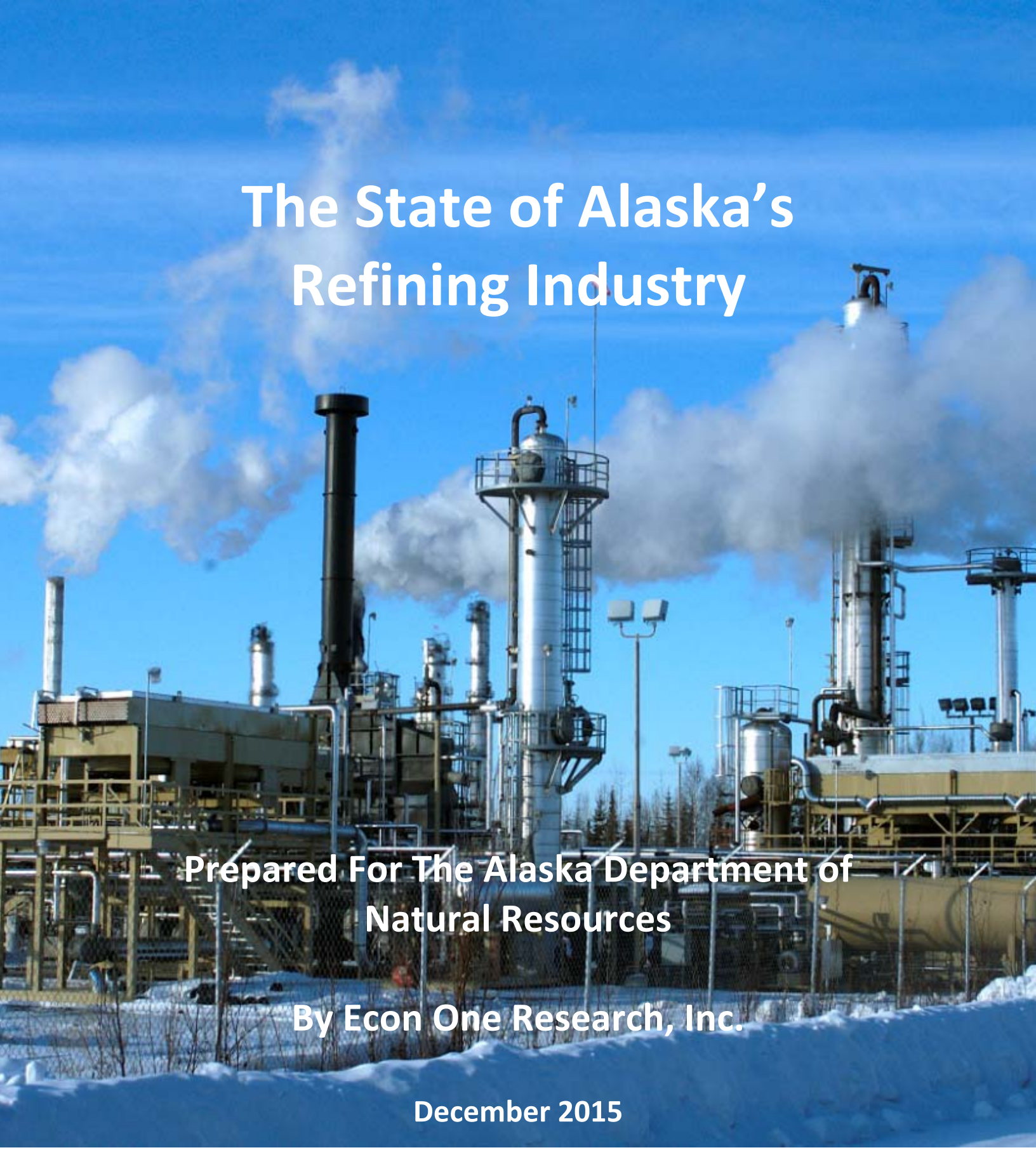


The State of Alaska's Refining Industry

Prepared For The Alaska Department of Natural Resources

By Econ One Research, Inc.

December 2015

econ ONE

Berkeley Houston Los Angeles Memphis New Delhi Sacramento Washington D.C. econone.com

TABLE OF CONTENTS

I. Executive Summary

A. Purpose and Structure of Report

This report was commissioned by the Alaska Department of Natural Resources pursuant to a request by the Senate Finance Committee made during the 2014 legislative session. The report examines the health of Alaska's refining industry, its contribution to Alaska's economy and current challenges facing the State's refiners.[1] In preparing this report, we have analyzed publicly available information and data, as well as information provided directly by Tesoro and Petro Star.

Our analysis is organized in the following sections.

Section I	Executive Summary
Section II	Overview of Alaska's Refining Industry
Section III	Petroleum Product Supply and Demand Picture in Alaska
Section IV	Refined Product Prices in Alaska
Section V	Contribution of Alaska's Refining Industry to the State's Economy
Section VI	Health and Financial Performance of Alaska's Refiners
Section VII	Challenges Facing Alaska's Refiners
Section VIII	Federal Government Programs Designed to Assist Smaller Refiners
Section IX	Conclusions

The balance of this (Executive Summary) provides a brief overview of the contents of each of the report's sections.

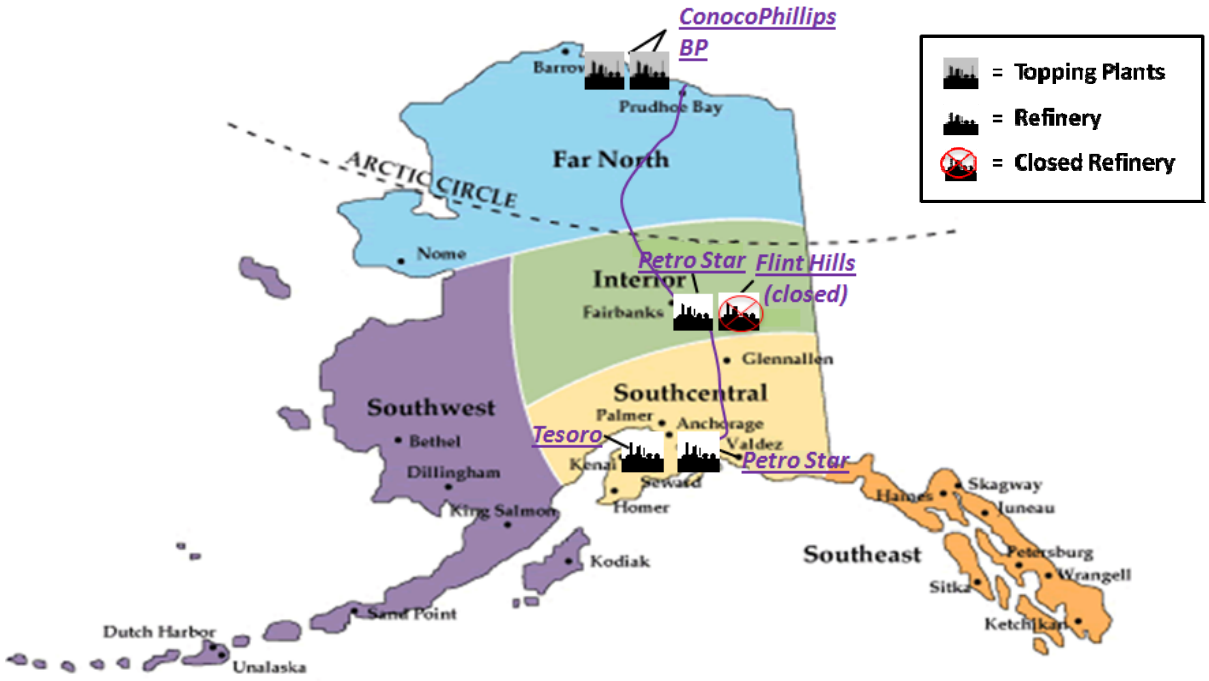
B. Overview of Alaska's Refining Industry

There were a total of six refineries operating in Alaska during 2014. Two of those refineries are small, "topping" plants owned by North Slope producers that supply product for operations on the Slope. The other four are "commercial" refineries, manufacturing

[1] The report examines Alaska's refining industry through the end of 2014. On November 23, 2015 Tesoro announced that it would acquire certain assets from Flint Hills, including terminal facilities in Fairbanks and Anchorage as well as marketing contracts. The proposed acquisition does not include the Flint Hills refinery. This report does not address the potential impacts associated with Tesoro's proposed acquisition.

petroleum product for Alaska residents and businesses. The four commercial refineries are the subject of this report. The location of Alaska's refineries is shown in Figure I.1 below.

Figure I.1
Location of Alaska Refineries



Tesoro owns and operates the oldest and largest of the State's refineries, located on the Kenai Peninsula at Nikiski. The other three refineries (referred to in this report as TAPS refineries) are located adjacent to TAPS and designed to run exclusively on ANS crude oil. The largest of the TAPS refineries is the Flint Hills facility in North Pole. Flint Hills ceased refining operations in June 2014. The other two TAPS refineries, located in North Pole and Valdez, are operated by Petro Star.

1. Tesoro

The Tesoro facility began operating in 1969. It is the most technologically sophisticated refinery in the State, producing gasoline, diesel, heating oil and jet fuel for Alaska markets. It also manufactures heavier fuel oil, the majority of which is shipped to facilities outside Alaska for further processing into light products (e.g., gasoline, diesel and jet fuel). The Tesoro facility is located at tidewater and refines primarily North Slope and Cook Inlet crude but also processes some foreign-produced and non-Alaskan domestic crude oil received via marine tanker.

Tesoro invested approximately $63 million in 2007 for upgrades to its refinery in order to manufacture Ultra Low Sulfur Diesel (ULSD), required in Alaska under federal law beginning in 2010. In addition, it invested approximately $189 million between 2010 and 2014, with a significant portion of this amount dedicated to meet EPA requirements for decreasing the benzene content in gasoline.

2. Flint Hills

The Flint Hills facility is the State's largest refinery on TAPS. The facility first began operations in 1977 under Earth Resources of Alaska. It was purchased by Mapco in 1980, then by Williams in 1998 and finally by its current owner, Flint Hills in 2004. At peak operations the refinery was capable of processing as much as 210,000 barrels per day (210 MBD) in three crude units, extracting between 25 and 30% of the volume into refined product and returning the balance of the oil, known as "return oil" into TAPS.

The refinery was initially designed to produce jet fuel and distillate (distillate includes diesel and heating oil). It was upgraded in 1981 to produce gasoline and asphalt as well. Flint Hills began reducing throughputs in 2010, shutting down one of its three crude units. It shut a second unit down in 2012, before finally ceasing all refining operations in 2014. Flint Hills operates the facility today as a terminal for the distribution of petroleum products transported from the south by rail or truck.

3. Petro Star

Petro Star is owned by the Arctic Slope Regional Corporation (ASRC). Petro Star operates two TAPS refineries; one in North Pole and another in Valdez. The North Pole facility began operation in 1985; the Valdez facility went into service in 1993. Together, the facilities can process up to 82 MBD of crude oil. Petro Star refines approximately 30% of the ANS it processes into primarily jet fuel and distillate, re-injecting the remaining 70% as return oil to TAPS. Petro Star invested approximately $200 million beginning in 2008 at its Valdez refinery to produce ULSD.

C. Petroleum Product Supply and Demand Picture in Alaska

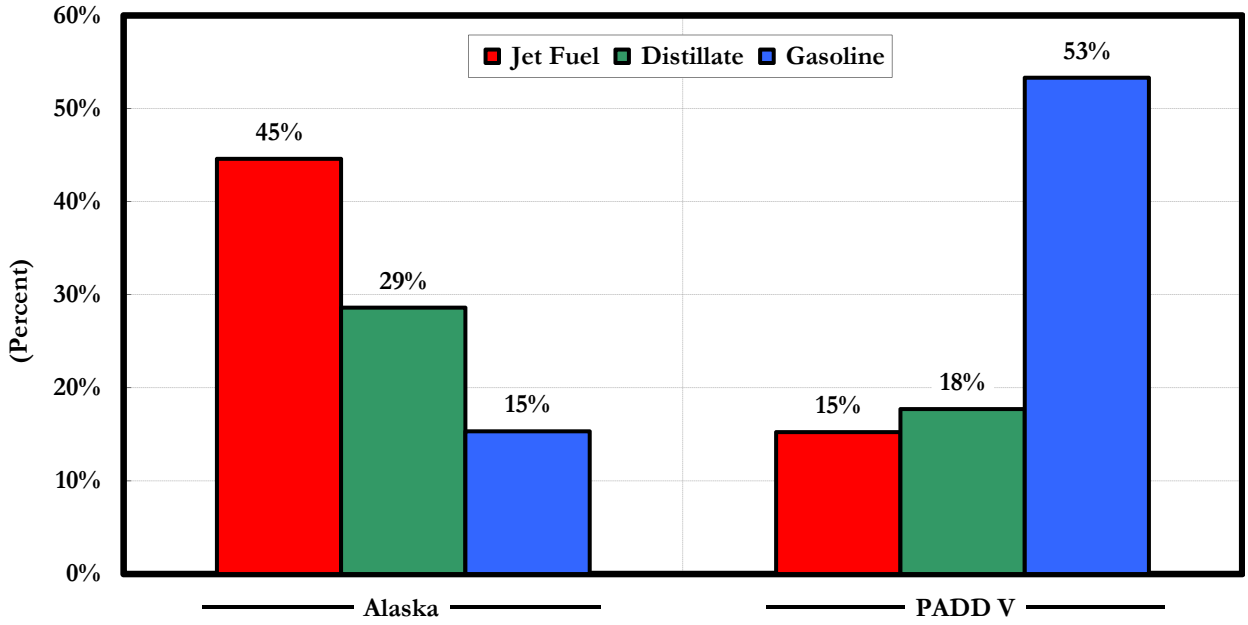
Alaska's refineries have supplied approximately 70%-80% of total demand for petroleum products in the State in recent years, with the remaining 20%-30% supplied by imports from the Pacific Northwest or Asia. Alaska refiners supply the majority of the State's demand in the Southcentral and Interior regions, while imports from the Pacific Northwest and Asia account for the majority of supply to Western and Southeast Alaska. Jet

fuel is also imported through the Port of Anchorage or Nikiski for use at Ted Stevens International Airport.

Tesoro exports significant quantities of heavier fuel oil from the State. There is no internal market for this product in Alaska and Tesoro does not have the ability to "upgrade" this product into marketable fuels such as gasoline, jet fuel and diesel. Tesoro has also exported some lighter products at times.

Figure I.2 shows the breakdown of product demand in Alaska and on the West Coast (PADD V).[2] Jet fuel accounts for nearly half of the demand for petroleum product in the State, making Alaska the largest consumer of jet fuel per-capita in the U.S. In contrast, jet fuel accounts for just 15% of product demand on the West Coast. Alaska is the smallest market for gasoline among the 50 U.S. states. Gasoline accounts for just 15% of all refined product sold in the State; it accounts for more than half of total refined product demand on the West Coast.

Figure I.2
Breakdown of Product Demand in Alaska and the U.S. West Coast



Source: Energy Information Administration, SEDS (2013).

[2] PADD stands for Petroleum Administration for Defense District. PADD V is comprised of Arizona, Alaska, California, Hawaii, Nevada, Oregon and Washington.

The product mix produced by Alaska's refiners reflects the State's unique demand situation. Alaska's refiners are geared to produce primarily jet fuel and distillate, while gasoline accounts for only a small portion of their output. In contrast, refiners in most of the rest of the U.S. produce up to a half or more of their total output as gasoline, with jet fuel and distillate being a much smaller percentage.

D. Refined Product Prices in Alaska

Gasoline and diesel prices in Alaska have historically been among the highest in the U.S. on a tax-adjusted basis. Retail gasoline prices in the Anchorage area averaged approximately $0.36/gallon higher than Seattle-area prices in 2014. Much of this difference can be accounted for by logistics. Transportation from the Pacific Northwest and Anchorage via large ocean-going barges costs approximately $0.25/gallon. While gasoline is generally not imported into the Southcentral or Interior of the State, imports are a potential alternative to local supply. Larger buyers of gasoline and diesel, including the State, have been able to purchase gasoline and diesel at prices that generally reflect the cost of importing product ("import parity") from the Pacific Northwest. The spread in gasoline and diesel prices between Alaska and the West Coast has been both higher and lower than import parity historically. This issue has been the subject of several investigative studies by the Attorney General's office dating back more than a decade.

In contrast to gasoline and diesel, jet fuel prices in Alaska averaged just $0.05/gallon over West Coast prices in 2014. Buyers of jet fuel have the ability to import and store large volumes of product to meet their needs. Jet fuel is generally cheaper in Asia than on the West Coast. Likewise, the cost of transporting product from Asia to Alaska is lower than the cost of moving product from the West Coast to Alaska, as movements from foreign ports are not subject to Jones Act restrictions. The ability to efficiently import and store product from Asia allows jet fuel buyers to obtain supply from Alaska refiners at very competitive prices.

E. Contribution of Alaska's Refining Industry to the State's Economy

Alaska's three refiners employed more than 330 people before the Flint Hills' closure. Those employees earned approximately $45 million annually, or an average of $136,000 per employee. The refineries and their employees helped support more than 1,350 additional jobs outside the industry, paying an additional $49 million in wages. We estimate that the total value added to Alaska's economy by the refining industry by the two refiners currently in operation (Tesoro and Petro Star) is approximately $153 million per year. This rises to nearly $200 million per year if Flint Hills is included. The table below summarizes estimated contributions by refiner to Alaska's economy.

Table I.1
Contribution of the Refining Industry to the State's Economy

Refiner	Earnings	Economic Value Added
	(Million Dollars)	
(1)	(2)	(3)
Tesoro	$57	$127
Petro Star	13	25
Flint Hills	24	46
Total	$94	$199
Total (Ex-Flint Hills)	$70	$153

Source: Econ One Analysis using IMPLAN model and BLS data.

The State receives additional benefits from the industry by selling Royalty in Kind (RIK) oil at prices higher than it would otherwise receive if collected as Royalty in Value (RIV). The additional revenue is due to the lower marine transportation deductions included in the RIK contract formulas relative to the marine deductions allowed producers for RIV determination.

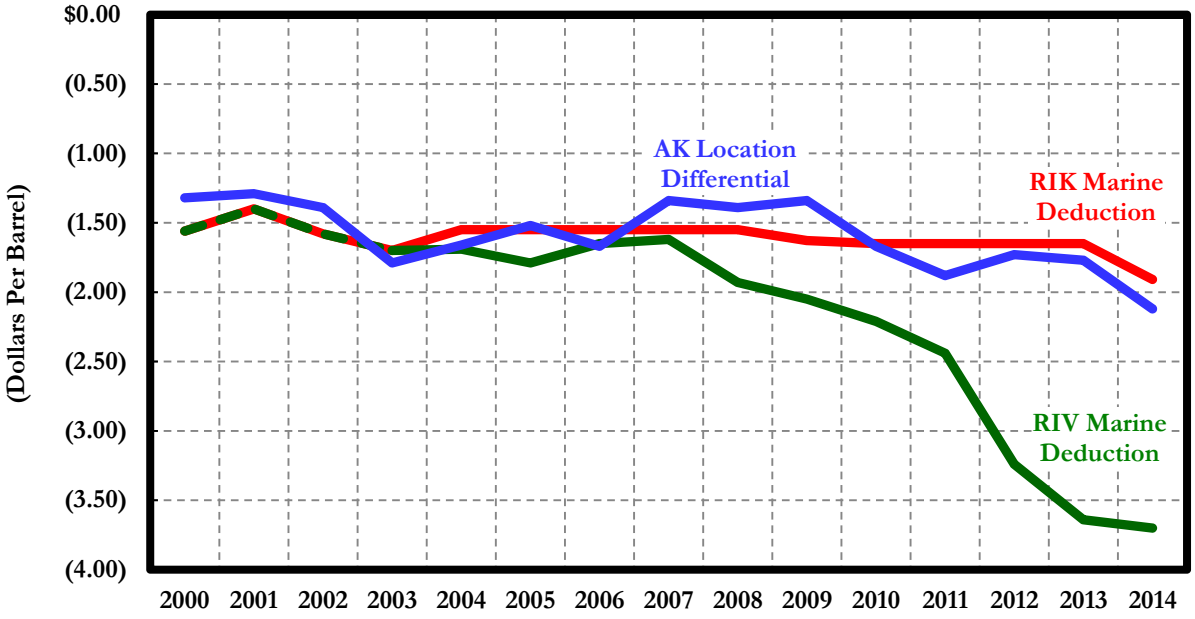
Flint Hills purchased roughly 24 MBD (8.8 million barrels per year) in RIK oil from the State in 2013. The State earned an additional $1.55 per barrel when selling its oil to Flint Hills than it did in RIV received from ANS producers from the same fields. Tesoro currently purchases approximately 15 MBD (5.5 million barrels per year) of RIK from the State, bringing the State approximately $1.75 per barrel more than it would receive as RIV. Petro Star does not purchase RIK from the State.

