State of Alaska
ENERGY SECTOR RISK PROFILE

U.S. DEPARTMENT OF ENERGY
Cybersecurity, Energy Security, and Emergency Response

Alaska State Facts

POPULATION
0.74 M

HOUSING UNITS
0.32 M

BUSINESS ESTABLISHMENTS
0.02 M

ENERGY EMPLOYMENT: 21,674 jobs
PUBLIC UTILITY COMMISSION: Regulatory Commission of Alaska
STATE ENERGY OFFICE: Alaska Energy Authority
EMERGENCY MANAGEMENT AGENCY: Alaska Division of Homeland Security and Emergency Management
AVERAGE ELECTRICITY TARIFF: 19.36 cents/kWh
ENERGY EXPENDITURES: $6,911/capita
ENERGY CONSUMPTION PER CAPITA: 822 MMBtu
(4th highest out of 50 states and Washington, D.C.)
GDP: $54.7 billion

Data from 2020 or most recent year available.
For more information, see the Data Sources document.

ANNUAL ENERGY CONSUMPTION

ELECTRIC POWER: 5,970 GWh
COAL: 1,200 MSTN
NATURAL GAS: 80 Bcf
MOTOR GASOLINE: 6,100 Mbbl
DISTILLATE FUEL: 5,200 Mbbl

ANNUAL ENERGY PRODUCTION

ELECTRIC POWER GENERATION: 165 plants, 6.1 TWh, *2.9 GW total capacity*
- **Coal:** 5 plants, 0.7 TWh, *0.2 GW total capacity*
- **Hydro:** 32 plants, 1.6 TWh, *0.5 GW total capacity*
- **Natural Gas:** 15 plants, 2.7 TWh, *1.4 GW total capacity*
- **Nuclear:** 0 plants
- **Petroleum:** 100 plants, 0.9 TWh, *0.8 GW total capacity*
- **Wind & Solar:** 7 plants, 0.1 TWh, *0.1 GW total capacity*
- **Other sources:** 6 plants, 0.0 TWh, *0.1 GW total capacity*

COAL: 1,000 MSTN
NATURAL GAS: 3,250 Bcf
CRUDE OIL: 169,900 Mbbl
ETHANOL: 0 Mbbl

Data from EIA (2018, 2019).

This State Energy Risk Profile examines the relative magnitude of the risks that the state of Alaska's energy infrastructure routinely encounters in comparison with the probable impacts. Natural and man-made hazards with the potential to cause disruption of the energy infrastructure are identified. Certain natural and adversarial threats, such as cybersecurity, electromagnetic pulse, geomagnetic disturbance, pandemics, or impacts caused by infrastructure interdependencies, are ill-suited to location-based probabilistic risk assessment as they may not adhere to geographic boundaries, have limited occurrence, or have limited historic data. Cybersecurity and other threats not included in these profiles are ever present and should be included in state energy security planning. A complete list of data sources and national level comparisons can be found in the Data Sources document.

Alaska Risks and Hazards Overview

- The natural hazard that caused the greatest overall property loss between 2009 and 2019 was **Flooding** at $15 million per year *(leading cause nationwide at $12 billion per year)*.
- Alaska had 18 Major Disaster Declarations, 3 Emergency Declarations, and 5 Fire Management Assistance Declarations for 15 events between 2013 and 2019.
- There is 1 Fusion Center located in Anchorage.

Annualized Frequency of and Property Damage Due to Natural Hazards, 2009 – 2019

	HAZARD FREQUENCY – Annualized	PROPERTY DAMAGE – Annualized ($Million per year)
Drought	0	$0
Earthquake (≥ 3.5 M)	886	$9
Extreme Heat	0	$0
Flood	16	$15
Hurricane	0	$0
Landslide	1	$0
Thunderstorm & Lightning	40	$1
Tornado	<1	$0
Wildfire	1	$0
Winter Storm & Extreme Cold	62	$0

Data Sources: NOAA and USGS

ELECTRIC


Chukchi Sea
Beaufort Sea
Prudhoe Bay
Fairbanks
CANADA
Bethel
Anchorage
Valdez
Bering Sea
Kodiak
Gulf of Alaska
Juneau
Sitka
Ketchikan
Power Plants
Installed Capacity (Megawatts)
50 - 250 MW
251 - 750 MW
751 - 1,500 MW
1,501 - 3,000 MW
3,501 - 6,500+ MW
Primary Generation Source
Coal
Hydro
Natural Gas
Nuclear
Oil
Renewable
Transmission Lines (Kilovolts)
220- 315 kV
345 - 450 kV
500 - 525 kV
735 - 765 kV
1,000 kV (DC)
Utility Company*
*Shaded by Company
Data Sources: ANL 2019; ESRI 2019; EIA 2019; Platts 2019.
Miles
0
100
200

