A collection of facts compiled over the duration of the operation of the Trans Alaska Pipeline System, by Alyeska Pipeline Service Company.
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# Pipeline Fast Facts

**Air Temperature Range Along Route:** -80 degrees Fahrenheit to 95 degrees Fahrenheit.

**Diameter of Pipe:** 48 inches.

**Elevations, Highest:**
- Atigun Pass: 4,739 feet (crest, pipeline MP 166.6).
- Isabel Pass: 3,420 feet.
- Thompson Pass: 2,812 feet.

**Grade, Maximum:** 145 percent (55 degrees) at Thompson Pass.

**Length of Line:** 800 miles (1,288 kilometers); includes 407 feet added in MP 200 reroute, April 22, 1985.

**Linefill Volume:** 9,059,057 barrels. This number differs with the “Linefill” (9,059,622 barrels).

**Mountain Ranges Crossed, North to South (three):** Brooks Range, Alaska Range, Chugach Range.

**Number of Gallons in a Barrel:** 42.

**Right-of-Way Widths:**
- Federal land: 54 feet (buried pipe); 64 feet (elevated pipe).
- State land: 100 feet.
- Private land: 54 feet to 300 feet

**River and Stream Crossings:** 34 major, nearly 500 others.

**Valves:** 178.

**Vertical Support Members (VSMs):** 78,000.

**Work Pad, Length:** 790 miles.

**Years Built:** 1974 to 1977.
# ACRONYMS AND ABBREVIATIONS

<table>
<thead>
<tr>
<th>ADEC</th>
<th>Alaska Department of Environmental Conservation</th>
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<tbody>
<tr>
<td>ANP</td>
<td>Alaska Native Program</td>
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<tr>
<td>ANUA</td>
<td>Alaska Native Utilization Agreement</td>
</tr>
<tr>
<td>API</td>
<td>American Petroleum Institute</td>
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<tr>
<td>APSC</td>
<td>Alyeska Pipeline Service Company</td>
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<tr>
<td>ARCS</td>
<td>Alternate Route Communications System</td>
</tr>
<tr>
<td>BBL</td>
<td>Barrel</td>
</tr>
<tr>
<td>BLM</td>
<td>United States Bureau of Land Management</td>
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<tr>
<td>BPD</td>
<td>Barrels per day</td>
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<tr>
<td>BWT</td>
<td>Ballast Water Treatment</td>
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<tr>
<td>CPW</td>
<td>Centerpoint West</td>
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<tr>
<td>CV</td>
<td>Check Valve</td>
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<tr>
<td>DG</td>
<td>Diesel generator</td>
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<tr>
<td>DOC</td>
<td>Depth of cover</td>
</tr>
<tr>
<td>DRA</td>
<td>Drag Reducing Agent</td>
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<tr>
<td>DSMA</td>
<td>Digital Strong Motion Accelerograph</td>
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<tr>
<td>DWT</td>
<td>Deadweight tons</td>
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<tr>
<td>E&amp;A</td>
<td>Electrification and Automation</td>
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<tr>
<td>EDRC</td>
<td>Equipment Diagnostic Reliability Center</td>
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<tr>
<td>ECO</td>
<td>Edison Chouest Offshore</td>
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<td>EMS</td>
<td>Earthquake Monitoring System</td>
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<tr>
<td>EPA</td>
<td>United States Environmental Protection Agency</td>
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<tr>
<td>IM</td>
<td>Integrity Management</td>
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<td>IMT</td>
<td>Incident Management Team</td>
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<td>GP</td>
<td>General purpose tug</td>
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<td>JPO</td>
<td>Joint Pipeline Office</td>
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<td>KV</td>
<td>Kilovolts</td>
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<td>MLU</td>
<td>Mainline unit</td>
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<td>MP</td>
<td>Milepost</td>
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<td>MTU</td>
<td>Master Terminal Unit</td>
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<td>MW</td>
<td>Megawatts</td>
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<td>OCC</td>
<td>Operations Control Center</td>
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<tr>
<td>OSRB</td>
<td>Oil spill response barge</td>
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<tr>
<td>PHMSA</td>
<td>Pipeline and Hazardous Materials Safety Agency</td>
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<td>PL</td>
<td>Pipeline</td>
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<tr>
<td>PPE</td>
<td>Personal protection equipment</td>
</tr>
<tr>
<td>PS</td>
<td>Pump station</td>
</tr>
<tr>
<td>PSI</td>
<td>Pounds per square inch</td>
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<tr>
<td>PV</td>
<td>Power Vapor</td>
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<td>RCAC</td>
<td>Regional Citizens Advisory Council</td>
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<td>RGV</td>
<td>Remote Gate Valve</td>
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<td>ROW</td>
<td>Right of Way</td>
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<tr>
<td>SIPPS</td>
<td>Safety Integrity Pressure Protection System</td>
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<td>SERVS</td>
<td>Ship Escort/Response Vessel System</td>
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<tr>
<td>TAPS</td>
<td>Trans Alaska Pipeline System</td>
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<tr>
<td>TG</td>
<td>Turbine Generator</td>
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<tr>
<td>VFD</td>
<td>Variable Frequency Drive</td>
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<tr>
<td>VSM</td>
<td>Vertical Support Member</td>
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<td>VMT</td>
<td>Valdez Marine Terminal</td>
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<td>VTO</td>
<td>Valdez Terminal Office</td>
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<tr>
<td>UPS</td>
<td>Uninterruptible Power Supply</td>
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</table>
ABOVEGROUND PIPE: See PIPE, Aboveground.

ACCESS ROADS: 225, linking state roads with the pipeline, pump stations and airfields.

- Gravel base: 3 feet minimum.
- Length: 120 feet to 7.5 miles.
- Number of roads: 225.
- Width: 28 feet.

AIRFIELDS, Operations: Two of the 14 airfields built during TAPS construction are still in operation: Galbraith Lake (5,200 feet long) and Prospect (5,000 feet long). These two airfields are on federal land and are operated under state leases.

ALASKA, Facts:

- Coastline: 33,900 miles.
- Land area: 586,000 square miles.

ALASKA NATIVE PROGRAM: Alyeska created the Alaska Native Program in October 1995 to ensure TAPS owners fulfill their commitments to the United States as embodied in Section 29 of the Federal Agreement and Grant of Right of Way. Through the Alaska Native Program, Alyeska is committed to supporting recruitment, employment, job counseling, education and training opportunities for Alaska Native people. See SECTION 29.

ALYESKA, Corporate Name: Alyeska Pipeline Service Company. Alyeska is an Aleut word meaning mainland.

ALYESKA, Date of Incorporation: August 14, 1970.

ALYESKA, Early History: The Trans Alaska Pipeline System (TAPS) was originally called the Trans Alaska Pipeline Project, and was a joint venture of Atlantic Pipe Line Company (now ConocoPhillips Transportation Alaska, Inc.), Humble Oil Pipeline Company (now ExxonMobil Pipeline Company) and BP Oil Corporation (later BP Pipelines (Alaska) Inc.), formed to develop a plan for construction of a pipeline for Prudhoe Bay oil.

ALYESKA, Internet Address: www.alyeskapipeline.com

ALYESKA, Office Addresses:

Anchorage (Corporate Headquarters):
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3700 Centerpoint Drive
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907-787-8700
Toll free: 877-257-5778
Mailing address:
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Anchorage, AK 99519-6660

Fairbanks:
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Fairbanks, AK 99701
Toll free: 877-257-5778
Mailing address:
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P.O. Box 60469
Fairbanks, AK 99706
SERVS:
Mailing address:
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SERVS (Ship Escort/Response Vessel System
P.O. Box 109
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Toll free: 877-257-5778

Valdez Marine Terminal:
Mailing address:
Alyeska Pipeline Service Company
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Valdez, AK 99686
Toll free: 877-257-5778

Washington, D.C.:
Alyeska Pipeline Service Company
1667 K St., N.W., Suite 430
Washington, D.C. 20006
202-466-3866

ALYESKA, Owners: The consortium of companies that owns TAPS. For a complete list, see www.alyeskapipeline.com.

ALYESKA, Personnel: Approximately 800 Alyeska employees and 1,000 or more contractors operate and maintain the Trans Alaska Pipeline System. As of September 30, 2019, employee demographics were:
- 762 Alyeska employees
- Anchorage: 309
- Fairbanks: 228
- Valdez: 225
- Alaska residents: 94.5 percent, approximately.

ALYESKA, Responsibilities: Design, construct, operate and maintain the Trans Alaska Pipeline System.

ALYESKA TACTICAL OIL SPILL MODEL (ATOM):
Software package specifically designed for oil spill trajectory modeling in Prince William Sound. ATOM is used to:
- Forecast path of oil, based on real weather input.
- Show wildlife impact potential and other sensitivities such as recreational sites, commercial fishing areas and shoreline types.
- Show locations of Prince William Sound communities and hatcheries.

ANIMAL CROSSINGS, Mainline: The purpose is to allow for free movement of big game animals (caribou, moose, etc.) across the pipeline right of way. Approximately 579 animal crossings are incorporated into TAPS, including:
- Elevated: 554 (minimum height 10 feet).
- Buried: 23.
- Buried, refrigerated: 2 (MP 645 and MP 649).

ARCHAEOLOGICAL SURVEY, Preconstruction: The entire TAPS route was surveyed by the University of Alaska and Alaska Methodist University under contract to Alyeska. The survey, which cost approximately $2.2 million, resulted in the excavation of approximately 330 sites.

ARCS (Alternate Route Communications System): A private radio network used by TAPS technicians for voice communications in remote locations.

ATIGUN AWARDS: First awarded in 2014, these awards recognize employees, contractors and teams for excellent performance in five categories: Environment; Health and Safety; Innovation; Integrity; and Teamwork. Awards are also given to individuals for Professionalism and Lifetime Achievement on TAPS.
BALLAST WATER TREATMENT (BWT): The Valdez Marine Terminal treats tanker ballast water to remove oil.

- Average ballast water treated: 24,000 barrels/day
- Capacity of system: 8,600 barrels/hour
- Crude oil recovered from ballast: 90 barrels/day average
- Purity standards: 0.73 parts per million aromatic hydrocarbons (permitted daily maximum)

BALLAST WATER TREATMENT (BWT) FACILITY: Major components:

- Biological treatment tanks: One aboveground concrete tank with a capacity of 5.5 million gallons.
- Diffuser line at discharge into Port Valdez: The line discharges at a maximum depth of 300 feet at a distance of 700 to 1,050 feet offshore.
- Dissolved Air Flotation (DAF) Units: Two cells, each 144 feet long, 24 feet wide and 12 feet deep.
- Piping from berths to tanks: 42-inch diameter.
- Time required for treatment: two-and-a-half to three days on average.
- Settling tanks: Two tanks with capacity of 430,000 barrels each, 53 feet, 6 inches high and 250 feet in diameter.
- BETX air strippers: Four with a capacity of 1,100 gallons per minute each.
- Regenerative thermal oxidizers: Two with a capacity of 11,000 cubic feet per minute each.

BARREL, Crude Oil: The normal unit of measurement for crude oil: 1 barrel = 42 gallons; 310.9 pounds per barrel.

BERTHS, Valdez Marine Terminal: Four berths were built at the Terminal: Berth 1 (floating platform with 13 buoyancy chambers and weighing 6.5 million pounds) and Berths 3, 4 and 5 (fixed platform). Berth 1 and Berth 3 are now out of service. Berths 4 and 5 are equipped with vapor-recovery arms, and as such, are the only active berths on the Terminal. All the loading and vapor arms on Berth 4 were replaced in an overhaul in 2014. The loading and vapor arms on Berth 5 were replaced beginning in 2016.

BIRD SPECIES: More than 170 identified along the TAPS route.

BRIDGE, Yukon River: Located at MP 353.3.

- Cost: $30 million (owners’ share approximately $10 million).
- Dimensions: 2,295 feet long; road deck 30 feet wide; grade 5.99 degrees.
- Opening date: October 1979.
- River width: 1,900 feet, typical.

BRIDGES, Pipeline: 13 total along TAPS.

BRIDGES, Road: 10 north of Yukon; 36 south of Yukon.
CARIBOU: TAPS crosses the ranges of the Central Arctic Herd on the North Slope and the Nelchina Herd in the Copper River Basin.

COLUMBIA GLACIER: Tidewater glacier in the northeast corner of Prince William Sound, at the head of Columbia Bay.

- Impact on tankers: When the captain of the port determines hazardous ice conditions exist in Valdez Arm, the Valdez Narrows ice routing measures are placed into effect in accordance with the Prince William Sound Vessel Escort Response Plan.

COMMUNICATIONS SYSTEM: The communications system comprises both microwave and fiber.

COMMUNICATIONS SYSTEM, Control: Control data systems provide for supervisory control and telemetry, seismic monitoring, maintenance monitoring and control of pipeline operations.

COMMUNICATIONS SYSTEM, Enterprise Data Services: Voice, data, video, and internet are provided for business systems.

CONCRETE WEIGHTS:

- Pipe coating: Used at river crossings; weight 75,000 pounds per 40-foot section.
- Saddles: Used in floodplains; weight 18,500 pounds each.

CONSTRUCTION, Airfields:

- Seven, 2,500 to 3,000 feet long.
- Seven, 5,000 feet long (Galbraith Lake and Prospect continue to be used by TAPS).

CONSTRUCTION, Camps:

- Largest camp: Valdez Marine Terminal, 3,480 beds.
- Largest pipeline camp: Isabel Pass, 1,652 beds.
- Number, 1974 to 1977: 29 total.
- Smallest pipeline camp: Sourdough, 112 beds.

CONSTRUCTION, Contractors and Subcontractors: 2,000, approximately.

CONSTRUCTION, Cost: Approximately $8 billion for entire system, including Valdez Marine Terminal and pump stations, at conclusion of initial construction period in 1977. Does not include interest on capital investment or capital construction after 1977.

Atigun Construction Camp was one of 30 camps operating during pipeline construction. The buildings were removed and the site was revegetated in 1978.
CONSTRUCTION, Ditch: See DITCH, Buried Pipeline.

CONSTRUCTION, Hydrostatic Testing:
- Maximum: equivalent to 96 percent of specified minimum yield strength.
- Minimum: 125 percent of operating pressure or 750 psi, whichever was greater.

CONSTRUCTION, Materials:
- Gravel for entire project: 73 million cubic yards.
- Gravel for work pad: 32 million cubic yards.
- Largest piece shipped: Floating tanker berth (3,250 tons).
- Shipped to Alaska: 3 million tons, approximately.

CONSTRUCTION, Time: Three years, two months (April 29, 1974 to June 20, 1977) to complete pipeline, pump stations, roads and Terminal.

CONSTRUCTION, Time for Preconstruction Effort: Six years, approximately.

CONSTRUCTION, Welding: See WELDS, Pipe.

CONSTRUCTION, Workforce:
- Minority hire: Ranged from 14 to 19 percent.
- Peak, contractors only: 21,600.
- Peak, total: 28,072 in October 1975 (Alyeska employees and contractors).
- Total for project: 70,000 approximately (1969-1977).
- Women: Ranged from 5 to 10 percent.

CONTINGENCY PLANS: A Contingency Plan (C-Plan) is a regulatory document that outlines commitments to specific oil spill response and preparedness scenarios. It is approved by both federal and state agencies. The plan is renewed every five years, when it is updated by Alyeska and then subjected to a lengthy public review when interest groups and individuals submit comments. Alyeska prepares three separate C-Plans: one for the pipeline, one for the Valdez Marine Terminal and one for Prince William Sound (also known as the Tanker C-Plan). The oil shipping companies are responsible for the Tanker C-Plan; Alyeska is considered the subject matter expert and co-authors the document.

CROSSINGS, Refrigerated, Road: The buried pipeline crossing of the Glenn Highway at Glennallen is refrigerated.

CRUDE OIL: A fluid made up of various hydrocarbon components, natural gas liquids and fixed gases.

CRUDE OIL, API Gravity: 33.4 degrees API at 60 degrees Fahrenheit for North Slope crude oil.