The State sells RIK to in-state refiners using a netback formula tied to the price of ANS on the West Coast. A deduction (or allowance) for marine transportation is included as a part of the formula. The higher the allowance, the lower the RIK selling price and visa-a-versa. The RIK and RIV marine allowances were similar prior to 2008, but have diverged in recent years. The RIV allowance has risen, while the RIK allowance has remained relatively constant. The RIK marine allowance used in the State's current contract with Tesoro (the only RIK contract in effect) is $1.95/barrel. This is about $1.75/barrel less than the $3.70/barrel marine allowance that ANS producers deduct when making RIV payments.

This difference is not due to bargaining on the part of DNR. Rather, it has been generally reflective of the alternatives historically available to in-state buyers. This can be seen in the Alaska Location Differential published by the Department of Revenue (DOR). This measure is based on an analysis of transactions involving delivery of ANS in Alaska

each year. The Alaska Location Differential is used to establish "Prevailing Values" in Alaska which are used in determining severance tax obligations associated with in-state deliveries of ANS. Figure I.3 shows the RIV and RIK marine deductions over time, as well as DOR's Alaska Location Differential.

Figure I.3
RIV and RIK Marine Allowances Have Diverged Since 2007



Source: State RIK contracts; Alaska DOR Revenue.

The industry also pays income taxes to the State and property taxes to the State, the Fairbanks North Star Borough and the Kenai Borough. Property taxes are a matter of public record; income taxes are confidential. We have estimated annual income taxes by refiner based on our analysis of refiner profitability as of 2014 and information provided by refiners. The table below summarizes the additional revenues received by state and municipal governments from the refining industry from RIK sales and taxes.

Table I.2
Revenues Received by State and Municipal Governments From Refining Industry

Refiner	RIK	Taxes	Total
	(Millions Dollars)		
			(2) + (3)
(1)	(2)	(3)	(4)
Tesoro	$9.6	$6.7	$16.3
Petro Star	0.0	0.9	0.9
Flint Hills	13.6	1.7	15.3
Total	$23.2	$9.3	$32.5
Total (Ex Flint Hills)	$9.6	$7.6	$17.2

Source: Econ One Analysis.

The refining industry is also a major supplier of fuel to the Department of Defense (DOD) in Alaska. The State's major military installations contribute approximately $2.5 billion to Alaska's economy. The DOD has historically stated that the presence of local refiners is vital to the operation of nearby military bases and national security overall. Along these lines it has implemented purchasing policies intended to assist smaller refiners, such as Alaska's, to continue to operate. There may be no way to determine with certainty whether the closure of one of more of Alaska's remaining refineries would jeopardize the continuing existence of Alaska's military operations. However, the presence of local, reliable fuel supply is viewed by the DOD as a positive factor in determining where to locate facilities and operations.

F. Health and Financial Performance of Alaska's Refiners

The financial performance of Alaska's TAPS refiners (Flint Hills and Petro Star) has deteriorated over the past half decade. This is evidenced by Flint Hills' decision to reduce runs and ultimately terminate refining operations. While Flint Hills cited several reasons for its decision to close, including groundwater contamination, the key consideration is likely the refinery's financial performance. Our analysis of TAPS refiners' operations also indicates that profitability has significantly declined over the past 5 years.

In contrast to TAPS refiners, Tesoro's financial performance appears to be relatively healthy. Our analysis of Tesoro's operations based on publicly available information contained in its 10-K reports indicates that its refining margins over the past 5 years have been in line with prior periods. The difference between Tesoro's performance and the TAPS refiner's performance can be explained at least in part by the following:

- Product Slate: Tesoro produces a higher value product slate, including gasoline.

- Logistics: Tesoro has the ability to deliver the majority of its product via pipeline to the Anchorage area while the TAPS refiners must barge, rail or truck most of their product to market.

- Crude Supply: Tesoro has more flexibility in crude supply; it can take advantage of some lower-cost crude oils from outside Alaska, as well as crude oil more suited to its refining operations.

- Refinery Fuel: Tesoro fuels its refinery with natural gas; the TAPS refiners must use fuel oil extracted from ANS, which has been more expensive and tied to the price of oil.

- Value of Heavy End of the Barrel: The TAPS refiners "export" the heavy portion of barrel that it cannot turn into product through TAPS in the form of return oil. Tesoro exports its heavy ends via tanker to refineries outside the State. The value of resid in the return oil assigned by the TAPS Quality Bank (QB) has declined in recent years relative to its value on the West Coast.

G. Challenges Facing Alaska's Refiners

Alaska's refiners face a number of challenges today. First, general economic conditions for the refining industry on the West Coast have deteriorated in recent years. Product demand fell in the wake of the 2008 financial crisis and has not returned to pre-crisis levels. Second, the demand for jet fuel in Alaska, the largest product manufactured by Alaska refiners, has dropped by more than 40% from pre-2008 levels. Third, Alaska's refineries are technologically simple and smaller in scale than outside refineries capable of supplying the State's demand via imports. Fourth, while Alaska's distance from other markets provides a logistical advantage to the State's refiners, insulating them somewhat from outside competition, that same distance makes it more difficult for Alaska's refiners to export product that is surplus to the State's needs, such as the heavy fuel oil produced at the Tesoro facility.

Alaska's TAPS refiners face additional challenges. First, because they are located along TAPS, they are distant from markets where much of their output is sold. While some product is delivered to customers located near TAPS refiners (e.g., the Fairbanks-area) at relatively low cost, the majority of TAPS refiners output is transported to more distant

points of sale by barge, truck or rail. Barging product from Petro Star's Valdez refinery to Anchorage costs approximately $0.10/gallon. Trucking costs from Valdez to Fairbanks and from North Pole refineries to Anchorage run approximately $0.20/gallon. Rail costs between Anchorage and the Flint Hills facility in North Pole are approximately $0.16/gallon.

Another challenge faced by TAPS refiners is the valuation of return oil assigned by the TAPS QB. A relatively high percentage of return oil is composed of Residual Oil (resid). Resid values under the QB formula have declined relative to the value of resid on the West Coast and relative to other refined product values since 2008. Declining resid values in the QB formula result in higher QB fees paid by TAPS refiners to re-inject return oil into the pipeline, reducing their profit margins.

The TAPS QB is regulated by the Federal Energy Regulatory Commission (FERC).[3] Flint Hills petitioned the FERC in 2013 to modify the methodology for valuing resid in the QB formula, arguing that the methodology was no longer producing reasonable valuations for resid. ANS producers and Tesoro opposed the request. Ultimately the FERC was not persuaded by TAPS refiners' arguments and in a 2014 decision it declined to make an adjustment to the resid valuation. The matter is currently on appeal at the U.S. Court of Appeals in D.C.[4]

H. Federal Government Programs Designed to Assist Smaller Refiners

The federal government has had several programs designed to assist smaller refiners. Two of these programs involve "set asides" of production from federal leases. The first set aside program went into effect in 1976 and gave smaller refiners the right to purchase up to 20% of RIK oil. The second set aside program went into effect in 1978 under the OCS Lands Act and requires producers entering into leases with the federal government subsequent to September 20, 1978 to sell up to 20% of their production to smaller refiners, as long as those refiners are willing to pay "market value."

As mentioned above, the DOD is a significant purchaser of refined products. Federal regulations require agencies, including the DOD, to use reasonable efforts to purchase part of its requirements from small refiners. Petro Star sells jet fuel to the DOD pursuant to these small-refiner purchase programs.

---

[3] The Regulatory Commission of Alaska also regulates the TAPS Quality Bank.

[4] Flint Hills has withdrawn from the proceeding, leaving Petro Star as the sole TAPS refiner in the matter.

I. Conclusions

Alaska's refiners are relatively simple and smaller in scale than refiners on the U.S. West Coast and Asia that are capable of supplying the State via imports. As a result, Alaska refiners are not as efficient as these potential competitors. Alaska's distance from outside supply sources does provide local refiners with a logistical advantage. However, this advantage is offset to some extent by costs associated with moving products to market within the state itself via barge, truck or rail, or exporting unmarketable heavy fuel oil to refiners outside the State. Moreover, commercial jet fuel, which is Alaska refiners' single largest product, is subject to very strong competition from outside the State as large, sophisticated buyers can efficiently import product from Asia.

Tesoro has been the healthiest (i.e., most profitable) of Alaska's refiners. Tesoro's performance over the past decade has been more stable than the TAPS refiners. It is larger and more technologically complex than the TAPS refiners. In addition, its location in Nikiski allows Tesoro to process multiple crude streams, utilize (less expensive) natural gas for fuel, and to deliver product efficiently to Alaska's largest market (Anchorage) via pipeline. All of these factors contribute to Tesoro's relative health.

The financial performance of the TAPS refiners has deteriorated significantly over the last half-decade. This is evidenced by decreasing throughputs at Flint Hills starting in 2010 and its ultimate decision to cease refining operations in 2014. It is also evidenced in our analysis of TAPS refiner margins.

The operation of the TAPS QB and its valuation of return oil have contributed to the deterioration of TAPS refiner profitability. TAPS refiners effectively "sell" return oil to TAPS through the operation of the QB; it is the only outlet available for the return oil stream. The evidence suggests that resid, which is a major component in return oil, has been undervalued by the QB in recent years. Lower return oil values provided by the QB result in lower profit margins for TAPS refiners.

Alaska refiners provide the State with significant economic benefits. Prior to Flint Hills' shutdown in 2014, the refining industry employed approximately 335 individuals and accounted for nearly $200 million annually in economic activity within Alaska, including approximately $94 million in income earned by workers inside and outside the industry. In addition, the industry provided $23.2 million in revenues annually to the State in the form of RIK purchases over and above the RIV alternative and $9.3 million in property and income taxes.[5]

---

[5] These figures are annualized with respect to Flint Hills' contributions.

II. Overview of Alaska's Refining Industry

A. Location

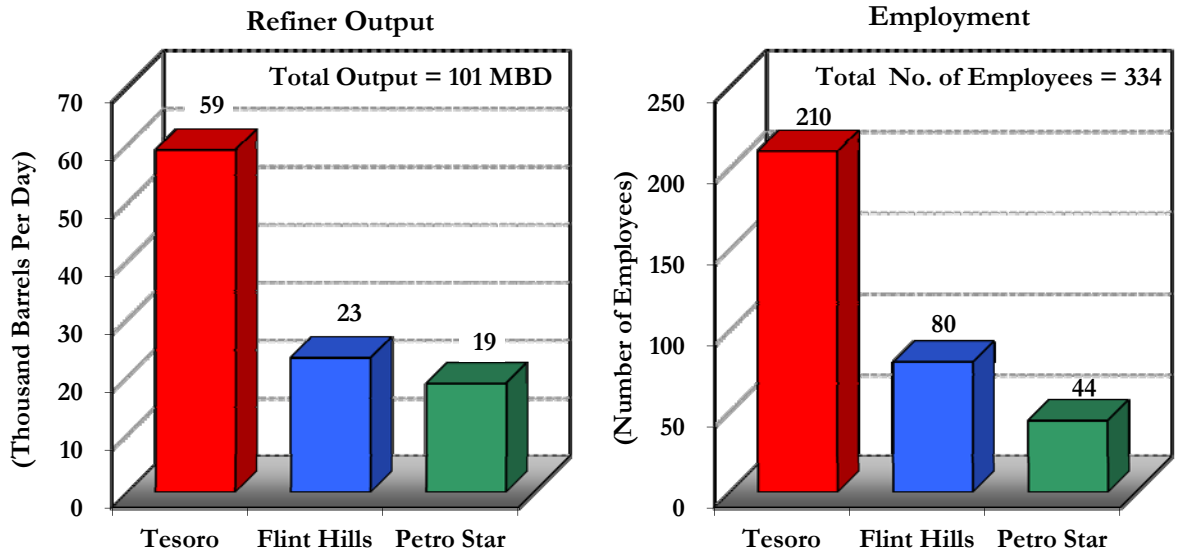
A total of six refineries operated in Alaska during 2014. Two of those refineries are small, "topping" plants owned by North Slope producers that supply product for operations on the Slope. The other four are "commercial" refineries, manufacturing petroleum product for Alaska residents and businesses. Figure II.1 shows the location of each of the six refineries in Alaska.

Figure II.1
Location of Alaska Refineries

The operation and performance of the commercial refiners, Tesoro, Petro Star and Flint Hills, is the subject of this report. Tesoro owns and operates the oldest and largest of the State's four commercial refineries at Nikiski, which is located at tidewater. The other three refineries are located adjacent to TAPS and are designed to run exclusively on ANS crude oil. The largest of the TAPS refineries is the Flint Hills facility in North Pole. Flint Hills ceased refining operations in June 2014. The other two TAPS refineries located in North Pole and Valdez are operated by Petro Star.

Alaska's four commercial refineries produced approximately 101 MBD of refined petroleum product on an annual basis as of 2014 and employed more than 330 people.[6] Figure II.2 below shows total production and employment by refiner for 2014. The figures shown for Flint Hills here reflect its status prior to closure.

Figure II.2
Refiner Output and Employment



Source: IMPLAN; Tesoro; Flint Hills; Petro Star; City of North Pole, Alaska, Regular City Council Meeting on June 2, 2014.

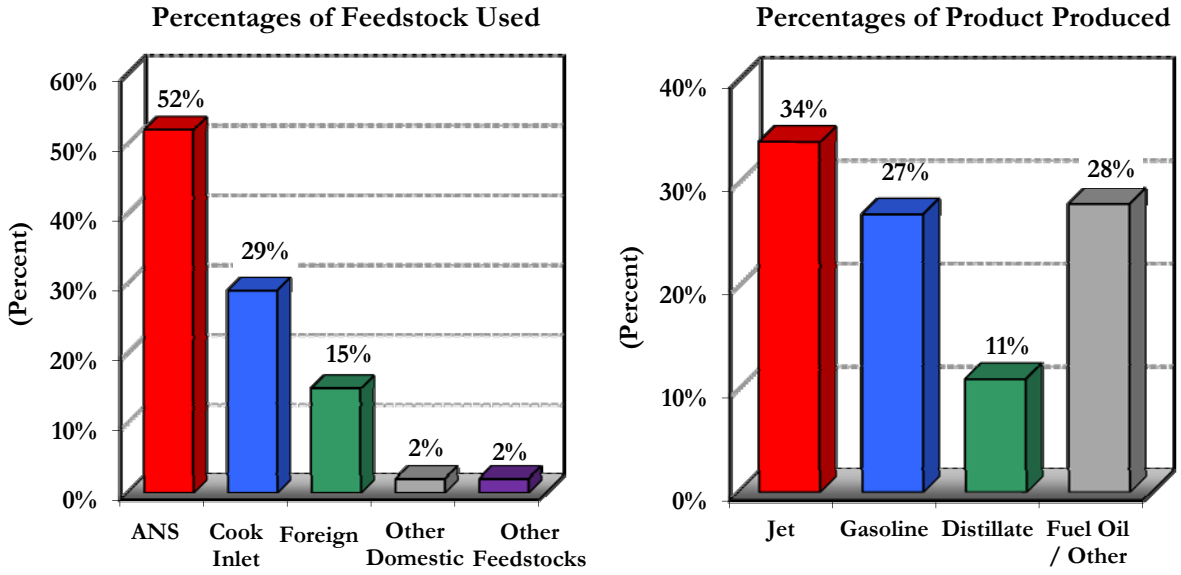
B. Tesoro

The Tesoro facility began operating in 1969. It is the most technologically sophisticated refinery in the State. It produces gasoline, jet fuel, diesel and heating oil for Alaska residents and businesses. It is the only operating refinery in the State capable of producing gasoline. Tesoro also produces nearly 30% of its output as heavier fuel oil, the majority of which is shipped to facilities outside Alaska for further processing. The refinery has a capacity of 72 thousand barrels per day (MBD). It processed approximately 59 MBD of crude oil and other feedstocks in 2014, its highest rate since 2007.

---

[6] Flint Hills' employment was 110 prior to its closure. Approximately 30 employees continue to support the ongoing terminaling operations at the Flint Hills facility in North Pole. We estimate the net refinery jobs lost at 80 (110-30). The output for Tesoro and Petro Star reflects 2014 production. Output for Flint Hills reflects 2013 production, the last full year of operation.

Figure II.3
Tesoro Refinery Input and Output: 2014



Source: Tesoro.

Figure II.3 above shows the breakdown of feedstocks processed by Tesoro and the products it produced in 2014. Approximately 80% of the refinery's input was made up of Alaska crude oil from the North Slope and Cook Inlet. The balance was oil imported via marine vessel from foreign sources, other domestic locations (e.g., North Dakota) and blending stocks.

Tesoro has invested a significant amount in its facility since 2006 to comply with regulations enacted by the Environmental Protection Agency (EPA). It invested $63 million in 2007 for the manufacture of Ultra Low Sulfur Diesel (ULSD), required in Alaska since 2010. In addition, it invested approximately $189 million between 2010 and 2014, of which a significant amount was used to meet EPA requirements for the benzene content in gasoline.[7] The Tesoro refinery employs approximately 210 people.[8]

---

[7] Tesoro completed the benzene reduction project over two phases. The first phase cost $70 million and was completed in 2010. The second phase was to be completed by July 2012. Tesoro company officials expected the total project to cost roughly $140 million.

[8] Tesoro employs a total of approximately 550 people throughout the State. Approximately 340 people are employed in operations outside the refinery.

