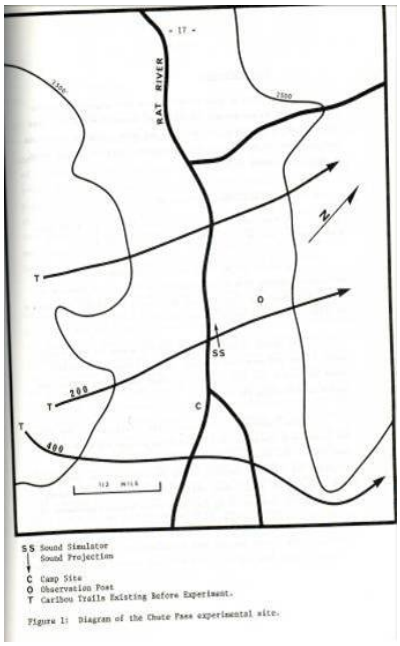
UNIVERSITY OF MICHIGAN

Environmental Effects of the Alaska Pipeline

The Alaskan Pipeline: A Necessary Obstruction?

The construction of the Alaskan Pipeline ushered in many good and bad consequences. Millions of barrels of oil were made readily available to be shipped to the United States for consumption. Many believed this positive impact could easily overshadow the environmental harm that can be caused by the hundreds of miles of piping. The piping flows through natural biomes, upsets animal trails, and carries with it the potential of a devastating leak or spill that would destroy fragile habitats. The question remains, is the pipeline worth approximately 8 billion dollars? Is the oil transported more valuable than the land that will be changed as a result of 800 miles of steel piping? The Trans-Alaskan Pipeline is well worth the environmental risks because of the minimal damage it does, and it is the most realistic, convenient, and sustainable way to transport oil out of Northern Alaska .

Before production was started in the early 1970s, a team of scientists traveled to Alaska to document the probable effects of the pipeline on the environment. Initially, they studied the trails of caribou and other large mammals and the quantity of furbearing animals to determine how these animals behaved without the mechanical disturbances (Jakimchuk). Caribou routes, for instance, were charted and placed on a map. When an imitation oil compressor was introduced, the caribou showed little signs of disturbance. In fact they, on average, only diverged 1/2 of a mile from the simulation site (McCourt). "Although the mean distance for test groups passing in front of the simulator was smaller that the mean distance for control groups, there was no significant difference between the two. Therefore no indications of disturbance could be concluded from this data" (McCourt). Figure 1 displays the paths of the caribou before the experiment and Figure 2 shows the alternative routes taken by the caribou.



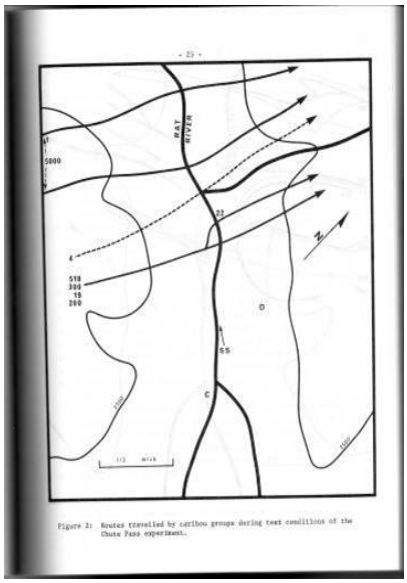


Figure 1 (left): Original charted paths of caribou
Figure 2 (right): Path of caribou with simulated pump
Source: Disturbance studies of caribou and other mammals in the Yukon and Alaska, 1972 /

K. H. McCourt ... [et al.]. Alaskan Arctic Gas Study Company. p. 218-222.

Furbearers were also shown to be mildly affected by Alaskan pipeline. Trapping was a large portion of the area's economy and the scientists wanted to be sure that the obstructions would not weaken the business (Ruttan). The experiments concluded that the only negative influence is that some places the woodland ground cover was destroyed and did not grow back to the previous extent. However, the dens and lairs of the animals were very mildly disturbed since most of their locations did not conflict with the pipeline's route (Ruttan). Overall the furbearers did not suffer greatly because of the pipeline and neither would the trapping business.

While the Alaskan Pipeline surely has some negative environmental effects, it is better than alternative methods of transporting Northern Alaskan oil. If a system of roads were built to transport the oil, road pollutants would cause plants to be more susceptible to pest attacks. Nitrogen oxide, a common pollutant from road traffic, causes forest dieback. A series of roads to Prudhoe Bay would also open the door for further resource extraction and development (Spellerberg). The Alaskan Pipeline only transports oil, and consequently it safeguards against the removal of metals, agricultural products, and other natural resources that could be developed. This untapped expanse of land can be preserved because the oil is transported without roads, and this system does not encourage further extraction of other natural resources in the area.

