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TRANSPORTATION OF ALASKAN OIL TO THE U.S. GULF COAST

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I. INTRODUCTION AND SUMMARY

The civil unrest in the Republic of Panama has raised the issue of alternative means of transportation for Alaskan crude should the Petroterminal de Panama (PTP) pipeline be shut down. The 81-mile line running from Puerto Armuelles on the Pacific Ocean to Chirique Grande on the Caribbean Sea was opened in October 1982, replacing the Panama Canal as the way to move Alaskan North Slope crude across Panama to eastern U.S. destinations. It is majority-owned by U.S. companies; the Republic of Panama holds a 41 percent interest. The pipeline has recently been carrying about 600 - 650 thousand barrels per day, one-third of North Slope production. Service has already been disrupted for a brief time due to general power shortages. The need for alternatives will be quickly felt in a prolonged shutdown, since lack of transportation to market outlets would reduce Alaskan crude oil output.

Our memorandum focuses on the domestic transportation alternatives, primarily using the Panama Canal again and diverting supplies through the Continental U.S. pipelines out of California. Differing views of tanker requirements, tanker availability and pipeline alternatives on the Continental U.S. can all contribute to a different assessment of whether the existing domestic modes of transportation can handle the pipeline volume. We have not addressed the option to allow exports of Alaskan crude during a pipeline shutdown. Clearly, this is an option which is technically and logistically possible. However, it requires a policy decision and executive or legislative action to allow what has been denied on a longstanding basis.

--In order to move 600,000 B/D through the Panama Canal, four to five daily trips through the Canal would be necessary (two laden, two returns). According to the Panama Canal Commission, the Canal could accommodate four extra voyages while increasing the Canal waiting time (transit-plus-waiting) for all traffic from the current 30 hours to 36 hours.

--Pipelines from California to the U.S. Gulf Coast could carry at least 50 and perhaps as much as 100 MB/D of Alaskan and Californian crude oils, thus reducing the volume which must be shipped via Panama. The capacity to ship additional Alaskan crude oil to the Gulf Coast is limited by the pipeline capacity out of Long Beach. However, incremental pipeline shipments of Californian crude oils out of the San Joaquin Valley to Texas could be replaced in PAD 5 refineries by Alaskan crude.

--Moving 600,000 B/D of Alaskan oil from the Pacific Ocean through the Canal and on to the U.S. Gulf Coast would require 500-600,000 deadweight tons of additional tanker capacity over that now employed in the eastern Panama/Gulf Coast route. If the volume moved through the Canal drops to 550 MB/D (assuming

increased use of the west-to-east pipelines), the required incremental tonnage is about 475,000 deadweight tons. This takes account of vessels which must be light-loaded in order to transit the Canal.

--Approximately 800,000 deadweight tons of appropriately sized Jones Act vessels are scheduled to be available in late March. About 540,000 of this capacity is in tankers which are equipped with the required inert gas systems. Furthermore, if volumes going from Valdez to Panama drop, vessels now used for that voyage may displace smaller West Coast vessels suitable for Canal transit. Thus, available Jones Act tonnage can meet the increased tanker demand with a margin of comfort.

--The cost of moving crude oil from Valdez to the U.S. Gulf Coast using the Panama pipeline is now about $3.25 per barrel. Assuming tanker rates at current levels, the cost of moving the crude oil using the Panama Canal would be about the same, $3.25 per barrel. If the trans-Panama pipeline were closed, however, the incremental tanker demand would likely cause rates to rise. If tanker rates rose to, say, $22/deadweight ton/month, more than a 50 percent increase from the current level, and there were delays at the Canal, the cost of the Valdez/Panama Canal/Gulf Coast voyage could increase by as much as $1.00 per barrel on an incremental basis. (Under long term charter arrangements, companies may be prevented from increasing rates, so the higher rates would not apply to all volumes.) Using the California-to-Texas pipeline system, the Valdez/Gulf Coast transportation cost is about $3.30 per barrel, or about the same as the current costs via Panama.

--Shipping Alaskan crude oil around Cape Horn is a time-consuming option that requires substantially increased tanker capacity. The delivery time would be twice as long as the current trans-Panama route, leading to a break in the delivery chain while vessels were positioned at Valdez and while vessels made the initial voyage. Where the industry now uses about 7.1 deadweight tons of tanker capacity for each barrel a day of oil moved from Valdez to the U.S. Gulf Coast via the pipeline and would use about 8.0 deadweight tons to move each barrel a day using the Panama Canal, the trip around Cape Horn requires 14 deadweight tons per barrel. Furthermore, even using all 17 of the Jones Act VLCC's, only about 250 MB/D could be transported. Additional volumes would require the use of smaller, more expensive vessels in the Jones Act fleet or a Jones Act waiver to allow other VLCC's.