CRUDE OIL, TAPS:
- Minimum temperature in 2019: 95 degrees Fahrenheit at injection into pipeline at PS 1. Approximately 50 degrees Fahrenheit at the Terminal.
- Travel time in August 2019: 19.4 days from PS 1 to the Terminal.
- Velocity: 1.7 mph in pipeline.
- Weight: 301.8 pounds/barrel; 6.63 barrels/ton.
CULTURAL ATTRIBUTES, Alyeska: Alyeska Pipeline Service Company has defined five cultural attributes. These attributes are recognized and reinforced throughout the company as critical to safe day-to-day operations and future success. They are:

- Take a system view: Acting and making decisions while considering risk and/or impact on the success of the total system.
- Make sound decisions: Make timely decisions with the right people, right data, right processes and the right focus.
- Learn, improve, innovate: Seek to learn from experiences, overcome challenges and enhance the way employees do business.
- Speak up, step up: Spot opportunities, share ideas and concerns, and take action on solutions.
- Act with discipline: Commit to high standards and consistency in work on TAPS.

DALTON HIGHWAY (Formerly North Slope Haul Road): James B. Dalton Highway is the name applied by the state in 1981 to 415 miles of roadway, including the North Slope Haul Road and the 57-mile road from the Yukon River to Livengood, constructed by Alyeska in the winter of 1969-70. This section of road was originally 56 miles, but one mile was added after realignment by the state at Livengood in 1981. James B. Dalton was a native-born Alaskan and graduate mining engineer who supervised construction of the Distant Early Warning (DEW) Line in Alaska. He was an expert in Arctic engineering and logistics and served as a consultant in early oil exploration in northern Alaska, pioneering winter trails for heavy equipment transport. The following information about the highway is current as of construction:

- Bridges, permanent: 20.
- Grade: 12 percent maximum.
- Gravel used: 32 million cubic yards.

DALTON HIGHWAY, Haul Road Portion: See HAUL ROAD.

DALTON HIGHWAY, Ownership: Originally Alyeska; control transferred to the state in October 1978.

DAMAGE PREVENTION PROGRAM: Alyeska Pipeline continually seeks to reduce the risk of accidental releases and pipeline damage through its public awareness and damage prevention programs. Alyeska participates in the 811 “Call Before You Dig” program and regularly communicates with land...
owners, excavators and emergency responders who live and work within the pipeline corridor.

**DEADWEIGHT TONS (dwt):** A unit of measure for the weight of tanker cargo; dwt x 7 = number of barrels, approximately.

**DESIGN MODES, Selection:** Soil sampling and other means were used to determine soil types along the route. Where thaw-stable soils were found, the pipeline was buried in the conventional manner. In areas of thaw-unstable soils, and where heat from the pipeline might cause thawing and consequent loss of soil foundation stability, the pipeline was insulated and elevated aboveground by means of a unique support system (see VERTICAL SUPPORT MEMBERS). To allow animals to cross, 23 sections were buried line-wide, each about 200 feet long.

**DESIGN MODES, Types:**

- **Aboveground:** 420 miles (see VERTICAL SUPPORT MEMBERS). Where thaw-unstable permafrost was encountered, problems associated with melting permafrost were avoided by placing the pipeline aboveground on an elevated support system. VSMs (pilings) were designed to resist frost-jacking forces and support the line.

- **Belowground (conventional):** 376 miles. Where either unfrozen or thaw-stable permafrost was encountered, the pipeline was buried in the conventional manner with no special provisions for permafrost (see PIPE, Belowground (Conventional)).

- **Belowground (special burial):** About 4 miles (see PIPE, Special Burial). Where thaw-unstable permafrost was found, but where the pipeline had to be buried for highway, animal crossing, or avoidance of rockslides and avalanches, the permafrost was protected from the heat of the pipeline by insulation around the pipeline. Some special burials include ground refrigeration systems along with pipe insulations. Special burial locations:
  - Atigun Pass: Two sections (about 1 mile) were buried in insulated boxes to provide protection from rockslides and avalanches.
  - MP 645-649: Caribou crossing.
  - MP 653: Caribou crossing.
  - MP 681: Crossing of Glenn Highway.
  - 23 Animal Crossings (all animal crossings are special burial).

**DIGITAL STRONG MOTION ACCELEROGRAPH (DSMA):** Field instrument to evaluate pipeline motion caused by earthquakes (see EARTHQUAKE, DSMAs). Pipe is wrapped before being placed in the trench during construction.

**DISCHARGE PRESSURE:** Pressure of the oil leaving a pump station.

**DITCH, Buried Pipeline:** 8 feet wide, 8 feet deep, approximately, but variable for overburden depth, which ranged from 3 to 35 feet.

**DRAG REDUCING AGENT (DRA):** A long-chain hydrocarbon polymer injected into the oil to reduce the friction due to turbulence in the oil. In today’s operating climate, DRA is periodically used to facilitate ramping up to higher throughputs while running Inline Inspection Tools, and during other operational activities.
EARTHQUAKE, Denali Fault, November 3, 2002: The pipeline withstood a magnitude 7.9 Richter Scale earthquake that was centered along the Denali Fault in Interior Alaska, approximately 50 miles west of the pipeline. The ground along the fault moved an estimated 18 feet horizontally and nearly 2.5 feet vertically. The quake was the largest on the Denali Fault since at least 1912 and among the strongest earthquakes recorded in North America in the last 100 years.

EARTHQUAKE, Design Magnitude: TAPS is seismically designed to survive earthquakes without damage or leakage. It can withstand a maximum magnitude 8.0 earthquake around the Denali Fault and between a 5.5 and 8.5 magnitude earthquake, depending on the area.

EARTHQUAKE, Design Movement: Maximum movement of pipe at pipeline crossing of major faults:
- Denali Fault: 20 feet lateral, 5 feet vertical.
- McGinnis Glacier Fault: 8 feet lateral, 6 feet vertical.
- Donnelly Dome Fault: 3 feet lateral, 10 feet vertical.
- Minor Potential Faults: 2 feet lateral, 2 feet vertical.

EARTHQUAKE, Faults Crossed by Pipeline: Denali, McGinnis Glacier and Donnelly Dome.

EARTHQUAKE, Monitoring: Seismograph instrumentation is installed at field locations consisting of accelerometers that measure earthquake ground motions. This data is continuously monitored at the Operations Control Center and automatic alerts are issued if a significant earthquake is detected.

EARTHQUAKE, November 30, 2018: A magnitude 7.0 earthquake struck north of Anchorage on November 30, 2018. There was no damage to TAPS.

ELECTRIFICATION AND AUTOMATION (E&A): Electrification and Automation (also called “Strategic Reconfiguration” or “SR”) refers to Alyeska’s overall renewal of assets. Work began in 2001 and concentrated on reducing physical infrastructure and simplifying operations and maintenance. The project focuses on creating more efficient operations while maintaining or enhancing safety, operational integrity and environmental performance. The system is modular and scalable and with flexibility for future increases or decreases in throughput. As of March 2016, pump stations 1, 3, 4 and 9 were operating on new pumps.

EMERGENCY RESPONSE: TAPS personnel train year-round to respond to emergencies, including oil spills. Requirements for response capabilities are outlined in three oil spill contingency plans (see CONTINGENCY PLAN). As part of Alyeska’s response strategy, employees are trained to fulfill roles in both the Incident Management Team (IMT) and the Crisis Management Team (CMT).

- CMT: The CMT’s objective is to prevent an internal or external event from creating a crisis situation. The team is focused on business continuity, while providing other assistance, so the IMT can focus on managing the incident.
IMT: The IMT is a universal organization with common terminology, structure and roles that forms to manage an incident. The IMT often includes representatives from many different agencies.

ESCORT TUGS: Commander, Contender, Challenger, Courageous and Champion. Designed and purpose-built for tethered tanker escort and oil spill response operations. The 140-foot vessels primarily assist tankers as they transit Prince William Sound. These powerful, state-of-the-art tugs have exceptional maneuverability and launched in 2018.

- Crew: Seven trained response personnel, bunk space for 12.
- Firefighting: ABS Class 1 firefighting rating that includes pumps, monitors, foam and vessel spray system.
- Propulsion: Azimuthing drive with Kort nozzles; 12,336 horsepower.
- Spill response equipment:
  - Oil detection radar.
  - Infrared camera system.
  - 2,000 feet of oil containment boom.
  - DESMI skimmer.
  - 40,000 gallons of recovered oil storage capacity.
  - Dispersant spray arm systems (Commander and Courageous).
  - Work boat.

FATALITIES, Construction: 32 incidents directly related to construction (includes employees of Ayeska, contractors and subcontractors; excludes common carriers).

FATALITIES, Operations: Nine operations-related incidents (includes employees of Ayeska, contractors and subcontractors):

- July 1977: PS 8 explosion.
- September 1977: Chandalar Camp heavy equipment accident.
- November 1978: PS 8 snow-clearing accident.
- December 1984: Valdez Marine Terminal heavy equipment accident.
- April 2006: Tug operations accident, SERVS.

FISH, Species: 34 identified in waters crossed by the pipeline.
**FUEL GAS LINE:** Carries natural gas from North Slope fields to fuel pump stations north of the Brooks Range. Generally parallels mainline crude oil pipeline, from Prudhoe Bay to PS 4.

- Compressors: Two 1,200-hp gas turbine compressors at PS 1 boost gas pressure from approximately 600 psi to 1,100 psi. The compressors are redundant and only one is needed at a time.
- Diameter: 10 inches from PS 1 to MP 34 (34 miles); 8 inches from MP 34 to PS 4 (115 miles).
- Gas temperature: 30 F, maximum (leaving PS 1).
- Length: 149 miles.
- Pressure: Design: 1440 psi. Operating: 1,200 psi, maximum currently.

**GABIONS AND CONCRETE MATS:** Used in Atigun Floodplain Pipe Replacement Project as cover on pipe in shallow burial area for protection from natural erosion and scouring. A gabion is a metal cage filled with rock; gabions are used to stabilize banks.

- Gabions: 31,750 feet.
- Concrete mats: 9,525 feet.

**GRADE, Maximum on TAPS Route:** 145 percent (55 degrees) at Thompson Pass.

**GENERAL PURPOSE TUGS:** Bainbridge, Elrington, Latouche and Ingot. Designed and purpose-built for a variety of operations in Prince William Sound. The vessels dock tankers coming into the Valdez Marine Terminal and tow response barges, support equipment deployments and perform other marine operations as needed.

- Size: 102 feet long.
- Crew: six trained response personnel, bunk space for 12.
- Propulsion: Azimuthing drive with Kort nozzles; 6,006 horsepower.
- Firefighting: Off-vessel firefighting system that includes pumps, monitors, foam and vessel spray system on two tugs (Bainbridge and Ingot).
HAUL ROAD: Portion of Dalton Highway from the Yukon River to Prudhoe Bay. Built by Alyeska.

- Cost: $125 million, approximately.
- Dates: Started April 29, 1974; completed and dedicated September 29, 1974.
- Labor: 3 million hours.
- Time: 154 days.
- Length: 358 miles (Yukon River to Prudhoe Bay).

HEAT PIPES: These self-contained passive refrigeration devices contain anhydrous ammonia or carbon dioxide gas under pressure which vaporize at temperatures just below freezing, rise and condense at radiators aboveground when the air temperature is well below freezing. This process transfers ground heat into the air during cold periods, thereby lowering the ground temperature to ensure thaw unstable soils remain frozen to steadily support the pipeline. There are 124,300 individual heat pipes along the pipeline (see VERTICAL SUPPORT MEMBERS).

INSULATION, Thickness:

- Elevated pipeline: 3.75 inches thick.
- Refrigerated belowground pipeline: 3.2 inches thick.
- Under gravel work pad or road: 2 to 4 inches.

INTEGRITY MANAGEMENT PLAN (IMP): Integrity management comprises all activities that monitor and maintain the integrity of all hydrocarbon handling facilities on TAPS. The purpose of IMP is to protect the environment by preventing oil spills, comply with all laws and regulations, maintain facilities within industry standards, and monitor and mitigate integrity risks.
JOINT PIPELINE OFFICE (JPO): The JPO is a consortium of federal and state agencies. The agencies include the State of Alaska Departments of Natural Resources, Environmental Conservation, Fish and Game, Labor and Workplace Development, Transportation Public Facilities, and Public Safety, Division of Fire Prevention; and, on the federal side, The Bureau of Land Management, the U.S. Department of Transportation/Office of Pipeline Safety, Environmental Protection Agency, U.S. Army Corps of Engineers, U.S. Coast Guard, and Minerals Management Service. The JPO has employees with offices in Anchorage, Fairbanks and Valdez. See REGULATORY AGENCIES.

LAND, Municipal Jurisdiction: Approximate pipeline length in each jurisdiction, north to south:

- North Slope Borough: 179.2 miles.
- Fairbanks North Slope Borough: 89.1 miles.
- City of Delta Junction: 5.5 miles.
- City of Valdez: 20.8 miles.

LAND OWNERSHIP, Area: Approximate area for all the pipeline ROW (18.4 square miles total):

- State government: 9.33 square miles.
- Federal government: 6.77 square miles.
- Owner companies: 2.9 square miles.
- Private: 1.41 square miles.

LAND OWNERSHIP, Owner: Approximate pipeline length for each ownership category (800 miles total):

- Federal government: 376 miles.
- State government: 344 miles.
- Private: 80 miles (including 51 miles on Alaska Native corporation land).

LEAK DETECTION SYSTEM: Provides detection and location of oil spills. TAPS has three independent systems:

- Deviation Alarm (DA) System
- Pipeline Leak Detection System (PLDS)
- Visual observation

LINEFILL: The oil necessary to fill the pipeline to start the pumps in a mechanically sound manner. At a throughput of 0.935 million barrels per day, the linefill volume is 9,059,622 barrels.
MAXIMUM ALLOWABLE OPERATING PRESSURE: A rating indicating the maximum pressure at which a pipeline or segment of a pipeline may be operated under U.S. Department of Transportation regulations in normal conditions. Also called pressure rating.

MOUNTAIN RANGES, Crossed by Pipeline: Three – Brooks Range, Alaska Range and Chugach Range.

MUTUAL AID AGREEMENTS: See OIL SPILL RESPONSE, Mutual Aid Agreements.

NORTH SLOPE, Environment: A nearly flat, treeless plain, covering about 88,000 square miles extending from the foothills of the Brooks Mountain Range to the Arctic Ocean. For 56 days in winter, the sun never rises. Winter twilight provides sufficient light for driving without headlights during the day. Winter temperatures drop to -60 degrees Fahrenheit. Wind chill factor may fall as low as minus 135 degrees Fahrenheit. From mid-April to mid-August, there is daylight 24 hours a day. Summer temperatures climb to 70 degrees Fahrenheit and higher.

NORTH SLOPE, Oil Discovery: Exploratory drilling on the North Slope continued for more than 20 years. Many unsuccessful exploratory wells were drilled and many companies gave up the search before the Prudhoe Bay Discovery Well was drilled by Atlantic Richfield Company and Humble Oil and Refining Company in 1967. A confirmation well the following year proved the discovery of the large oil and gas reservoir.

NOTICES TO PROCEED, Construction: 465 federal and 403 state notices to proceed were required from the Federal Alaska Pipeline Office and the State Pipeline Coordinator’s Office.
OIL SPILL CONTINGENCY PLAN, Pipeline: TAPS
Pipeline Oil Discharge Prevention and Contingency Plan:

- Containment Sites: 222 designated sites on or near drainages along TAPS. Criteria for selection: accessibility, river velocity, river channel configuration, environmental sensitivity. Eighty-one of the 222 containment sites have pre-staged oil spill equipment and supplies specific to the area response requirements.

- Equipment: Varies by response facility. Total inventory available includes the following:
  - Vessels (jet boats, airboats, landing craft, airboat freighters): 31.
  - Boom, containment: 65,500 feet.
  - Boom, fire: 2,150 feet.
  - Vacuum trucks: 11.

- Leak Detection: Three systems (see LEAK DETECTION SYSTEMS).

- Personnel:
  - Pipeline personnel trained in oil spill response. Each response facility has 24-hour oil spill response capabilities.
  - Drills: Field drills are conducted to evaluate preparedness to react to an oil spill. The drills permit evaluation of the training program, particularly oil spill skills such as reconnaissance, assessment and response.
  - Training: Consists of a five-day academy for new employees and a two-day refresher for existing employees, as well as other specialized training such as fast water response, vessel operations and source control.

