @-@ inch ( 122 @-@ centimeter ) pipeline including 11 pumping stations . Another right of way was requested to build a construction and maintenance highway paralleling the pipeline . A document of just 20 pages contained all of the information TAPS had collected about the route up to that stage in its surveying .

The Interior Department responded by sending personnel to analyze the proposed route and plan . Max Brewer , an arctic expert in charge of the Naval Arctic Research Laboratory at Barrow , concluded that the plan to bury most of the pipeline was completely unfeasible because of the abundance of permafrost along the route . In a report , Brewer said the hot oil conveyed by the pipeline would melt the underlying permafrost , causing the pipeline to fail as its support turned to mud . This report was passed along to the appropriate committees of the U.S. House and Senate , which had to approve the right @-@ of @-@ way proposal because it asked for more land than authorized in the Mineral Leasing Act of 1920 and because it would break a development freeze imposed in 1966 by former Secretary of the Interior Stewart Udall .

Udall imposed the freeze on any projects involving land claimed by Alaska Natives in hopes that an overarching Native claims settlement would result . In the fall of 1969 , the Department of the Interior and TAPS set about bypassing the land freeze by obtaining waivers from the various native villages that had claims to a portion of the proposed right of way . By the end of September , all the relevant villages had waived their right @-@ of @-@ way claims , and Secretary of the Interior Wally Hickel asked Congress to lift the land freeze for the entire TAPS project . After several months of questioning by the House and Senate committees with oversight of the project , Hickel was given the authority to lift the land freeze and give the go @-@ ahead to TAPS .

TAPS began issuing letters of intent to contractors for construction of the " haul road " , a highway running the length of the pipeline route to be used for construction . Heavy equipment was prepared , and crews prepared to go to work after Hickel gave permission and the snow melted . Before Hickel could act , however , several Alaska Native and conservation groups asked a judge in Washington , D.C. to issue an injunction against the project continuing . Several of the native villages that had waived claims on the right of way reneged because TAPS had not chosen any Native contractors for the project , and the contractors chosen were not likely to hire Native workers .

On April 1 , 1970 , Judge George Luzerne Hart , Jr . , of the United States District Court for the District of Columbia , ordered the Interior Department to not issue a construction permit for a section of the project that crossed one of the claims . Less than two weeks later , Hart heard arguments from conservation groups that the TAPS project violated the Mineral Leasing Act and the National Environmental Policy Act , which had gone into effect at the start of the year . Hart issued an injunction against the project , preventing the Interior Department from issuing a construction permit and halting the project in its tracks .

After the Department of the Interior was stopped from issuing a construction permit , the unincorporated TAPS consortium was reorganized into the new incorporated Alyeska Pipeline Service Company . Former Humble Oil manager Edward L. Patton was put in charge of the new company and began to lobby strongly in favor of an Alaska Native claims settlement to resolve the disputes over the pipeline right of way .

= = Opposition = =

Opposition to construction of the pipeline primarily came from two sources : Alaska Native groups and conservationists . Alaska Natives were upset that the pipeline would cross the land traditionally

claimed by a variety of native groups , but no economic benefits would accrue to them directly . Conservationists were angry at what they saw as an incursion into America 's last wilderness . Both opposition movements launched legal campaigns to halt the pipeline and were successful in preventing construction from 1970 to 1973 .

= = = Conservation objections = = =

Although conservation groups and environmental organizations had voiced opposition to the pipeline project before 1970 , the introduction of the National Environmental Policy Act allowed them legal grounds to halt the project . Arctic engineers had raised concerns about the way plans for a subterranean pipeline showed ignorance of Arctic engineering and permafrost in particular . A clause in NEPA requiring a study of alternatives and another clause requiring an environmental impact statement turned those concerns into tools used by the Wilderness Society , Friends of the Earth , and the Environmental Defense Fund in their spring 1970 lawsuit to stop the project .