Electric Infrastructure

- Alaska has 57 electric utilities:
  - *12 Investor owned*
  - *18 Cooperative*
  - *23 Municipal*
  - *4 Other utilities*
- Plant retirements scheduled by 2025: 5 electric generating units totaling 3 MW of installed capacity.

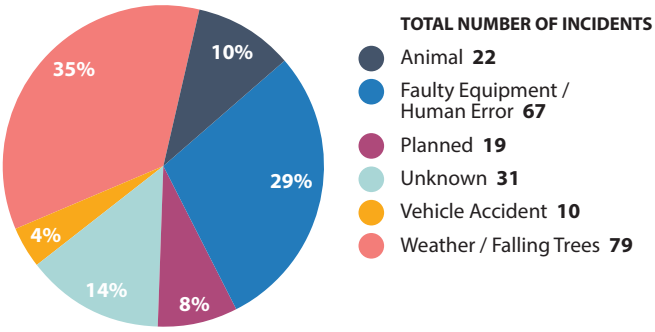
- In 2018, the average Alaska electric customer experienced 3.1 service interruptions that lasted an average of 5.6 hours.
- In Alaska, between 2008 and 2017:
  - *The greatest number of electric outages occurred in **September** (8th for outages nationwide)*
  - *The leading cause of electric outages was **Weather or Falling Trees** (leading cause nationwide)*
  - *Electric outages affected 50,885 customers on average*

Electric Customers and Consumption by Sector, 2018

	CUSTOMERS	CONSUMPTION
Residential	84%	33%
Commercial	16%	44%
Industrial	<1%	23%
Transportation	<1%	<1%