OIL SPILL CONTINGENCY PLAN, Tankers: Tankers transiting Prince William Sound are required by the state to have oil spill contingency plans. The Prince William Sound Tanker Oil Discharge Prevention and Contingency Plan is a required part of each tanker’s individual contingency plan. Alyeska Pipeline/SERVS is the primary response action contractor responsible for the implementation aspects of the tanker plan. The prevention portion of this plan requires that each laden tanker transiting Prince William Sound must be escorted by two vessels, one of which must be a specially equipped prevention and response vessel or tug. Laden tankers are tethered to escort tugs from the Terminal through the Valdez Narrows and Valdez Arm. Also included in the plan are speed limits for tankers and weather restrictions. The response portion of the plan includes plans for open-water and nearshore shoreline response and support operations.

OIL SPILL CONTINGENCY PLAN, Terminal: The Valdez Marine Terminal Oil Discharge Prevention and Contingency Plan includes a comprehensive prevention plan outlining spill prevention measures taken at the Terminal, as well as a response section describing land and water response for spills originating from Terminal facilities. A spill from a tanker at berth or transiting Port Valdez is covered under the Prince William Sound Tanker Oil Discharge Prevention and Response Plan. Although a spill from a tanker is the responsibility of the tanker owner, Alyeska provides initial spill response.
RESPONSE RESOURCES:

- Personnel: Oil spill response crews trained to conduct land and water response operations are available 24 hours a day.
- Equipment: The following equipment is stored in Prince William Sound:
  - Barges: Eight barges (654,000 barrels, approximately, for recovered oil); one flat-deck barge with sensitive-area protection boom (serves as on-water staging location).
  - Boom: Less than 50 miles of various types of containment and recovery boom.
  - More than 50 major skimming systems and more than 50 smaller skimming systems with recovery capability of 300,000 barrels of oil within 72 hours.
  - Skimmers, self-propelled: Four total – JBF 6001 (Valdez Star) with recovery rate of 2,000 barrels/hour and storage of 1,310 barrels; JBF 3003 (two units) with recovery rate of 571 barrels/hour; and MARCO Class VII with recovery rate of 1,281 barrels/hour.
  - Tugs: 10.
  - Vacuum trucks: Three.
  - Support vessels: Seven.

- Prevention programs applicable to the various contingency plans:
  - Corrosion control programs.
  - Inspection and records.
  - Medical monitoring.
  - Preventive maintenance.
  - Security.
  - Substance abuse programs.
  - Tank leak protection.
  - Training programs.
  - Transfer procedures.
  - Escort System.

OIL SPILL RESPONSE, Mutual Aid Agreements:
An official agreement to provide equipment and resources for oil spill response to entities outside of Alyeska, such as the United States Coast Guard.

OPERATIONAL INTEGRITY: An Alyeska program designed to assure the integrity of the pipeline system is maintained while attaining the highest standards of safety and environmental protection.

OPERATIONS CONTROL CENTER (OCC): The OCC in Anchorage continually monitors the status of all pump stations and valves using supervisory control and data acquisition (SCADA) systems with remote sensors. Data such as pressures, flow rates, temperatures, tank levels and valve positions are recorded and analyzed for abnormal operations or any indication of a pipeline leak. The pipeline controller at the OCC can rectify any abnormal operation by changing settings for pump speed or relief valves, or by issuing idle or stop commands to the mainline pumps. The OCC controller can also activate remote control valves. The monitoring and analysis systems include backup communications equipment and computers.
PACKLINE: Oil flow that completely fills a pipeline.

PERMAFROST: Any rock or soil material that has remained below 32 degrees Fahrenheit continuously for two or more years. The two-year minimum stipulation is meant to exclude from the definition the overlying ground surface layer that freezes every winter and thaws every summer (called the active layer or seasonal frost).

PERMAFROST, Affected Areas on TAPS: Approximately 75 percent of the line passes through permafrost terrain. The line traverses the continuous zone on the North Slope and through the Brooks Range. It then encounters the discontinuous and sporadic zones and passes through areas of no permafrost in the immediate vicinity of Valdez.

PERMAFROST, Depth Along Pipeline Route: A few inches to 2,230 feet, approximately.

PERMAFROST, Design Solutions: The pipeline design is based primarily on the soil conditions encountered along the right of way. There are three principal design modes: aboveground, conventional burial and special burial (see DESIGN MODES).

PERMAFROST, Problems:
- Frost-heaving: When the active layer freezes, ice forms and pushes the ground surface upward.
- Frost-jacking: When heaving occurs, if a structure embedded in the ground is not properly anchored to resist such movement, the structure will be forced upward along with the ground surface. In most cases, the structure does not return to its original position when the active layer thaws during the following summer. The net upward movement is called jacking. This phenomenon can occur whenever there is seasonal freezing and thawing of the active layer and is not limited to permafrost areas.
- Thaw settlement: Structures founded on thaw-unstable permafrost may settle if large amounts of ice in the permafrost melt. Melting is typically caused by heat from the structure or changes to the natural thermal conditions.

PERMAFROST, Types:
- Cold permafrost: Remains below 30 degrees Fahrenheit (may be as low as 10 degrees Fahrenheit on the North Slope); tolerates introduction of considerable heat without thawing.
- Ice-rich: 20 to 50 percent visible ice.
- Thaw-stable: Permafrost in bedrock, in well-drained, coarse-grained sediments such as glacial outwash gravel, and in many sand and gravel mixtures. Subsidence or settlement when thawed is minor; foundation remains essentially sound.
- Thaw-unstable: Poorly drained, fine-grained soils, especially silts and clays. Such soils generally contain large amounts of ice. The result of thawing can be loss of strength, excessive settlement and so much moisture in the soil that it flows.
- Warm permafrost: Remains just below 32 degrees Fahrenheit. The addition of very little heat may induce thawing.

PERMAFROST, Zones:
- Continuous zone: Permafrost is found almost everywhere in the zone, as the name implies; includes all of the North Slope.
- Discontinuous zone: Permafrost is found

19 the facts.
intermittently; includes much of the interior of the state.

- Sporadic zone: Permafrost is found in isolated small masses of permanently frozen ground.

**PERMANENT LIVING QUARTERS:** See PUMP STATIONS, Living Quarters.

**PERMITS, Construction:** 515 federal and 832 state permits were required to build TAPS.

**PHILANTHROPY:** Alyeska supports organizations that fuel healthy, vibrant communities and that employees engage in and value. Alyeska operates in communities with unique characteristics, needs and priorities. Special consideration will go to health and social services in Anchorage and Fairbanks, and to environmental stewardship and regional partnerships out of Valdez [http://giving.alyeska-pipeline.com](http://giving.alyeska-pipeline.com).

**PIG:** A pig is a mechanical device that is pushed through the pipeline by the product to perform various operations on the pipeline without stopping flow. This process is referred to as pigging. Alyeska runs two basic types or classes of pigs: cleaning, and instrumented or smart. These devices help Alyeska clean and inspect the pipeline to prevent and detect problems. The three basic types of smart pigs are ultrasonic transducer (UT), magnetic flux leakage (MFL) and curvature. These pigs are used to periodically inspect for pipeline corrosion and deformation using nondestructive sensor technologies including ultrasound and magnetic sensors. As they evaluate the data, engineers look for suspect areas and compile a list of specific locations to determine and prioritize integrity investigations through a corrosion dig, a physical examination of the pipeline. Depending on what the dig reveals, the corrective action might be the addition of a sleeve or a new, higher-quality coating developed since the pipeline was originally constructed.

- **CLEANING PIG:** Non-instrumented pigs that are designed to clean the pipe wall to mitigate internal corrosions and/or prepare the pipe for a smart pig run. The cleaning, or scraper, pigs run in the mainline and mitigate internal corrosion by removing wax and water from the pipe wall, disrupting the life cycle of aerobic bacteria that cause microbiologically influenced corrosion (MIC) when left in place. Cleaning pigs also improve the success rate of pig runs by demonstrating the line can be pigged, removing debris that would compromise the data from a smart pig run.

- **INSTRUMENTED (SMART) PIG:** Instrumented pigs are in-line-inspection (ILI) tools called smart pigs. The data they gather allows engineers to recommend intervention before wall loss anomalies become a problem. Alyeska has been an industry leader in the use of ILI tools, also doing so before it was mandated by regulations. The UT and MFL pigs are used to detect and measure corrosion and metal loss internally and externally on the pipe wall. These two smart pigs complement each other – UT is a better measurement tool and MFL a better detection tool.

  - Ultrasonic Transducer (UT) pig: This pig uses sound waves to measure the thickness of
the steel pipe wall. The pig knows the speed of sound in steel and therefore is able to calculate the thickness. The UT pig has 512 transducers, each taking 625 readings per second.

- Magnetic Flux Leakage (MFL) pig: This type of corrosion tool uses powerful magnets to saturate the pipe wall with magnetism. Sensors between the poles of the magnets detect disturbances caused by metal loss due to corrosion or other mechanical damage. The MFL tool has 1,120 sensors to characterize the shape of the disturbance in the magnetic field.

- Curvature pig: This tool uses inertial navigation technology to measure the position and shape of the pipe. This device tells the recorder where the pig is in three-dimensional space every 2 inches. This tool also has 64 radius measuring fingers arrayed around the pig body to measure the shape of the pipe. This data allows the engineers to monitor dents, ovalities and wrinkles in the pipe. Engineers also determine where the pipe is moving due to settlement or upheaval. This tool is also called a deformation pig, or a caliper pig.

- ROBOTIC CRAWLER PIG: This tool, the Remotely Operated Diagnostic Inspection System (RODIS), was originally developed for the nuclear industry and more recently has been used for natural gas pipelines. Alyeska has modified and tested the tool for inspecting varying pipe diameters and configurations. The tool is self-propelled (or crawls) by remote operation, rather than being pushed by fluid or operated by hand. Robotic crawlers are ideally suited for short runs of pipe that are not configured for launching and receiving pigs.

Alyeska has used this technology to inspect natural gas, ballast and crude piping systems from Pump Station 1 to the Valdez Marine Terminal.

- PIGLET: Affectionate term for small-bore pigs Alyeska uses to pig facility and natural gas transmission piping. These include both smart and cleaning pigs.

**PIG, Frequency:** Smart pigs are run every three years. Scraper pigs are run every six days (as of early 2016). Changes to this schedule are made based on operational needs.

**PIG, Launching/Receiving Facilities:** PS 1 (launch only), PS 4 (launch and receive), PS 8 (contingency launch only for smart pigs), PS 9 (launcher and receiver) and the Valdez Marine Terminal (receive only).

**PIPE:** The pipe for TAPS was manufactured in Japan (Italy for Atigun floodplain pipe replacement project).

- Diameter, outside: 48 inches (122 centimeters).
- Lengths, standard: 40 feet and 60 feet.
- Pieces required for pipeline: More than 100,000.
- Tested to: Maximum axial force of 2.52 million pounds and lateral deflection force of 459,000 pounds before wrinkling (typical test sample: 31 feet 5 inches).
- Thickness, wall: 0.462 inches (466 miles) and 0.562 inches (334 miles).
- Volumetric displacement: 11,366 barrels/mile (0.462-inch thickness); 11,270 barrels/mile (0.562-inch thickness).
- Weight: 235 pounds/linear foot (0.462-inch thickness); 285 pounds/linear foot (0.562-inch thickness).
PIPE, Aboveground: Specially designed vertical supports were placed in drilled holes or driven into the ground. In warm permafrost (see PERMAFROST) and other areas where heat might cause undesirable thawing, the supports contain two, 2-inch diameter pipes called heat pipes, containing anhydrous ammonia, which vaporizes belowground, and rises and condenses aboveground, removing ground heat whenever the air temperature is 5 to 10 degrees Fahrenheit cooler than the ground temperature at the base of the heat pipe. Heat is transferred through the walls of the heat pipes to aluminum radiators atop the pipes (see VERTICAL SUPPORT MEMBERS).

PIPE, Belowground (Conventional): The pipe is underlain with a layer of fine bedding material and covered with prepared gravel padding and soil fill material, in a ditch from 8 to 16 feet deep in most locations, but up to 49 feet deep at one location. Zinc ribbons, which serve as sacrificial anodes to inhibit corrosion of the pipe, are buried alongside the pipeline. (The Atigun pipe replacement section, 8.5 miles in length, has four magnesium ribbon sacrificial anodes installed.) Electrical currents in the earth’s surface, called telluric currents and caused by the same phenomenon that generates the northern lights, can be picked up by the pipeline and zinc/magnesium anodes. The anodes act like grounding rods to safely return these currents to the earth, reducing the risk of damage to the pipeline.

PIPE, Special Burial, Non-Refrigerated: In areas of thaw-unstable soils calling for elevated pipeline construction, but where the pipeline had to be buried for highway crossings, animal crossings or avoidance of rockslides and avalanches, the line was insulated to protect the permafrost from the heat of the pipeline and buried.

PIPE, Special Burial, Refrigerated: In some areas, the line was insulated and buried in a refrigerated ditch. Refrigeration plants at each of these points circulate chilled brine through loops of 6-inch diameter pipe to maintain the soil in a stable frozen condition.

PIPE SHOES: 39,000, approximately.

PORT OF VALDEZ: A natural fjord 12 miles long, 2.5 miles wide and up to 800 feet deep, with a tidal range of 12 to 14 feet.

POWER VAPOR FACILITY: The power generation facility at the Valdez Marine Terminal.

- Primary plant facilities:
  - Three steam boilers each with an output of 175,000 pounds/hour at 600 psi at 750 degrees Fahrenheit.
  - Three condensing steam turbine generators each with a capacity of 12.5 MW at 13.8 kV.

- Standby systems:
  - Two 12-cylinder diesel generators: capacity 6.0 MW total.
  - Four uninterruptable power supply systems supplied by 125-volt battery bank for essential control equipment.

PRESIDENTS:

Ed L. Patton 1970-1976
William Darch 1976-1978
Frank G. Turpin 1978-1985
George M. Nelson 1985-1989
James B. Hermiller 1989-1993
David Pritchard 1993-1996
Robert A. Malone 1996-2000
David G. Wight 2000-2005
Kevin M. Hostler 2005-2010
Admiral Thomas Barrett 2010-2019

PRESSURE, Maximum Operating: 1,180 psi.

PRESSURE RELIEF STATION: Pump Station 5 re-injects oil drained down for pressure relief, but does not have mainline pumps and does not boost total stream.

PRESSURE RELIEF VALVE: A valve designed to open automatically to relieve pressure and keep it below a designated level.

PRESSURE SPIKE: A sudden, brief rise in pressure.

PRESSURE SURGE: A pressure spike/excursion moving through the pipeline at sonic velocity. Produced by a sudden change in velocity of the moving stream that results from shutting down a pump station or pumping unit, closure of a valve or any other blockage of the moving stream.

PRINCE WILLIAM SOUND REGIONAL CITIZENS ADVISORY COUNCIL (PWSRCAC): Independent citizens’ council empowered by the federal Oil Pollution Act of 1990 to provide comment on Alyeska’s PWS operations, promoting environmentally safe operation of the Valdez Marine Terminal and the TAPS tanker traffic in PWS.

- Budget: Averages more than $4 million per year (provided by Alyeska under a signed contract that ensures PWSRCAC’s absolute independence from Alyeska).
- Members include the Alaska State Chamber of Commerce; Alaska Wilderness Recreation & Tourism Association; Chugach Alaska Corporation; the cities of Cordova, Homer, Kodiak, Seldovia, Seward, Valdez and Whittier; the communities of Chenega Bay and Tatitlek; Cordova District Fishermen United; the boroughs of Kenai Peninsula and Kodiak Island; Kodiak Village Mayors Association; Oil Spill Region Environmental Coalition; and Prince William Sound Aquaculture Corporation.

PRUDHOE BAY: A coastal feature of the Beaufort Sea, approximately 250 miles north of the Arctic Circle and 1,300 miles south of the North Pole. Also used generally to describe a land area of petroleum development of Alaska’s North Slope: 18th largest field in the world. Largest field in North America.

PUMP STATIONS: Original design called for 12 pump stations with four pumps operating at each pump station. PS 11 was never built. PS 5 was built as a relief station. Eight stations were operating at start-up (PS 1, 3, 4, 6, 8, 9, 10 and 12). PS 8 pump building was destroyed by an explosion and fire on July 8, 1977 that occurred during start-up; the station was recommissioned on March 7, 1978. PS 2 was commissioned October 2, 1979; PS 7 was commissioned December 1, 1980.