Due to the injunction against the project , Alyeska was forced to do further research throughout the summer of 1970 . The collected material was turned over to the Interior Department in October 1970 , and a draft environmental impact statement was published in January 1971 . The statement met with massive criticism from almost the moment it was released . The statement amounted to 294 pages but generated more than 12 @, @ 000 pages of testimony and evidence in Congressional debates by the end of March . Criticisms of the project included its effect on the Alaska tundra , possible pollution , harm to animals , geographic features , and the lack of much engineering information from Alyeska . One element of opposition the report quelled was the discussion of alternatives . All the proposed alternatives ? extension of the Alaska Railroad , an alternative route through Canada , establishing a port at Prudhoe Bay , and more ? were deemed to pose more environmental risks than construction of a pipeline directly across Alaska .

Opposition also was directed at the building of the construction and maintenance highway parallel to the pipeline . Although a clause in Alyeska 's pipeline proposal called for removal of the pipeline at a certain point , no such provision was made for removal of the road . Sydney Howe , president of the Conservation Foundation , warned : " The oil might last for fifty years . A road would remain forever . " This argument relied upon the slow growth of plants and animals in far northern Alaska due to the harsh conditions and short growing season . In testimony , an environmentalist argued that arctic trees , though only a few feet tall , had been seedlings " when George Washington was inaugurated " .

The portion of the environmental debate with the biggest symbolic impact took place when discussing the pipeline 's impact on caribou herds . Environmentalists proposed that the pipeline would have an effect on caribou similar to the effect of the U.S. transcontinental railroad on the American Bison population of North America . Pipeline critics said the pipeline would block traditional migration routes , making caribou populations smaller and making them easier to hunt . This idea was exploited in anti @-@ pipeline advertising , most notably when a picture of a forklift carrying several legally shot caribou was emblazoned with the slogan , " There is more than one way to get caribou across the Alaska Pipeline " . The use of caribou as an example of the pipeline 's environmental effects reached a peak in the spring of 1971 , when the draft environmental statement was being debated .

= = = Native objections = = =

In 1902 , the United States Department of Agriculture set aside 16 @, @ 000 @, @ 000 acres ( 64 @, @ 750 km<sup>2</sup> ) of Southeast Alaska as the Tongass National Forest . Tlingit natives who lived in the area protested that the land was theirs and had been unfairly taken . In 1935 , Congress passed a law allowing the Tlingits to sue for recompense , and the resulting case dragged on until 1968 , when a \$ 7 @. @ 5 million settlement was reached . Following the Native lawsuit to halt work on the Trans @-@ Alaska Pipeline , this precedent was frequently mentioned in debate , causing pressure to resolve the situation more quickly than the 33 years it had taken for the Tlingits to be satisfied .

Between 1968 and 1971 , a succession of bills were introduced into the U.S. Congress to compensate statewide Native claims . The earliest bill offered \$ 7 million , but this was flatly rejected .

The Alaska Federation of Natives , which had been created in 1966 , hired former United States Supreme Court justice Arthur Goldberg , who suggested that a settlement should include 40 million acres ( 160 @, @ 000 km<sup>2</sup> ) of land and a payment of \$ 500 million . The issue remained at a standstill until Alyeska began lobbying in favor of a Native claims act in Congress in order to lift the legal injunction against pipeline construction . In October 1971 , President Richard Nixon signed the Alaska Native Claims Settlement Act ( ANCSA ) . Under the act , Native groups would renounce their land claims in exchange for \$ 962 @. @ 5 million and 148 @. @ 5 million acres ( 601 @, @ 000 km<sup>2</sup> ) in federal land . The money and land were split up among village and regional corporations , which then distributed shares of stock to Natives in the region or village . The shares paid dividends based on both the settlement and corporation profits . To pipeline developers , the most important aspect of ANCSA was the clause dictating that no Native allotments could be selected in the path of the pipeline .

= = Legal issues and politics = =

Alyeska and the oil companies fought objections to the pipeline 's construction in both the courts and in Congress , where debates about the pipeline 's environmental impact statement continued through 1971 . Objections about the caribou herds were countered by observations of Davidson Ditch , a water pipeline with the same diameter of the Trans @-@ Alaska Pipeline , which caribou were able to jump over . To those who argued that the pipeline would irrevocably alter Alaska wilderness , proponents pointed to the overgrown remnants of the Fairbanks Gold Rush , most of which had been erased 70 years later . Some pipeline opponents were satisfied by Alyeska 's preliminary design , which incorporated underground and raised crossings for caribou and other big game , gravel and styrofoam insulation to prevent permafrost melting , automatic leak detection and shutoff , and other techniques . Other opponents , including fishermen who feared tanker leaks south of Valdez , maintained their disagreement with the plan .