Another alternative to the pipeline is transportation east through the Trans-Canada Corridor. Whether by rail or pipeline, this route would go through the heart of the Arctic National Wildlife Refuge (Yellow book). See figure 3. The musk ox, for example, would be one of the species affected by the route. ANWR is a key habitat for the limited musk oxen population in Alaska , estimated at around 1000 total (U.S. Department of the Interior). This limited population needs help to survive, not roads or rail lines through their habitat. Interestingly, musk oxen have now been spotted far west of Prudhoe Bay , meaning they have been able to cross under the elevated Alaskan Pipeline (U.S. Department of the Interior). It is not certain whether musk ox would have success crossing busy shipping roads or rails. Once again, the pipeline outweighs the alternatives because of its gentle affect on the environment.

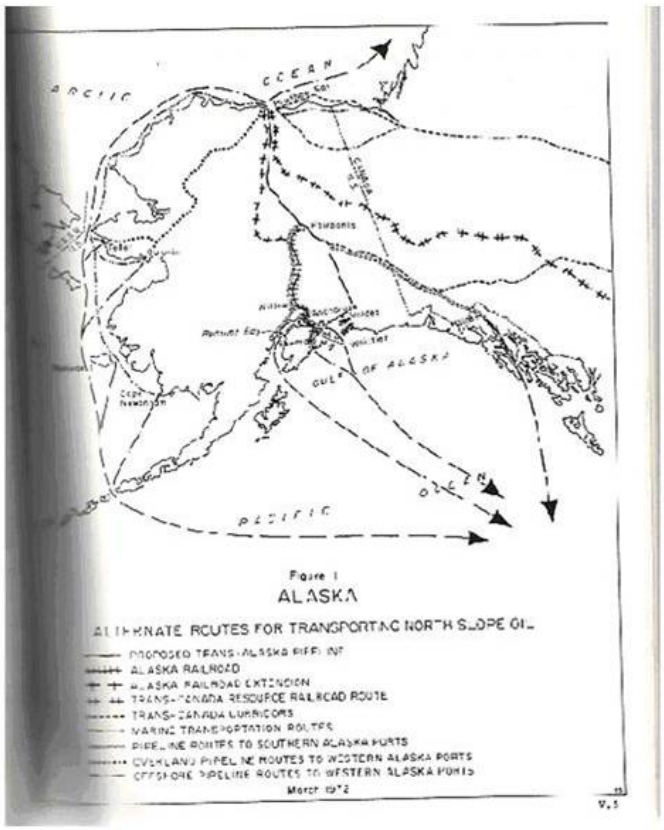


Figure 3: A map of suggested oil routes through various means of transportation. Federal Task Force on Alaskan Oil Development. U.S. Department of the Interior. Final Environmental Impact Statement. Volume 5, page 3. Washington, D.C. 1972.

Oil has been shipped on tankers directly from Prudhoe Bay in northern Alaska for many years. The dangers, though, make this option too environmentally risky. Shipping east through the Arctic Ocean can be done, but the ice puts tankers at higher risk of cargo puncture, and therefore oil spills. The arctic waters are home to especially environmentally sensitive organisms, like the marine flora (Federal Task Force on Alaskan Oil Development). The ship would then move down the east coast of Canada , through the upwelling waters off Nova Scotia that are so rich in fishing (Allan). Going southwest through the Bering Sea is infeasible because tankers would encounter on each trip around 250 fishing boats with limited navigational systems, causing a high risk of collision (Federal Task Force on Alaskan Oil Development). Overall, the small environmental problems posed by the current route of the Alaskan Pipeline are minimal compared to the potential problems of alternative road, rail, and water routes.

The Alaskan Pipeline goes through many different types of environment, from tundra and permafrost near Prudhoe Bay to spruce forests in the South (Argonne National Laboratory, 3.2, p. 2). The environment is in relatively good condition. Since the peregrine falcon has been delisted, there are no endangered or threatened plants, or terrestrial mammals along the pipeline corridor. Two species of eider and the short tailed albatross are endangered, but their environment is stable (Argonne National Laboratory, 3.2, p. 88). Eastern Alaska draws environmental attention because it has some of the more “photogenic” species. The polar bear, caribou, and musk ox are given strong support for preservation, even though they are not actually endangered. Much focus has been given to caribou herds in regard to the Alaskan Pipeline, because some caribou are forced to migrate across it. The concern about noise from compressors was investigated before the pipeline was built, and since then, caribou migration has

been studied. On rare occasions scientists have observed failed crossings by individual caribou. The effect is minimal, as the pipeline only crosses the territory of two of the twelve major caribou herds in Alaska , the Central Arctic herd in the North and the Nelchina herd in the South (Argonne National Laboratory, 3.2, p. 46). Since the pipeline was built, both of these herds have increased their numbers considerably. The data clearly indicates that the pipeline is not prohibiting caribou population growth or migration.

Roads and railroads are a much bigger problem for migrating mammals. Approximately 200 moose per year are killed by trains and over 700 per year are killed by road traffic (Argonne National Laboratory, 4.3, p. 61). See figures 4 and 5. Along with the negative impacts on the surrounding fauna, roads and trains present a clear danger to the stability of migratory animals. But the biggest environmental problem with the Alaskan Pipeline is the potential for oil spills. The Exxon Valdez oil spill in 1989 is the most well-known pipeline disaster. The oil tanker ran into a reef in Prince William Sound and spilled over 250,000 barrels of oil. This single accident accounts for over 75% of all oil spilled by the pipeline. The spill was not the fault of the pipeline, but rather of a careless ship captain who ran his tanker aground. Four out of the top five oil spills by the pipeline are spills from oil tankers (Argonne National Laboratory, 4.1, p. 6). The risk of a devastating spill would still be present if the oil was shipped on tankers directly from Prudhoe Bay instead of through the pipeline.