PUMP STATIONS, Crew: Crews vary per station; typically six to 25 employees. Personnel include security, maintenance, technicians, administrative professionals and safety employees. Shifts are generally one week on/one week off, or two weeks on/two weeks off.

PUMP STATIONS, Crude Oil Tank Capacity: PS 1: 420,000 barrels; PS 5: 150,000 barrels; all others: 55,000 barrels.

PUMP STATIONS, Electrification and Automation (E&A): Pump Stations 1, 3, 4 and 9 have been upgraded to use electrical (instead of diesel) power and are now automated [controlled remotely by Operations Control Center (OCC)]. Pump Stations 5 and 7 are using legacy equipment.

E&A upgrades include:

- Three new electrically driven mainline pump/motor modules or MLUs at each station.
- Power generation modules at PS 1, 3 and 4 that include turbine drivers.
• Transmission line and substations for power supply from North Slope Central Power Facility at PS 1 and from GVEA at PS 9.
• Electrical distribution system and modules.
• Tie-ins and interconnecting crude oil and fuel gas piping and supports.
• Essential facilities for cold restart provided or maintained as appropriate.
• Upgraded relief control system actuators.
• Upgraded fire and gas systems.
• New onsite control, data gathering and data transfer systems.
• Upgraded pressure protection and process safety command system.

**PUMP STATIONS, Fire Systems:**
• Airfield rescue and fire training provided at stations with airports.
• Pump stations with airports have designated firefighting trucks for the airfields.
• Types: Halon, NOVAC, water and foam, dry chemical, wet chemical and carbon dioxide.

**PUMP STATIONS, Fuel Requirements:** 30,000 to 60,000 gallons per day, average, per station (fuel oil equivalent).

**PUMP STATIONS, Permanent Living Quarters:** Permanent living quarters at PS 3, 4, 5, 6 and 7. PS 9 personnel live in nearby communities.

**PUMP STATIONS, Power:** All stations generate electrical power, with power plants ranging from 1.3 MW at PS 1 to 4.7 MW at PS 6, depending on availability of commercial power, presence of topping unit, and/or vapor recovery system. PS 8 and 9 also purchase commercial power.

**PUMP STATIONS, Recirculation:** In order to add heat to the crude oil, the oil is recirculated within the pump station. This results in additional heat being added to the crude before it leaves that pump station.

**PUMP STATIONS, Refrigerated Foundations:** PS 1, 3, 5 and 6.

**PUMP STATIONS, Status as of May 2016:**
• PS 1, 3, 4 and 9 operating.
• PS 5 operating as relief station.
• PS 7 on warm standby, used in the winter to increase crude oil temperature.
• PS 2 ramped down July 1, 1997.
• PS 6 ramped down August 8, 1997.
• PS 8 ramped down June 30, 1996.
• PS 11 was not built, but has maintenance facilities.
• PS 12 ramped down April 1, 2005.

**PUMP STATIONS, Turbines:** Turbine engines drive the pumps. See TURBINES.

**PUMPS, Booster:** All pump stations have booster pumps to move oil from the storage tanks to the mainline. (PS 1 has two mainline booster pumps to boost oil pressure.) PS 5 has two injection pumps.

The pipeline begins at Pump Station 1 in Prudhoe Bay.
REcirculation: See PUMP STATIONS, Recirculation.

Regulatory Agencies: The following agencies have jurisdiction over various aspects of TAPS.

*The asterisk denotes a member of the Joint Pipeline Office (JPO):

- Alaska Department of Environmental Conservation*
- Alaska Department of Fish and Game*
- Alaska Department of Labor & Workforce Development*
- Alaska Department of Natural Resources*
- Alaska Department of Public Safety
- Alaska Department of Transportation & Public Facilities
- Alaska State Fire Marshal*
- Regulatory Commission of Alaska
- Federal Aviation Administration
- Federal Energy Regulatory Commission
- Federal Maritime Commission
- Interstate Commerce Commission
- Local Boroughs and Municipal Governments
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Department of Commerce, National Oceanic and Atmospheric Administration
- U.S. Department of Interior, Bureau of Land Management*
- U.S. Department of Labor, Occupational Safety and Health Administration*
- U.S. Department of Transportation,
- Office of Pipeline Safety*
- U.S. Environmental Protection Agency*
- U.S. Fish and Wildlife Service*
- U.S. National Transportation Safety Board

Restoration, Area Revegetated: Nearly 7,750 acres (through 1997).

Restoration, Basic Data:
- Area: Approximately 550 acres.
- Fertilizer used: 5,500 tons.
- Grass seed used: More than 450 tons.
- Seedlings planted: 83,500.
- Soil samples, random: 15,000 to test for regeneration.
- Trees transplanted: 24,000.

Restoration, Visual Impact Stipulations: See VISUAL IMPACT STIPULATIONS.

Right-of-Way Use Guideline (RUG) Program:
TAPS crosses hundreds of tracts of public and private land, has above- and belowground segments, and is designed to accommodate transportation crossings at documented public trails. Alyeska adopted a policy for protecting the safe operation of TAPS and respecting the rights of public and private landowners along the TAPS ROW while assuring the public’s right of entry under the law.

Alyeska requires those wanting linear use of the ROW or its numerous access roads to register for permission under the Right-of-Way Use Guideline (RUG). Perpendicular pipeline crossings with vehicles under 1,500 pounds or non-vehicular, low-impact modes of transportation may proceed without Alyeska permission. While on the ROW, individuals must be in possession of a copy of the RUG plus government-issued photo identification to be presented if requested by TAPS security officer or employee.
The ROW was not designed to be used as a roadway and can be hazardous. Depending upon security conditions, TAPS work activity or weather, portions of the ROW may be closed to the public. Blocking Alyeska access roads is not allowed. Hunting, trapping or shooting along the pipeline ROW is also prohibited.

**RIGHT-OF-WAY WIDTHS:**

- Federal lands: 54 feet (buried pipe); 64 feet (elevated pipe).
- State lands: 100 feet.
- Private lands: 54 feet to 300 feet.

**ROAD CROSSINGS, Pipeline:** 17 (highway) north of Yukon River; 22 south (highway and numerous state and municipal maintained roads). The crossing at the Glenn Highway in Glennallen is refrigerated.

**SAFETY MANAGEMENT SYSTEM:** Managing a pipeline, like other manufacturing and industrial activities, requires a systematic approach to conduct safe operations. Alyeska is following the recommendation of the U.S. National Transportation Safety Board by adapting the Pipeline Safety Management System (SMS). This can maximize safety performance and serve as a model to risk-prone industries. SMS provides operators with a structured, comprehensive, regular method of assessing risks of operations, learning from experience and continuously improving pipeline safety.

SMS will help TAPS operators more effectively manage all the aspects of pipeline safety through a 10-step multifaceted approach.

1. Leadership and management commitment.
2. Stakeholder engagement.
3. Risk management.
4. Operational controls.
5. Incident investigation, evaluation and lessons learned.
7. Management review and continuous improvement.
9. Competence, awareness and training.
10. Documentation and record keeping.

Alyeska will incorporate SMS into its existing safety management processes, ensuring operators integrate learnings from industry trends, incident
findings and recommendations, regulatory notices and advisories, internal audits and evaluations, or changes in operations. The result is a comprehensive system that is a catalyst for safety management and allows for flexible and scalable solutions.

**SAFETY, Philosophy:** The management and employees of Alyeska Pipeline Service Company believe that:

- All occupational injuries and illnesses are preventable.
- All Alyeska personnel have a personal responsibility for their own safety and the safety of their coworkers.
- If an employee or contractor observes or knows of an unsafe condition(s), he or she will appropriately and respectfully intervene to mitigate that condition(s). If the unsafe condition(s) cannot immediately be addressed or mitigated, it will be immediately reported up the chain of command.
- No business objective is so important that it will be pursued at the sacrifice of safety.
- Safe conduct is a condition of employment at APSC.
- Safety is an integral part of every job performed on TAPS.
- APSC will have the best safety performance in the industry.

These statements represent Alyeska’s fundamental safety beliefs that are vital to Alyeska’s business. Internalizing these beliefs will ensure that nobody gets hurt.

**SECTION 29:** Prior to the construction of TAPS, Alyeska made a commitment to the Alaska Native community to recruit, train, employ and promote Alaska Natives. This commitment was defined in Section 29 of the Federal Agreement and Grant of Right-of-Way for the Trans Alaska Pipeline System.

Section 29 recognizes that Alaska Natives as landowners, like all private landowners, must be compensated for land use and occupancy. Instead of cash payments, Alaska Natives opted for jobs and job training opportunities (see ALASKA NATIVE PROGRAM).

**SERVS (Ship Escort/Response Vessel System):** The mission of SERVS, which was established July 10, 1989, is to prevent oil spills by assisting tankers in safe navigation through Prince William Sound and to protect the environment by providing effective response services to the Valdez Marine Terminal and Alaska crude oil shippers in accordance with oil spill response agreements and plans.

**SERVS, Boom:** More than 50 miles of various types of oil containment and recovery boom are available at SERVS.

**SERVS, Escort Tugs:** See ESCORT TUGS.

**SERVS, Fishing Vessels:** 450+ vessels.

**SERVS, General Purpose Tugs:** See GENERAL PURPOSE TUGS.

**SERVS, Nonmechanical Response Equipment:**

- ADDS pack: two Airborne Dispersant Delivery Systems; treatment potential: 2,600 barrels/payload.
- Heli-torch: One airborne ignition system.
- Spill spray: Two meter-controlled dispersant spray units; onboard tankage 3,000 gallons concentrate liquid.

**SERVS, Pre-staged equipment:** Hatcheries and sensitive areas: Lake Bay, Cannery Creek, Solomon Gulch, Main Bay, Sawmill Bay, Valdez Duck Flats and 10 sensitive areas in the Port of Valdez.

- Others: Naked Island, Port Etches, Whittier, Cordova, Chenega Bay and Tatitlek.
SERVS, Response Barges: 8.
- Open water barges: Four.
- Dedicated Nearshore Barge: One.
- Lightering Barge: One.
- Deck Barge: One.
- Small Product Storage Barge: One.
- Total storage capacity: More than 650,000 barrels.

SERVS, Response Centers: Chenega Bay, Cordova, Tatitlek, Valdez and Whittier.

SERVS, Skimmers: Approximately 140 skimming units.
- Skimming capacity: Ranges from greater than 2,000 barrels/hour to small systems for operating in shallow water.
- Total recovery capacity: More than 35,000 barrels/hour.
- Valdez Star oil spill recovery vessel: 123-foot vessel with dynamic-inclined-plane skimming system with a design-skimming capacity of 2,000 barrels/hour.

SERVS, Vessels (Utility tug): The anchor-handler Ross Chouest is SERVS’ utility tug. It performs mooring maintenance, supports fishing vessel training and carries out a host of other duties.

SERVS, Wildlife Hazing: Capture and rehabilitation plans are in place for spill response support.

SHIP ESCORT/RESPONSE VESSEL SYSTEM: See SERVS.

SLACKLINE: Oil flow that does not completely fill a pipeline.

SOCIAL MEDIA:
- Facebook: @alyeskapipeline
- Twitter: @alyeskapipeline
- Website: www.alyeskapipeline.com

SOIL SURVEYS, Pre-Construction:
- Bore holes: 3,500, approximately.
- Soil samples: 15,000, approximately.

SPILLS, Reported: The table below lists the yearly totals for crude oil spills that are reported by regulation to agencies. These spills include Alyeska and shipper vessel spills that occurred on TAPS.

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<tr>
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<td>2018</td>
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</table>
TANKER VAPOR CONTROL SYSTEM: Berths 4 and 5 are fitted with vapor recovery arms to collect vapors released during tanker loading. Operation of the system began in March 1998.

TANKERS, Aids to Navigation and Safety:

• Major lighthouse, light towers, differential GPS coverage, radar reflectors, racons, fog signals, buoys, day markers and strobe beacons.
• The U.S. Coast Guard maintains a vessel traffic service that includes radio/telephone communications with vessels, GPS-based transponder surveillance system in the Gulf of Alaska approaches and Prince William Sound, and two radar sites providing coverage in Port Valdez, the Valdez Narrows and Valdez Arm.
• Vessels are escorted through Prince William Sound.
• Ice navigation rules/restrictions and wind restrictions apply to tanker operations in the Sound.

TANKERS, Alyeska Role: The tankers that carry oil from the Valdez Marine Terminal are not owned by Alyeska. The role of Alyeska is to operate the Terminal and SERVS on behalf of the tanker owners. Alyeska, through SERVS, is contracted as a primary response action contractor to provide services in the event or threat of an oil spill from a tank vessel carrying crude oil that has been transported by TAPS.

TANKERS, Approach Routes:

• Gulf of Alaska to Prince William Sound to Port Valdez, via Hinchinbrook Entrance following dedicated traffic lanes to Valdez Arm and Valdez Narrows.
• Hinchinbrook Entrance: 6.4 to 6.8 miles clearance.

TANKERS, Classification:

• General purpose: Up to 25,000 dwt.
• Super tanker: 25,000 to 150,000 dwt.
• Very large crude carrier (VLCC): 150,000 to 300,000 dwt.
• Ultra large crude carrier (ULCC): More than 300,000 dwt.

TANKERS, Draft of Largest Tankers: 85 feet.

TANKERS, Escorts: Outbound laden tankers are escorted by two tugs from the Terminal to Cape Hinchinbrook, a distance of approximately 77 miles, with one tug remaining on station at Cape Hinchinbrook until the tanker proceeds 17 miles into the Gulf of Alaska. One of the tugs is attached (tethered) to the tanker for the first 20 miles to provide immediate assistance if required. Inbound tankers (in ballast) are provided a standby sentinel escort from the Gulf of Alaska to the Terminal. Inbound laden tankers are escorted in the same way, but in reverse order of operations. In 2018, a fleet of new, mission-built tugs arrived in Prince William Sound, a significant investment in safe oil transportation for years to come. The tanker escort system in Prince William Sound uses best available technology in accordance with State of Alaska and federal laws.

TANKERS, Largest Berthed and Loaded to Date: 270,000 dwt.
TANKERS, Natural Phenomena Affecting Movements:

- High winds: The Valdez Narrows is closed to all tanker traffic if the winds exceed 40 knots.
- Cape Hinchinbrook: When the winds exceed 45 knots or the seas exceed 15 feet, Hinchinbrook Entrance is closed to laden tankers.
- Glacier ice: The U.S. Coast Guard Prince William Sound Vessel Traffic Center may impose ice routing measures as appropriate. These may include movable one-way zones, daylight-only restrictions or closure to tankers (see also COLUMBIA GLACIER).

TANKERS, Number Loaded per Month: 20 average (2018).

TANKERS, Size that can be Berthed and Loaded: Berths 4 and 5: 270,000 dwt.

TANKERS, Traffic Lanes:

- Depths along: 600 to 1,000 feet average; 350 feet minimum (in Valdez Narrows).
- Distance separating: 1 mile.
- Width: 3/4 mile.
- Valdez Narrows: One-way traffic; clearance 1,000 yards from Middle Rock to southeast shore.

TELLURIC CURRENTS: Electrical currents in the earth’s surface, caused by the same phenomenon that generates the northern lights.

THERMAL EXPANSION: Change in pipe length due to change in crude oil temperature.

- Tie-in temperature: Actual pipe temperatures at the time when final welds were made which joined strings of pipe into a continuous line.
- Hot position: Pipe at maximum oil temperature (145 degrees Fahrenheit).
- Cold position: Pipe at minimum steel temperature (minus 60 F, pre-start-up).
- Each 40-foot length of pipe expands 0.031 inches with each 10 degree Fahrenheit rise in temperature and contracts the same distance with each 10 degree Fahrenheit drop in temperature.
- Longitudinal expansion of typical 720-foot straight aboveground segment from minimum tie-in temperature to maximum operating temperature: 9 inches. Note: Due to anchoring, the pipeline does not expand lengthwise, but shifts laterally on the aboveground supports (see ZIGZAG CONFIGURATION).
- Maximum aboveground lateral movement:
  - Tie-in to hot position: 8 feet.
  - Tie-in to cold position: 4 feet.
- Thermal stress: Maximum 25,000 psi where belowground pipeline is fully restrained by the soil (the maximum longitudinal stress due to change in temperature from pipe temperature at tie-in to maximum oil temperature).

THROUGHPUT: The amount of North Slope crude oil transported from PS 1 to the Valdez Marine Terminal.