All the arguments both for and against the pipeline were incorporated into the 3 @, @ 500 @-@ page , 9 @-@ volume final environmental impact statement , which was released on March 20 , 1972 . Although Alaska Sen. Ted Stevens felt the statement " was not written by a proponent , " it maintained the general approval for pipeline construction that was demonstrated in the draft statement . U.S. Secretary of the Interior Rogers Morton allowed 45 ? days of comment after the release , and conservationists created a 1 @, @ 300 @-@ page document opposing the impact statement . This document failed to sway Judge Hart , who lifted the injunction on the project on August 15 , 1972 .

The environmental groups that had filed the injunction appealed the decision , and on October 6 , 1972 , the U.S. District Court of Appeals in Washington , D.C. partially reversed Hart 's decision . The appeals court said that although the impact statement followed the guidelines set by the National Environmental Policy Act , it did not follow the Minerals Leasing Act , which allowed for a smaller pipeline right of way than was required for the Trans @-@ Alaska Pipeline . The oil companies and Alyeska appealed this decision to the U.S. Supreme Court , but in April 1973 , the court declined to hear the case .

= = Congressional issues = =

With the appeals court having decided that the Minerals Leasing Act did not cover the pipeline 's requirements , Alyeska and the oil companies began lobbying Congress to either amend the act or create a new law that would permit a larger right @-@ of @-@ way . The Senate Interior Committee began the first hearings on a series of bills to that effect on March 9 , 1973 . Environmental opposition switched from contesting the pipeline on NEPA grounds to fighting an amendment to the leasing act or a new bill . By the spring and summer of 1973 , these opposition groups attempted to

persuade Congress to endorse a Trans-Alaska Canada oil pipeline or a railroad. They believed the "leave it in the ground" argument was doomed to fail, and the best way to oppose the pipeline would be to propose an ineffective alternative which could be easily defeated. The problem with this approach was that any such alternative would cover more ground and be more damaging environmentally than the Trans-Alaska Pipeline.

Hearings in both the U.S. Senate and the House continued through the summer of 1973 on both new bills and amendments to the Mineral Leasing Act. On July 13, an amendment calling for more study of the project – the Mondale-Bayh Amendment – was defeated. This was followed by another victory for pipeline proponents when an amendment by Alaska Sen. Mike Gravel was passed by the Senate. The amendment declared that the pipeline project fulfilled all aspects of NEPA and modified the Mineral Leasing Act to allow the larger right-of-way for the Alaska pipeline. Upon reconsideration, the vote was tied at 49-49 and required the vote of vice president Spiro Agnew, who supported the amendment. A similar amendment was passed in the House on August 2.

== Oil crisis and authorization act ==

On October 17, 1973, the Organization of Arab Petroleum Exporting Countries announced an oil embargo against the United States in retaliation for its support of Israel during the Yom Kippur War. Because the United States imported approximately 35 percent of its oil from foreign sources, the embargo had a major effect. The price of gasoline shot upward, gasoline shortages were common, and rationing was considered. Most Americans began demanding a solution to the problem, and President Richard Nixon began lobbying for the Trans-Alaska Pipeline as at least a part of the answer.

Nixon supported the pipeline project even before the oil crisis. On September 10, 1973, he released a message stating that the pipeline was his priority for the remainder of the Congressional session that year. On November 8, after the embargo had been in place for three weeks, he reaffirmed that statement. Members of Congress, under pressure from their constituents, created the Trans-Alaska Pipeline Authorization Act, which removed all legal barriers from construction of the pipeline, provided financial incentives, and granted a right-of-way for its construction. The act was drafted, rushed through committee, and approved by the House on November 12, 1973, by a vote of 361-14-60. The next day, the Senate passed it, 80-5-15. Nixon signed it into law on November 16, and a federal right-of-way for the pipeline and transportation highway was granted on January 3, 1974. The deal was signed by the oil companies on January 23, allowing work to start.