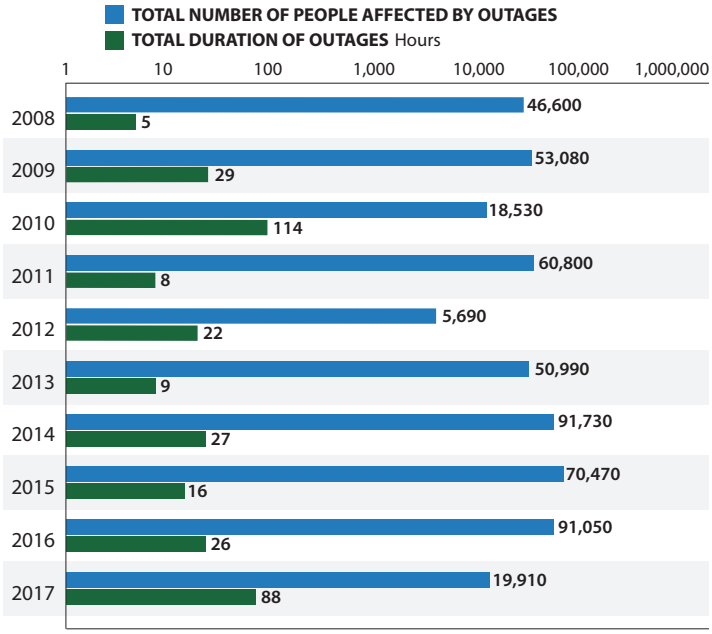
Data Source: EIA

Electric Utility-Reported Outages by Cause, 2008 – 2017



Data Source: Eaton

Electric Utility Outage Data, 2008 – 2017



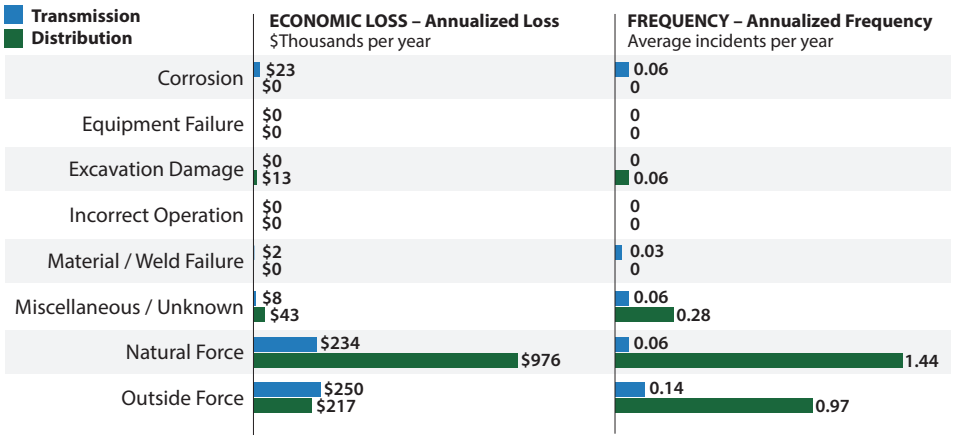
Note: This chart uses a logarithmic scale to display a very wide range of values.
Data Source: Eaton

NATURAL GAS


Chukchi Sea
Beaufort Sea
Prudhoe Bay
Fairbanks
CANADA
Bethel
Anchorage
Valdez
Bering Sea
Kodiak
Gulf of Alaska
Juneau
Sitka
Ketchikan
Natural Gas Storage
Natural Gas Processing Plants
Pipelines
Local Distribution Companies
Data Sources: ANL 2019; EIA 2019; ESRI 2019; Platts 2019
Miles
0
100
200

Natural Gas Transport

Top Events Affecting Natural Gas Transmission and Distribution, 1984–2019



Data Source: DOT PHMSA

- As of 2018, Alaska had:
  - *810 miles of natural gas transmission pipelines*
  - *3,451 miles of natural gas distribution pipelines*
- 26% of Alaska's natural gas transmission system and 6% of the distribution system were constructed prior to 1970 or in an unknown year.
- Between 1984 and 2019, Alaska's natural gas supply was most impacted by:
  - ***Outside Forces** when transported by transmission pipelines (3rd leading cause nationwide at $20.65M per year)*
  - ***Natural Forces** when transported by distribution pipelines (4th leading cause nationwide at $26.42M per year)*

Natural Gas Processing and Liquefied Natural Gas

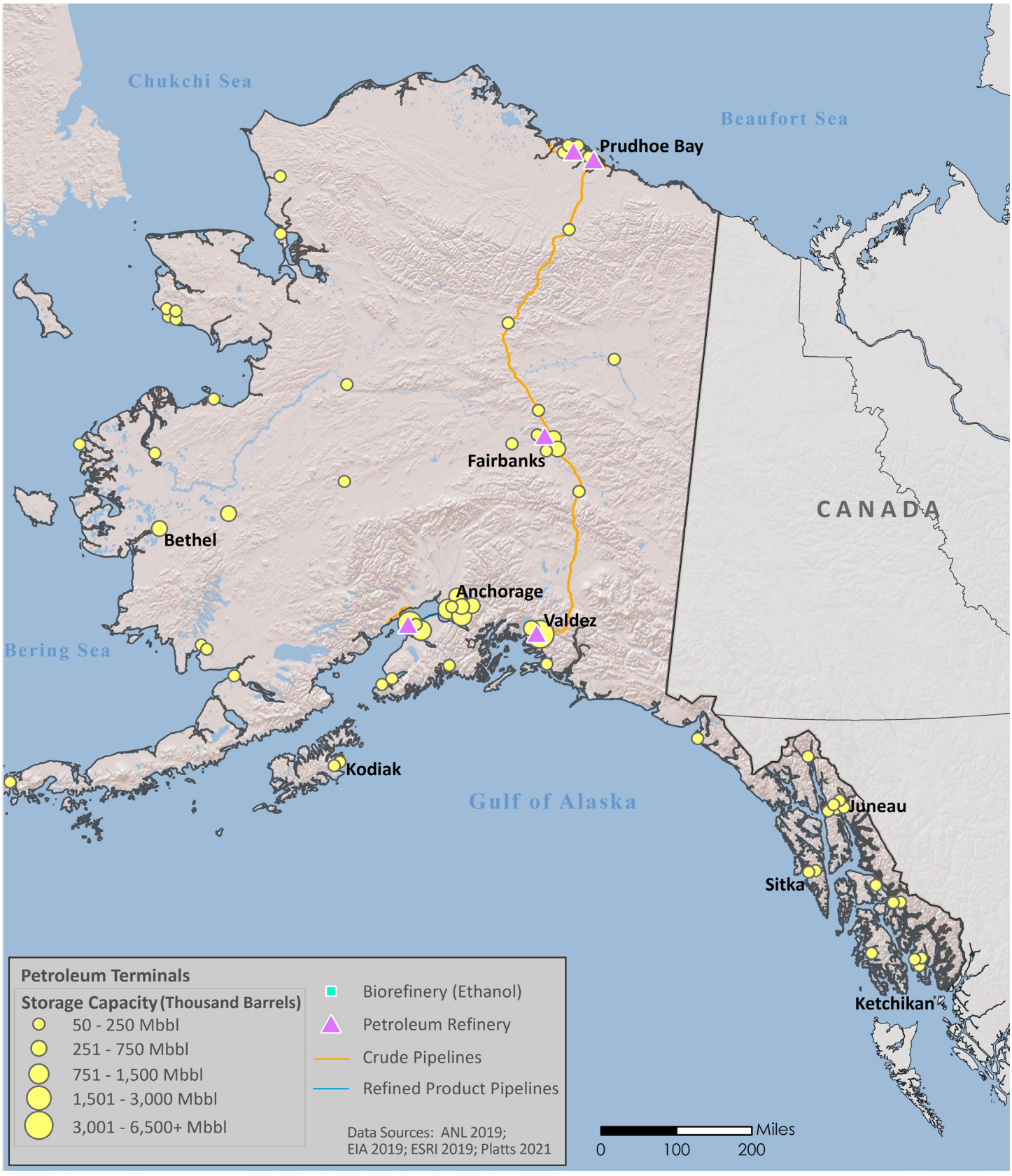
Natural Gas Customers and Consumption by Sector, 2018