II. BACKGROUND

Oil shipped through Valdez goes to the West Coast, the U.S. Virgin Islands, and to Panama where the oil is moved by pipeline across the Isthmus and reloaded on tankers which transport the oil to the eastern U.S. As shown in Table 1, annual Alaska oil movements to Panama remained relatively constant from 1984

through 1987 at about 600,000 B/D; rising North Slope production was offset by increased consumption of ANS oil on the West Coast.

TABLE 1

WATERBORNE DISTRIBUTION OF NORTH SLOPE OIL
(thousands of barrels per day)

	West Coast[1]	Virgin Islands	Panama[2]	Total
1987	1203	118	596	1917
1986	1112	98	576	1786
1985	1037	119	636	1792
1984	966	118	577	1661

1. Alaska, Hawaii, California, Oregon and Washington.
2. With subsequent delivery to the eastern U.S.

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Each of these three market destinations involves a different transportation pattern:

1. U.S. flag tanker movements from Alaska to West Coast refining centers;

2. U.S. flag tanker movements from Alaska to Panama, off-loading at the Pacific Ocean port of Puerto Armuelles into the Petroterminal de Panama (PTP) pipeline, moving through the pipeline to Chirique Grande on the Caribbean Sea and reloading on U.S. flag tankers for delivery to the Gulf and East Coast; and

3. foreign flag tanker movements from Alaska around South America to the Amerada Hess refinery in the U.S. Virgin Islands.

There are 68 U.S. flag (Jones Act) tankers with a capacity of 6.8 million deadweight tons (DWT) employed in the transportation of North Slope oil to domestic refining centers. Another 6 foreign flag tankers with a capacity of 1.5 million DWT transport North Slope oil around South America to the Virgin Islands. Summary statistics are presented in Table 2.
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TABLE 2

ESTIMATED VESSEL PARTICIPATION IN THE ALASKA OIL TRADE

Trade	Number Ships	Deadweight Tons (millions)	Average Size (DWT)	1987 Volume (MB/D)	Round Trip Time (days)
Alaska/West Coast	32	2.5	78,000	1200	14
Alaska/Panama	16	2.9	180,000	600	30
Panama/Eastern U.S.	20	1.4	70,000	600	<14
Subtotal U.S. Flag	68	6.8	NA		
Alaska/Virgin Islands	6	1.5	250,000	120	90
Total	74	8.3	NA		

III. ALTERNATIVES TO THE PANAMA PIPELINE

If a disruption of the PTP pipeline were to occur, it is reasonable to anticipate that a combination of alternatives would be employed to relieve the situation, rather than a single strategy. Assuming exports are not allowed, the alternatives include:

A. Shuttle tanker movements through the Panama Canal;

B. The movement of some Alaska oil through the Four Corners / All American pipeline systems, combined with additional consumption of Alaska oil in California refineries while displaced California oil is transported to eastern markets through the All American pipeline; and

C. Tanker movements around South America.

A. Tanker Movements through the Panama Canal

Prior to the completion and operation of the PTP pipeline in October 1982, North Slope oil was moved through the Panama Canal, up to 800 MB/D at the peak in early 1982.

TABLE 3

MONTHLY SHIPMENTS OF ALASKAN OIL THROUGH THE PANAMA CANAL, JAN-SEPT. 1982

(barrels per day)

Jan.	677,000	Jun.	691,000
Feb.	792,000	July	664,000
Mar.	809,000	Aug.	585,000
Apr.	703,000	Sept.	630,000
May	602,000		

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Although the Panama Canal formerly accommodated shipments of more than 600,000 B/D of Alaskan oil, it is not a foregone conclusion that the Canal could do so currently. According to the Panama Canal Commission, the Canal can accommodate 40 vessel transits per day; 16 or 17 of these can be of the size used for oil shipments, a relatively larger size which may approach the Canal's maximum of about 60,000 deadweight tons. Recent traffic in the Canal has been 38 daily transits, with 13 in the large vessel category. The Canal Commission expects traffic in the coming weeks to fall to 35-36 vessel transits per day, about the average in the latest five months.

The Panama Canal Commission therefore estimates that it could handle four transits for Alaskan oil (two laden, two returns) per day. At this higher capacity, the Commission estimates that the waiting-plus-transit time would go to 36 hours from the current 30. According to estimates by shipping companies, between four and five tanker transits per day would be necessary to carry 600,000 B/D of ANS crude oil. Total round trip voyage time, including Canal transit and the voyage to the oil terminal on Panama's Pacific side will increase by four to five days.