THROUGHPUT, Average (2018): 509,315 barrels/day, or 21,221.5 barrels/hour or 14,855 gallons/minute.
THROUGHPUT, History: See table below.

<table>
<thead>
<tr>
<th>Year</th>
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<th>Yearly Total</th>
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</table>

THROUGHPUT, Maximum Daily: 1.14 million barrels average (with four pump stations operating). Rates exceeding 750,000 barrels require addition of drag reducing agent (DRA).

**Topping Unit:** Mini-refinery that produces turbine fuel. Topping units are located at PS 6, 8 and 10, and all are ramped down. The unit at PS 10 was ramped down in 1995, the unit at PS 8 in 1996 and the PS 6 unit in 1997.

**Trans Alaska Pipeline System:** The formal name for the infrastructure maintained and operated by Alyeska Pipeline Service Company. The informal acronym more commonly used is TAPS.

**Trans Alaska Pipeline System, in Pop Culture:** TAPS makes numerous appearances in pop culture. Highlights include a 1976 movie and song titled “Pipe Dreams,” helmed by Gladys Knight; a 1977 Godzilla comic that finds the mythical beast wrenching the pipe from its supports and wielding it as a weapon; a 1978 TV commercial for Ford Motorcraft products featuring Muhammad Ali in a furry-hooded parka, with rigs ripping beneath TAPS amid flurries of snow; the 2007 vampire flick *30 Days of Night* that features characters that are pipeline employees; and the follow-up to the classic 1970s TV show *Sanford and Son*, called *Sanford*, which credits son Lamont’s absence to having relocated to Alaska to work on the pipeline. In 2007’s *The Simpsons Movie*, the Simpson family is treated with a $1,000 check upon entering Alaska, told it’s essentially a payoff from oil companies. The industry is also broadly featured in Steven Seagal’s 1994 macho movie *On Deadly Ground*, which filmed on location in Valdez and also made Siskel and Ebert’s list of the 10 worst movies of the year. The pipeline is also a central figure in many, many badly reviewed novels.

**TurbinEs, Fuel Requirements, Avon:**
- Gas-fired units: 4.3 million standard cubic feet/unit/day, average.
- Liquid-fired units: 30,000 gal/unit/day, average (rim cooled); 24,000 gal/unit/day, average (non-rim cooled).
TURBINES, Power Ratings: (Sea level, 59 degrees Fahrenheit):

- Avon gas generator: 24,600 exhaust gas horsepower.
- Reaction turbine: 18,700 brake horsepower (rim cooled); 15,300 brake horsepower (non-rim cooled).
- The only remaining Avon in service is located at PS 7. It is liquid only fired, and used for winter recycle operation. The unit is currently set up as a non-rim cooled unit.

TURBINE GENERATORS, Electrical: PS 1 has one Siemens SGT 400 12.9 MW and one Rolls Royce 401KB7S 5 MW turbine generator. PS 3 and PS 4 each have two Siemens SGT 400 12.9 MW turbine generators. The units provide electricity to the station for essentials such as heat and lighting, as well as power for operation of the newer electrical pumps. At PS 1, both units are natural gas fired. At PS 3 and 4, one unit each is fired on natural gas only, while one unit each can be fired on natural gas or liquid (diesel) fuel. Liquid fuel is only used when the natural gas line is out of service. At PS 1, the SGT 400 is the normal turbine generator in service. The Rolls Royce–powered turbine generator is a backup, and Prudhoe-area grid power can be imported, if necessary. At PS 3 and 4, one unit at each station is normally in operation during summer months, and both units are normally in operation at each station during the winter months when pump recycle is being utilized.

The fuel consumption of a gas-fired Siemens SGT 400 is about 3.5 million standard cubic feet per day at full load. The fuel consumption for a liquid-fired unit operating near full load is about 20,000 gallons per day. A gas-fired Rolls Royce 501KB7S running at full load consumes approximately 1.7 million standard cubic feet per day.

ULTIMATE STRENGTH: The stress level at which the pipe will fail/rupture or break. The ultimate strength of the steel is determined by testing during the manufacture of the pipe.
VALDEZ MARINE TERMINAL (TERMINAL): The Terminal, the southern terminus of the trans-Alaska pipeline, is located on ice-free Port Valdez at the northeastern end of Prince William Sound. The Terminal occupies approximately 1,000 acres on the southern shore of Port Valdez. The facility was designed to load tankers and to provide the storage capacity in TAPS to allow production on the North Slope to operate without impact-related delays from the marine transportation system. The Terminal today operates with two tanker loading berths, with 14 storage tanks with a working inventory capacity of 6.6 million barrels of crude oil.

VALDEZ MARINE TERMINAL, Cost to Build: $1.4 billion.

VALDEZ MARINE TERMINAL, Elevation: Sea level to 660 feet. All facilities except berths are 15 feet or higher.

VALDEZ MARINE TERMINAL, Emergency Shutoff Valves: Crude oil loading onto a tanker can be shut down in less than 10 seconds at loading rates up to 100,000 barrels/hour.

VALDEZ MARINE TERMINAL, Firefighting: Alyeska Pipeline’s award-winning Fire/Rescue Brigade trains annually to provide on-scene fire, technical rescue and medical response to the Terminal. The fire brigade’s capabilities and equipment include:

- Fire boats: Six (tugs equipped with firefighting equipment).
- Three industrial fire engines; one Squad (rescue truck/ fire engine pumper); one foam tanker, one ambulance, four mobile fire response trailers.
- Personnel training: All Terminal technicians trained to incipient level; advanced training for exterior and interior level fire brigade members; annual refresher for all three levels.
- Systems: Portable extinguishers, water and foam systems, Halon, NOVEC.
- The brigade performs rescue standby for over 2,000 confined space entries annually.
- The brigade is part of the Source Control team that provides emergency response to the pipeline.

VALDEZ MARINE TERMINAL, Fuel Requirements: All Terminal and SERVS operations (fuel oil equivalent) 500 barrels/day, average.
VALDEZ MARINE TERMINAL, Holding Tanks (Crude):

- Capacity: 510,000 barrels each; 9.18 million barrels total volume.
- Dimensions: Height 63.3 feet, diameter 250 feet.
- Floor thickness: 1/4-inch steel plate (on concrete ring wall).
- In service: 14.
- Number: 18 constructed; 14 in service.
- Roof: Fixed, conical.
- Roof supports: 61 columns, 24 inches in diameter.
- Slosh zone: 3 feet, 9 inches.
- Space enclosed: 1.2 acres each, approximately.
- Wall thickness: Graduated from 1-1/8 inch steel bottom ring, to 1/2 inch top ring.

VALDEZ MARINE TERMINAL, Holding Tanks (Crude) Containment Dikes:

- Capacity: 110 percent capacity of both tanks, which accounts for water and snow accumulation.
- Number of tanks in each: Two.
- Reinforcing steel: 52 miles in each, diameter, 1/2 to 3/8 inch.

VALDEZ MARINE TERMINAL, Stack Heights: Boiler, 300 feet; incinerators (four) 108 feet.

VALDEZ MARINE TERMINAL, Tanker Vapor Control System: See TANKER VAPOR CONTROL SYSTEM.

VALDEZ MARINE TERMINAL, Vapor Recovery: Five rotary compressors each rate at 13,500 standard cubic feet/minute. Two compressors are dedicated to recovering vapors from storage tanks, two compressors dedicated to recovering vapors from tanker berths and one swing compressor that can provide either function.

VALDEZ NARROWS, Clearance: 1,000 yards: Middle Rock to southeast shore.

VALVE, Block: When closed, the valve can block oil flow in either direction. Block valves include manual gate valves, remote gate valves and station block valves (suction valves and discharge valves).

- Manual gate valve: Block valve that is operated manually; placed in check valve segments periodically to provide more positive isolation than can be provided by check valves during pipeline maintenance.
- Remote gate valve (RGV): A remotely controlled block valve for the primary purpose of isolating segments of the line in the event of a catastrophic pipeline break. Valve operating times are either four or eight minutes to fully open or fully close.
- Station block valve: A gate valve installed at the inlet (suction) side and the outlet (discharge) side of the pump station or Terminal to isolate the facility from the pipeline in the event of an emergency.

VALVE, Check: A valve that operates one-way and prevents the reverse flow of oil. Check valves are designed to be held open by flowing oil and to drop closed automatically when oil flow stops or is reversed. To increase operating efficiency, some check valves are held fully open mechanically, thus lifting valve clappers entirely free of the oil stream, reducing turbulence. Actuators fitted to these valves receive signals from flow or pressure sensors to drop the valve clappers free. Once the clappers have been released, the actuated check valve functions as a normal check valve to stop flow reversal. Approximately one-half of the mainline check valves are fitted with hydraulic actuators. The remainder have manual actuators only.
VALVE, Pipeline:
- Check: 83.
- Remotely Operated Gate Valve: 63.
- Manually Operated Gate Valve: Nine.
- Block Gate Valve: There is a BL1 and BL2 at each pump station, except Pump Station 1; there is only BL1 there. Block Valves at Pump Station 2 were removed. Total number: 21.
- Total: 176.

VALVE, Pressure Relief: A valve designed to open automatically to relieve pressure and keep it below a designated level.

VALVE REPAIR PROGRAM: The program’s goal is to evaluate the conditions of TAPS valves, actuators and operators as appropriate and to implement a comprehensive maintenance program to ensure long-term system integrity.

VALVES, Pump Stations and Terminal:
- Size: Two to 48 inches.
- Design pressure: Varies to meet process conditions. (Class 150# through Class 2500#.)
- Type: Gate, ball, check, plug, etc.

VAPEX RECOVERY: See VALDEZ MARINE TERMINAL, Vapor Recovery.

VERTICAL SUPPORT MEMBERS (VSM): Pipe embedded in the ground to support the aboveground pipe in areas of thaw-unstable permafrost. Some VSMs contain heat pipes to remove heat and keep the ground frozen.
- Number: 78,000.
- Depth embedded: 15 to 70 feet.
- Distance between: Anchor supports, 800 to 1,800 feet; standard supports, 60 feet, approximately.
- Number fitted with heat pipes: 61,000 (122,000 individual heat pipes, two per VSM where fitted).

VESSEL OF OPPORTUNITY PROGRAM: Alyeska Pipeline, through the Ship Escort/Response Vessel System (SERVS), contracts with more than 400 vessels around Prince William Sound to provide oil spill response support. The Vessel of Opportunity program was started in 1990, to employ local residents in oil spill response, especially those working in the fishing industry. Today, the boats and their crews are an integral part of Alyeska’s response readiness. Every year, vessels of opportunity participate in rigorous training that lasts several days. Crews spend time in the classroom learning oil spill and emergency response basics. Then they head on water for hands-on experience. They work with SERVS personnel on response barges to load up their own boats with equipment, and then practice deploying boom, setting up skimmers and rehearsing other recovery tactics. Additionally, many vessels participate in drills and exercises to ensure they are prepared to respond in case of an actual incident. Vessel Administrators have offices in Cordova, Whittier, Kodiak, Homer, Seward and Valdez.

VISUAL IMPACT STIPULATIONS:
- Access roads: 12 degree maximum allowable grade.
- Buffer strips (undisturbed land):
  - 300-foot width of undisturbed land along streams.
  - 500-foot width required between state highways and material sites.
  - Half mile required between work pads and parks, refuges, etc.
- Right-of-way visibility: Maximum straight length permitted visible from highway: 600 feet.
WATERFLOOD: An oil field term referring to a system of pumping water into the oil reservoir behind the produced oil to maintain reservoir pressure and ultimately recover more oil.

WELDS, Pipe:

- Double joints: 42,000 (a double joint is two pipe sections welded into a single length before transport to the field for placement in the line).
- Field girth welds: 66,000.
- Passes for field girth welds: Seven for 0.562-inch pipe; six for 0.462-inch pipe.

YIELD STRENGTH: The stress level above which the pipe will yield, bend and/or stretch.

ZIGZAG CONFIGURATION: Aboveground sections of the pipeline are built in a zigzag configuration to allow for expansion or contraction of the pipe because of temperature changes. The design also allows for pipeline movement caused by an earthquake.
MAP, TAPS

Trans Alaska Pipeline System
The following is a chronology of significant events during operations of the Trans Alaska Pipeline System.

### 1968

**March 13**  
Atlantic Richfield Company (ARCO) and Humble Oil and Refining Company (now Exxon Company, U.S.A.) announce Prudhoe Bay discovery well.

**June 25**  
Confirmation well announced by ARCO and Humble Oil.

**July 29**  
Pipeline field study team arrives in Alaska under authority of a transportation subcommittee of an ARCO-Humble North Slope Coordinating Committee.

**Oct. 28**  
Atlantic Pipeline Company (a subsidiary of Atlantic Richfield), Humble Oil Pipeline Company (a subsidiary of Humble Oil and Refining Company) and BP Exploration U.S.A., Inc. (a subsidiary of British Petroleum Company, Ltd.) enter into an agreement for a planning study and for engineering design and construction of the Trans Alaska Pipeline Project.

### 1969

**Feb. 7**  
Atlantic Pipeline, Humble Oil Pipeline and BP Oil Corporation (formerly BP Exploration U.S.A., Inc.) approve an amendment to their original agreement, electing to proceed with design and construction, and changing the name of the project to Trans Alaska Pipeline Project.

The acronym TAPS is coined.

**Feb. 10**  
Atlantic Pipeline, Humble Oil Pipeline and BP Pipeline Corporation (a subsidiary of BP Oil Corporation) announce plans to build an 800-mile trans-Alaska pipeline.

**June 6**  
TAPS files for federal right-of-way permits over public lands.

**Sept. 13**  
First 48-inch pipe arrives in Valdez from Japan.

**Oct. 22**  
Humble Oil Pipeline, Atlantic Pipeline and BP Pipeline are joined by Amerada Hess Corporation, Home Pipeline Company, Mobil Pipeline Company, Phillips Petroleum Company and Union Oil Company of California in joint venture.

**December**  
Road from Livengood to the Yukon River was built (winter of 1969-1970).

### 1970

**April**  
Lawsuits are filed by environmental groups and others to block pipeline construction.

**Aug. 27**  
Trans Alaska Pipeline System Agreement made and signed by Atlantic Pipeline Company, BP Pipeline Corporation, Humble Oil Pipeline Company, Amerada Hess Corporation, Home Pipeline Company, Mobil Pipeline Company, Phillips Petroleum Company and Union Oil Company of California, all referred to as TAPS owners.

**Aug. 27**  
TAPS owners form Alyeska Pipeline Service Company, a separate corporation.
<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 27</td>
<td>Agreement made to design and construct the Trans Alaska Pipeline. Alyeska Pipeline Service Company appointed as contractor and agent for the construction project.</td>
</tr>
<tr>
<td>1971</td>
<td><strong>May 20</strong> Operating agreement established between Alyeska Pipeline Service Company (as agent) to operate and maintain TAPS on behalf of TAPS owners.</td>
</tr>
<tr>
<td>Jan. 1</td>
<td>Atlantic Pipeline Company (TAPS owner) stock reissued to ARCO Pipeline Company.</td>
</tr>
<tr>
<td>1973</td>
<td><strong>June 20</strong> First oil flows from PS 1 (10:26 a.m. Alaska Standard Time, pig in trap; 10:27 a.m. Alaska Standard, pig depart signal).</td>
</tr>
<tr>
<td>Nov. 16</td>
<td>Trans Alaska Pipeline Authorization Act (TAPAA) becomes law.</td>
</tr>
<tr>
<td>1974</td>
<td><strong>June 24</strong> Oil front at PS 3 (12:56 p.m.).</td>
</tr>
<tr>
<td>January</td>
<td>Home Pipeline Company (TAPS owner) stock reissued to six other oil pipeline companies.</td>
</tr>
<tr>
<td>Jan. 3</td>
<td>Federal right-of-way grant issued.</td>
</tr>
<tr>
<td>April 29</td>
<td>Construction of road from Prudhoe Bay to Yukon River begins.</td>
</tr>
<tr>
<td>May 3</td>
<td>State right-of-way lease issued.</td>
</tr>
<tr>
<td>Sept. 29</td>
<td>Road from Prudhoe Bay to Yukon River completed.</td>
</tr>
<tr>
<td>Dec. 19</td>
<td>Humble Oil Pipeline Company (TAPS owner) stock reissued to Exxon Pipeline Company.</td>
</tr>
<tr>
<td>1975</td>
<td><strong>July 7</strong> Oil front at PS 8 (9:24 p.m.).</td>
</tr>
<tr>
<td>March 27</td>
<td>First pipe laid at Tonsina River.</td>
</tr>
<tr>
<td>Oct. 11</td>
<td>Yukon River Bridge completed.</td>
</tr>
<tr>
<td>Oct. 26</td>
<td>Pipeline project 50 percent complete.</td>
</tr>
<tr>
<td>1977</td>
<td><strong>July 8</strong> PS 8 pump building destroyed by explosion and fire; one fatality; oil loss, 300 barrels.</td>
</tr>
<tr>
<td></td>
<td><strong>July 19</strong> Oil leak (heavy equipment accident) at CV 7, 1,800 barrels.</td>
</tr>
<tr>
<td></td>
<td><strong>July 20</strong> Oil front at PS 9 (10:37 a.m.).</td>
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<tr>
<td></td>
<td><strong>July 22</strong> Oil front at PS 10 (4:46 a.m.).</td>
</tr>
<tr>
<td></td>
<td><strong>July 26</strong> Oil front at PS 12 (3:48 a.m.).</td>
</tr>
<tr>
<td></td>
<td><strong>July 28</strong> Oil reaches the Terminal (11:02 p.m.).</td>
</tr>
<tr>
<td></td>
<td><strong>Aug. 1</strong> ARCO M/V Juneau departs Valdez with first oil.</td>
</tr>
</tbody>
</table>
1978
Feb. 15  Oil spill caused by sabotage at Steele Creek, MP 457.53, 16,000 barrels.
Feb. 16  Pipe repair MP 457.53.
March 7  PS 8 recommissioned (11:05 a.m.).