== Construction ==

Although the legal right-of-way was cleared by January 1974, cold weather, the need to hire workers, and construction of the Dalton Highway meant work on the pipeline itself did not begin until March. Between 1974 and July 22, 1977, when the first barrel of oil reached Valdez, tens of thousands of people worked on the pipeline. Thousands of workers came to Alaska, attracted by the prospect of high-paying jobs at a time when most of the rest of the United States was undergoing a recession.

Construction workers endured long hours, cold temperatures, and brutal conditions. Difficult terrain, particularly in Atigun Pass, Keystone Canyon, and near the Sagavanirktok River forced workers to come up with solutions for unforeseen problems. Faulty welds and accusations of poor quality control caused a Congressional investigation that ultimately revealed little. More than \$8 billion was spent to build the 800 miles (1,300 km) of pipeline, the Valdez Marine Terminal, and 12 pump stations. The construction effort also had a human toll. Thirty-two Alyeska and contract employees died from causes directly related to construction. That figure does not include common carrier casualties.

= = Impact = =

The construction of the Trans-Alaska Pipeline System and its completion in 1977 had an immense effect on Alaska, the United States, and the rest of the world. Its impact has included economic, physical, and social repercussions running the gamut from life in small towns to the global oil market.

= = = Boomtowns = = =

Construction of the pipeline caused a massive economic boom in towns up and down the pipeline route. Prior to construction, most residents in towns like Fairbanks, still recovering from the devastating 1967 Fairbanks Flood, strongly supported the pipeline. By 1976, after the town's residents had endured a spike in crime, overstressed public infrastructure, and an influx of people unfamiliar with Alaska customs, 56 percent said the pipeline had changed Fairbanks for the worse. The boom was even greater in Valdez, where the population jumped from 1,350 in 1974 to 6,512 by the summer of 1975 and 8,253 in 1976.

This increase in population caused many adverse effects. Home prices skyrocketed: a home that sold for \$40,000 in 1974 was purchased for \$80,000 in 1975. In Valdez, lots of land that sold for \$400 in the late 1960s went for \$4,000 in 1973, \$8,000 in 1974, and \$10,000 in 1975. Home and apartment rentals were correspondingly squeezed upward by the rising prices and the demand from pipeline workers. Two-room log cabins with no plumbing rented for \$500 per month. One two-bedroom home in Fairbanks housed 45 pipeline workers who shared beds on a rotating schedule for \$40 per week. In Valdez, an apartment that rented for \$286 per month in December 1974 cost \$520 per month in March 1975 and \$1,600 per month, plus two mandatory roommates, in April 1975. Hotel rooms were sold out as far away as Glenallen, 115 miles (185 km) north of Valdez.

The skyrocketing prices were driven by the high salaries paid to pipeline workers, who were eager to spend their money. The high salaries caused a corresponding demand for higher wages among non-pipeline workers in Alaska. Non-pipeline businesses often could not keep up with the demand for higher wages, and job turnover was high. Yellow cab in Fairbanks had a turnover rate of 800 percent; a nearby restaurant had a turnover rate of more than 1,000 percent. Many positions were filled by high school students promoted above their experience level. To meet the demand, a Fairbanks high school ran in two shifts: one in the morning and the other in the afternoon in order to teach students who also worked eight hours per day. More wages and more people meant higher demand for goods and services. Waiting in line became a fact of life in Fairbanks, and the Fairbanks McDonalds became No. 2 in the world for sales, behind only the recently opened Stockholm store. Alyeska and its contractors bought in bulk from local stores, causing shortages of everything from cars to tractor parts, water softener salt, batteries and ladders.

The large sums of money being made and spent caused an upsurge in crime and illicit activity in towns along the pipeline route. This was exacerbated by the fact that police officers and state troopers resigned in large groups to become pipeline security guards at wages far in excess of those available in public sector jobs. Fairbanks' Second Avenue became a notorious hangout for prostitutes, and dozens of bars operated throughout town. In 1975, the Fairbanks Police Department estimated between 40 and 175 prostitutes were working in the city of 15,000 people. Prostitutes brought pimps, who then engaged in turf fights. In 1976, police responded to a shootout between warring pimps who wielded automatic firearms. By and large, however, the biggest police issue was the number of drunken brawls and fighting. On the pipeline itself, thievery was a major problem. Poor accounting and record keeping allowed large numbers of tools and large amounts of equipment to be stolen. The Los Angeles Times reported in 1975 that as many as 200 of Alyeska's 1,200 yellow-painted trucks were missing from Alaska and "scattered from Miami to Mexico City". Alyeska denied the problem and said only 20-30 trucks were missing. The theft problem was typified by pipeliners' practice of mailing empty boxes to pipeline camps.