Assuming that pipeline operations are terminated, the resulting increase in tanker tonnage for movements through the Canal is thus approximately 530,000 deadweight tons. Because several of the ships now in Panama/Gulf Coast service will have to be light-loaded to meet Canal requirements, their effective capacity will fall. The net tonnage increase will therefore be approximately 600 MDWT. As noted, however, it is not clear that all volumes displaced from the pipeline would follow the same route.

B. Movement of Additional Volumes through West-to-East Pipelines

The pipelines which run from California eastward to PAD 3 (the Gulf Coast region) offer an additional offset to PTP pipeline volumes. There is some unused capacity to carry ANS volumes from the Long Beach terminus of the Four Corners pipeline and California volumes from the San Joaquin Valley gathering area
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for the All-American Pipeline (AAPL). In both cases, the destination for the incremental oil would be Gulf Coast refineries via the pipeline interconnections available at AAPL's McCamey, TX terminus, near Midland.

The **Four Corners Pipe Line** runs from Long Beach, CA to Red Mesa, UT and then to Bisti, NM, where it connects with the Texas - New Mexico system. It has a gathering system in the Bakersfield region in California and in the Four Corners area of Utah. Its capacity is approximately 75,000 B/D. Four Corners connects with AAPL at Cadiz, in southeastern California.

The **All-American Pipeline** is a 300 MB/D line which now runs from California to west Texas. Expansion to the Texas Gulf Coast is planned and under construction. The line was designed to carry heavy California crudes and thus includes a heating system. It is currently operating unheated, however, requiring a minimum gravity of 28 degrees API. California crudes are routinely heavier than AAPL's requirement, and may require blending with lighter crudes in order to move in the line. Blending lighter crudes with heavier ones for pipeline shipments in California is common and constrains the choices for disposition of light crude volumes: without the light crudes to blend, the heavy crudes cannot move. The line has recently been carrying about 75-85,000 B/D of California crudes to the Gulf Coast. It does not have a facility on the California coast capable of receiving waterborne shipments of ANS crude. To ship ANS crude, AAPL would have to rely on deliveries via Four Corners into the interconnection of the two lines.

There are thus several constraints to west-to-east pipeline shipments to relieve a PTP pipeline disruption: Four Corners Pipe Line's capacity and the gravity of California crudes available for blending and shipment.

At a conservative estimate, about 50,000 B/D of additional volumes could be moved in west-to-east pipelines, a combination of increased shipments of ANS and San Joaquin Valley crudes. Others estimate that these shipments could be twice this amount. Incremental ANS volumes would be refined in California to offset the additional California crudes moving east.

C. Net Change in Tanker Tonnage and Associated Costs

If additional ANS volumes were refined in California, the amount of oil that would require Canal transit would fall, and so would the incremental requirement for tanker tonnage, as shown in Table 4 and as discussed below for each route.

TABLE 4

NET CHANGE IN TANKER REQUIREMENTS FOR ANS SHIPPING

Current, using Panama pipeline	
1,200 MB/D, Valdez to Long Beach	2,520 M DWT
600 MB/D, Valdez to Panama	2,880 M DWT
600 MB/D, Panama to U.S. Gulf Coast	1,390 M DWT
	6,790
Assuming 50 MB/D additional to Long Beach, and using Panama Canal	
1,250 MMB/D, Valdez to Long Beach	2,625 M DWT
550 MMB/D, Valdez to Panama	2,640 M DWT
550 MMB/D, Panama Canal and to Gulf Coast	1,760 M DWT
	7,025

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--Valdez/West Coast. Under our assumption that an additional 50 MB/D of ANS oil is either shipped across California or is used to displace California crudes shipped to the Gulf Coast, the higher volumes add about 100,000 DWT to the tonnage required for the Valdez/Long Beach route. Although the average vessel size now used on this route is 78,000 DWT, there is some flexibility to use larger vessels, such as any displaced from the Valdez/Panama route.

--Valdez/Panama. There is a net reduction in the tonnage required for the Valdez/Panama traffic. These vessels, which are too large for the Canal, would displace smaller vessels in the West Coast trade.