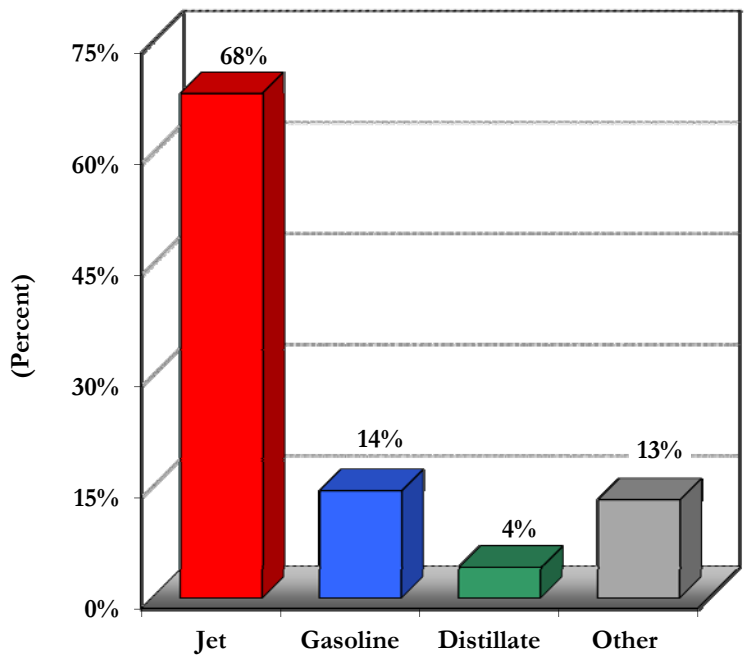
C. Flint Hills

The Flint Hills facility is the State's largest TAPS refinery. The facility first began operations in 1977 under Earth Resources of Alaska. It was subsequently purchased by Mapco in 1980, then by Williams in 1998 and finally by its current owner Flint Hills in 2004. At peak operations, the refinery was capable of processing as much as 210,000 barrels per day (210 MBD) in three crude units, extracting between 25 and 30% of the volume into refined product and returning the balance of the oil, known as "return oil" into TAPS. The refinery was initially designed to produce jet fuel and distillate (distillate includes diesel and heating oil). It was upgraded in 1981 to produce gasoline and asphalt as well. Flint Hills opted not to upgrade its facility to manufacture ULSD.

Flint Hills began reducing throughputs in 2010, shutting down one of its three crude units as demand for jet fuel in Alaska fell. It shut a second unit down in 2012 reducing operating capacity to 85 MBD, before finally ceasing all refining operations in 2014.[9] Flint Hills produced approximately 23 MBD of refined product during 2013. It operates the North Pole facility today as a terminal for the distribution of petroleum products transported from the south by rail or truck. The terminal is run by 30 employees, down from 110 employees before closure.

[9] The units that have been taken out of service were not removed and could potentially be used in the future.

Figure II.4
Flint Hills Refinery Output: 2013

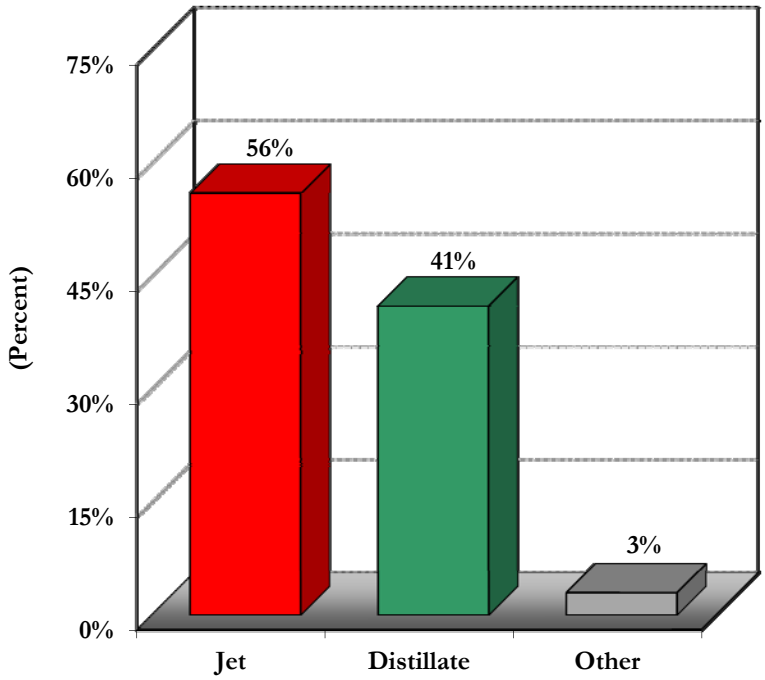


Source: Final Best Interest Finding and Determination for the Sale of Alaska North Slope Royalty Oil to Flint Hills Resources Alaska, LLC, 25 March 2013.

D. Petro Star

Petro Star is owned by the Arctic Slope Regional Corporation (ASRC). It is the only commercial refiner in the State that is Alaska-owned. Petro Star operates two TAPS refineries; one in North Pole and the other in Valdez. The North Pole facility began operation in 1985; the Valdez facility went into service in 1993. Together, the facilities can process up to 82 MBD of crude oil. Petro Star refines approximately 30% of the ANS it processes into primarily jet fuel and distillate (diesel and heating oil), re-injecting the remaining volume as return oil to TAPS. In 2014 Petro Star produced approximately 19 MBD of refined product. The output of Petro Star's refineries is shown below.

Figure II.5
Petro Star Refinery Output: 2014



Source: Petro Star.

Petro Star invested approximately $200 million beginning in 2008 at its Valdez refinery to produce ULSD. In May 2014, Petro Star began supplying naphtha-blended fuel to Golden Valley Electric Association (GVEA) for use as local power generation. Flint Hills supplied this fuel to GVEA prior to its closure. Petro Star employs approximately 44 people in its refining operations.

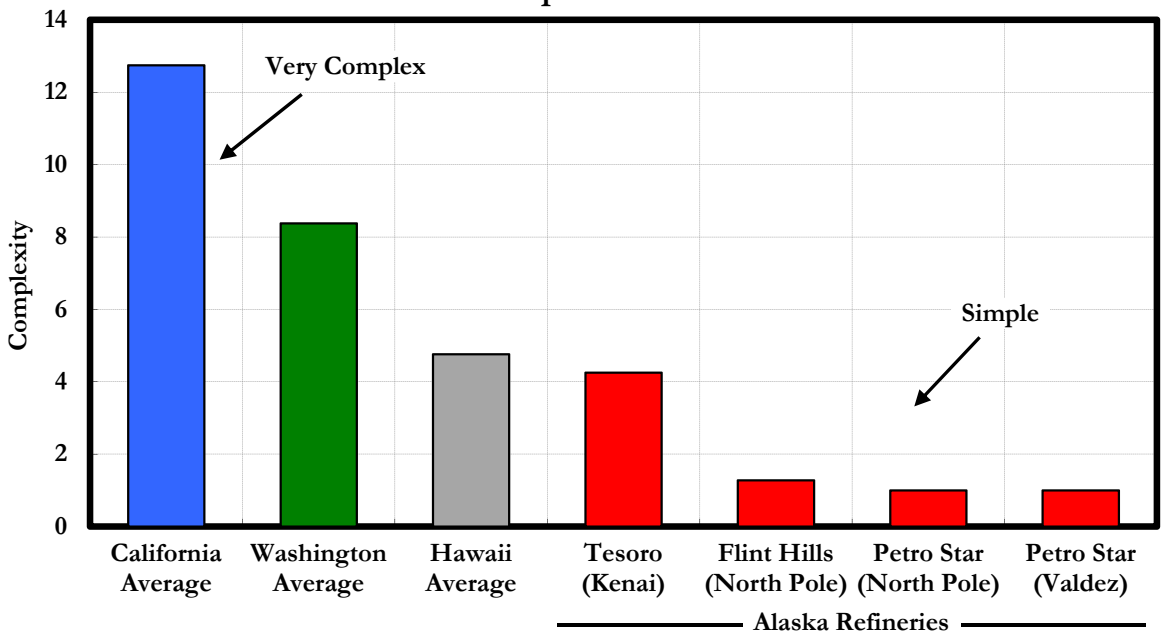
E. Alaska's Refineries are Less Complex than other West Coast Refineries

Alaska's refineries are technologically "simple" relative to typical West Coast refineries which are considered to be "complex." They are geared primarily for the production of jet fuel, diesel and heating oil (and some gasoline). They are not equipped to upgrade the "bottom" or heavier portion of the crude oil barrel. They either return this heavy oil to TAPS (Petro Star, Flint Hills) in the form of "return oil" or they export it outside of Alaska (Tesoro) via marine tanker or barge for use as a feedstock by more sophisticated refineries, such as those located on the West Coast.

The ability to upgrade the bottom of the barrel into lighter refined products determines a refinery's complexity. West Coast refiners can upgrade the bottom of the barrel into higher valued products such as gasoline and distillates using cracking and coking units. This gives them the ability to process cheaper, heavy crude oil into light products.

Figure II.6 compares the complexity of Alaska refineries to other West Coast refineries by utilizing the Nelson complexity factors. California refineries are the most complex, with the ability to process very heavy crude oil through coking units into light products. Washington-area refineries are also complex, with coking facilities. The average complexity in Washington is brought down somewhat by the presence of U.S. Oil, which is a less complex "cracking" facility. Cracking facilities have the ability to process some heavy oil into lighter products, but not to the extent of a coking refinery. Alaska's refineries are much less complex. Tesoro has some cracking capacity, but the TAPS refiners have no upgrading equipment installed.

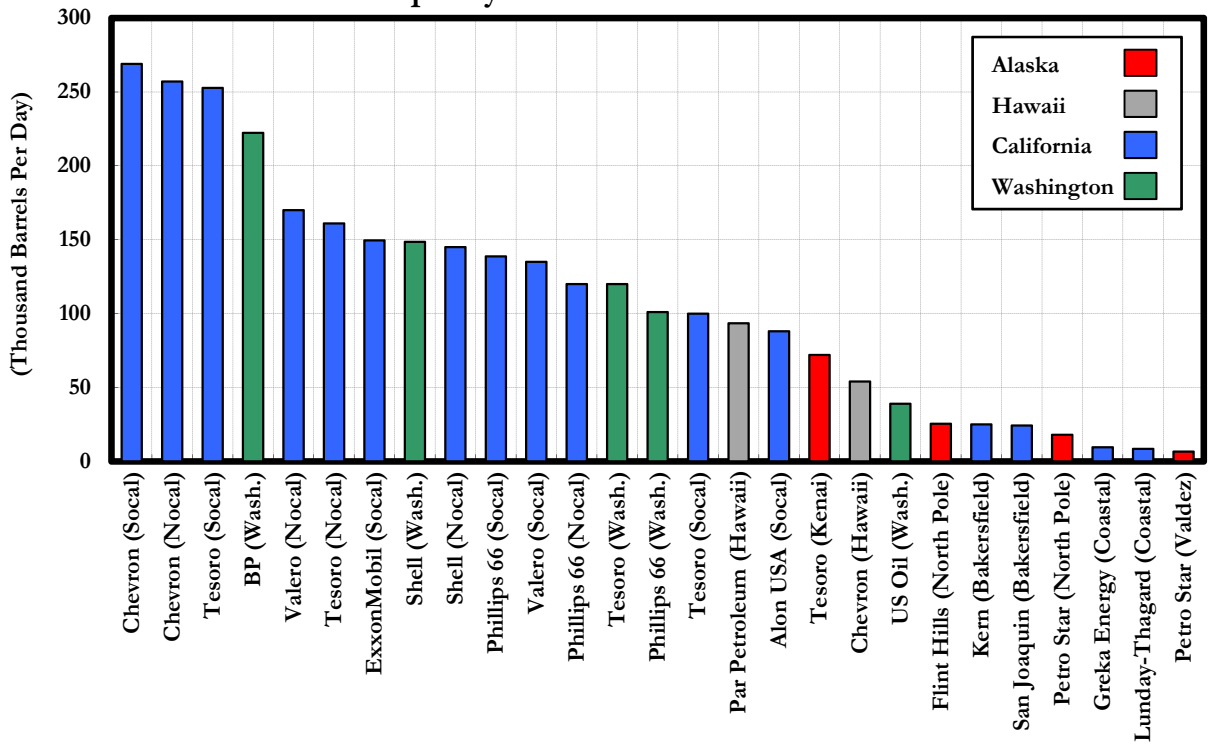
Figure II.6
Alaska Refineries Compared to Other PADD V Facilities



Source: Oil and Gas Journal; Energy Information Administration; Penn World.

Alaska's refineries are also much smaller than refineries on the West Coast. Figure II.7 shows the average capacity of refiners on the West Coast and Alaska. A typical West Coast refinery is about 4 times larger than the average refinery in Alaska.

Figure II.7
Capacity of West Coast Refineries



Note: Flint Hills and Petro Star capacity is calculated as 30% of throughput capacity, as 70% of throughput capacity is re-injected into TAPS as return oil.

Source: Flint Hills; Petro Star; Tesoro; Energy Information Administration; Oil and Gas Journal.

The lack of complexity and smaller size of Alaska's refineries put them at a competitive disadvantage relative to West Coast refineries.

III. Petroleum Product Supply and Demand Picture in Alaska

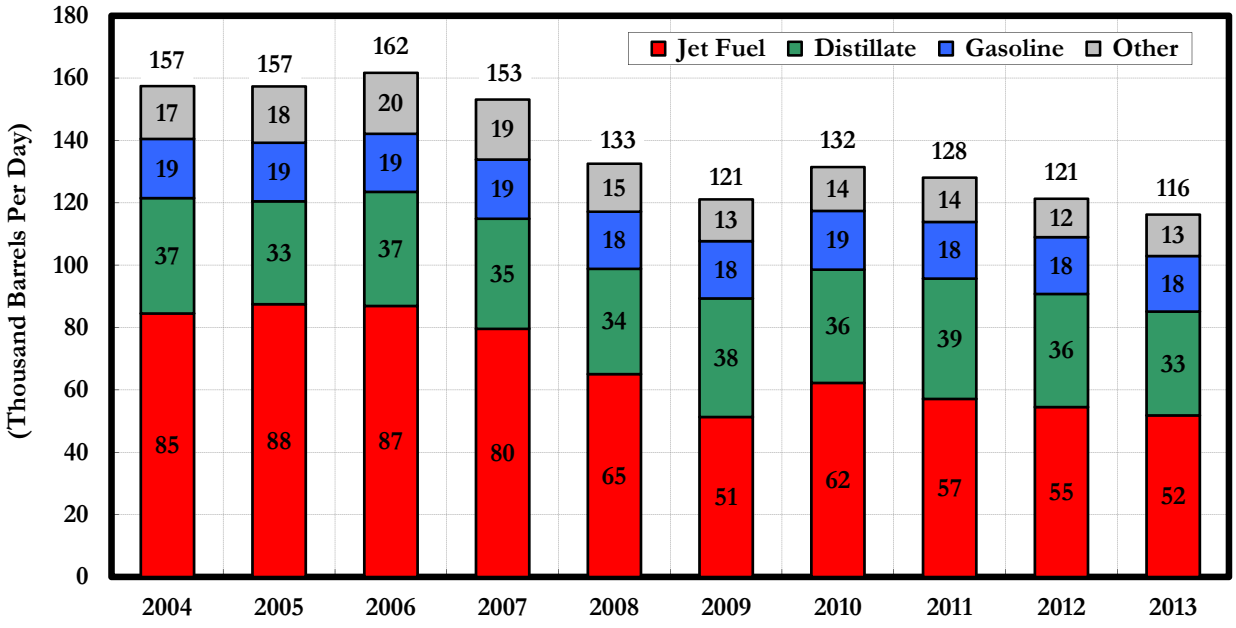
A. Petroleum Product Demand in Alaska

Figure III.1 shows total product demand in Alaska between 2004 and 2013, the latest year for which data for all products is available. Total product demand in Alaska peaked in 2006 at 162 MBD (about 2.5 billion gallons per year), falling to 116 MBD (1.8 billion gallons) in 2013.[10] Jet fuel is the largest volume product sold in Alaska, accounting for nearly

[10] The data presented here is compiled by the U.S. Energy Information Administration (EIA) and includes production from the two small topping refineries on the North Slope.

50% of total State demand during the past decade. Jet fuel sales fell from a peak of 88 MBD in 2005 to 52 MBD in 2013, a decline of approximately 40%. The drop in jet fuel demand is due to a decrease in the number of airline movements into and out of Alaska along with increasingly more fuel efficient jet engines and planes. Gasoline and distillate demand in Alaska has been relatively stable over the past decade, accounting for 16% and 28% of total State demand in 2013, respectively.

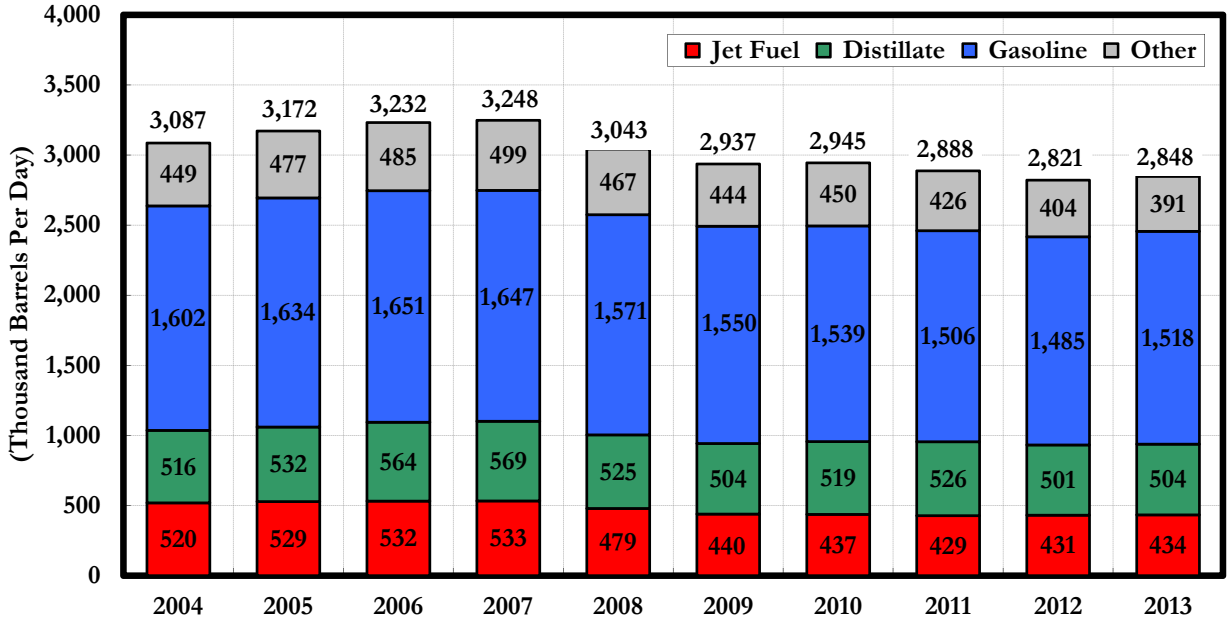
Figure III.1
Product Demand Over Time for Alaska: 2004 - 2013



Source: Energy Information Administration, SEDS.