The boxes then would be filled with items and shipped out . After Alyeska ruled that all packages had to be sealed in the presence of a security guard , the number of packages being sent from camps dropped by 75 percent .

== Economy of Alaska ==

Since the completion of the Trans-Alaska Pipeline System in 1977 , the government of the state of Alaska has been reliant on taxes paid by oil producers and shippers . Prior to 1976 , Alaska's personal income tax rate was 14 % the highest in the United States . The gross state product was \$ 8 billion , and Alaskans earned \$ 5 billion in personal income . Thirty years after the pipeline began operating , the state had no personal income tax , the gross state product was \$ 39 billion , and Alaskans earned \$ 25 billion in personal income . Alaska moved from the most heavily taxed state to the most tax-free state .

The difference was the Trans-Alaska Pipeline System and the taxes and revenue it brought to Alaska . Alyeska and the oil companies injected billions of dollars into the Alaska economy during the construction effort and the years afterward . In addition , the taxes paid by those companies altered the tax structure of the state . By 1982 , five years after the pipeline started transporting oil , 86 % of Alaska revenue came directly from the petroleum industry .

The series of taxes levied on oil production in Alaska has changed several times since 1977 , but the overall form remains mostly the same . Alaska receives royalties from oil production on state land . The state also has a property tax on oil production structures and transportation ( pipeline ) property - the only state property tax in Alaska . There is a special corporate income tax on petroleum companies , and the state taxes the amount of petroleum produced . This production tax is levied on the cost of oil at Pump Station 1 . To calculate this tax , the state takes the market value of the oil , subtracts transportation costs ( tanker and pipeline tariffs ) , subtracts production costs , then multiplies the resulting amount per barrel of oil produced each month . The state then takes a percentage of the dollar figure produced .

Under the latest taxation system , introduced by former governor Sarah Palin in 2007 and passed by the Alaska Legislature that year , the maximum tax rate on profits is 50 percent . The rate fluctuates based on the cost of oil , with lower prices incurring lower tax rates . The state also claims 12 % of all oil produced in the state . This " royalty oil " is not taxed but is sold back to the oil companies , generating additional revenue . At a local level , the pipeline owners pay property taxes on the portions of the pipeline and the pipeline facilities that lay within districts that impose a property tax . This property tax is based on the pipeline's value ( as assessed by the state ) and the local property tax rate . In the Fairbanks North Star Borough , for example , pipeline owners paid \$ 9 million in property taxes - approximately 10 percent of all property taxes paid in the borough .

The enormous amount of public revenue created by the pipeline provoked debates about what to do with the windfall . The record \$ 900 million created by the Prudhoe Bay oil lease sale took place at a time when the entire state budget was less than \$ 118 million , yet the entire amount created by the sale was used up by 1975 . Taxes on the pipeline and oil carried by it promised to bring even more money into state coffers . To ensure that oil revenue wasn't spent as it came in , the Alaska Legislature and governor Jay Hammond proposed the creation of an Alaska Permanent Fund - a long-term savings account for the state . This measure required a constitutional amendment , which was duly passed in November 1976 . The amendment requires at least 25 percent of mineral extraction revenue to be deposited in the Permanent Fund . On February 28 , 1977 , the first deposit - \$ 734 million - was put into the Permanent Fund . That deposit and subsequent ones were invested entirely in bonds , but debates quickly arose about the style of investments and what they should be used for .

In 1980 , the Alaska Legislature created the Alaska Permanent Fund Corporation to manage the investments of the Permanent Fund , and it passed the Permanent Fund Dividend program , which provided for annual payments to Alaskans from the interest earned by the fund . After two years of legal arguments about who should be eligible for payments , the first checks were distributed to



Alaskans . After peaking at more than \$ 40 billion in 2007 , the fund 's value declined to approximately \$ 26 billion as of summer 2009 . In addition to the Permanent Fund , the state also maintains the Constitutional Budget Reserve , a separate savings account established in 1990 after a legal dispute over pipeline tariffs generated a one @-@ time payment of more than \$ 1 @.@ 5 billion from the oil companies . The Constitutional Budget reserve is run similar to the Permanent Fund , but money from it can be withdrawn to pay for the state 's annual budget , unlike the Permanent Fund .