Table 4.3-14. Moose killed by trains in Alaska.

Winter	November	December	January	February	March	April	Total
1984-85	1	4	39	103	199	25	371
1985-86	1	3	3	9	5	0	21
1986-87	4	22	51	29	16	4	126
1987-88	11	81	60	98	64	14	328
1988-89	11	30	68	83	60	3	255
1989-90	28	65	306	160	123	29	711
1990-91	18	41	70	43	30	21	223
1991-92	3	23	34	40	35	7	142
1992-93	5	26	93	47	11	2	184
1993-94	1	12	21	20	15	4	73
1994-95	28	76	44	29	15	7	199
1995-96	4	0	2	15	26	7	54
1996-97	27	14	16	6	7	6	76
1997-98	9	25	29	16	1	7	87
1998-99	3	10	24	28	16	8	89
1999-2000	5	30	95	109			239
Total	159	462	955	835	623	144	3178
Average	10	29	60	52	39	9	199

Source: Reese (2000, pers. comm.)

Figure 4 (above): A table documenting the moose deaths caused by trains.
Source: Argonne National Laboratory <http://www.tapseis.anl.gov/documents/report.cfm>

Table 4.3-15. Moose killed by documented collisions with motor vehicles in Southcentral Alaska (listed by GMUs).

Year	7	13	14A	14B	14C	15A	15B	15C	16	Total
1994-95	34	50	260	34	239	168	59	53	4	901
1995-96	18	50	85	6	14	90	70	63	15	511
1996-97	27	50	185	10	136	160	80	44	4	696
1997-98	28	50	168	13	137	143	68	84	14	705
1998-99	46	50	130	15	152	178	74	76	10	731
Total	153	250	828	78	678	739	351	320	47	3,544
Average	31	50	166	16	156	148	70	64	9	709

Estimates made for Unit 13.
Very few roadkills in other parts of the state — perhaps 50 per year between GMUs 12 and 20.
As of 2/11/00, there were approximately 370 roadkills this winter (*Anchorage Daily News*).
Sinnott (1999): Moose killed as a result of collisions with motor vehicles — documented kills; actual number killed by vehicles is certainly greater.

Figure 5 (above): A table documenting the moose deaths caused by motor vehicles.
Source: Argonne National Laboratory <http://www.tapseis.anl.gov/documents/report.cfm>

All of the top ten worst oil leaks from the pipeline took place before 1990 (Argonne National Laboratory, 4.1, p. 8). After the Exxon Valdez spill, governmental regulations were increased out of environmental concern. The qualifications for oil tanker navigators were raised and escort vessels are now required to guide the tankers in Prince William Sound . The alarm system on the pipeline itself has been modernized to detect leaks quickly. The line volume balance system measures the total oil that

goes into the pipe versus the total oil coming out of the pipe to determine if there are small, slow leaks in the pipe. A transient volume balance system was added in 1998 and uses complex computer models to determine the theoretical pressure at different places in the pipe and compares it to the actual readings (Argonne National Laboratory, 4.2, p. 10, 11). One of the biggest concerns when the pipeline was built was the advancement of glaciers into the pipeline. However, no glaciers along the Alaskan Pipeline corridor have advanced since the pipeline was built (Argonne National Laboratory, 4.2, p. 18).

The Alaskan Pipeline is a model for sustainable development. It was designed with economic efficiency as well as environmental safety in mind. However, it may not be the cheapest method of shipping oil. It has an estimated energy intensity of 280 BTU/ton-m. Transporting oil over the ocean has an energy efficiency between 60-100 BTU/ton-m (Argonne National Laboratory, 4.9, p. 5). It may not be the most efficient method, but it is one of the safest ways environmentally. If this oil is seen as part of the problem of saturating the atmosphere with carbon, then the pipeline is not a good model for sustainable development. However, the pipeline is the most sustainable method of transporting the oil. The environmentally conscious fashion in which the pipeline was designed is a good paradigm for future development.

The future of the pipeline is uncertain. At the rate of oil being consumed, the pipeline will continue to be a necessity. However, as times change and people realize the harmful effects of their habits, the importance of oil may decrease. Also, the stability of the pipeline is becoming an issue. It is an old structure and many parts are in need of repairs. The U.S. government has plans to refurbish the damaged areas, but there is no guarantee that the pipeline will last for many more years. Research needs to be done to find alternate and safe methods of getting the oil out of Alaska should the pipeline no longer be available. Also, government officials and scientists need to be prepared for the harmful effects of global warming. As of right now the glaciers are not an issue but would their melting cause the ground to soften and create problems for the piping? There are numerous risks like potential terrorist attacks that needed to be researched as well. In the mean time, the pipeline is one of the most economically efficient ways to transport oil and probably the most environmentally friendly method that exists today.

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