B. Product Demand on the West Coast

Figure III.2
Product Demand Over Time for PADD V: 2004 - 2013



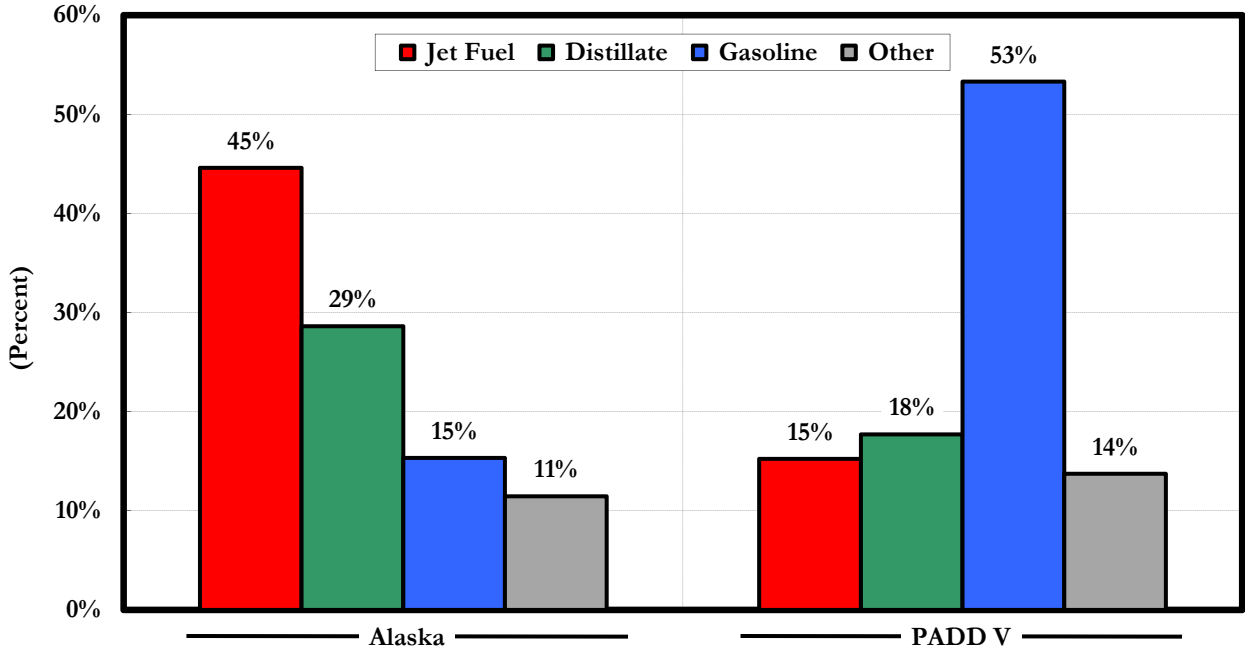
Source: Energy Information Administration, SEDS.

Product demand has also declined outside of Alaska in recent years, though not to the same degree the State has experienced. The drop in demand outside of Alaska is due in part to higher refined product prices following increases in crude oil prices beginning in 2006, the economic slowdown following the 2008 financial crisis and efficiency gains in jet engines and automobiles. Figure III.2 shows demand for petroleum product in PADD V. Similar to Alaska, demand has fallen from peak in the middle part of the last decade through 2013, with jet fuel demand falling nearly 20% since its peak in 2007.

C. Product Demand in Alaska vs. the West Coast

The composition of demand for petroleum products is unique in Alaska (Figure III.3). Jet fuel accounts for nearly half of the demand in Alaska, making the State the largest consumer of jet fuel per-capita in the U.S. In contrast, jet fuel accounts for just 15% of product demand on the West Coast generally. Distillate, which includes diesel and heating fuel, accounts for approximately 30% of state-wide demand, but less than 20% outside the State. Gasoline accounts for just 15% of all refined product sold in the State, while it is the largest product consumed outside Alaska, accounting for more than half of total refined product demand on the West Coast.

Figure III.3
Product Demand in Alaska v. PADD V



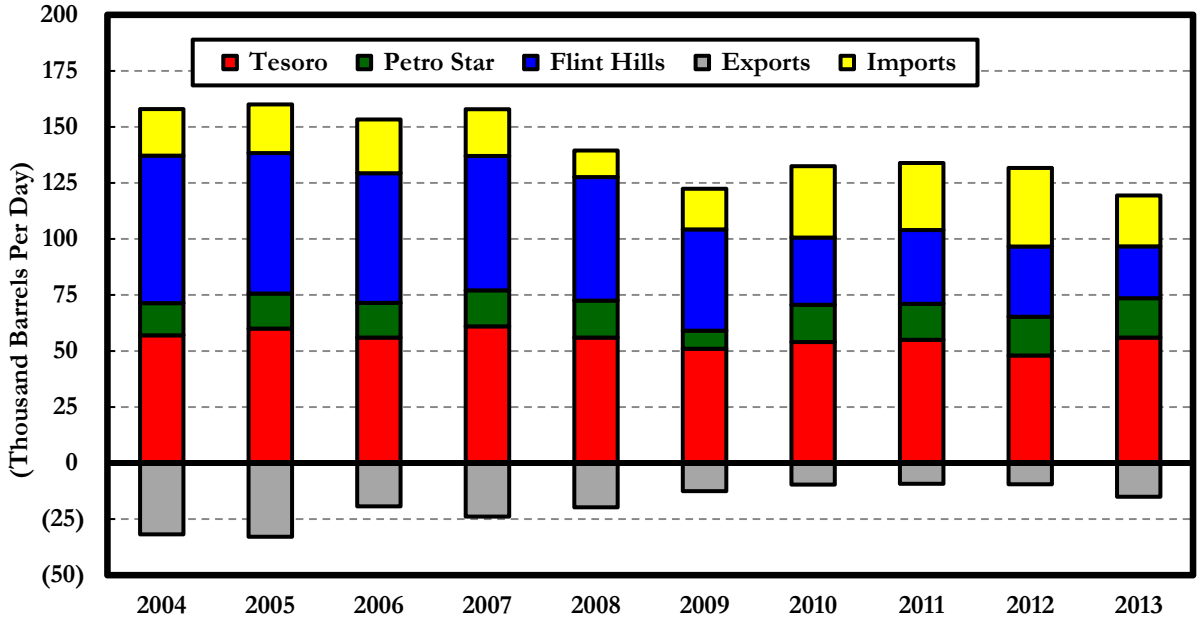
Source: Energy Information Administration, SEDS (2013).

D. Supply of Petroleum Product in Alaska

Alaska's refineries supply the majority of demand for refined product in the State, though their contribution has declined over the past decade as imports have claimed an increasingly larger percentage of Alaska's product demand. Figure III.4 shows supply to Alaska from local refiners, plus imports into and exports from Alaska. Imports are shown in yellow and add to Alaska supply. Exports are shown in grey and take away from supply. Prior to 2008 Alaska was a net exporter of refined petroleum product on balance (grey larger than yellow). It has been a net importer of product since 2009 (yellow larger than grey).

Imports represented about 16% of Alaska supply in 2004. They were 22% in 2013. The closure of Flint Hills removed approximately 25 MBD of supply from the market. The gap has been filled by increased imports, as well as additional production from Tesoro and Petro Star.

Figure III.4
Product Supply in Alaska: 2004 - 2013



Source: Tesoro: Tesoro 10-K, various years.
Flint Hills: Estimated based on RIK purchases.
Petro Star: Petro Star.
Imports/Exports: U.S. Army Corps of Engineers, State to State Commodity Movement Database.

E. Import and Export Movements

Figure III.5 below shows the movement patterns of refined product into and out of the State. Alaska refiners supply the majority of the State's demand in the Southcentral and Interior regions, while gasoline and distillate imports from the Pacific Northwest and Asia account for the majority of supply to Western and Southeast Alaska. Significant quantities of jet fuel are also imported through the Port of Anchorage or Nikiski.

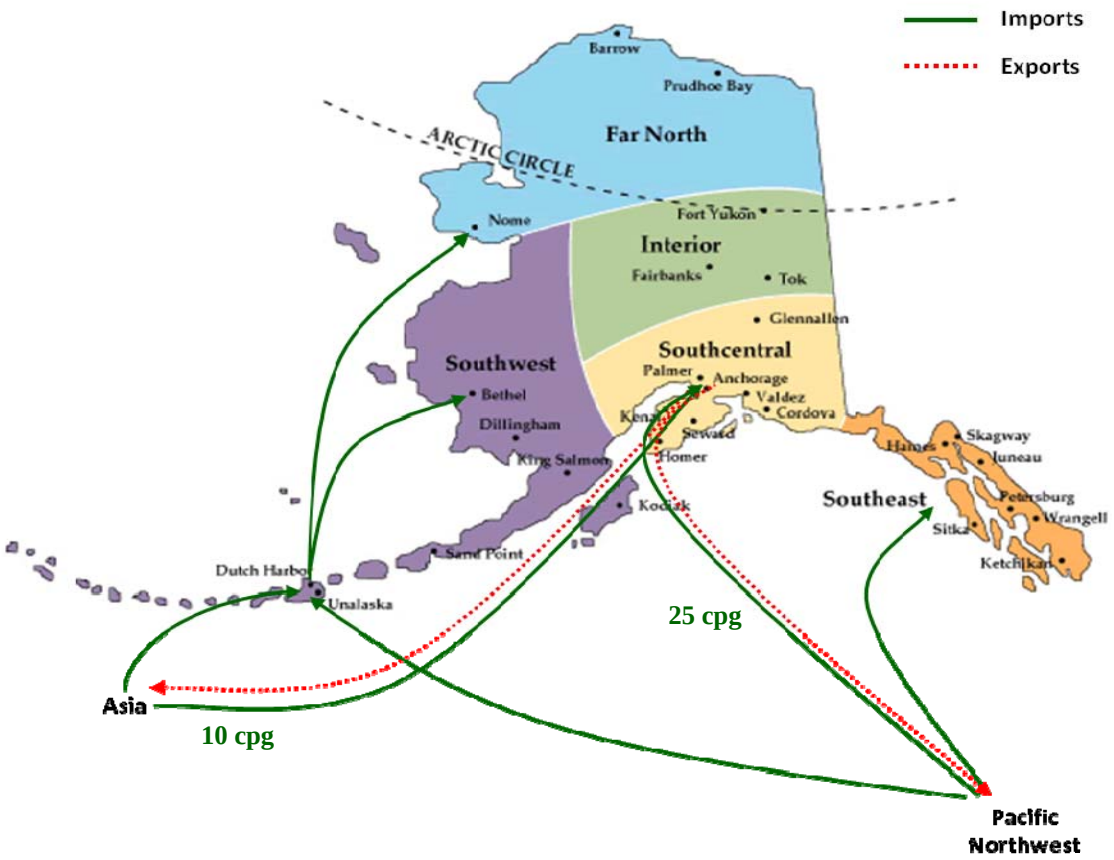
The cost to import product to Anchorage ranges from 10 cents per gallon (cpg) for shipments on tankers from Asia (mostly jet fuel), to 25 cpg for product shipped on large barges from the Pacific Northwest. The cost of shipping from the Pacific Northwest is higher than the cost from Asia because (1) shipments typically occur on barges, which are smaller and less cost efficient than tankers, and (2) vessels moving between U.S. ports must meet Jones Act requirements, i.e. they must be U.S. built, crewed and flagged, whereas movements from foreign ports do not require Jones Act vessels.

The cost to move product from the Pacific Northwest to Southeast Alaska by barge can be either higher or lower than the cost to move product to Anchorage, depending on

volumes delivered and locations served. The cost to deliver product to Western Alaska from the Pacific Northwest is significantly higher than moving product to rail belt communities.

Tesoro exports significant quantities of heavier fuel oil from its Nikiski refinery. There is no internal market for this product in Alaska and Tesoro does not have the ability to "upgrade" all of the heavy oil it produces into marketable fuels such as gasoline, jet fuel and diesel. Flint Hills and Tesoro have exported some volumes of gasoline and/or gasoline components such as naphtha in prior years.

Figure III.5
Product Movement Into and Out of Alaska



F. Transportation of Petroleum Products from Alaska's Refineries

Figure III.6 below shows the typical cost of transportation from Alaska's refineries to the major markets they serve in the rail belt. Product is moved from refinery to market via pipeline, truck, rail and barge.

Figure III.6
Refined Product Movements Within Alaska

Tesoro has the ability to move product from its refinery to Anchorage via pipeline, which is the most cost-efficient method of transportation. The cost to transport product from Tesoro's facility to Anchorage is approximately $0.02/gallon.

With the exception of product sold to GVEA, the TAPS refiners do not have the ability to move product via pipeline. Petro Star transports jet and distillate to the Anchorage area on barges at a cost of approximately $0.10/gallon. Petro Star also sends product from its North Pole refinery to Anchorage and the North Slope Borough via truck. It also trucks product from its Valdez refinery to the Fairbanks area. Trucking costs between Fairbanks and Anchorage and between Valdez and Fairbanks are approximately $0.20/gallon. Flint

Hills has the ability to send product to and from its North Pole facility via rail. Rail costs currently run approximately $0.16/gallon between North Pole and Anchorage.

IV. Refined Product Prices in Alaska

A. Petroleum Product Prices in Alaska are Higher than in the Rest of the U.S.

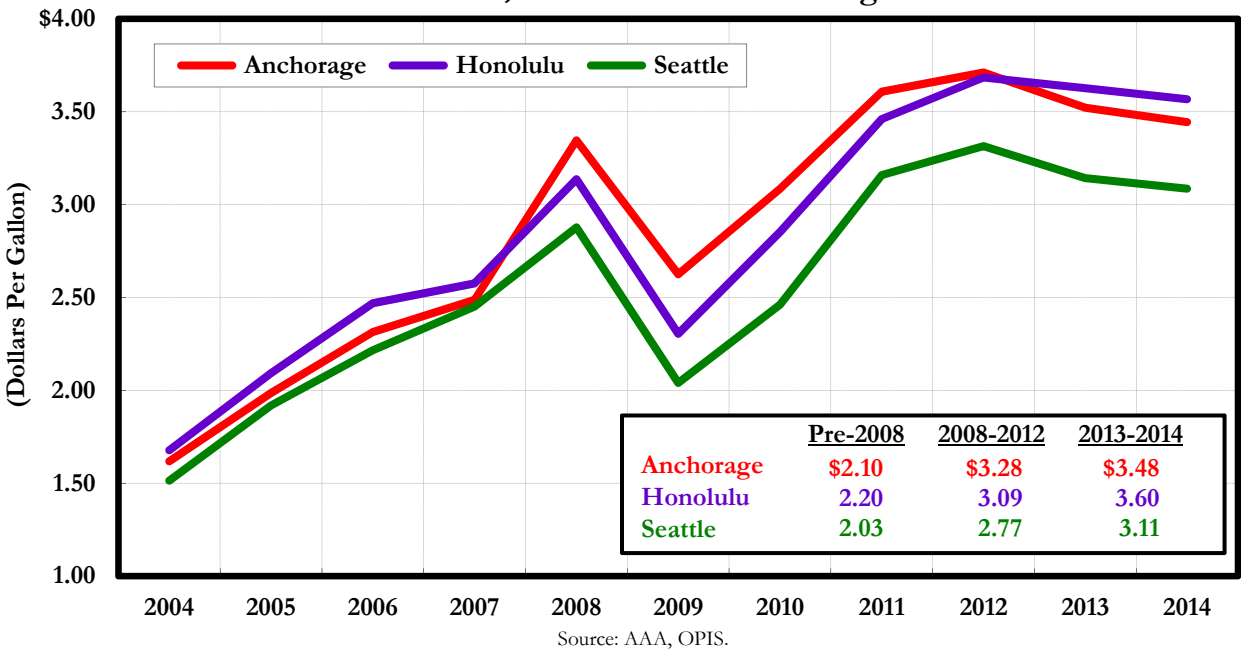
Refined product prices in Alaska are higher than they are in the rest of the U.S, though the differences in prices are not uniform across products. The highest differences are seen in gasoline and diesel, while the lowest difference is seen in jet fuel.

B. Gasoline Prices in Anchorage

Figure IV.1 below compares average annual retail gasoline prices (before the addition of taxes) in Seattle, Honolulu and Anchorage between 2004 and 2014. The Seattle area is a major refining center on the U.S. West Coast and a source of supply to Alaska. Much of the gasoline consumed in the Southeast and Western parts of the State is supplied via barge delivery out of the Seattle area. In addition, many wholesale gasoline contracts in Alaska are tied to the wholesale price of gasoline in Seattle or the Pacific Northwest.

Honolulu is similar to Anchorage in many respects (except weather and beaches, of course). It is home to two local refineries (Chevron and Par, formerly Tesoro) that supply the majority of Hawaii's gasoline needs, it is geographically isolated from alternative supply sources, and like Anchorage, it is a relatively small market with a relatively small number of suppliers at the wholesale level.

Figure IV.1
Annual Average Retail for Gasoline (Before Taxes): 2004 - 2014
Seattle, Honolulu and Anchorage



Source: AAA, OPIS.

Prior to 2008 Anchorage retail prices averaged just $0.07/gallon over Seattle retail prices and were lower than prices in Honolulu. This was a period of rising prices. Historically the spread between prices in Alaska (or Hawaii) and the larger West Coast markets narrows when prices rise, and expands when prices fall. During this earlier period Alaska refiners also exported gasoline and/or gasoline components outside the State as production exceeded in-State demand.

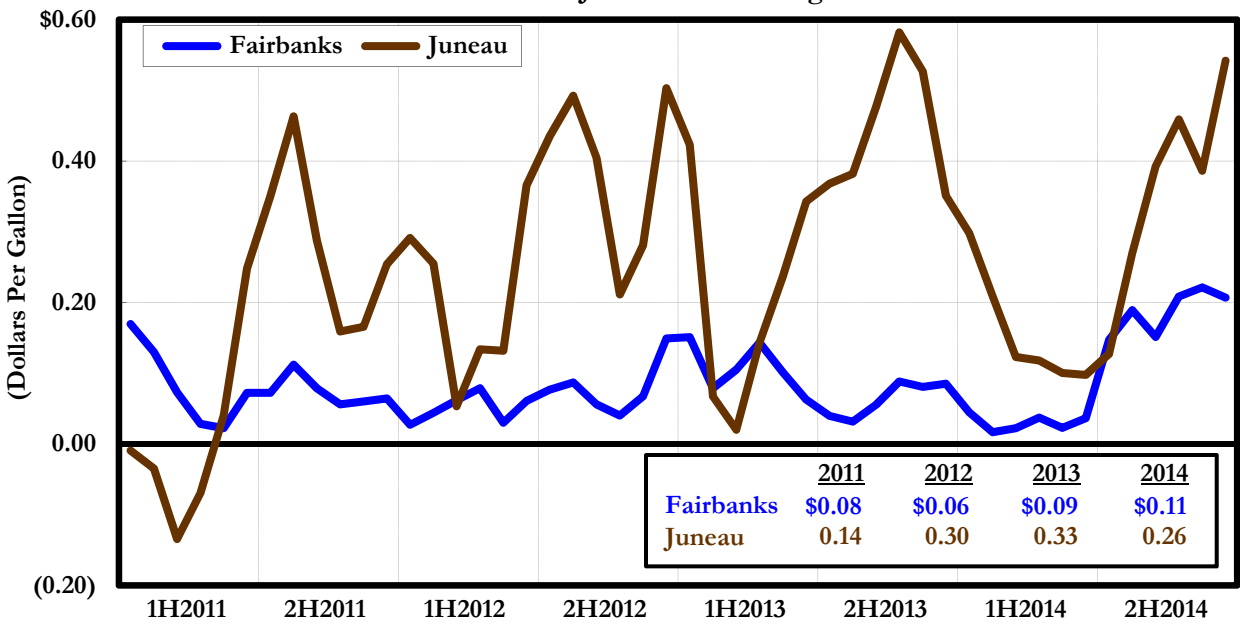
Gasoline prices fell throughout the country in the later part of 2008 as crude prices dropped by $100/barrel during a six-month period. Prices in Anchorage (and Alaska generally) fell as well, but to a lesser degree. The spread between Anchorage and Seattle prices averaged $0.51/gallon during the 5-year period between 2008 and 2012. As discussed above, this was a period of falling jet fuel demand. Flint Hills and Tesoro reduced output during this period, which resulted in lower production of jet fuel and gasoline. Lower gasoline output reduced the amount excess to Alaska's supply needs, accommodating an increase in the gasoline price spread between Anchorage and both Seattle and Honolulu relative to earlier periods.

The spread between Anchorage and Seattle fell somewhat after 2012, averaging $0.38/gallon in 2013 and $0.36/gallon in 2014. Prices in Anchorage were $0.11 lower on average than prices in Honolulu in this same period.