= = = Oil prices = = =

Although the Trans @-@ Alaska Pipeline System began pumping oil in 1977 , it did not have a major immediate impact on global oil prices . This is partly because it took several years to reach full production and partly because U.S. production outside Alaska declined until the mid @-@ 1980s . The Iranian Revolution and OPEC price increases triggered the 1979 energy crisis despite TAPS production increases . Oil prices remained high until the late 1980s , when a stable international situation , the removal of price controls , and the peak of production at Prudhoe Bay contributed to the 1980s oil glut . In 1988 , TAPS was delivering 25 percent of all U.S. oil production . As North Slope oil production declined , so did TAPS ' share of U.S. production . Today , TAPS provides less than 17 percent of U.S. oil production .

= = = Social impact = = =

The pipeline attracts tens of thousands of visitors annually on pipeline tourism trips . Notable visitors have included Henry Kissinger , Jamie Farr , John Denver , President Gerald Ford , King Olav V of Norway , and Gladys Knight . Knight starred in one of two movies about the pipeline construction , Pipe Dreams . The other film was Joyride , and both were critically panned . Other films , such as On Deadly Ground and 30 Days of Night , refer to the pipeline or use it as a plot device .

The pipeline has also inspired various forms of artwork . The most notable form of art unique to the pipeline are pipeline maps ? portions of scrap pipe cut into the shape of Alaska with a piece of metal delineating the path of the pipeline through the map . Pipeline maps were frequently created by welders working on the pipeline , and the maps were frequently sold to tourists or given away as gifts . Other pipeline @-@ inspired pieces of art include objects containing crude oil that has been transported through the pipeline .

= = Technical details = =

Oil going into the Trans @-@ Alaska Pipeline comes from one of several oil fields on Alaska 's North Slope . The Prudhoe Bay Oil Field , the one most commonly associated with the pipeline , contributes oil , as do the Kuparuk , Alpine , Endicott , and Liberty oil fields , among others . Oil emerges from the ground at approximately 120 ° F ( 49 ° C ) and cools to 111 ° F ( 44 ° C ) by the time it reaches Pump Station 1 through feeder pipelines that stretch across the North Slope . North Slope crude oil has a specific gravity of 29 @.@ 9 API at 60 ° F ( 16 ° C ) . In 2008 , the pipeline carried approximately 700 thousand barrels per day ( 110 @,@ 000 m3 / d ) , less than its theoretical maximum capacity of 2 @.@ 14 million barrels per day ( 340 @,@ 000 m3 / d ) or its actual maximum of 2 @.@ 03 million barrels per day ( 323 @,@ 000 m3 / d ) in 1988 . From Pump Station 1 it takes an average of 11 @.@ 9 days for oil to travel the entire length of the pipeline to Valdez , a speed of 3 @.@ 7 miles per hour ( 6 @.@ 0 km / h ) .

The minimum flow through the pipeline is not as clearly defined as its maximum . Operating at lower flows will extend the life of the pipeline as well as increasing profit for its owners . The 2012 flow of 600 @,@ 000 bbd is significantly less than what the pipeline was designed for . Low flowrates require that the oil move slower through the line , meaning that its temperature drops more than in high @-@ flow situations . A freeze in the line would block a pig in the line , which would force a

shutdown and repairs . A 2011 engineering report by Alyeska stated that , to avoid freezing , heaters would need to be installed at several pump stations . This report noted that these improvements could bring flow as low as 350 @, @ 000 bbd , but it did not attempt to determine the absolute minimum . Other studies have suggested that the minimum is 70 @, @ 000 100 @, @ 000 bbd with the current pipeline . Alyeska could also replace the 48 " pipeline from Prudhoe Bay to Fairbanks with a 20 " pipeline and use rail the rest of the way , which would allow as little as 45 @, @ 000 bbd .