1979
June 10 Oil leak caused by pipe settlement at MP 166.43, Atigun Pass, 1,500 bbl.
June 13 ARCO M/V Heritage, 1,000th tanker to load.
June 15 Oil leak caused by pipe settlement at MP 734.16, 4,000 barrels.
June 19 Pipe repair, MP 734.16.
July 1 First commercial injection of DRA into pipeline at PS 1.
Aug. 18 Curvature pig (super pig) stuck in line at CV 29.
Sept. 25 CV 29 opened; stopple and bypass installed; curvature pig removed.
Oct. 2 PS 2 commissioned.
October Yukon River Bridge opened.

1980
Jan. 22 One billionth barrel arrives at the Terminal.
Feb. 11 Oil leak from leaking valve at the Terminal east tank farm, 3,200 barrels.
May 12 Oil leak from relief tank valve, 238 barrels.
Sept. 20 Monument to pipeline construction workers dedicated at the Terminal.
Dec. 1 PS 7 commissioned.
Dec. 29 M/V Thompson Pass, 2,000th tanker to load.

1981
Jan. 1 Oil leak from drain connection failure at CV 23, 1,500 barrels.
Nov. 10 Two billionth barrel arrives at the Terminal.
Dec. 15 First Kuparuk field oil delivered to PS 1.

1982
June 7 RGV 121A, un-commanded closure.
June 19 M/V Philadelphia, 3,000th tanker to load.
June 20 Fifth anniversary of TAPS operations.

1983
July 21 Three billionth barrel arrives at the Terminal.
Nov. 8 M/V Tonsina, 4,000th tanker to load.

1984
March 20 Removal of stuck scraper pig at CV 4 and relocation of pig trap from PS 5 to PS 4.
Nov. 1 Removal of stuck pig at PS 10.

1985
Jan. 11 M/V Overseas Boston, 5,000th tanker to load.
March 11 Four billionth barrel arrives at the Terminal.
April 22 MP 200 final tie-in of 48-inch permanent reroute (404.7 feet added to total pipeline length); reroute due to pipe settlement.
Nov. 2 Milne Point field start-up.
Nov. 9 Two primary generators damaged by fire in generator room at PS 1.
1986

March 5  ARCO M/V Sag River, 6,000th tanker to load.
April 18 Union Oil Pipeline Company (TAPS owner) becomes Unocal Pipeline Company.
Sept. 15 Five billionth barrel arrives at the Terminal.
Nov. 18 Tee damaged by scraper pig at PS 10. Tee replaced.
Dec. 15 Lisburne field start-up.
Dec. 24 Sohio Pipeline Company (TAPS Owner) becomes Sohio Alaska Pipeline Company.

1987

April 1  First high-definition corrosion pig run.
April 19 M/V Atigun Pass, 7,000th tanker to load.
June 20 10th anniversary of TAPS operations.
Sept. 29 Buckled pipe replaced, Atigun Pass, MP 166.4.
Oct. 3  Endicott field start-up.

1988

Jan. 1  BP Pipelines, Inc. (TAPS owner) merged into Sohio Alaska Pipeline Company (TAPS owner).
Jan. 14 Highest daily throughput of 2,145,297 barrels.
Feb. 16 Six billionth barrel arrives at the Terminal.
May 2  Chevron M/V Mississippi, 8,000th tanker to load.
September PS 2 pump manifold pipe replacement project complete.

1989

Jan. 3 Oil spill, M/V Thompson Pass, 1,700 barrels; crack in vessel’s hull.
March 1 Sohio Alaska Pipeline Company (TAPS Owner) becomes BP Pipeline (Alaska), Inc.
March 24 Oil spill, M/V Exxon Valdez, 250,000 barrels; vessel runs aground at Bligh Reef.
May 27 Texaco M/V Florida, 9,000th tanker to load.
June 1 First ultrasonic corrosion pig run.
June 30 Seven billionth barrel arrives at the Terminal.
August Feasibility study for Atigun floodplain pipe replacement project done to replace 8.5 miles of mainline pipe between MP 157 and 165.5.

1990

Feb. 8 Alyeska and Regional Citizens’ Advisory Council (RCAC) signed contract.
June Construction complete on the Terminal incinerator repair project.
June 12 Dead-leg repair/replacement, PS 1.
July 31 Exxon M/V New Orleans, 10,000th tanker to load.
Aug. 25 1,000th SERVS escort.
September PS 3 corrosion repair; station temporarily bypassed.
September   Construction begins on 8.5-mile Atigun Floodplain Pipe Replacement Project.

Sept. 15   Project to inspect, recoat and reinsulate 1,600 feet of insulated buried mainline pipe between MP 167.3 and 167.5 complete.

December   First shipment of pipe for Atigun Floodplain Pipe Replacement Project arrives in Valdez.

1991

Jan. 1   Eight billionth barrel arrives at the Terminal.

Feb. 28   ARCO Pipeline Company (TAPS owner) becomes ARCO Transportation Alaska, Inc.

March   Concrete biological treatment tanks (BTT) placed in service at the Terminal.

September   Atigun Floodplain Pipe Replacement Project completed (MP 157-165.5).

Oct. 2   M/V Overseas Boston, 11,000th tanker to load.

Oct. 14   2,000th SERVS escort.

1992

January   Floor of crude oil storage Tank 5 at the Terminal replaced and cathodic protection installed.

April-May   Corrosion repairs to 2.5-mile section of pipe in the Chandalar Shelf.

June   First run of inertial pipeline pig.

June 20   15th anniversary of TAPS operations.

July 7   Nine billionth barrel arrives at the Terminal.

July 30   Full-scale aerial dispersant test in Prince William Sound.

Aug. 7   RGV 73 un-commanded closure, overpressuring the pipeline.

September   Tank 111 at PS 1 returned to service after bottom replacement project complete.

October   Recoating of superstructure for Berths 3 and 4 at the Terminal completed.

December   Completion of new roof for 40,000-square-foot dissolved air flotation (DAF) building at the Terminal.

1993

Jan. 1   3,000th SERVS escort.

Jan. 20   Petro Star Refinery online in Valdez.

March   Construction of new tug dock at the Terminal complete.

June   PS 10, desalter for pretreating topping unit crude feed put in service.

June   PS 9, mainline pump No. 3 converted to half-head operation.

September   Recoating of the Terminal Berth 5 superstructure complete.

October   Completion of inspection, repair and recoating of last of 10 storage tanks at the Terminal. This completes the initial inspection of all major storage tanks at the Terminal.

Dec. 10   Fuel gas line pig launcher installed at MP 34.
1994
March  Tank 209 at PS 10 leaks 3,500 gallons of residual oil in tank farm.
March 5  10 billionth barrel arrives at the Terminal.
May 13  ARCO M/V Texas, 13,000th tanker to load.
June 18  4,000th SERVS escort.
July 5   Alyeska selects method of tanker vapor control at the Terminal.

1995
March 9  Valdez Emergency Operations Center/Escort Response Base opened.
March 30 Alyeska employees work 1 million consecutive hours without a lost-time accident.
April   Alyeska completes major electrical improvement project (ANSC) line-wide.
May 24  PS 8 topping unit shut down.
Oct. 20 Alyeska and U.S. Department of Interior sign new Alaska Native Utilization Agreement.
Oct. 26 PS 7 idled for maintenance, three months.
December Alyeska completed construction on new otter rehabilitation facility.
Dec. 12 11 billionth barrel arrives at the Terminal.
Dec. 31 ARCO M/V Juneau, 14,000th tanker to load.

1996
January 5,000th SERVS escort.
April 20 Oil leak at CV 92 discovered, 800 barrels released.
April 25 CV 92 leak repair begins.
June 30 PS 8 placed in ramped-down status.
July 1  PS 10 topping unit placed in ramped-down status.
August Pressure pulsations felt in Thompson Pass created by slackline condition.
Sept. 17 Alyeska investigates pipe vibrations near pipeline MP 776.
Nov. 27 Alyeska responds to evidence of hydrocarbons detected by soil probes near MP 776; no spill found.

1997
January Exxon Pipeline Company (TAPS owner) becomes ExxonMobil Pipeline Company.
January Temporary back-pressure system installed at the Terminal to stop pressure pulsations in Thompson Pass.
Jan. 1   Phillips Alaska Pipeline Corporation (TAPS owner) stock reissued to Phillips Transportation Alaska, Inc.
June 20 20th anniversary of TAPS operations.
July 1   PS 2 placed in ramped-down status.
Aug. 5  6,000th SERVS escort.
Aug. 8   PS 6 topping unit placed in ramped-down status.
Aug. 12 M/V Overseas Juneau, 15,000th tanker to load.
Oct. 2   Permanent back-pressure control system operational.
Dec. 1   12 billionth barrel arrives at the Terminal.
1998
March 19   Tanker vapor control system brought into full operation at the Terminal.
Sept. 25-26 Pipeline shut down for 28 hours, 40 minutes to repair CV 122 and replace RGV 80.
Oct. 15   Alyeska and U.S. Department of Interior renew Alaska Native Utilization Agreement.

1999
Jan. 27    Nanuq, enhanced tractor tug, arrives at Valdez to join SERVS’ fleet.
May 21     7,000th SERVS escort.
May 22     Tan’erliq, enhanced tractor tug, arrives at Valdez to join SERVS fleet.
June 26    ARCO M/V Spirit, 16,000th tanker to load.
July 10    10th anniversary of SERVS.
Sept. 11   Pipeline shut down for 25 hours, 49 minutes to replace RGV 60.

2000
February   M/V Alert, prevention/response tug, arrives at Valdez to join SERVS’ fleet.
April      Pipeline movement at MP 170.
April 27   13 billionth barrel arrives at the Terminal.
May        M/V Attentive, prevention/response tug, arrives at Valdez to join SERVS fleet.
June       Scraper pig removed seat ring from CV 74.
June 30    Mobil Alaska Pipeline Company (TAPS owner) stock reissued to Williams Alaska Pipeline Company, LLC.

July       M/V Aware, prevention/response tug, arrives at Valdez to join SERVS’ fleet.
Aug. 1     ARCO Transportation Pipeline Company (TAPS owner) stock reissued to Phillips Transportation Alaska, Inc.
Summer    Extensive rebuilding of Berth 4 at the Terminal.
Sept. 16   Pipeline shut down to replace CV 74 and the M-2 valve at PS 9.
Oct. 7     Shutdown to test remaining valves needed to complete the five-year test program for all mainline valves.

2001
July 11    M/V Polar Endeavor, first Millennium class double-hull tanker, arrives at the Terminal.
July 19    8,000th SERVS escort.
Summer    Extensive renewal of Berth 5 at the Terminal.
Aug. 21    SERVS receives Distinguished Achievement award in recognition of outstanding third-party oil spill response to the grounding of the F/V Windy Bay in Prince William Sound.
Sept. 22   M/V Marine Columbia, 17,000th tanker to load.
Sept. 22   Pipeline shut down for mainline valve maintenance and integrity test and performance evaluation of two 48-inch mainline RGVs.
Oct. 4     Bullet hole at MP 400 leaks 258,000 gallons of oil. More than 178,000 gallons recovered and reinjected into the pipeline.
<table>
<thead>
<tr>
<th>Date</th>
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</tr>
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<tr>
<td>November</td>
<td>Terminal Tank 94 raised 2 feet (ballast water tank, 250-foot diameter).</td>
</tr>
<tr>
<td>Nov. 2</td>
<td>First oil from Northstar field received at PS 1.</td>
</tr>
<tr>
<td>Nov. 9</td>
<td>Chevron M/V Mississippi, final tanker load after 30 years of service and 1,002 sailings, all ports (432 from the Terminal).</td>
</tr>
<tr>
<td>2002</td>
<td></td>
</tr>
<tr>
<td>June 20</td>
<td>25th anniversary of TAPS operations.</td>
</tr>
<tr>
<td>July 25</td>
<td>Pipeline shut down to replace RGV 39.</td>
</tr>
<tr>
<td>Aug. 1</td>
<td>Valdez Marine Terminal office building dedication.</td>
</tr>
<tr>
<td>October</td>
<td>Phillips Transportation Alaska, Inc. (TAPS owner) becomes ConocoPhillips Transportation Alaska, Inc.</td>
</tr>
<tr>
<td>Oct. 10</td>
<td>Laden tanker Kenai assisted by escort vessels when mechanical problems developed at Hinchinbrook Entrance.</td>
</tr>
<tr>
<td>Oct. 30</td>
<td>Main firewater distribution line at the Terminal relined.</td>
</tr>
<tr>
<td>November</td>
<td>Terminal tank 93 raised 2 feet (ballast water tank, 250-foot diameter).</td>
</tr>
<tr>
<td>Nov. 3</td>
<td>MP 588 experiences 7.9 magnitude earthquake; damaged shoes and VSM crossbeams repaired and replaced. No oil spilled.</td>
</tr>
<tr>
<td>Nov. 26</td>
<td>State of Alaska renews pipeline right of way for 30 years.</td>
</tr>
<tr>
<td>2003</td>
<td></td>
</tr>
<tr>
<td>Jan. 20</td>
<td>14 billionth barrel arrives at the Terminal.</td>
</tr>
<tr>
<td>April</td>
<td>Alyeska Pipeline receives the American Petroleum Institute’s 2002 Environmental Large Operator Award and recognition for improved safety performance (29 percent reduction in OSHA recordables over a three-year period).</td>
</tr>
<tr>
<td>March 31</td>
<td>Williams Alaska Pipeline Company, LLC (TAPS Owner) stock reissued to Koch Alaska Pipeline Company, LLC.</td>
</tr>
<tr>
<td>April</td>
<td>Alyeska Pipeline receives the American Petroleum Institute’s 2003 Environmental Large Operator Award and recognition for improved safety performance (47 percent reduction in OSHA recordables over a three-year period).</td>
</tr>
<tr>
<td>2004</td>
<td></td>
</tr>
<tr>
<td>March 31</td>
<td>Williams Alaska Pipeline Company, LLC (TAPS Owner) stock reissued to Koch Alaska Pipeline Company, LLC.</td>
</tr>
<tr>
<td>April</td>
<td>Alyeska Pipeline receives the American Petroleum Institute’s 2004 Environmental Large Operator Award (no Pipeline Performance Tracking System (PPTS) releases).</td>
</tr>
<tr>
<td>Dec. 14</td>
<td>10,000th SERVS escort.</td>
</tr>
<tr>
<td>Dec. 21</td>
<td>15 billionth barrel arrives at the Terminal.</td>
</tr>
</tbody>
</table>
April 2006  
Alyeska wins the American Petroleum Institute’s Distinguished Environmental and Safety Award, API’s highest recognition for a pipeline operator. Alyeska also received the 2005 Environmental Large Operator Award (zero releases).