C. Gasoline Prices in Fairbanks and Juneau

Prices in Fairbanks and Juneau have generally been greater than Anchorage-area prices. Figure IV.2 shows retail gasoline prices in these locations relative to Anchorage over the past four years. Gasoline prices in Fairbanks averaged approximately $0.08/gallon above Anchorage prices while Flint Hills was in operation and still manufacturing gasoline. Since that time, gasoline has been brought into the Interior via rail and/or truck from points south. As would be expected, Fairbanks prices have increased relative to Anchorage since the refinery's closure, averaging nearly $0.20/gallon in the second half of 2014.

Figure IV.2
Comparison of Monthly Retail Prices for Gasoline (Before Taxes): 2011 - 2014
Fairbanks and Juneau v. Anchorage



	2011	2012	2013	2014
Fairbanks	$0.08	$0.06	$0.09	$0.11
Juneau	0.14	0.30	0.33	0.26

Source: AAA, OPIS.

Juneau is supplied from the Pacific Northwest. Prices in Juneau are more variable than prices in Anchorage and Fairbanks. Juneau prices were approximately $0.26/gallon above Anchorage prices during the four years ending in 2014.

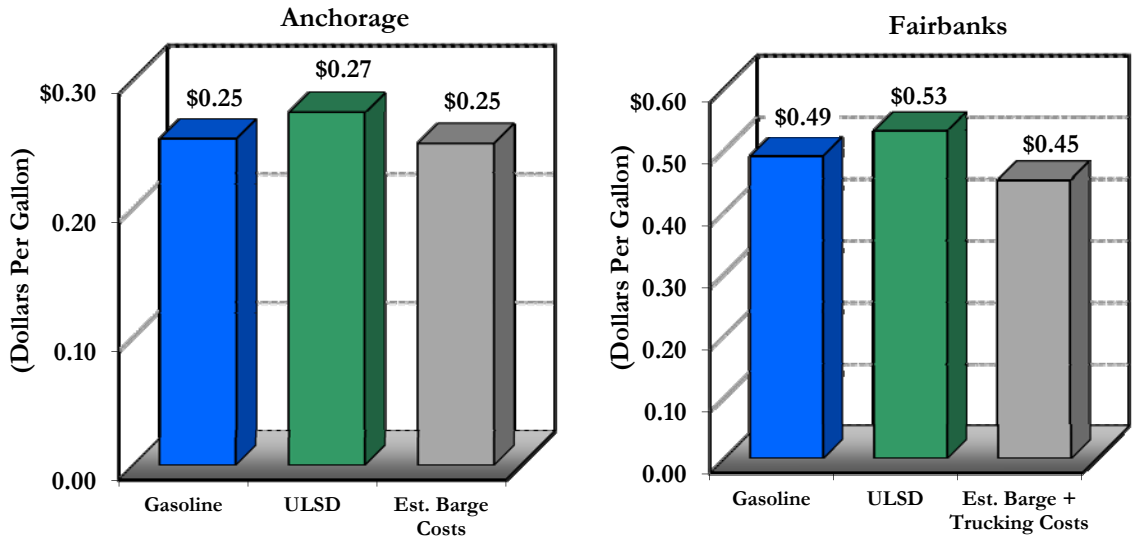
D. Wholesale Gasoline and Diesel Prices

Refiners typically post wholesale "rack" prices for marketers that buy product at a truck loading rack. Rack prices are available publicly for Anchorage and other cities including Seattle. However, comparisons of rack prices between Alaska and locations

outside the State are not particularly useful, as actual selling prices to wholesalers in Alaska are often heavily discounted relative to the published rack price. Data that is publicly available indicates that marketers in Alaska have been able to purchase both gasoline and diesel (ULSD) at prices that are generally in line or somewhat lower that the cost of importing product from the Pacific Northwest.

The State of Alaska through its Division of General Services purchases both gasoline and ULSD in Anchorage and Fairbanks from Delta Western Petroleum, a non-refiner marketer operating in Alaska. Figure IV.3 shows the State's purchase price for gasoline and ULSD in Anchorage and Fairbanks effective beginning October 2014. The State's cost of supply is in line with the cost of moving product from the Pacific Northwest to Alaska, including barge, terminal and additional truck or rail charges. Prices for Anchorage delivery are $0.25 - $0.27 per gallon over Seattle rack prices, while prices in Fairbanks are $0.49 - $0.53 over Seattle rack.

Figure IV.3
State Buying Price Over Seattle Rack: Effective October 1, 2014



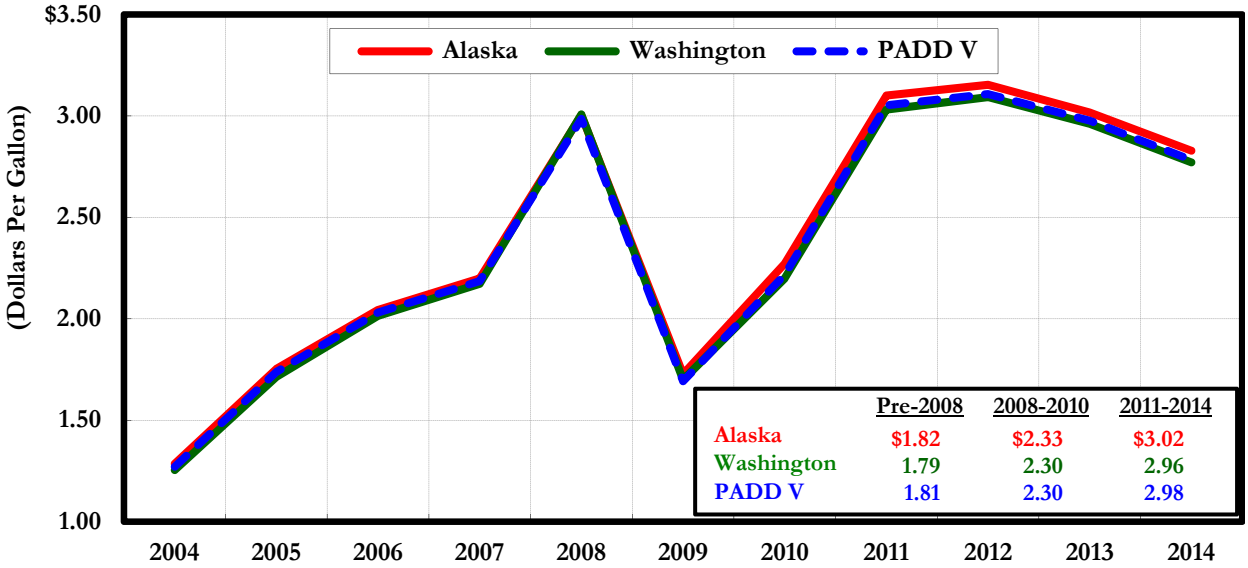
Source: State Purchases: Alaska Department of Administration;
Transportation Costs: Econ One estimate.

Delta Western likely purchases the product it supplies to the State from local refiners, as there is no indication these products are imported. If Delta Western was to attempt to import the product and make delivery to the State, the total cost, including barging, terminaling, and truck distribution to the State's facilities would likely be greater than the spread over Seattle rack that the State pays to Delta Western. This indicates that Delta Western's acquisition cost from Alaska refiners is somewhat lower than the cost of transporting product from the Seattle area to Anchorage.

E. Jet Fuel Prices

Figure IV.4 shows annual average jet fuel prices in Alaska, Washington and PADD V overall from 2004 through 2014. In contrast to gasoline and diesel, jet fuel prices in Alaska have closely followed prices in other West Coast locations.

Figure IV.4
Annual Average Retail Prices for Jet Fuel (Before Taxes): 2004 - 2014
Alaska, Washington, PADD V



Note: Alaska prices are withheld for May and Oct-Dec 2014; Washington prices are withheld for Sep-Oct 2004. We estimate these months based on their relationship with PADD V for surrounding months.

Source: Energy Information Administration.

Jet fuel is generally priced in Alaska and other West Coast locations by reference to wholesale prices in Los Angeles, CA. Those prices in turn are strongly influenced by the ability of large buyers to import jet fuel from alternative sources in Asia. Alaska jet fuel buyers also have the ability to import jet fuel directly from Asia. They can bring product in on efficient vessels and have significant storage capacity at the Port of Anchorage and Ted Stevens International Airport. Wholesale jet fuel prices in Asia are generally lower than they are on the West Coast. As discussed above, the cost of shipping product from Asia to Alaska on non-Jones Act tankers is approximately $0.10/gallon, which is significantly lower than the cost of shipping product to Alaska from the West Coast. The ability of Alaska buyers to purchase, import and store jet fuel sourced from Asia refiners allows them to obtain supply from Alaska refiners at very competitive prices.

V. Contribution of Alaska's Refining Industry to the State's Economy

A. Overview

The refining industry is one of the most significant manufacturing industries in Alaska. A 2010 study by the Alaska Department of Labor shows that the industry accounted for 11% of jobs and 23% of total wages paid to workers involved in non-seafood manufacturing. Alaska refiners provide petroleum products to virtually every industry in the State and the majority of its residents. It is also a significant supplier of product to Alaska's military bases, which account for approximately $2.5 billion in annual economic activity in Alaska.

We have estimated the contribution of Alaska's refining industry to the State's economy using the IMPLAN economic modeling software.[11] This software was originally developed for use by the Federal Government, and is now widely used by both the public and private sectors to analyze the impact of events, projects and legislation on specific industries as well as local, state and federal economies. We utilize inputs specific to Alaska that were provided by IMPLAN, Alaska refiners and other sources. We make adjustments to the basic IMPLAN data and assumptions where appropriate to better reflect the specifics of the refining industry in Alaska. Our estimates are annual figures and are based on refiners' operations as of the beginning of 2014.

B. Worker Earnings and Total Value Added By Alaska's Refining Industry

Alaska's three refiners employed 334 people at the beginning of 2014, paying approximately $45 million in wages annually. The 254 employees at the remaining operating refineries (Tesoro and Petro Star) account for approximately $35 million in annual earnings. These are highly-skilled jobs, with annual earnings averaging approximately $136,000 per year. Table V.1 below shows estimated employment and annual wages for refinery employees. For purposes of this analysis we have used average earnings data across the State's refining industry as reported by the U.S. Bureau of Labor Statistics (BLS). Actual earnings at each refiner may differ somewhat from the figures we present below, but the totals across refiners should not be materially different.

[11] IMPLAN stands for IMpact analysis for PLANing.

Table V.1
Employment and Earnings by Refiner

Refiner	No. of Employees	Earnings ($Million)
(1)	(2)	(3)
Tesoro	210	$29
Petro Star	44	6
Flint Hills	80	11
Total	334	$45
Total (Ex-Flint Hills)	254	$35

Source: Econ One Analysis using IMPLAN model and BLS data.

The industry supports an additional 1,367 jobs throughout Alaska's economy.[12] These include 785 "indirect" and 582 "induced" jobs. Indirect jobs are those outside the refining industry that help meet the needs of the industry. An example of an indirect job would be an electrician or welder that is employed by a contractor doing work at the refinery. Induced jobs are those supported by household spending of both the directly and indirectly supported jobs of the refining industry. An example of an indirect job would be a restaurant worker that provides service to someone employed by the refining industry. We estimate that earnings associated with these indirect and induced jobs is approximately $49 million, bringing the total income provided to Alaska workers by the refining industry to $94 million.[13] The loss of worker income due to Flint Hills' shutdown totals approximately $24 million annually across Alaska's economy. A breakdown is shown in Table V.2 below.

[12] These are total job positions. They are not necessarily full-time equivalent jobs.

[13] The earnings figures reported here reflect wages and/or salaries earned by workers. They do not include additional benefits paid by refiners to or on behalf of workers, such as health insurance, 401k contributions, and payroll taxes.

Table V.2
Employment and Earnings for Alaska's Refining Industry

Category	No. of Employees	Earnings ($Million)
(1)	(2)	(3)
Direct	334	$45
Indirect	785	32
Induced	582	17
Total	1,701	$94
Total (Ex-Flint Hills)	1,318	$70

Source: Econ One Analysis using IMPLAN model and BLS data.

Table V.3 below shows our estimate of the total value added to the State's economy by the refining industry. Total value added includes wages (presented above), employee benefits (such as health insurance and 401k), and any profits earned by Alaska's refiners and the business they and their employees help support. However, not all of this value added remains in Alaska's economy. Some of it is earned by owners residing outside the State, as in the case of Tesoro and Flint Hills. The figures shown here are estimates of the portion of total value added by the refining industry that remains in the State's economy, i.e., the refining industry's contribution to Alaska's economy.

Table V.3
Value Added to Alaska's Refining Industry

Refiner	Direct	Indirect + Induced	Total
	(Million Dollars)		
(1)	(2)	(3)	(2) + (3) (4)
Tesoro	$60	$67	$127
Petro Star	12	13	25
Flint Hills	21	25	46
Total	$93	$106	$199
Total (Ex-Flint Hills)	$72	$80	$153

Source: Econ One Analysis using IMPLAN model and BLS data.

We estimate that the refining industry contributed nearly $200 million to Alaska's economy on an annual basis prior to Flint Hills' closure. We estimate that Flint Hills accounted for close to $50 million per year, while the remaining operating refineries account for just over $150 million.

C. Direct Benefits to State and Municipal Governments: RIK Sales and Taxes

The State receives additional benefits from the industry in the form of RIK sales, income taxes and property (or ad valorum) taxes; the municipalities receive property tax payments from refiners.

Prior to its closure, Flint Hills purchased roughly 24 MBD (8.8 million barrels per year) in Royalty in Kind (RIK) oil from the State. The State earned an additional $1.55 per barrel when selling its oil to Flint Hills than it did in RIV received from ANS producers from the same fields. Tesoro currently purchases approximately 15 MBD (5.5 million barrels per year) of RIK from the State, bringing the State approximately $1.75 per barrel more than it would receive as RIV.[14] Petro Star does not purchase RIK from the State, though it has expressed interest in the past. It acquires ANS for its refineries from a major North Slope producer.

The industry also pays income taxes to the State and property taxes to the State, the Fairbanks North Star Borough and the Kenai Borough. Property taxes are a matter of public record; income taxes are confidential. We have estimated annual income taxes by refiner based on our analysis of refiner profitability as of 2014 and information provided by refiners. Table V.4 below summarizes our estimate of the additional revenues received by state and municipal governments from the refining industry associated with RIK sales and taxes.

We estimate that the refining industry contributed $23.2 million in additional RIK revenues and $9.3 million in taxes prior to Flint Hills' closure, for a total of $32.5 million in direct revenue benefits from refiners. Flint Hills accounted for about $15 million of this total, while the remaining operating refiners contribute approximately $17 million.

[14] These differences are due to the transportation deductions used in the RIK sales contracts versus the transportation deduction ANS producers are allowed as a part of their RIV royalty payments.

Table V.4
Revenues Received by State and Municipal Governments From Refining Industry

Refiner	RIK	Taxes	Total
	(Million Dollars)		
(1)	(2)	(3)	(2) + (3) (4)
Tesoro	$9.6	$6.7	$16.3
Petro Star	0.0	0.9	0.9
Flint Hills	13.6	1.7	15.3
Total	$23.2	$9.3	$32.5
Total (Ex Flint Hills)	$9.6	$7.6	$17.2

Source: Econ One Analysis.

D. Refiner Contribution to Military Presence in Alaska

The refining industry is a major supplier of fuel to the Department of Defense (DOD) in Alaska. The State's major military installations contribute approximately $2.5 billion to Alaska's economy. The DOD has historically stated that the presence of local refiners is vital to the operation of nearby military bases and national security overall. Along these lines it has implemented purchasing policies intended to assist smaller refiners, such as Alaska's, to continue to operate.

There may be no way to determine with certainty whether the closure of one of more of Alaska's remaining refineries would jeopardize the continuing existence of Alaska's military operations. However, the presence of local, reliable fuel supply is viewed by the DOD as a positive factor in determining where to locate facilities and operations.

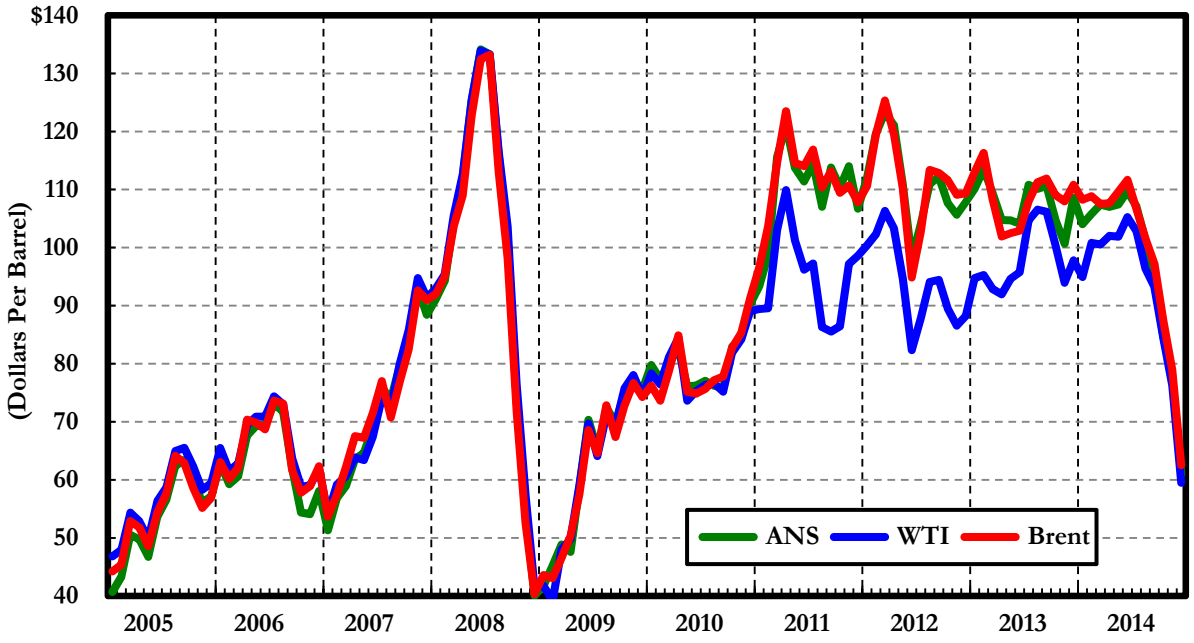
VI. Health and Financial Performance of Alaska's Refiners

A. Refining Performance in the U.S.

The health of the U.S. refining industry has varied in recent years depending on geographic location. Refiners located on the East and West Coasts (PADD I and PADD V, respectively) have seen their financial results weaken along with declining product demand in the U.S. generally. Refiners in the middle part of the country (PADDs II and IV in particular) have fared much better, due to access to relatively cheap crude caused by logistical bottlenecks and the inability to transport rapidly increasing crude oil production in these areas to refining centers. As a result, refiners in the middle part of the U.S. have

enjoyed crude costs considerably below prevailing world levels. This is illustrated below in Figure VI.1, which shows the price of Brent (representative of refiner costs in PADD I), ANS (representative of refiner costs in PADD V), and WTI (representative of refiner costs in PADDs II and IV).