Pumping stations maintain the momentum of the oil as it goes through the pipeline . Pump Station 1 is the northernmost of 11 pump stations spread across the length of the pipeline . The original design called for 12 pump stations with 4 pumps each , but Pump Station 11 was never built . Nevertheless , the pump stations retained their intended naming system . Eight stations were operating at startup , and this number increased to 11 by 1980 as throughput rose . As of December 2006 , only five stations were operating , with Pump Station 5 held in reserve . Pump Stations 2 and 7 have a capacity of moving 60 @, @ 000 gallons / minute ( 227 @, @ 125 l / min ) , while all other stations have a capacity of 20 @, @ 000 gal / min ( 75 @, @ 708 l / min ) . The pumps are natural @-@ gas or liquid @-@ fueled turbines .

Because of meanders and thermal and seismic accommodations , the amount of 48 @-@ inch ( 1 @, @ 200 mm ) diameter welded steel pipeline between the pipe stations and the end of the line is 800 @. @ 3 miles ( 1 @, @ 288 @. @ 0 km ) , while the linear distance between the Prudhoe Bay and Valdez station endpoints is 639 @. @ 34 miles ( 1 @, @ 028 @. @ 92 km ) . The pipeline crosses 34 major streams or rivers and nearly 500 minor ones . Its highest point is at Atigun Pass , where the pipeline is 4 @, @ 739 feet ( 1 @, @ 444 m ) above sea level . The maximum grade of the pipeline is 145 % , at Thompson Pass in the Chugach Mountains . The pipeline was created in 40 and 60 @-@ foot ( 12 @. @ 2 and 18 @. @ 3 @-@ meter ) sections . Forty @-@ two thousand of these sections were welded together to make a double joint , which was laid in place on the line . Sixty @-@ six thousand " field girth welds " were needed to join the double joints into a continuous pipeline . The pipe is of two different thicknesses : 466 miles ( 750 km ) of it is 0 @. @ 462 inches ( 1 @. @ 17 cm ) thick , while the remaining 334 miles ( 538 km ) is 0 @. @ 562 inches ( 1 @. @ 43 cm ) thick . More than 78 @, @ 000 vertical support members hold up the aboveground sections of pipeline , and the pipeline contains 178 valves .

At the end of the pipeline is the Valdez Marine Terminal , which can store 9 @. @ 18 million barrels ( 1 @, @ 460 @, @ 000 m<sup>3</sup> ) of oil . Eighteen storage tanks provide this capacity . They are 63 @. @ 3 feet ( 19 @. @ 3 m ) tall and 250 feet ( 76 m ) in diameter . They average 85 % full at any given time ? 7 @. @ 8 million barrels ( 1 @, @ 240 @, @ 000 m<sup>3</sup> ) . Three power plants at the terminal generate 12 @. @ 5 megawatts each . Four tanker berths are available for mooring ships in addition to two loading berths , where oil pumping takes place . More than 19 @, @ 000 tankers have been filled by the marine terminal since 1977 .

= = Maintenance = =

The pipeline is surveyed several times per day , mostly by air . Foot and road patrols also take place to check for problems such as leaks or pipe settling or shifting . The pipeline can be surveyed in as little as two hours , but most surveys take longer to ensure thoroughness . These external inspections are only part of standard maintenance , however . The majority of pipeline maintenance is done by pipeline pigs ? mechanical devices sent through the pipeline to perform a variety of functions .

The most common pig is the scraper pig , which removes wax that precipitates out of the oil and collects on the walls of the pipeline . The colder the oil , the more wax buildup . This buildup can cause a variety of problems , so regular " piggings " are needed to keep the pipe clear . A second type of pig travels through the pipe and looks for corrosion . Corrosion @-@ detecting pigs use either magnetic or ultrasonic sensors . Magnetic sensors detect corrosion by analyzing variations in the magnetic field of the pipeline 's metal . Ultrasonic testing pigs detect corrosion by examining vibrations in the walls of the pipeline . Other types of pigs look for irregularities in the shape of the

pipeline , such as if it is bending or buckling . " Smart " pigs , which contain a variety of sensors , can perform multiple tasks . Typically , these pigs are inserted at Prudhoe Bay and travel the length of the pipeline . In July 2009 , a pig launcher was installed at Pump Station 8 , near the midpoint of the pipeline .