	CUSTOMERS	CONSUMPTION
Residential	91%	21%
Commercial	9%	16%
Industrial	<1%	7%
Transportation	<1%	<1%
Electric Power	<1%	56%
Other	<1%	<1%

Data Source: EIA

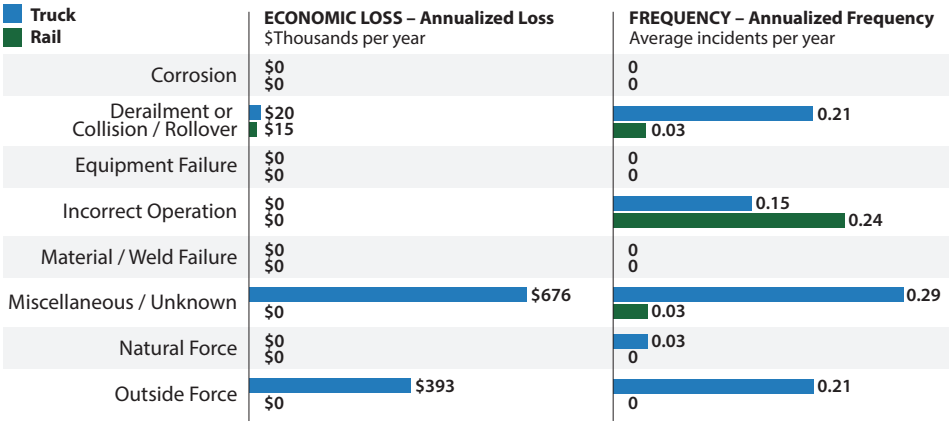
- Alaska has 0 natural gas processing facilities.
- Alaska has 4 liquefied natural gas (LNG) facilities with a total storage capacity of 880,153 barrels.

PETROLEUM


Chukchi Sea
Beaufort Sea
Prudhoe Bay
Fairbanks
CANADA
Bethel
Anchorage
Valdez
Bering Sea
Kodiak
Gulf of Alaska
Juneau
Sitka
Ketchikan
Petroleum Terminals
Storage Capacity (Thousand Barrels)
50 - 250 Mbbl
251 - 750 Mbbl
751 - 1,500 Mbbl
1,501 - 3,000 Mbbl
3,001 - 6,500+ Mbbl
Biorefinery (Ethanol)
Petroleum Refinery
Crude Pipelines
Refined Product Pipelines
Data Sources: ANL 2019; EIA 2019; ESRI 2019; Platts 2021
Miles
0
100
200