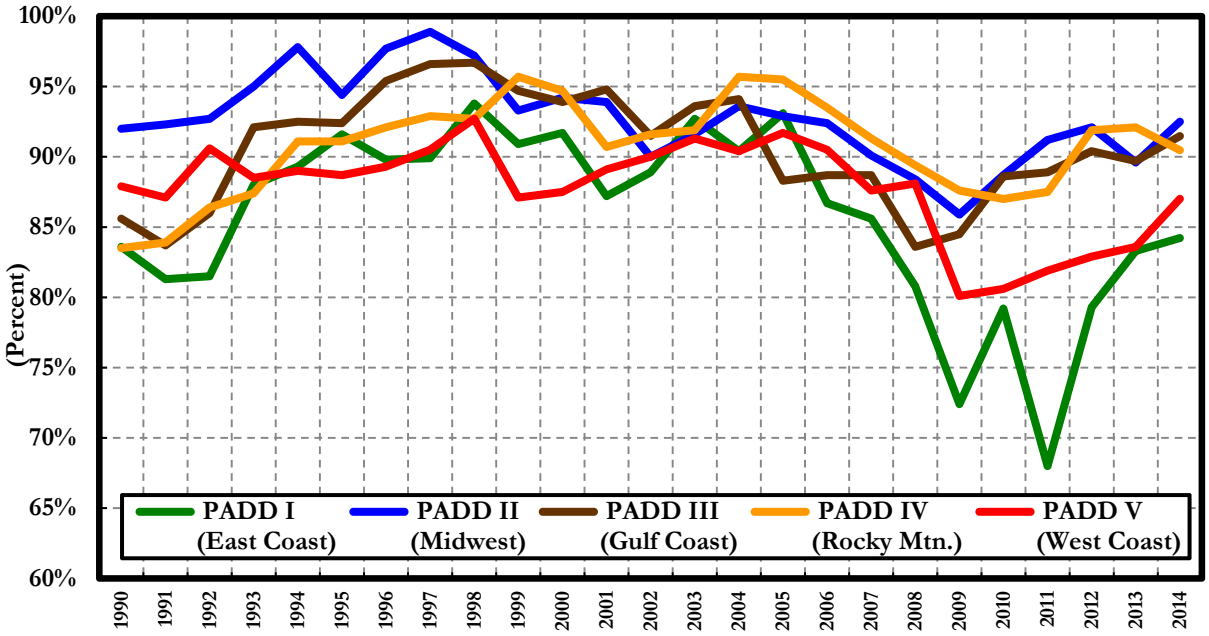
Figure VI.1
ANS, WTI and Brent Crude Oil Prices: 2005-2014



Source: Platt's.

Refinery utilization rates dropped sharply in PADD I and PADD V after 2007 as seen in Figure VI.2 below. Utilization remained relatively strong in PADDs II and IV, however, as refiners in these regions were buoyed by access to cheaper crude supplies. Utilization did rebound in PADD I after 2011, but this was largely a result of the decommissioning of capacity rather than increased throughputs.

Figure VI.2
Refinery Utilization by PADD: 1990-2014

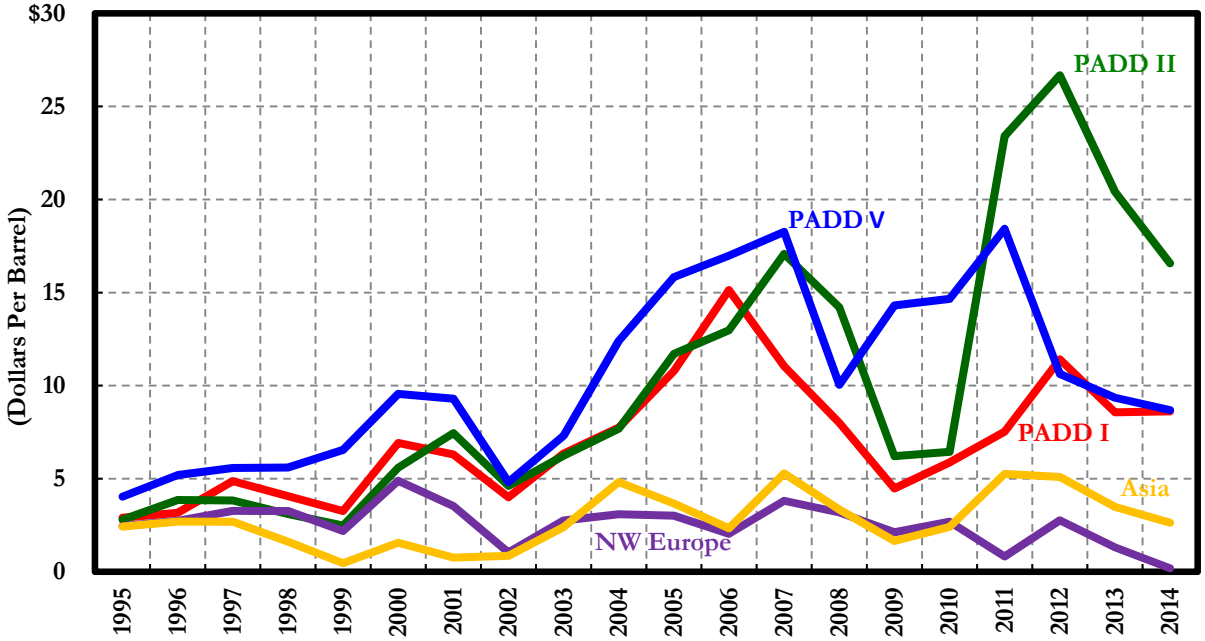


Source: Energy Information Administration.

Figure VI.3 shows per-barrel "cash" margins for typical refineries located in different regions of the U.S., Europe and Asia back to 1995. These figures are published in the *Oil and Gas Journal* and reflect the per-barrel profit earned from processing an "incremental" barrel of crude oil. They are used to analyze trends in refining profitability over time and across regions.[15] The trends in refining margins seen here show a general weakening for refiners in PADD I, PADD V and Europe, stable margins in Asia, and record margins in the middle part of the country after 2010 where refiners have enjoyed access to cheaper domestic crude oil.

[15] These margins represent the per-barrel profit earned from refining an "incremental" barrel of crude oil. The margins only consider variable costs, which are the cost of crude oil and any additional costs incurred to process the "incremental" barrel. They do not account for fixed costs or capital costs (depreciation).

Figure VI.3
Incremental Refining Margins by Location: 1995 - 2014



Source: Jacobs Consultancy, Inc., as reported in *Oil and Gas Journal*.

B. Refinery Performance in Alaska: A Tale of Two Refineries

1. General

There are no publicly available refining profitability data available that are specific to Alaska. We have examined information available in Tesoro's filings with the Securities and Exchange Commission (SEC), information provided by Petro Star and information we have assembled with respect to product prices and distribution costs in Alaska to estimate the refining margins and financial performance of Alaska's refiners over the past decade. We examine changes across time, and in comparison to the performance of refiners located on the West Coast and in Asia, both of which supply refined product to Alaska markets.

As we show in the balance of this section, the health and performance of Alaska's refineries appear mixed, much like it has been across different areas of the U.S. Tesoro, which is the most technologically sophisticated and logistically advantaged of the State's refiners, appears to have performed relatively well over the past half-decade, even as general conditions on the West Coast deteriorated. The TAPS refiners (Flint Hills and Petro Star) on the other hand have not fared as well. Their performance has declined to a greater degree than West Coast refiners.

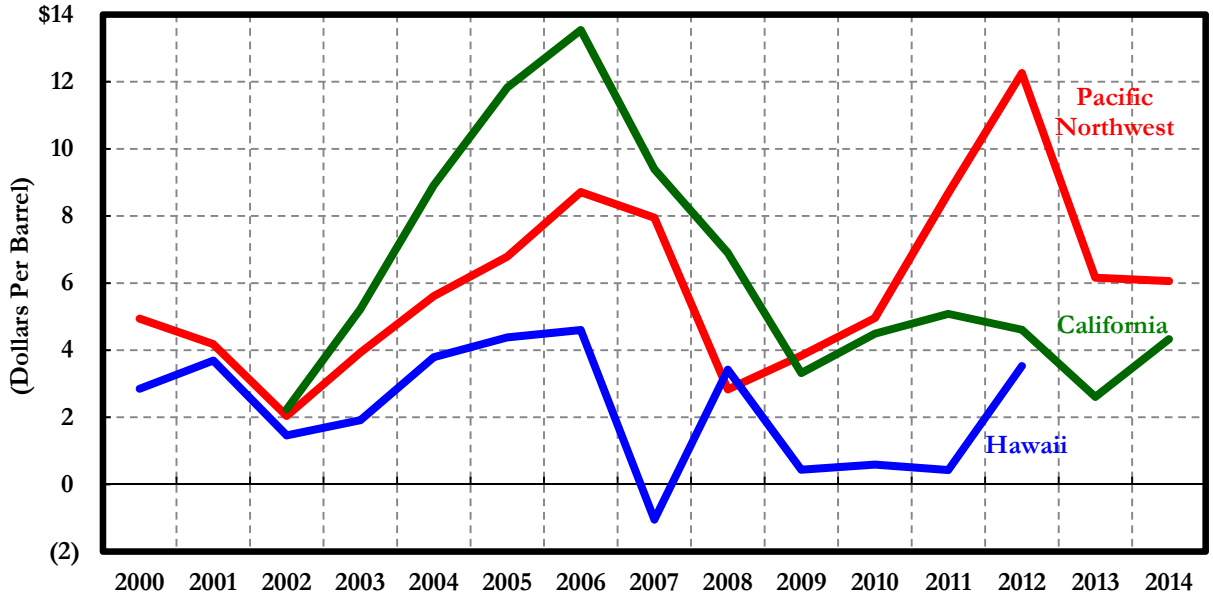
2. Tesoro

Tesoro is a publicly traded company and reports a great deal of information to investors through public filings with the SEC. Tesoro reports annual per-barrel "gross margins" and manufacturing costs by region in its 10-K filings. Gross margins are the difference between total refined product revenue and feedstock costs; manufacturing costs represent the average cost of operation, excluding (or before) depreciation and amortization. The difference between these two values is Tesoro's "net" margin.

Tesoro reports these figures for its Hawaii refinery (which was sold in 2013), its California refineries (located in Los Angeles and San Francisco) and its Pacific Northwest refineries (located in the Puget Sound and Kenai). Figure VI.4 below shows the per-barrel net margins reported by Tesoro between 2000 and 2014.

Tesoro's net margin in the Pacific Northwest region, which includes the Kenai refinery, averaged $6.02/barrel during the 5 year period ending in 2009; it averaged $7.62/barrel during the last 5-year period (ending 2014). Margins in 2014 were just over $6.00/barrel, which is close to Tesoro's 10-year average margin (2005-2014) of $6.82.

Figure VI.4
Refining Profitability as Reflected in Tesoro's SEC Filings
2000 - 2014



Source: Tesoro 10-K, various years.

Tesoro operates three refineries in California. One is located in Martinez, California near San Francisco. It was purchased from Ultramar in 2002 when Ultramar merged with

Valero. The other two are located in the Los Angeles area. Tesoro acquired Shell's Wilmington refinery in 2007; it acquired BP's Carson refinery in 2013. Margins at Tesoro's California refineries declined from an average of $9.00/barrel during the 5 years ending 2009 to $4.22/barrel during the past 5 years. Margins in 2014 were $4.33, which is significantly lower than Tesoro's 10-year average of $6.61 in California. This is a similar trend to the margin information for PADD V refiners presented in Figure VI.3 above.

Tesoro purchased a refinery in Hawaii from BHP in 1998 and subsequently sold it in 2013, citing poor financial performance as a reason. The refinery is somewhat larger, though similar in complexity, to its Kenai refinery. As seen in Figure VI.4 above, margins at Tesoro's Hawaii refinery declined in 2007 and were generally lower than historical averages after that point.

Tesoro does not report Alaska financial results separately in its 10-K filings.[16] Tesoro did publish results for the Kenai refinery prior to its 1998 acquisitions of the Hawaii and Anacortes refineries, but that was the only refinery Tesoro operated at the time. The Kenai refinery processes approximately 1/3 the volume of crude oil that Tesoro refines at Anacortes. The performance of the Anacortes refinery should be closer to Tesoro's California refineries than to its Alaska refinery, as they both serve West Coast markets and are more similar in configuration. Anacortes does process some cheaper domestic crude from the Bakken, which is a cost advantage relative to its California refineries. At the same time, however, Anacortes is not as sophisticated as Tesoro's refineries in California, with lower conversion capabilities. Though it is impossible to say with certainty (given data limitations), on balance these factors and the margin information available suggest that Tesoro's financial performance in Alaska has not declined over the past half-decade, at least to the degree seen in West Coast refineries generally.

3. The TAPS Refiners

The TAPS refiners (Flint Hills and Petro Star) are privately owned. They do not have an obligation to report financial results publicly as does Tesoro. Petro Star provided us with data regarding its operations in Alaska, including refining costs and product yields.[17] We

---

[16] We requested margin information from Tesoro along with other data for the Kenai refinery. Tesoro provided all of the information we requested, with the exception of margin data for Kenai.

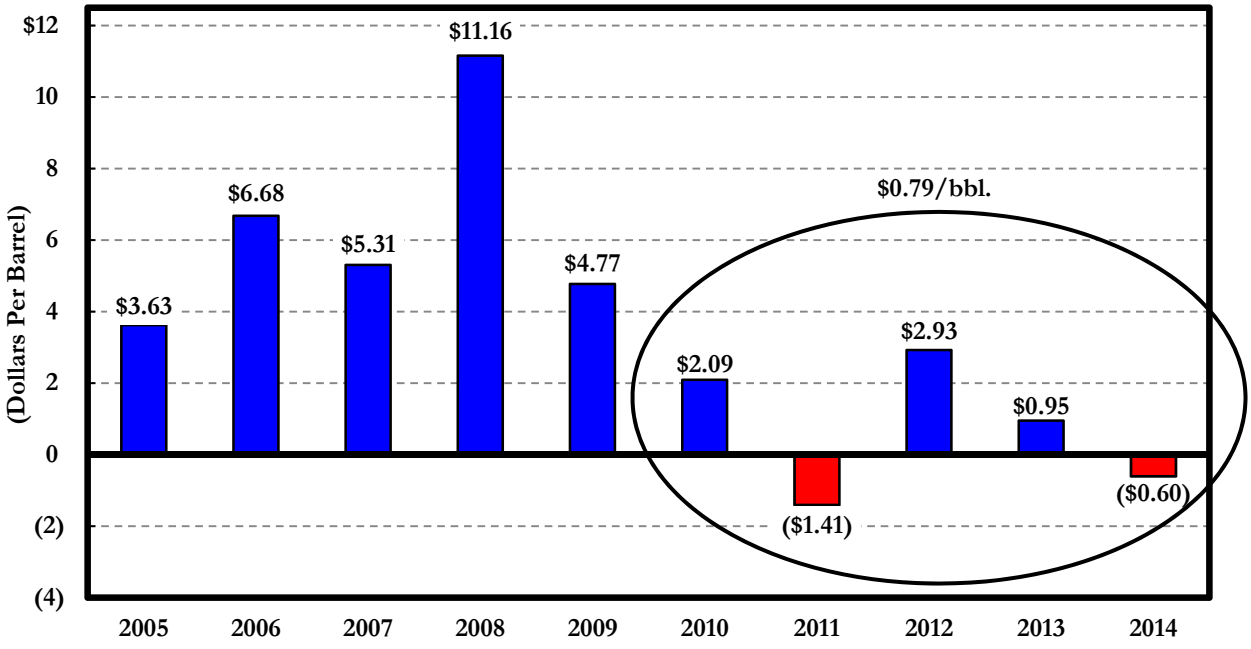
[17] As with Tesoro, we requested information from Petro Star regarding its financial performance and operations. Petro Star provided all of the requested information, including manufacturing costs, but did not provide margin data. Petro Star provided operational information for each of its refineries, but requested that refinery-specific information not be disclosed publicly. Accordingly, we have presented some of our discussion and analysis in aggregate for both refineries.

used this data along with information we developed regarding product prices to estimate refining margins over the past decade for a TAPS refinery configured similarly to Petro Star's operations in Alaska. The major assumptions used in our modeling are as follows:

- Two refineries along TAPS: 25% of production at North Pole, 75% at Valdez.
- ANS crude oil is acquired from the State consistent with the historical RIK terms.
- Crude is shipped to the refineries at the lowest published intrastate tariff.
- Return oil is subject to the historical and current QB methodology.
- Refining costs exclude depreciation and amortization; this is consistent with the cost data we used from Tesoro's public filings.
- Refined product mix is 50% jet fuel, 25% diesel fuel and 25% heating oil and includes ULSD produced at the Valdez refinery from 2010 forward.
- Valdez production is moved to Anchorage via barge and sold at prevailing wholesale prices.
- North Pole production is sold in the Fairbanks area and moved via truck to Anchorage at prevailing wholesale prices.

Figure VI.5 below shows our estimate of TAPS refiner margins over the past decade under the assumptions described above. The margins here reflect the difference between revenue and operating costs. Consistent with Tesoro's reporting of margin data in its 10-K filings, the estimated margins here do not include capital costs, which are reflected in depreciation and amortization. During the past half-decade (2010-2014), margins averaged $0.79/barrel. This represents a significant reduction relative to the prior 5-year period in which margins averaged $6.31/barrel.

Figure VI.5
Estimated TAPS Refiner Margins: 2005 - 2014



Source: Econ One Analysis.

The analysis above paints a picture of TAPS refiner performance that is consistent with Flint Hills' decision to cut back on production beginning in 2010 and to ultimately cease refining operations. Flint Hills cited several reasons for its ultimate decision to stop refining this past year, including groundwater contamination issues at its facility. However, unless continuing refining operations were resulting in an increase in groundwater contamination, ceasing operations due to this issue would not appear economically rational. Rather, the more likely reason for Flint Hills' decision appears to be the underlying financial performance of the refinery.

4. Reasons for the Difference Between Tesoro and TAPS Refiner Performance

The performance of the TAPS refiners in recent years stands in sharp contrast to the results reported by Tesoro in its 10-K filings for its Pacific Northwest refineries. The difference can be explained at least in part by the following.

- Product Slate: Tesoro produces a higher value product slate, including gasoline. As seen in Figure IV.1, gasoline prices in Alaska have been higher relative to West Coast prices since 2008. The higher spread helped support Tesoro's margins. Unlike Petro Star, Flint Hills did produce some gasoline at its refinery, though not to the same extent as Tesoro.

- Logistics: Tesoro has the ability to deliver the majority of its product via pipeline to the Anchorage area while the TAPS refiners must barge, rail or truck the majority of their product output to market. Pipeline costs from Tesoro's facility have been stable, and less than $0.02/gallon. In contrast, barge and truck costs have risen over time due to double-hull requirements for barges and increasing fuel costs for both barge and truck deliveries.

- Crude Supply: Tesoro has more flexibility in crude oil supply and has been able to use some lower-cost crude oils from outside Alaska at times, including Bakken crude produced in North Dakota. As a result, Tesoro has been able to take advantage to some extent of the depressed crude oil prices in the mid-continent of the U.S. (See Figure VI.1 above). TAPS refiners are dependent on ANS, which has remained at world levels. At the same time, however, TAPS refiners enjoy lower transportation costs to their facilities, particularly those located in the Fairbanks area, as they are closer to the supply source.

- Refinery Fuel: Tesoro fuels its refinery with natural gas; the TAPS refiners use fuel oil extracted from ANS, which has been more expensive and tied to the price of oil. Rising crude oil prices increase the cost of refinery fuel for TAPS refiners.

- Value of Heavy End of the Barrel: The TAPS refiners "export" the heavy portion of barrel that they cannot turn into product through TAPS in the form of return oil. Tesoro exports its heavy ends via tanker to refineries outside the State. The value of the return oil assigned by the TAPS Quality Bank has declined in recent years relative to the value for heavy ends available to Tesoro on the West Coast. We discuss this issue further in Section VII.

C. Summary

Refining profitability has declined on the East and West Coasts over the past half decade following the 2008 financial crisis and ensuing recession along with decreasing product demand. Refining profitability in the middle part of the U.S. has bucked the general trend because these refiners have had access to below world market crude oil supplies produced in the mid-continent.