April 11  
M/V Kodiak, 19,000th tanker to load.

August 2006  
Smart pig run from PS 1 to PS 4, successful.

September 2006  
Smart pig run from PS 4 to the Terminal, not successful due to wax buildup. Rerun scheduled for March 2007.

Dec. 22  
Scraper pig 67 came apart in line at PS 7.

2007  
Jan. 9  
Pipeline restarted after leak on bypass piping stopped.

Feb. 9  
Alyeska starts up new pumps at PS 9, the first station to receive upgraded equipment.

March 2007  
Smart pig launches at PS 4.

March 22  
Smart pig completes review of TAPS.

May 14  
Project work at PS 3 stabilizes pipeline.

June 20  
30th anniversary of TAPS operations.

Nov. 1  
TAPS crews wrap up repairs to storm damage to right of way.

Dec. 17  
New pumps started at PS 3; second station to receive upgraded equipment.

2008  
Jan. 23  
Operations Control Center begins 24/7 operations in Anchorage.

Feb. 7  
BWT successfully connects to vapor recovery system, substantially reducing the risk of fire and explosion associated with flammable vapors in the tanks, and also eliminating a major source of emissions at the Terminal.

April 3  
Alyeska installs pressure-containing sleeve to repair areas of external corrosion near PS 1.

June 28-29  
Pipeline shut down to replace RGV 72.

Aug. 13  
Alyeska wraps up cathodic protection project near Valdez.

Aug. 16-17  
Pipeline shut down for routine maintenance, including pig trap replacement at the Terminal.

Nov. 5  
Federal Transportation Worker Identification Credential (TWIC) program implemented at the Terminal.

Jan. 28  
11,000th SERVS tanker escort.

April 2009  
Alyeska receives 2008 American Petroleum Institute’s Distinguished Operator Award (Large Operator), among the oil industry’s top honors and reserved for pipeline operators that demonstrate excellence in safety, environment and integrity. Alyeska also won API’s Distinguished Environment and Safety award for the fifth consecutive year.
May 21  New pumps started at PS 4: Third station to receive upgraded equipment.

July 10  SERVS marks 20th anniversary.

**2010**

April  Alyeska is awarded the 2009 American Petroleum Institute’s award for top environmental performance in 2009.

**2011**

May 12  Alyeska Pipeline Service Company employees and contractors reach a major safety milestone: 10 million hours without a Day Away From Work Case (DAFWC).

July 2011  An Alyeska team completes the Low Flow Impact Study, a $10 million project designed to study and evaluate operational risks related to declining throughput.

Sept. 21  TAPS receives the 2011 Outstanding Environmental Engineering Geologic Project Award from the Association of the Environmental and Engineering Geologists.

**2012**

Jan. 9  Alyeska Pipeline Service Company receives a legislative citation for its response to the January 2011 booster pump piping leak at Pump Station 1.

March 16  Alyeska Pipeline wins a World’s Most Ethical Companies Award from the Ethisphere Institute.

April  The Alaska Legislature honors Alyeska Pipeline with a legislative citation for its Alyeska’s World’s Most Ethical Company award.

May  Alyeska receives the Most Improved Projects Process Award for small projects (between $2 and $10 million) from Independent Project Analysis.

June 6  SERVS celebrates 12,000 tanker escorts.

June 20  Alyeska reaches its 35th anniversary of operations.

Aug. 2  The 35th anniversary of first tanker leaving Valdez.

**2013**

March 5  Alyeska wins a World’s Most Ethical Companies Award from the Ethisphere Institute for the second year in a row.

July  Koch withdraws as TAPS owner.

**2014**

March 20  Alyeska wins a World’s Most Ethical Companies Award from the Ethisphere Institute for the third year in a row.

Aug. 13  17 billionth barrel arrives at Valdez Marine Terminal.

**2015**

February  Vessel of Opportunity Program, managed by Alyeska’s SERVS team, wins the Ocean Leadership Award from the Alaska SeaLife Center.

March  At Governor’s Health & Safety Conference, Alyeska wins a Governor’s Safety Award of Excellence.

March 9  Alyeska wins a World’s Most Ethical Companies Award from the Ethisphere Institute for the fourth year in a row.
December Alyeska finishes year with best safety performance on record, with Alyeska employees and contractors working a combined 5,827,988 hours with just four recordable injuries.

2016

March 7 Alyeska wins a World’s Most Ethical Companies Award from the Ethisphere Institute for the fifth year in a row.

May 7 SERVS escorts 13,000th outbound laden tanker, the Polar Endeavor.

Dec. 31 In 2016, the pipeline moved 189,539,817 barrels and averaged 517,868 barrels a day, the first calendar year-over-year throughput increase since 2002.

2017

March Alyeska wins a World’s Most Ethical Companies Award from the Ethisphere Institute for the sixth year in a row.

June 20 Alyeska marks its 40th anniversary of pipeline operations. Activities throughout the year include public receptions and events and employee celebrations. The hashtag #40more launches.

Oct. 24 The Valdez Marine Terminal Operations Control Center, or XOCC, was officially disconnected from TAPS.

Dec. 31 In 2017, TAPS moved 192,472,797 barrels, a year-over-year total increase of 1.5 percent over 2016.

2018

February Alyeska wins a World’s Most Ethical Companies Award from the Ethisphere Institute for the seventh year in a row.

Feb. 25 First Edison Chouest vessels arrive in Valdez; tescort tug Commander, general purpose tug Elrington and the OSRB-1 barge.

April 20 17 billionth barrel loaded onto tanker Alaskan Navigator.

July 1 The marine services contract transitions from Crowley Marine Corporation to Edison Chouest Offshore/Alaska Ventures.

2019

April Alyeska introduced an improved and modernized version of its Earthquake Management System, the system’s fourth update since TAPS start-up.

July 31 A team led by the University of Alaska Fairbanks completes the country’s first FAA-approved true beyond-visual-line-of-sight domestic flight of an unmanned aircraft system under the small UAS rule, flying along 3.87 miles of TAPS near the Chatanika River on the Elliott Highway.

Aug. 27 BP announces sale of its Alaska operations and interests, including Prudhoe Bay and the Trans Alaska Pipeline System, to Hilcorp Alaska.

Sept. 27 Major abatement and facility removal of Pump Station 10 is complete, marking first demolition of a legacy pump station.

December 18 billionth barrel expected to be delivered via TAPS.
REPAIRS, MAJOR

Following is a chronology of major TAPS repair and project work since 1977:

1977

July 7    MP 489.12: Approximately 20 feet south of north block valve at PS 8; damage to 30-degree elbow and pipe from injection of supercooled nitrogen ahead of oil front during oil-in. Replaced with new elbow and two six-foot pumps. Pipe reburied.

July 8    MP 489.24: Pump building at PS 8 destroyed in an explosion and fire; pipeline undamaged. Pump building was replaced and recommissioned on March 7, 1978.

September  MP 388.00: North of Lost Creek; two bullet indentations. Covered with 48-inch diameter, 3-foot welded split sleeve.

1978

February  MP 457.53: Steele Creek; one-inch diameter hole (sabotage). Covered with 48-inch diameter, 22.5-inch bolted split sleeve; subsequently covered with welded sleeve.

1979

June     MP 166.43: North side Atigun Pass; hairline crack caused by buckle. Covered with 56-inch diameter, 6-foot welded split sleeve; 19 steel supports installed. Pipe reburied.

June     MP 734.16: One mile north of PS 12; hairline crack caused by buckle in pipe. Covered with 56-inch diameter, 6.1-foot welded split sleeve; seven steel supports installed. Pipe reburied.


October  MP 166.41: North side Atigun Pass; buckled pipe. Covered with 56-inch diameter, 6-foot welded split sleeve. Pipe reburied.

1980

April     MP 449.96: Indentation, possibly from bullet. Covered with 48-inch diameter, 18-inch welded split sleeve.

May      MP 159.70: Construction damage from backhoe during monitor rod installation. Covered with 48-inch diameter, 3.6-foot welded split sleeve. Pipe reburied.

June     MP 416.00: Approximately two miles south of PS 7; pipe settlement. Approximately 430-foot excavation; eight steel supports installed. Pipe not reburied.

August  MP 752.00: Flash flood, 900 feet of overburden washed out; no damage. Pipe reburied.

November MP 720.00: Pipe settlement. Approximately 200-foot excavation; pipe lifted and concrete slurry added beneath pipe. Pipe reburied.
1981
No major repairs.

1982
April

August
MP 166.03: North side Atigun Pass; pipe buckle. Covered with 56-inch diameter, 6.5-foot welded split sleeve. Pipe reburied.

1983
March

April
MP 200.24: Dietrich River channel; pipe buckle. River channel redirected temporarily; approximately 125-foot excavation; 56-inch diameter, 6-foot welded split sleeve installed; five specially designed steel supports installed. Pipe reburied.

October
MP 45.97: Pipe settlement. Approximately 200-foot excavation; concrete slurry added beneath pipe. Pipe reburied.

1984
March
Removal of scraper pig stuck at CV 4 and relocation of pig trap from PS 5 to PS 4.

November
Removal of stuck pig at PS 10.

1985
January
MP 200: Temporary bypass tie-in, pipe settlement.

April
MP 200: Final tie-in of 48-inch permanent reroute (404.7 feet added to total pipeline length, April 22). Reroute due to pipe settlement.

1986
Oct. 10
Steele Creek: Permanent welded sleeve installed over bolted split sleeve.

Nov. 18
PS 10: Replaced tee damaged by stuck scraper pig.

1987
Aug. 25
Mechanical damage covered with 3-foot welded sleeve.

Sept. 29
MP 166.41 to 166.43: Atigun Pass. Replaced 234 feet of buckled pipe.

1988
No major repairs.

1989
January
Thirty sleeves installed for corrosion repairs.

1990
January
Eighty-six sleeves installed for corrosion repairs.

Nov. 23
MP 172.62: Dent covered by 6-foot welded sleeve.

Dec. 3
Mechanical damage covered with bolted clamp, later covered with a split tee (part of Atigun floodplain pipe replacement project).
1991
January   Eighteen sleeves installed for corrosion repairs.
March 8   MP 779.47: Mechanical damage covered by 4-foot welded sleeve.
April 6   MP 756.80: Mechanical damage covered by 4-foot welded sleeve.
September MP 157-165.5: Atigun Floodplain Pipe Replacement Project (FPRP) completed. Permanent reroute of 8.5 miles of mainline pipe due to corrosion.

1992
No major repairs.

1993
June 6   MP 775: Mechanical damage covered by 3-foot welded sleeve.

1994
July 22  CV 9: Bypass spool replaced and drain line repaired.
July 30  CV 86: Bypass and drain line repaired.
Sept. 30 CV 74: Drain line repaired.

1995
March 15 CV 55: Replaced actuator.
June 8   CV 89: Replaced actuator.
July 14  RGV stem leak repaired.
Sept. 15 Extended Chena Hot Springs Road casing.

1996
April 25 CV 92: Replaced bypass line.

1997
Feb. 8   Wilbur Creek: Installed armadillo sleeve; repair due to corrosion.
June 20  MP 775.75: Mechanical damage covered by 2.5-foot welded sleeve.
Oct. 9   MP 799.68: Corrosion repair covered by 4.8-foot welded sleeve.

1998
March 19 Tanker vapor control system start-up at the Terminal.
Sept. 25 Replaced RGV 80 and repaired CV 122.

1999
April 26 MP 652: Two sleeves installed for corrosion repair.
Sept. 11 RGV 60: Replaced.

2000
May 26   MP 170: Completed reset and repair of tripped anchors, a result of the collapse of vapor pocket after pipeline restart.
June 1   MP 710.76: Mechanical damage covered by two, 2-foot welded sleeves.
Sept. 16 PS 9: Replaced CV 74 and M-2 valve.

2001
Sept. 22 Pipeline shut down for mainline valve maintenance and integrity test, and performance evaluation of two, 48-inch mainline RGVs.
Oct. 4   MP 400: Bullet hole repaired with hydraulic clamp. Clamp later replaced with a threaded O-ring fitting.
### 2002
- **July 10**: Set full-close limit switches on valves along pipeline; changed out three valves in gas building at PS 3.
- **July 27**: RGV 39: Pipeline shut down to replace valve.
- **Nov. 3**: MP 588: Repaired or replaced damaged shoes and VSM crossbeams from 7.9 magnitude earthquake.

### 2003
- **July 18-19**: Set full-close limit switches on RGVs; other pump station work.
- **Aug. 8-12**: Set full-close limit switches on RGVs; other pump station work.
- **Aug. 15**: Performed maintenance and tests on selected RGVs; OCC special commands.
- **Sept. 10-12**: Set full-close limit switches on RGVs; other pump station work.

### 2004
- **July 10-11**: Pig trap valve replacement at PS 4; set full-close limit switches on valves along pipeline.
- **Aug. 16-17**: Tie-in work at PS 1 and PS 3 for Strategic Reconfiguration; performed maintenance and tests on selected RGVs; OCC special commands.

### 2005
- **June 19-20**: Pig trap valve replacement at PS 4, due to factory defective valve installed in 2004. Installed new mainline CV at PS 7.
- **July 23-24**: Tie-in work at PS 9 for Strategic Reconfiguration. Ramped down and isolated PS 12 and replaced mainline through the station. Isolated all buildings at PS 12 for future demolition/salvage.

### 2006
- **July 22-23**: Isolated PS 10 from the mainline and installed a mainline 48-inch CV inside the manifold building. Replaced the 48-inch mainline check valve 109 located on the south bank of the Klutina River. Both these scopes were accomplished in the 36-hour shutdown.
- **October**: Flooding in the Valdez area causes extensive damage to ROW, state highway and most bridges in the southern 60 miles of the pipeline right of way. Repairs continued through 2007.

### 2007
- **No major repairs.**

### 2008
- **June 28-29**: Replaced RGV 72 and removed the tees for SR configuration at PS 9.
- **Aug. 16-17**: 1,700 feet of bypass pipe installed at PS 2, permanently disconnecting PS 2 from TAPS.
2009

June 20-21  Replaced 62,000 pound valve at PS 3 used to redirect crude flow inside the pump station. Enhanced leak protection or mainline valves at PS 1.

July  Removed dual functionality tees from PS 3 suction and discharge headers, isolating the legacy pump building at PS 3 for future demolition/salvage. This leaves only the new electric drivers to move oil at this location. Also replaced 62,000 pound M2 valve and decommissioned Turbine Fuel Tank 137 from service at PS 3.

2010

June 19-20  Replaced M1 and S2 valves at PS 4.

July  Removed dual functionality tees from PS 4 suction and discharge headers, isolating the legacy pump building at PS 4 for future demolition/salvage. This completes the transition to the new electric drivers to move oil at this location. Decommissioned Turbine Fuel Tank 147 from service at PS 4.

2011

Jan. 8-20  PS 1 Booster Pump Building spill to containment resulted in two back-to-back shutdowns as crews engineered and installed aboveground bypass piping.

2012

June 1-2  Leading Edge Flow Meter modifications at Pump Stations 3 and 4; mainline RGV stem seals replaced on three Remote Gate Valves; updates to PS11 Safety Integrity Pressure Protection System (SIPPS).

August  Pump Station 6 straight pipe project completed.

2013

March 15  In-Line Inspection Tool relaunched from Pump Station 1, gathering data critical to Alyeska’s integrity management program.

March 26  In-Line Inspection Tool relaunched from Pump Station 4 to Valdez, continuing effort to gather integrity management data.

June 8  Mainline valves along pipeline tested during 18-hour shutdown, ensuring performance as part of Alyeska’s suite of tools for protecting TAPS and the environment.

July 26  Straight pipe project completed at Pump Station 10 during planned six-hour shutdown.

August 9  Mainline valves along pipeline tested during 18-hour shutdown.
June 20-21 | During 24-hour major maintenance shutdown, crews perform power system modifications at PS1, isolate belowground piping at PS3, perform power switch installation at PS4, test all mainline valves between Atigun Pass and PS5 and inspect power substation at PS9.

July 16 | First crawler pig run conducted, testing potential of new technology to inspect segments of TAPS facility piping.

Aug. 29-30 | During 36-hour major maintenance shutdown, teams tested all mainline valves between PS1 and 3, returned belowground piping to service at PS3, installed two valves at PS5, removed suction relief dead-leg piping at PS7 and conducted SIPPS testing and work.