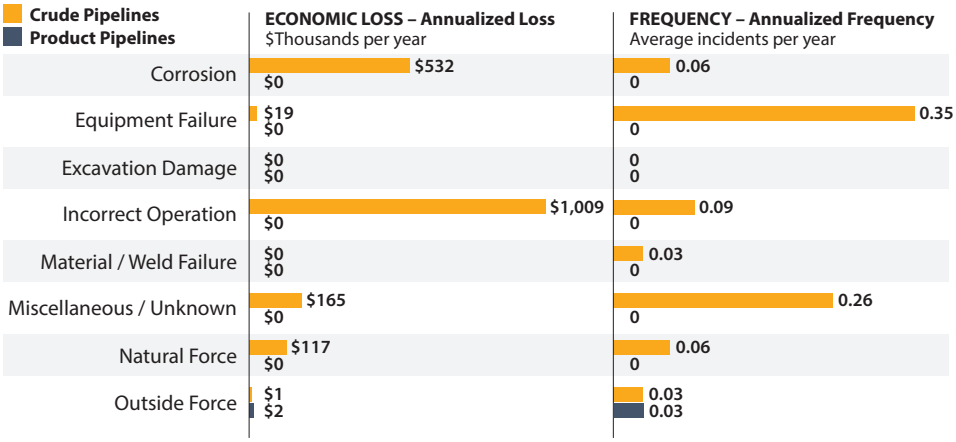
Petroleum Transport

Top Events Affecting Petroleum Transport by Truck and Rail, 1986–2019



Data Source: DOT PHMSA

Top Events Affecting Crude Oil and Refined Product Pipelines, 1986–2019



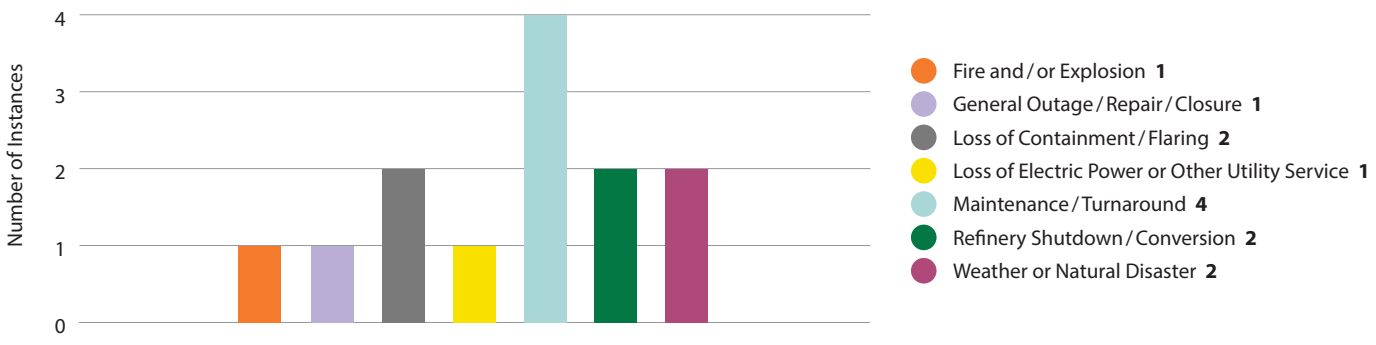
Data Source: DOT PHMSA

- As of 2018, Alaska had:
  - *1,119 miles of crude oil pipelines*
  - *112 miles of refined product pipelines*
  - *0 miles of biofuels pipelines*
- 5% of Alaska's petroleum pipeline systems were constructed prior to 1970 or in an unknown year.
- Between 1986 and 2019, Alaska's petroleum supply was most impacted by:
  - ***Miscellaneous or Unknown*** *events when transported by truck (3rd leading cause nationwide at $52.87M per year)*
  - ***Derailments, Collisions, or Rollovers*** *when transported by rail (leading cause nationwide at $19.71M per year)*
  - ***Incorrect Operations*** *when transported by crude pipelines (6th leading cause nationwide at $4.23M per year)*
  - ***Outside Forces*** *when transported by product pipelines (leading cause nationwide at $19.06M per year)*
- Disruptions in other states may impact supply.

Petroleum Refineries

- Alaska has 5 petroleum refineries with a total operable capacity of 164.2 Mb/d.
- Between 2009 and 2019, the leading cause of petroleum refinery disruptions in Alaska was:
  - ***Maintenance*** *(2nd leading cause nationwide)*

Causes and Frequency of Petroleum Refinery Disruptions, 2009–2019



Data Source: Hydrocarbon Publishing