A third type of common maintenance is the installation and replacement of sacrificial anodes along the subterranean portions of pipeline . These anodes reduce the corrosion caused by electrochemical action that affect these interred sections of pipeline . Excavation and replacement of the anodes is required as they corrode .

= = Incidents = =

The pipeline has at times been damaged due to sabotage , human error , maintenance failures , and natural disasters . By law , Alyeska is required to report significant oil spills to regulatory authorities . The Exxon Valdez oil spill is the best @-@ known accident involving Alaska oil , but it did not involve the pipeline itself . Following the spill , Alyeska created a rapid response force that is paid for by the oil companies , including ExxonMobil , which was found liable for the spill .

An explosion on July 8 , 1977 , Pump Station No. 8 , killed one worker , injured five others , and destroyed the pump station . A US House of Representatives Committee later announced the cause was workers not following the proper procedures , causing crude oil to flow into a pump under repair at the time . Since the startup of the Alaska pipeline on June 20 , 1977 , to August 15 , 1977 , seven incidents and accidents have caused the pipeline to be shut down periodically . The NTSB investigated the system , and made recommendations .

The largest oil spill involving the main pipeline took place on February 15 , 1978 , when an unknown individual blew a 1 @-@ inch ( 2 @. @ 54 @-@ centimeter ) hole in it at Steele Creek , just east of Fairbanks . Approximately 16 @, @ 000 barrels ( 2 @, @ 500 m<sup>3</sup> ) of oil leaked out of the hole before the pipeline was shut down . After more than 21 hours , it was restarted .

The steel pipe is resistant to gunshots and has resisted them on several occasions , but on October 4 , 2001 , a drunken gunman named Daniel Carson Lewis shot a hole into a weld near Livengood , causing the second @-@ largest mainline oil spill in pipeline history . Approximately 6 @, @ 144 barrels ( 976 @. @ 8 m<sup>3</sup> ) leaked from the pipeline ; 4 @, @ 238 barrels ( 673 @. @ 8 m<sup>3</sup> ) were recovered and reinjected into the pipeline . Nearly 2 acres ( 8 @, @ 100 m<sup>2</sup> ) of tundra were soiled and were removed in the cleanup . The pipeline was repaired and was restarted more than 60 hours later . Lewis was found guilty in December 2002 of criminal mischief , assault , drunken driving , oil pollution , and misconduct .

The pipeline was built to withstand earthquakes , forest fires , and other natural disasters . The 2002 Denali earthquake damaged some of the pipeline sliders designed to absorb similar quakes , and it caused the pipeline to shut down for more than 66 hours as a precaution . In 2004 , wildfires overran portions of the pipeline , but it was not damaged and did not shut down .

In May 2010 , as much as several thousands of barrels were spilled from a pump station near Fort Greely during a scheduled shutdown . A relief valve control circuit failed during a test of the fire control system , and oil poured into a tank and overflowed onto a secondary containment area .

A leak was discovered on Jan 8 , 2011 , in the basement of the booster pump at Pump Station 1 . For more than 80 hours , pipeline flow was reduced to 5 percent of normal . An oil collection system was put in place , and full flow resumed until the pipeline was again shut down while a bypass was installed to avoid the leaking section .

= = Future of the pipeline = =

Decline in oil production has posed a serious problem for the pipeline .

By 2015 , it is anticipated that daily oil throughput will approach 500 @, @ 000 barrels per day ( 79 @, @ 000 m<sup>3</sup> / d ) , unless additional sources of oil are developed . As volumes decrease , Alyeska will begin closing pump stations . The company intends to close all but four stations , because the lower throughput will require less pumping to maintain its momentum . While some reports

supporting drilling in the ANWR coastal plain maintain that the pipeline may reach its minimum operating level of 200 @, @ 000 barrels per day ( 32 @, @ 000 m3 / d ) by 2020 the Trans @-@ Alaska Pipeline System Renewal Environmental Impact Statement estimated levels above this through at least 2032 due to ongoing exploration outside ANWR . Improvements that allow low flow @-@ rates could extend its lifespan as far as 2075 .

By law , Alaska is required to remove all traces of the pipeline after oil extraction is complete . No date has been set for this removal , but plans for it are being updated continuously .

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