Sept. 14 | Pig launcher installed at Pump Station 9, expanding Alyeska’s ability to pig TAPS in smaller segments.

Nov. 14 | Berth 4 overhaul completed.

2015

January | Portable diesel-fired crude oil heater installed at Remote Gate Valve 65 for contingency heat during winter operations to help manage temperature during declining throughput volumes and mitigate ice accumulation incoming to Pump Station 7.

June 12-13 | Replaced pig launcher valves at PS1; isolated belowground piping at PS4 to use new technology to conduct internal integrity inspection; tested all mainline valves between Isabel and Thompson passes to confirm valve sealing capability.

2016

June 12-13 | Replaced pig launcher valves at PS1; isolated belowground piping at PS4 to use new technology to conduct internal integrity inspection; tested all mainline valves between Isabel and Thompson passes to confirm valve sealing capability.

Aug. 1-7 | Replacement of flare tip at Pump Station 1.

Nov. 23 | Slipstream heat implemented as primary strategy to maintain throughput during winter operations.

2017

Nov. 29 | Multilateral engineering analyses establish new minimum viable crude oil throughput to extend service life of TAPS.

2018

Oct. 31 | Engineering analysis of lower minimum incoming crude oil temperature at Pump Station 1 allows increase in throughput.

2019

May 20 | Major abatement and facility removal of Pump Station 10 begins. It is the first demolition of a TAPS pump station.

Sept. 27 | Major abatement and facility removal of Pump Station 10 ends, an Alyeska project that involved 15 contractors and more than 24,000 man hours.
SHUTDOWNS, PIPELINE

The following is a chronology of scheduled long-duration maintenance shutdowns and major unplanned shutdowns after oil first reached Valdez. For additional information on other shutdowns, contact Alyeska Pipeline.

1977
- Aug. 2 40 minutes (Equipment malfunction)
- Aug. 15 110 hours, 11 minutes (PS 9 sump overflow)
- Sept. 20 59 minutes (Equipment malfunction)
- Oct. 9 4 hours, 14 minutes (Producer shutdown)

1978
- Jan. 10 4 hours (Equipment malfunction)
- Jan. 16 4 hours, 22 minutes (Equipment malfunction)
- Feb. 15 21 hours, 31 minutes (Sabotage, Steele Creek)
- May 6 7 hours, 18 minutes (Equipment malfunction)

1979
- June 10 53 hours, 37 minutes (Atigun Pass leak)

1980
- May 12 3 hours, 37 minutes (PS 10 crude tank valve leak)
- Oct. 17 5 hours, 16 minutes (Scheduled maintenance)

1981
- Jan. 1 15 hours, 38 minutes (CV 23 leak)

1982
- Dec. 22 12 hours (Equipment malfunction)

1984
- March 20 57 hours, 40 minutes (Scraper pig stuck at CV 4. PS 4 trap relocation)
<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>Jan. 21</td>
<td>66 hours</td>
<td>MP 200 bypass tie-in.</td>
</tr>
<tr>
<td></td>
<td>April 22</td>
<td>20 hours, 40 minutes</td>
<td>MP 200 final reroute tie-in of 48-inch pipe (404.7 feet added to total pipeline length).</td>
</tr>
<tr>
<td></td>
<td>Nov. 9</td>
<td>10 hours, 15 minutes</td>
<td>PS 1 explosion and fire.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1986</strong></td>
</tr>
<tr>
<td></td>
<td>Sept. 26</td>
<td>31 hours, 50 minutes</td>
<td>Removed scraper pig at PS 10.</td>
</tr>
<tr>
<td></td>
<td>Nov. 18</td>
<td>16 hours, 54 minutes</td>
<td>Replaced tee at PS 10.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1987</strong></td>
</tr>
<tr>
<td></td>
<td>Sept. 29</td>
<td>24 hours, 6 minutes</td>
<td>Atigun Pass pipe replacement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1989</strong></td>
</tr>
<tr>
<td></td>
<td>Feb. 26</td>
<td>1 hour, 31 minutes</td>
<td>Power failure at PS 1.</td>
</tr>
<tr>
<td></td>
<td>Oct. 20</td>
<td>5 hours, 16 minutes</td>
<td>Repair corroded pipe at MP 144.2.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1990</strong></td>
</tr>
<tr>
<td></td>
<td>March 21</td>
<td>4 hours 10 minutes</td>
<td>PS 3, broken valve 320.</td>
</tr>
<tr>
<td></td>
<td>June 12</td>
<td>12 hours, 39 minutes</td>
<td>PS 1, valve D2 pipe replacement.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1992</strong></td>
</tr>
<tr>
<td></td>
<td>Aug. 7</td>
<td>1 hour, 49 minutes</td>
<td>Un-commanded closure of RGV 73, electric short.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1994</strong></td>
</tr>
<tr>
<td></td>
<td>April 15</td>
<td>24 hours, 28 minutes</td>
<td>Replace 002 valve at Valdez and troubleshoot segment 4 RGVs.</td>
</tr>
<tr>
<td></td>
<td>April 18</td>
<td>7 hours, 57 minutes</td>
<td>Work on PS 4 Systronics master panel.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>1995</strong></td>
</tr>
<tr>
<td></td>
<td>Sept. 11</td>
<td>15 hours, 45 minutes</td>
<td>Scheduled maintenance.</td>
</tr>
<tr>
<td></td>
<td>Sept. 12</td>
<td>4 hours, 51 minutes</td>
<td>Completion of scheduled PS 2 maintenance.</td>
</tr>
<tr>
<td>Year</td>
<td>Date</td>
<td>Duration</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
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<td>-------------------</td>
<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>1996</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 6</td>
<td>21 hours, 45 minutes</td>
<td>Scheduled maintenance.</td>
<td></td>
</tr>
<tr>
<td>July 12</td>
<td>10 hours, 25 minutes</td>
<td>Scheduled maintenance, preparations for PS 8 and PS 10 ramp down.</td>
<td></td>
</tr>
<tr>
<td>Aug. 1</td>
<td>8 hours, 40 minutes</td>
<td>Scheduled maintenance as part of ramping down PS 8 and PS 10.</td>
<td></td>
</tr>
<tr>
<td>Aug. 6</td>
<td>11 hours, 2 minutes</td>
<td>Scheduled maintenance as part of ramping down PS 8 and PS 10.</td>
<td></td>
</tr>
<tr>
<td><strong>1997</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 26</td>
<td>5 hours, 44 minutes</td>
<td>Communications failure with RGVs in segment 12.</td>
<td></td>
</tr>
<tr>
<td>Aug. 1</td>
<td>17 hours, 49 minutes</td>
<td>Scheduled maintenance for PS 2 and PS 6 ramp-down preparation.</td>
<td></td>
</tr>
<tr>
<td>Aug. 8</td>
<td>19 hours, 29 minutes</td>
<td>Placed PS 6 in ramped-down status.</td>
<td></td>
</tr>
<tr>
<td><strong>1998</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 18</td>
<td>5 hours, 9 minutes</td>
<td>PS 1 in-rush vapor test and vibration test of the Terminal incoming relief piping.</td>
<td></td>
</tr>
<tr>
<td>Aug. 14</td>
<td>5 hours, 4 minutes</td>
<td>Communications failure, segment 10.</td>
<td></td>
</tr>
<tr>
<td>Sept. 25</td>
<td>28 hours, 40 minutes</td>
<td>Valve maintenance, replaced RGV 80 and repaired CV 122.</td>
<td></td>
</tr>
<tr>
<td><strong>1999</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sept. 11</td>
<td>25 hours, 49 minutes</td>
<td>Valve maintenance, replaced RGV 60, tested 46 mainline valves and completed 165 other maintenance tasks.</td>
<td></td>
</tr>
<tr>
<td>Nov. 13</td>
<td>8 hours, 6 minutes</td>
<td>Planned maintenance and Autologic testing.</td>
<td></td>
</tr>
<tr>
<td><strong>2000</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sept. 16</td>
<td>29 hours, 39 minutes</td>
<td>Planned line-wide maintenance shutdown.</td>
<td></td>
</tr>
<tr>
<td>Oct. 7</td>
<td>7 hours, 31 minutes</td>
<td>Planned line-wide shutdown for maintenance of mainline valve leak test.</td>
<td></td>
</tr>
<tr>
<td><strong>2001</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sept. 22</td>
<td>21 hours, 4 minutes</td>
<td>Planned maintenance shutdown.</td>
<td></td>
</tr>
<tr>
<td>Oct. 4</td>
<td>60 hours, 30 minutes</td>
<td>Bullet puncture (sabotage) at MP 400.</td>
<td></td>
</tr>
</tbody>
</table>
**2002**

July 27 29 hours, 57 minutes  Planned maintenance shutdown to replace Remote Gate Valve 39.

Nov. 3 66 hours, 33 minutes  7.9 magnitude earthquake at MP 588.

**2004**

Jan. 2 45 hours, 51 minutes  Communications failure at valve 972.

July 10-11 31 hours, 36 minutes  Planned maintenance shutdown, including replacing two pig launcher valves at Pump Station 4.

Aug. 16 17 hours  Planned maintenance shutdown to install new infrastructure at Pump Stations 1 and 3, replace two pig trap valves and perform RGV maintenance and testing.

**2005**

June 19 35 hours, 42 minutes  Planned maintenance shutdown to install infrastructure at Pump Station 4 to prepare the station for Strategic Reconfiguration project, replace two pig trap valves at Pump Station 4 and install a 48-inch mainline check valve at Pump Station 7.

July 23 32 hours, 32 minutes  Planned maintenance shutdown to prepare Pump Station 9 for electric pump motors and install straight line pipe at Pump Station 12.

**2006**

July 22-23 36 hours  Planned maintenance shutdown. Replaced CV 109, and performed additional maintenance tasks.

Oct. 10 9 hours, 45 minutes  Communication failure at RGVs 117, 118, 119, 121 and 121A, due to flooding between PS 12 and the Terminal.

Nov. 15 16 hours, 25 minutes  Shutdown due to high inventory in Valdez.

Nov. 17 6 hours, 8 minutes  Shutdown due to high inventory in Valdez and problems at PS 4.

Nov. 18 22 hours, 30 minutes  Shutdown to build inventory at PS 1.
<table>
<thead>
<tr>
<th>Year</th>
<th>Date</th>
<th>Duration</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>June 28</td>
<td>28 hours, 49 minutes</td>
<td>Planned maintenance shutdown.</td>
</tr>
<tr>
<td></td>
<td>Aug. 16</td>
<td>35 hours, 37 minutes</td>
<td>Planned maintenance shutdown to install 1,700 feet of new 48-inch mainline pipe at Pump Station 2 and replace a pig trap at the Valdez Marine Terminal.</td>
</tr>
<tr>
<td>2009</td>
<td>June 20-21</td>
<td>33 hours, 58 minutes</td>
<td>Planned maintenance shutdown to remove unused pipe and replace a valve at Pump Station 3, test new equipment at Pump Station 4 and do leak protection work on valves at Pump Station 1.</td>
</tr>
<tr>
<td></td>
<td>July 18</td>
<td>36 hours, 30 minutes</td>
<td>Planned maintenance shutdown to install a pig launcher at Pump Station 8.</td>
</tr>
<tr>
<td>2010</td>
<td>May 25</td>
<td>79 hours, 38 minutes</td>
<td>Pump Station 9 crude tank 190 relief event/overfill.</td>
</tr>
<tr>
<td></td>
<td>June 19</td>
<td>33 hours, 58 minutes</td>
<td>Scheduled maintenance shutdown to install new aboveground piping connection to Kuparuk at Pump Station 1, and to disconnect legacy piping and replace two large valves at Pump Station 4.</td>
</tr>
<tr>
<td></td>
<td>July 31</td>
<td>31 hours, 35 minutes</td>
<td>Scheduled maintenance shutdown to replace a valve at Pump Station 9, replace gas supply lines to the Pump Station 3 and 4 turbine generators and replace 6-inch bypass piping on a CV at Pump Station 1.</td>
</tr>
<tr>
<td>2011</td>
<td>Jan. 8</td>
<td>85 hours, 10 minutes</td>
<td>Booster pump piping leak at Pump Station 1 (restarted on interim basis).</td>
</tr>
<tr>
<td></td>
<td>Jan. 8-15</td>
<td>147 hours, 59 minutes</td>
<td>Total duration of combined January 8 and January 15 shutdowns.</td>
</tr>
<tr>
<td></td>
<td>Jan. 15</td>
<td>62 hours, 49 minutes</td>
<td>Installation of bypass piping at Pump Station 1.</td>
</tr>
<tr>
<td></td>
<td>July 16</td>
<td>33 hours, 23 minutes</td>
<td>Scheduled maintenance shutdown to replace valves at Pump Station 4 and installation of straight line pipe at Glennallen Response Base (Pump Station 11).</td>
</tr>
</tbody>
</table>
Here is a closer look at long-duration maintenance shutdowns and unplanned shutdowns since 2012.

<table>
<thead>
<tr>
<th>Date</th>
<th>Duration</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2012</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 2</td>
<td>17 hours, 42 minutes</td>
<td>Scheduled maintenance shutdown for mainline valve testing between Pump Stations 5 and 7 and SIPPS work at Pump Station 11.</td>
</tr>
<tr>
<td>July 28</td>
<td>18 hours, 28 minutes</td>
<td>Scheduled maintenance shutdown.</td>
</tr>
<tr>
<td><strong>2013</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 8</td>
<td>18 hours, 46 minutes</td>
<td>Scheduled maintenance shutdown for main line valve testing, SIPPS upgrades at pump stations, fuel gas system work at Pump Station 3.</td>
</tr>
<tr>
<td>Aug. 12</td>
<td>19 hours, 20 minutes</td>
<td>Scheduled maintenance shutdown for valve testing in segments 7 to 9, SIPPS upgrades, work at PS 4 and 5 and suction header work at PS 9.</td>
</tr>
<tr>
<td><strong>2014</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 20</td>
<td>21 hours, 45 minutes</td>
<td>Scheduled maintenance shutdown for valve testing at Pump Station 5, legacy cut over at Pump Station 1 and installation of pig crawler blinds at Pump Station 3.</td>
</tr>
<tr>
<td>Aug. 29-30</td>
<td>36 hours, 5 minutes</td>
<td>Scheduled maintenance shutdown for valve testing at Pump Stations 1 and 3, removal of pig crawler blinds at Pump Station 3, valve installation at Pump Station 5 and dead-leg removal at Pump Station 7.</td>
</tr>
<tr>
<td><strong>2015</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 12-13</td>
<td>36 hours, 6 minutes</td>
<td>Scheduled maintenance shutdown for Pump Station 1 pig launcher valve replacement, mainline valve testing between Isabel Pass and Thompson Pass, isolation of crawler pig relief at Pump Station 4.</td>
</tr>
<tr>
<td>Aug. 21-22</td>
<td>33 hours, 49 minutes</td>
<td>Scheduled maintenance shutdown for valve testing at Pump Stations 3 and 4, Pump Station 1 cutover from MCC to E&amp;A, Pump Station 5 RGV-40 replacement.</td>
</tr>
</tbody>
</table>
2016

April 20  8 hours, 52 minutes  Pipeline shut down due to fire at Pump Station 5’s Tank 150 during inspection of tank pressure/vacuum vents.

June 25-26  35 hours, 37 minutes  Scheduled maintenance shutdown for Pump Station 1 removal of three legacy commissioning spools, tie-in of new aboveground MLU discharge line and VMT East Metering piping inspection.

2017

May 6  12 hours, 43 minutes  Scheduled maintenance shutdown for isolation of main VMT incoming crude header for cleaning and inspection.

June 3  16 hours, 30 minutes  Scheduled maintenance shutdown for Pump Station 3 manifold building work and stem seal replacements on 33-MOV-3103 and 33-MOV-3201.

2018

June 23  17 hours, 30 minutes  Scheduled maintenance shutdown for CKV-23 bypass replacement and Pump Station 9 Substation Maintenance.

2019

June 22  16 hours, 23 minutes  Scheduled maintenance shutdown for commissioning VMT mainline dual offtakes and Pump Station 1 SIPPS download.

Aug. 24-25  30 hours, 40 minutes  Scheduled maintenance shutdown for replacement of VMT mainline pig receiver isolation valves and Pump Station 9 automation processor upgrades.

For additional information on shut downs, contact Alyeska Pipeline.
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