--Panama/Gulf Coast. The Canal/Gulf Coast voyage, as noted earlier, requires more tanker capacity than the current pipeline/tanker combination. Hence, requirements for tonnage in Panama/Gulf Coast service rise, even though volumes of oil shipped across Panama are lower. According to this calculation, about 370,000 DWT of additional capacity suitable for Panama Canal transit is required. This may be on the low side, as noted earlier, since some vessels now being used to go from eastern Panama to the U.S. Gulf Coast can only go through the Canal if they are light-loaded; effectively their capacity falls, and additional tonnage is necessary to make up for the drop. Taking account of these larger ships, the net capacity increase for shipments from Panama to the Gulf Coast is on the order of 475,000 DWT.

--Total. The total tonnage increment for all domestic shipments of Alaskan oil is therefore about 335,000 DWT.
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With respect to the availability of Jones Act tankers, we have examined the list of vessels with expiring charters, shown in Table 5. There are about 800,000 deadweight tons available. Approximately 540,000 DWT have the necessary inert gas systems. Because some of the vessels will be rechartered in the same service, this compilation may overstate tonnage which could move into the Panama shuttle trade. However, rising tanker rates may change the plans for a vessel. Altogether it appears that there is adequate Jones Act tonnage available to carry the ANS volumes through the Canal.

TABLE 5

U.S. FLAG TANKER AVAILABILITY, END-MARCH 1988
(in thousands DWT)

	Texas Gulf Cost (Dirty)	
1.	Potomac Trader	50
2.	Fredericksburg	39
3.	Delaware Trader	50
4.	Groton (Barge)	42
5.	OMI Hudson	51
6.	Philadelphia (Barge)	42
7.	Charleston	39
	Subtotal	313
	Texas Gulf Coast (Clear)	
8.	Chablis	31
9.	Exxon Princeton	42
10.	Falcon Princess	37
11.	New York (Barge)	29
12.	OMI Charger	38
13.	OMI Leader	38
14..	OMI Willamette	38
15.	St. Emilion	35
16.	Texaco Georgia	26
17.	Texaco Montana	27
	Subtotal	341
	West Coast (Dirty)	
19.	Cove Liberty	69
20.	OMI Champion	38
21.	Texaco Connecticut	39
	Subtotal	146
Total		800

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The transportation costs associated with the shift of ANS volumes out of the Panama/Gulf Coast route are shown below. These are incremental costs, and thus will not apply to all volumes because of long term charter arrangements.
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TABLE 6

TRANSPORTATION COSTS FOR ANS CRUDE, VALDEZ TO THE U.S. GULF COAST

	Via Panama Pipeline (Current)	Via Panama Canal	Via Calif-Texas Pipeline
Tanker, Valdez to:			
Long Beach	-	-	$1.00
Panama	1.50	1.50	-
Pipeline			
Trans-Panama	.75	-	-
Long Beach to Gulf Coast	-	-	$2.30
Canal Toll	-	.40	-
Tanker, Panama to Gulf Coast*	1.00	1.35-2.33	-
	3.25	3.25-4.23	$3.30

*Range chosen as current tanker rates (about $14/DWT/month) at the low end and $22/DWT tanker rate at the high end. Panama Canal high estimate assumes Canal delays.

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As shown, shipments through the Canal, at current tanker rates, cost about the same as the current pipeline operation. However, tanker rates may be expected to rise in a disruption. If rates move from the current $14/DWT/month to say, $22/DWT/month, more than a 50% increase, the incremental cost of shipping via the Panama Canal will go up about $1.00/bbl. The cost of pipelining out of California is less volatile, but as already discussed, can be used for limited volumes of ANS or California crudes. Pipeline costs from the San Joaquin Valley to the Gulf Coast is about $1.75/barrel. A producer would be willing to sell California crude at the Gulf Coast if he thought he could recoup the additional transportation costs.

D. Tanker Movements around South America

This is the most time consuming and tanker-intensive alternative. The round trip voyage time is approximately 90 days and requires 14 deadweight tons of tanker capacity to deliver one barrel of Alaska oil to the Gulf Coast. Therefore, if all 600,000 BD of Alaska now moving across Panama were to move oil around South America to the eastern U.S., approximately 8.4 million deadweight tons of tanker capacity would be required.
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Because of economies of scale on the 14,000 mile voyage, large tankers are used for this service. There are 17 Jones Act VLCCS (vessels with capacity above 165,000 DWT) with total tonnage of 3.4 million deadweight tons; these ships could carry about 250 MB/D if they were available. Additional shipments around Cape Horn would require smaller, more expensive Jones Act vessels or a temporary relaxation of Jones Act provisions to allow the use of non-Jones Act VLCC's.

The delivery time is twice as long as the current delivery mode; 22 versus 45 days, round trip 45 versus 90 days. There would be an initial delay as tankers were positioned at Valdez, and a further break in the delivery chain while tankers made their initial voyage.