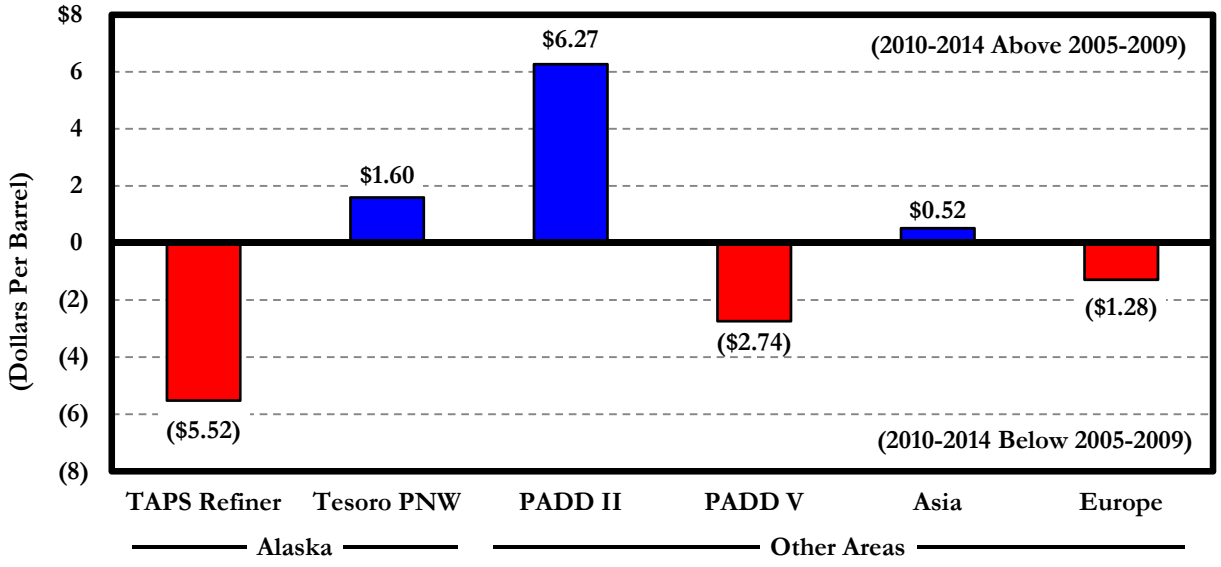
The experience of Alaska refiners is somewhat like a Tale of Two Refineries. Tesoro appears to have fared relatively well during this period, benefiting from a more valuable product slate, more advantageous logistics and access to better suited and cheaper crude oil

supplies. TAPS refiners on the other hand have not fared well in recent years. A higher percentage of their product slate (jet fuel) is subject to intense competition from outside refiners, they face more challenging and costly logistics, and they have been impacted by increasing QB costs for return oil.

Figure VI.6 below summarizes changes in refining margins earned by refiners on the West Coast (PADD V), the mid-continent (PADD II), Europe, Asia and Alaska over the past decade. The Alaska margins are calculated on a different basis than the margins for the other refiners shown.[18] However, this should not pose a problem when looking at changes in margins over the time frame examined. Changes in margins should mirror the underlying profitability change for each refiner/area.

TAPS refiners have experienced the largest drop in profitability over the past decade, followed by European and West Coast refiners. Asian refiners along with Tesoro have seen moderate increases in profitability, while mid-continent refiners have enjoyed more significant profit increases as a result of their access to relatively cheap crude oil.

Figure VI.6
Change in Refinery Margins Over Past Decade
2010-2014 v. 2005-2009



Source: TAPS Refiner: Econ One Analysis.
Tesoro: Tesoro 10-K, various years.
Other Areas: PACE Refining, Jacobs Consultancy, Inc. as reported in *Oil and Gas Journal*

[18] The margins for Alaska refiners are average margins, while the margins shown for other refining areas are "incremental" margins.

VII. Challenges Facing Alaska's Refiners

Alaska refiners face a number of challenges. Some are common to the entire West Coast refining industry, some are Alaska-specific, and some are specific to individual refiners in Alaska.

A. Common Issues

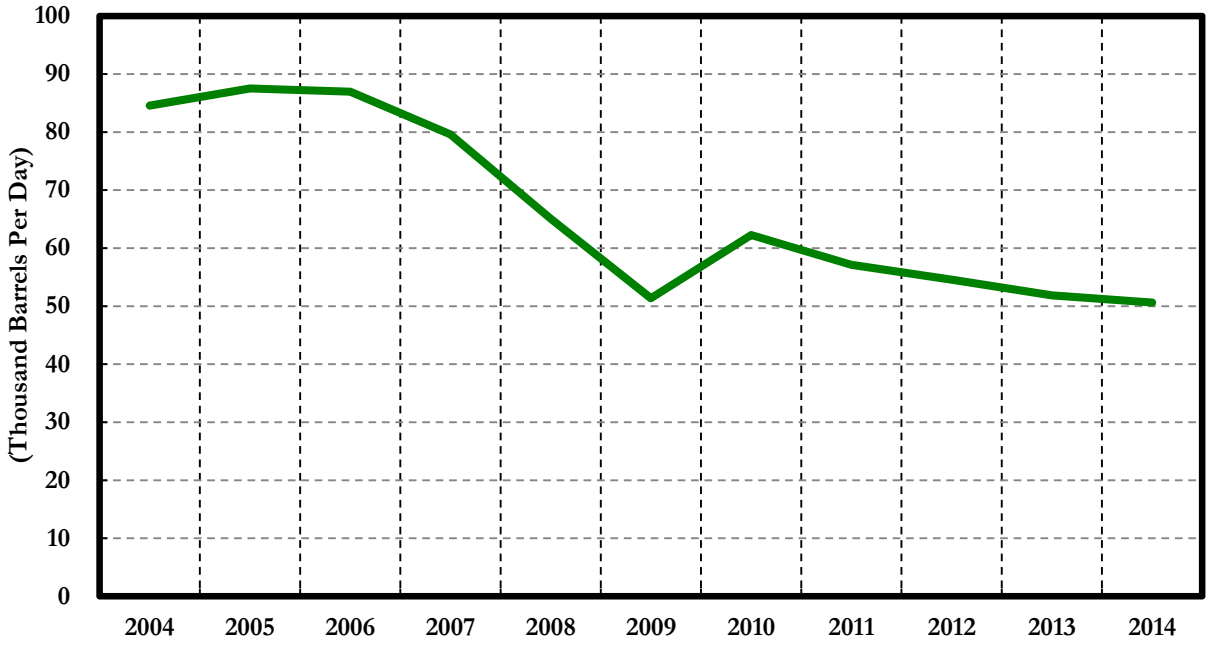
1. Decreasing Product Demand

Perhaps the most significant challenge facing refiners on the West Coast and in Alaska is the decline in demand for refined product. The demand for refined product on the West Coast decreased by 12% between 2007 and 2013 (Figure III.2). Decreasing product demand has led to lower refining utilizations in general (Figure VI.2) and declining margins and profitability (Figure VI.3). Overall product demand in Alaska has declined by 28% from pre-2008 peak levels (Figure III.1).

2. Jet Fuel Markets in Alaska

The biggest drop in demand has occurred in jet fuel markets. West Coast demand for jet fuel is off by nearly 20% from pre-2008 peak levels. Jet fuel demand in Alaska began to drop after 2006, falling significantly in 2008 and again in 2009. It rebounded slightly in 2010 before falling again through 2014. Overall, jet fuel demand has fallen by 40% over the past 8 years (Figure VII.1 below). The decline in jet fuel demand is not likely to be reversed, as improvements in jets and jet engines have resulted in greater fuel efficiency. This has allowed aircraft to fly longer routes without stopover, and it has allowed them to move passengers and/or cargo over any given distance with less fuel.

Figure VII.1
Alaska Jet Fuel Demand: 2004-2014



Source: Energy Information Administration, Alaska International Airports.

Alaska's refineries, particularly the TAPS refineries, were designed to maximize the production of jet fuel. Falling jet fuel demand led Flint Hills to idle capacity beginning in 2010 and contributed to its decision to cease refining operations last year. As discussed in Section IV, jet fuel is also the most competitive product market in Alaska, as buyers have the ability to easily bypass in-State refiners and import product from abroad. Declining demand for jet fuel on the West Coast serves to intensify competition for the remaining volumes.

3. Scale and Technology

As discussed in Section II, Alaska's refineries are relatively small in size (Figure II.7) and technologically simple (Figure II.6). The combination of these two factors puts Alaska's refiners at a disadvantage relative to larger, more efficient refineries outside the State. The disadvantage becomes greater when refinery utilization outside the State drops, as it has in recent years. Lower utilizations mean that refiners have spare production capacity, which puts pressure on product prices, margins and profitability. Refiners of Alaska's size and complexity are generally the first to close or idle units in this environment.

This disadvantage is offset somewhat by logistics. Alaska's distance from other refining sources provides the State's refiners with a "buffer" relative to its competitors, who must ship product from outside the State if they want to compete in Alaska. As discussed in Section III and shown in Figure III.5, the cost of bringing product into the rail belt from the Seattle area is about $0.25/gallon, while the cost of bringing product from Asia, which is the

source of Alaska's jet fuel imports, is about $0.10/gallon. Alaska refiners would have difficulty competing with outside refiners without this logistical buffer.

There are also logistical disadvantages facing Alaska's refiners. They are different depending on the refiner and where it is located. We discuss logistical challenges specific to each refiner, as well as other issues below.

B. Tesoro

Tesoro converts approximately 70% of the oil it refines into higher-value light products (gasoline, distillate and jet fuel); the remaining 30% is produced largely as lower-value fuel oil. The ability to convert 70% of each barrel processed into light product is better than what other Alaska refiners can do, but it is not as great as the more sophisticated West Coast refineries, which can convert 90% or more of a barrel of crude oil into light products. Tesoro's lower conversion ratio puts it at a competitive disadvantage relative to most West Coast refiners.

In addition, since most of this heavy product cannot be sold in Alaska, it must be exported to refineries outside the State that have the capability to further process it into light products. The need to export 30% of its refinery slate is an additional competitive disadvantage for Tesoro, as it must dispose of the product in markets where other refiners are located (West Coast or Asia), incurring shipping costs to do so. Tesoro has the ability to export the product to U.S. locations using larger and more efficient vessels than would be used to import refined product to Alaska from the West Coast. Nevertheless, the need to export a significant portion of its refinery output erodes some of the benefit it enjoys from its proximity to Alaska markets.

C. TAPS Refiners

The TAPS refiners face their own set of unique challenges. First, they are very "simple" operations, converting only 25-30% of the crude oil they process into light products. The balance of the oil is re-injected into TAPS as return oil. Flint Hills has/had the capability to produce a limited volume of gasoline, but does not have the capability to produce ULSD. Petro Star, the only TAPS refiner currently in operation today, can produce ULSD but not gasoline.

TAPS refiners also face higher distribution costs. While a small portion of TAPS refiners' output moves to market via pipeline, the majority is moved to market via truck, rail or barge, all of which are much more expensive than shipping via pipeline. When it was operating, Flint Hills shipped product to Anchorage via rail car, which costs approximately

$0.16/gallon. Petro Star barges product from its Valdez refinery to Anchorage at a cost of approximately $0.10/gallon; it trucks product from Valdez to the Interior and sends product from its North Pole facility to Anchorage at a cost in the range of $0.20/gallon. The majority of product sold in the Fairbanks-area from North Pole facilities is distributed by truck, though at costs lower than moving the product south to Anchorage.

Tesoro is able to move most of the product it sells in Anchorage via pipeline. The cost of moving from the Tesoro facility to Anchorage, Alaska's largest market, is less than $0.02/gallon. Product moved to the Fairbanks-area from Tesoro's facility incurs additional trucking or rail charges from Anchorage.

TAPS refiners also have higher fuel costs. They do not have access to natural gas supplies and must manufacture their refinery fuel from the ANS crude oil they process, which is more expensive. West Coast refiners as well as Tesoro's Kenai facilities all have access to lower-cost natural gas supplies for refinery fuel.

TAPS refiners are dependent on one supply source, ANS. They do not have the flexibility to take advantage of some of the lower-cost or more suitable crudes that Tesoro can.

Finally, TAPS refiners must "export" the majority of the crude oil they process into TAPS as return oil. For each barrel of return oil re-injected into TAPS, refiners pay a "penalty" into the Quality Bank that is designed to compensate other shippers for the degradation in value to the ANS common stream caused by the heavier return oil. Though not structured as a sale, the TAPS refiners effectively sell the return oil to TAPS shippers through the operation of the Quality Bank. This is their only market. The price they receive is set by the Quality Bank pursuant to tariffs governed by the Federal Energy Regulatory Commission (FERC) and the Regulatory Commission of Alaska (RCA). The current methodology employed by the TAPS QB appears to undervalue return oil, at least in recent years. This has negatively impacted TAPS refiners' margins and profitability. We discuss this issue further in the section below.

D. TAPS Quality Bank

The purpose of the TAPS QB is to account for the differences in values among the various streams that flow into the ANS common stream exported from Valdez (the Composite Stream). Those streams consist of the oil produced from the different fields on the North Slope, as well as the return oil that is re-injected by TAPS refiners.

The Quality Bank measures the different streams comprising ANS by estimating the value of the components (or "cuts") contained in each stream when refined in a typical West

Coast Coking refinery. This method, known as the "distillation methodology" has been used since 1994. The FERC and the RCA have regulatory jurisdiction over the Quality Bank.

The cut values used in the QB calculation and the values assigned to the various North Slope crude streams at Pump Station #1 on average during 2013 are illustrated in Figure VII.2.

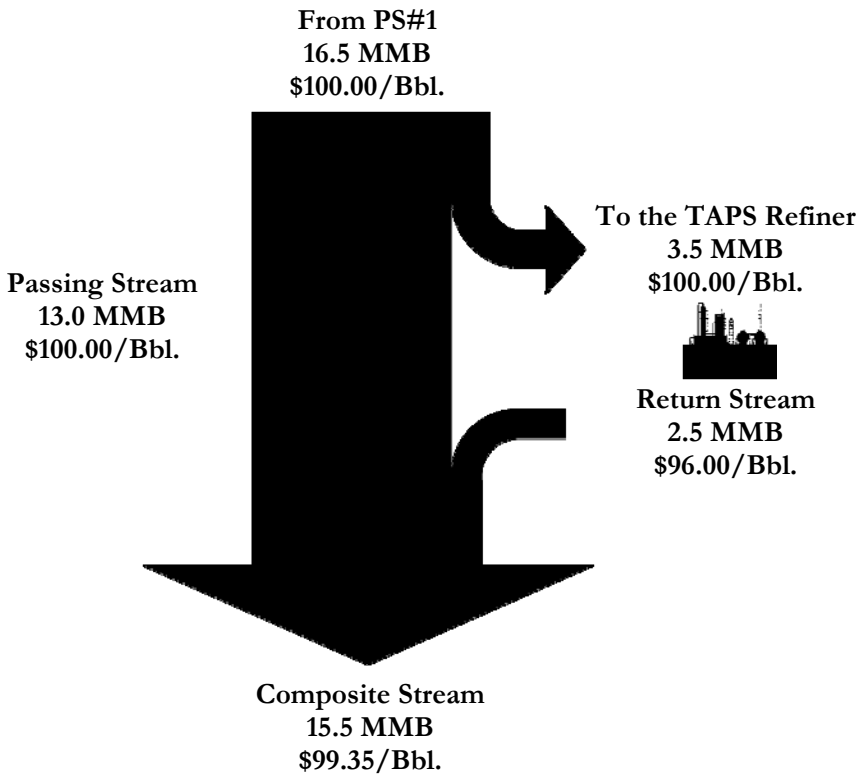
Figure VII.2
Illustration of the TAPS Quality Bank Methodology: Composite at PS1

Component	Percent of Total	Component Value	Field	Field Value
Propane (C3)	0.47%	$47.65	Badami Unit	$105.89
IsoButane (iC4)	0.93%	71.23	Nikaitchuq Unit	106.65
Normal Butane (nC4)	2.75%	65.08	Kuparuk River Unit	106.75
LSR Gasoline (C5-175F)	6.70%	84.56	Milne Point Unit	107.09
Naphtha (175F-350F)	18.37%	113.64	Duck Island Unit	107.47
Light Distillate (350F-450F)	9.62%	124.14	Oooguruk Unit	107.93
Heavy Distillate (450F-650F)	19.43%	121.96	Prudhoe Bay Unit	108.14
Gas Oil (650F-1050F)	26.80%	119.92	Colville River Unit	108.35
Resid (1050F and Over)	14.95%	73.51	Lisburne Unit	109.35
			Northstar Unit	111.91
Stream	100.00%	$107.96	→	$107.96

Lighter crude oil streams from the Northstar, Colville River and Prudhoe Bay units that contain relatively greater percentages of the higher valued cuts (Naphtha – Heavy Distillate) are more valuable, while heavier crude streams from the Badami, Nikaitchuq and Kuparuk units that contain a greater percentage of the lower-value resid are less valuable. Shippers of less valuable oil pay into the Quality Bank; shippers of more valuable oil receive payments from the Quality Bank. The sum of payments and receipts wash out each month.

Differences in stream values are also measured along TAPS at the Golden Valley Pipeline and at Valdez where crude is taken off by the TAPS refiners and where return oil is re-injected into the TAPS common stream. The TAPS refiners remove some of the more valuable cuts in the refining process. As a result, the oil they return to TAPS is less valuable and heavier than the oil they remove. This is illustrated in Figure VII.3.

Figure VII.3
Illustration of the TAPS Quality Bank Methodology: Return Oil Impact



In this example the value assigned by the Quality Bank to the 16.5 million barrels of monthly production from the North Slope at PS1 and available to TAPS refineries at the North Pole is $100.00. This is known as the "passing stream" because it passes the refineries (except for the portion they process). In this example TAPS refineries remove 3.5 million barrels for processing during the month, extracting 1 million barrels of light refined product and re-injecting 2.5 million barrels of return oil into TAPS, which is assigned a value of $96.00/barrel by the Quality Bank, based on the composition of the stream and the Quality Bank cut values. The return oil is lower in value and heavier than the passing stream because the refiners have removed a portion of the lighter end of the oil in the refining process. The 2.5 million barrels of return oil valued by the Quality Bank at $96.00/barrel is comingled with the 13.0 million barrels of "passing" oil that was not removed by TAPS refiners valued by the Quality Bank at $100.00. The value assigned by the Quality Bank to the "combined"

stream of passing oil and return oil is $99.35, which is the volume weighted average of the two.[19] This calculation is set forth below.

Equation 1: (13.0 MMBLS x $100 + 2.5 MMBLS x $96)/15.5 MMBLS = $99.35/bbl.

TAPS refiners pay into the Quality Bank based on the difference between the value of the passing stream and the return stream. The fee is calculated as follows.

Equation 2: 2.5 MMBLS x [$100/bbl (passing) - $96/bbl. (return)] = $10 million.

This equates to $4.00/barrel for each barrel of return oil re-injected by TAPS refiners. It equates to $10.00/barrel for each barrel retained by TAPS refiners and turned into product.

Equation 3: $10 million / 1 MMBLS = $10/bbl.

The amount paid into the Quality Bank by TAPS refiners is paid to shippers to compensate them for the degradation in quality caused by the return oil. The payment is equal to the difference between the value of the passing stream, which is what shippers put into TAPS, and the composite stream, which is what is available to shippers after the return oil is comingled with the passing stream. The calculation is set forth below.

Equation 4: 15.5 MMBLS x [$100 (passing) - $99.35 (composite)] = $10 million.

Table VII.1 below shows the average composition of the passing and return streams at the connection points between TAPS and the North Pole refineries in 2013.

[19] This example is intended to be a simplified illustration of the Quality Bank methodology as it relates to the TAPS refiners. The figures used are illustrative only and are not drawn from any particular month or refinery.

Table VII.1
North Pole Passing and Return Stream Composition: 2013

Component	Passing Stream	Return Stream	Difference
	(Percent)		
	(1)	(2)	(2) - (1) (3)
Propane (C3)	0.47%	0.31%	-0.16%
IsoButane (iC4)	0.93%	0.74%	-0.19%
Normal Butane (nC4)	2.75%	2.14%	-0.59%
LSR Gasoline (C5-175F)	6.70%	6.66%	-0.04%
Naphtha (175F-350F)	18.37%	13.23%	-5.14%
Light Distillate (350F-450F)	9.62%	2.28%	-7.34%
Heavy Distillate (450F-650F)	19.43%	17.53%	-1.90%
Gas Oil (650F-1050F)	26.80%	36.08%	+9.28%
Resid (1050F and Over)	14.95%	21.03%	+6.08%

The return stream has a lower percentage of the more valuable light cuts (Naphtha and Light Distillate), which have been extracted by the TAPS refiners, and a higher percentage of the less valuable resid, which are not extracted in the refining process. Accordingly, higher values for the lighter cuts result in higher payments by TAPS refiners, while higher values for the heavier cuts result in lower payments. These relationships are illustrated in Figure VII.4 below.

Figure VII.4
Quality Bank Relationships

Cut Value	Value Difference Between Passing and Return Stream	Payment by TAPS Refiner And Credit to Shippers
Light ↑	↑	↑
Light ↓	↓	↓
Heavy ↑	↓	↓
Heavy ↓	↑	↑

Flint Hills petitioned the FERC in 2013 to modify the QB methodology, arguing that the formula was undervaluing resid. FERC dismissed the Flint Hills complaint but opened its own investigation. ANS producers and Tesoro (who are all shippers) opposed changing the resid valuation. The FERC was not persuaded by the TAPS refiners' arguments and chose not to make adjustments to the resid valuation. FERC issued its opinion in 2014. Petro Star appealed the FERC's decision to the U.S. Circuit Court of Appeals in D.C., where it is pending. Flint Hills has withdrawn from the litigation, and Petro Star is the sole appellant.

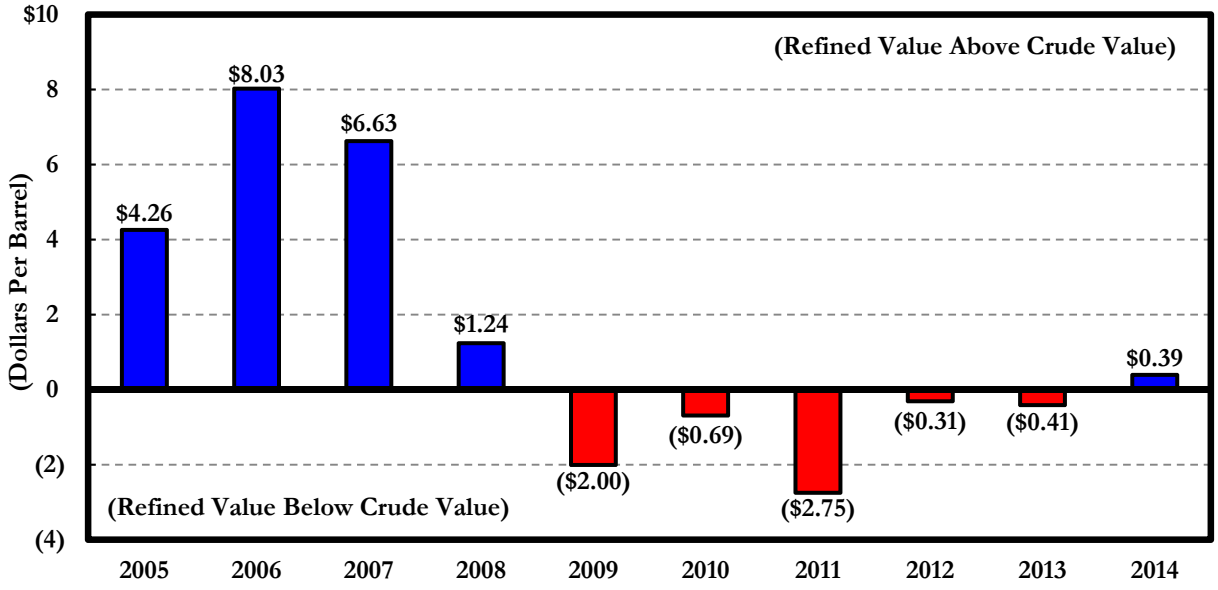
TAPS refiners argued during the regulatory process that resid had been undervalued since at least 2009. They argued that the cost deductions assumed for coking operations in the Quality Bank methodology have not accurately reflected what the market has allowed refiners to earn on those assets. They argued that the cost deductions are too high, inappropriately reducing the value of resid used by the TAPS QB. They also argued that the assumed coker yields in the QB methodology understate liquid recoveries, which further reduces the value of resid.

We have reviewed information presented to the FERC by the TAPS refiners and ANS shippers. An exhaustive review of the entire record is beyond the scope of this report. Notwithstanding this limitation, we found the evidence presented by TAPS refiners to be compelling, suggesting that resid likely has been undervalued by the existing Quality Bank methodology in recent years.

We also reviewed the FERC's Opinion and considered the reasoning offered in rejecting TAPS refiners' positions and upholding the existing Quality Bank valuation of resid. We present some of the information below that indicates a problem with the existing QB methodology and that give us pause when considering the FERC's decision with respect to the reasonableness of the resid values produced by the current QB methodology.

First, the composite value of the TAPS stream using the QB methodology has generally been lower than the market value of ANS since 2009, as seen below in Figure VII.5. The QB methodology uses the values of refined products on the West Coast to determine the value of the different cuts for each stream. The composite value of refined products should normally be higher than the value of the raw crude used to manufacture those products. The difference in the two is the value added in the refining process, (i.e., refining costs and profit). Accordingly, the value assigned the Quality Bank to the composite ANS stream should generally be higher than the West Coast market value of ANS itself.

Figure VII.5
The Value of the ANS Composite Stream has Generally Understated Market Value Since 2009

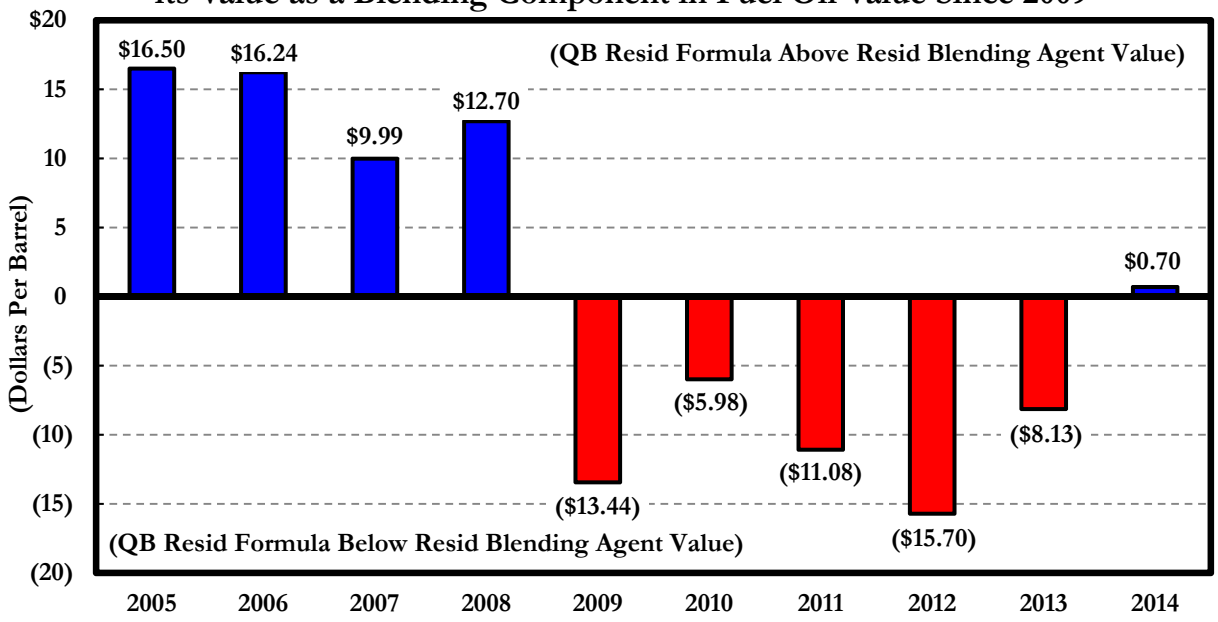


Source: TAPS Quality Bank; Platt's.

This difference was positive through 2008, but has generally been negative since then. The relationship that has existed since 2009 indicates that one or more of the QB cuts has been undervalued in recent years. It does not necessarily indicate that the problem is the resid valuation, just that one or more of the cuts has been undervalued.

Second, the value of resid oil when used as a blending component for bunker fuel has been higher than the value of resid provided for in the QB methodology since 2009. This is contrary to the expected relationship between these two measures and contrary to the relationship seen prior to 2009, as shown below in Figure VII.6.

Figure VII.6
The Value of the Resid Used by the Quality Bank has Understated its Value as a Blending Component in Fuel Oil Value Since 2009



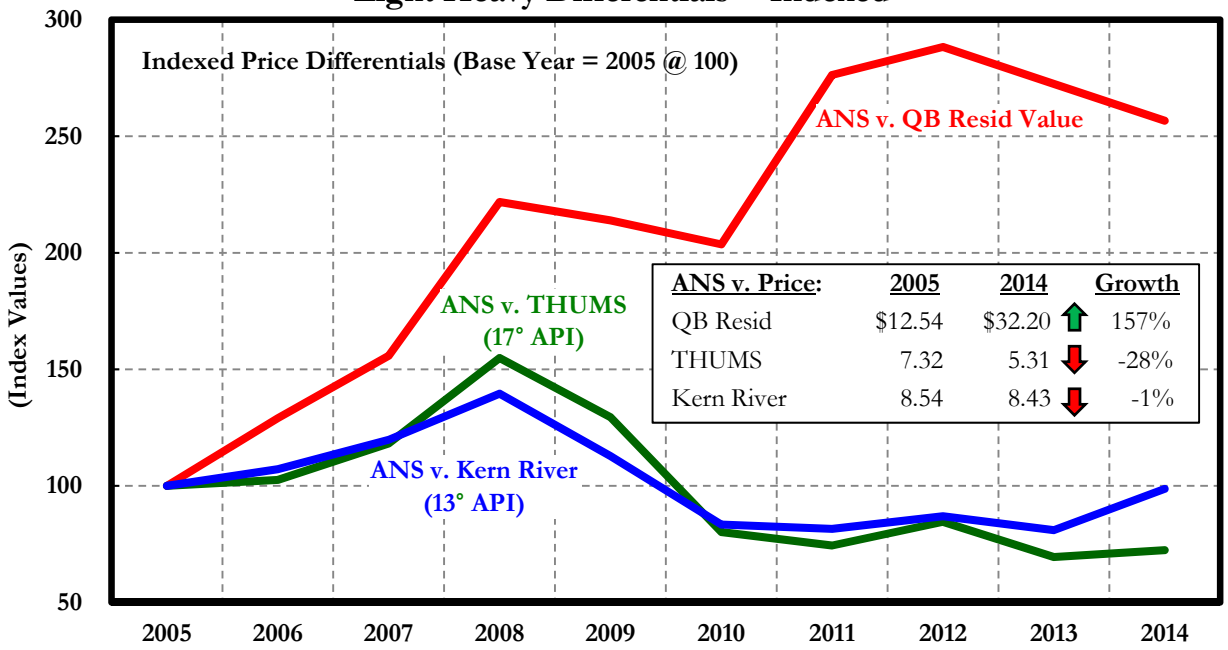
Source: TAPS Quality Bank; Platt's.

The QB methodology determines the value of resid based upon its estimated value as input to West Coast coking refineries. The QB methodology for resid valuation starts with the values of the products (e.g., gasoline) that are derived from coking ANS resid, then subtracts the estimated costs (both operating and capital costs) to arrive at the value of resid as an input to a coker.

The highest and best use for ANS resid is as an input to a coking unit. That was the case prior to 2009 and has been the case since. Blending resid into bunker fuel is an inferior (i.e., less valuable) use for ANS resid. Yet, the QB valuation methodology, which assumes the resid is processed in a coker, yields lower values beginning in 2009. This indicates that resid is one of the cuts (or perhaps the only cut) that has been undervalued by the QB methodology.

Third, the value difference observed between lighter and heavier oil streams (the "light-heavy differential") on the West Coast indicates a problem with the QB resid valuation. Figure VII.7 below shows the change in value from 2005 through 2014 between ANS, which is a relatively light crude oil on the West Coast, and Kern River and Thums crude, two of the heavier crude oils produced in California. It also shows the change in value between ANS and QB resid values during the same period.

Figure VII.7
Light Heavy Differentials -- Indexed



Source: TAPS Quality Bank; Platt's.

This figure shows the light-heavy differential measured by ANS and the QB resid valuation grew by 157% between 2005 and 2014. At the same time the light-heavy differential measured by ANS and the two heavy California crude streams was either flat, or moving in the opposite direction (i.e., suggesting a narrowing of the light-heavy differential). The difference between the market value of ANS and the QB resid value suggests a widening light-heavy differential, while the difference in the market value of ANS and heavy California crude oils clearly shows a flat or narrowing light-heavy differential. This picture further suggests a problem with the QB resid valuation.

VIII. Federal Government Programs Designed to Assist Smaller Refiners

The federal government has enacted a number of "set aside" programs designed to assist smaller refiners in remaining competitive by providing access to crude supply and federal bulk fuel procurement. As in the case of Alaska's refiners, small refiners in other parts of the country are often located near military installations. The government has viewed

the success of these refineries as an important asset in ensuring adequate supply of jet fuel and other energy needs to the military.[20]

A. Small Refiner Supply Set Asides

Two of these programs have focused on assuring access to crude oil supplies at "reasonable" prices and involve set asides of production from federal leases for use by smaller refiners.

The Minerals Management Service (MMS, now BOEM) established the Small Refiner Program in 1976, under the Mineral Leasing Act of 1920. The program gave smaller refiners the right to purchase up to 20% of federal RIK oil at "market value." The program was intended to provide a reliable supply of crude oil for smaller refiners who did not have access to their own production. The Small Refiner Program had 60 contracts in the mid-80s, but only 6 by the end of the 1990s as the MMS made changes to its RIK program.

By 2005 the RIK oil in the Pacific no longer generated sufficient small refiner interest and the Pacific portion of the program was discontinued. By 2008, the MMS was considering terminating its RIK program in the wake of scandal and corruption allegations. The MMS reviewed the program and decided that there was still sufficient economic need to keep in place. There were only two RIK contracts for small refiners in 2010 when the program was deemed to be no longer needed and it was phased out upon expiration of the remaining contracts. Through the life of the program small refiners purchased over 550 million barrels of royalty oil worth over $13 billion.

The second supply set aside program went into effect in 1978 under the OCS Lands Act and remains in effect today. The law requires offshore producers entering into leases with the federal government subsequent to September 20, 1978 to sell up to 20% of their production to smaller refiners as long as they are willing to pay "market value." Market value is not defined under the program and the contract terms are left up to the parties to negotiate. The 20% is separate from any RIK royalties paid by the producer. The program provides an opportunity for refiners, but does not set price levels. The producer is still free to set and negotiate rates and is allowed to consider finances and creditworthiness of the applicants.

---

[20] Department of the Interior, Minerals Management Service. (30 July 2008). MMS Small Refiner Program to Continue [Press Release]. Retrieved from http://www.boem.gov/boem-newsroom/press-releases/2008/press0730.aspx

B. Small Business Purchase Programs

The federal government supports the development and continuation of smaller business, including refineries through procurement set asides. Congress enacted the Small Business Act in 1953 to ensure that a portion of purchases, contracts and sub-contracts are placed with small businesses. Congress establishes small business contracting guidelines for each department. For example, the DOD currently targets sourcing 21% of contracts and 37% of sub-contracts from small businesses. These budgeting goals are achieved through the Small Business Set-Aside Program.

The DOD considers the importance of small refiners in its fuel supply decisions. Since 1960, the DOD has specifically targeted small refiners through a set aside for bulk fuel contracts. Bulk fuel contracts are often too large for a single refiner to fill, so the Department allows multiple parties to fill a single contract and sets aside a portion for small refiners. The Department first requests offers from all suppliers that can meet the needs in a general geographic area. The Department calculates the regional prices that would prevail if there were no small business set asides and then offers that price to the small refiners. Petro Star qualifies as a small refiner and has participated in partial set aside contracts through the DOD for aviation fuel.

IX. Conclusions

Alaska's refiners are technologically simple and smaller in scale than refiners on the U.S. West Coast and Asia, which are capable of supplying the State via imports, making Alaska refiners less efficient than these potential competitors. Alaska's distance from outside supply sources provides local refiners with a logistical advantage relative to their competition. However, much of this advantage is offset by costs associated with moving products to market within the state itself via barge, truck or rail, or exporting unmarketable heavy fuel oil to refiners outside the State.

Jet fuel is the single largest product manufactured by Alaska's refiners. Alaska refineries were designed to produce a major portion of their output as jet fuel to meet the need of what once was a large and growing market. Jet fuel accounts (or accounted for in the case of Flint Hills) for more than 50% of the output of TAPS refineries and about 34% of Tesoro's output.

Jet fuel demand grew in Alaska through 2005 but has dropped by more than 40% since then, with large decreases in 2008 and 2009. Jet fuel is also subject to very strong competition from outside the State as large, sophisticated buyers can efficiently import

product from abroad. These factors have had a significant impact on Alaska refiners and contributed to Flint Hills' decision to shut crude units down beginning in 2010, and eventually to cease refining operations this past year.

Tesoro has been the healthiest (i.e., most profitable) of Alaska's refiners. Tesoro's performance over the past decade appears to be more stable than other in-state refiners. It is larger and more technologically complex than the TAPS refiners. In addition, its location in Nikiski allows Tesoro to process multiple crude streams, utilize (less expensive) natural gas for fuel, and to deliver product efficiently to Alaska's largest market (Anchorage) via pipeline. All of these factors contribute to Tesoro's health relative to the TAPS refiners.

The financial performance of the TAPS refiners has significantly deteriorated over the last half-decade. This is evidenced by decreasing throughputs at Flint Hills starting in 2010 and its ultimate decision to cease refining operations in 2014. It is also evidenced in our analysis of TAPS refiner margins.

The operation of the TAPS QB and its valuation of return oil have contributed to the deterioration of TAPS refiner profitability. TAPS refiners effectively "sell" return oil to TAPS through the operation of the Quality Bank; it is the only outlet available for the return oil stream. The evidence indicates that resid, which is a major component in return oil, has been undervalued by the QB methodology in recent years. Lower return oil values provided by the Quality Bank result in lower profit margins for TAPS refiners.

Alaska refiners provide the State with significant economic benefits. Prior to the Flint Hills' shutdown, the refining industry employed more than 330 individuals and accounted for nearly $200 million annually in economic activity within Alaska, including approximately $94 million in earnings for Alaska workers inside and outside the industry. In addition, the industry provided the State with $23.2 million in revenues annually in the form of RIK purchases over and above what the State would have earned from RIV. It paid approximately $9.3 million to the State and municipal governments in taxes. RIK and tax contributions totaled $32.5 million annually. Flint Hills accounted for approximately half of this amount, mostly in the form of RIK purchases.

Alaska refiners provide fuel to a majority of the State's residents and businesses and are a significant source of fuel for Alaska's military installations. These facilities support more than $2.5 billion in economic activity annually in Alaska.