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**THESIS**

**COST-BENEFIT ANALYSIS OF PERMANENT CHANGE  
OF DUTY STATION (PCS) MODES OF TRAVEL  
FOR MOVES TO ALASKA**

by

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December 2013

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**COST-BENEFIT ANALYSIS OF PERMANENT CHANGE OF DUTY STATION  
(PCS) MODES OF TRAVEL FOR MOVES TO ALASKA**

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## **ABSTRACT**

This research examines whether permanent change of station (PCS) travel by privately owned vehicle (POV) to Alaska is to the government's advantage. The objectives of this research are to determine estimated total costs of PCS travel to Alaska by various modes of travel; to identify which of the PCS cost drivers has the greatest impact on government expenditures; and to calculate and project potential cost savings to the government based on the results of the cost-benefit analysis. Historical costs collected from the Defense Finance and Accounting Service are used to create a database of costs incurred by service members traveling to Alaska over the course of two years (May 2010 through April 2012). Coupled with historical travel rates, shipping estimates, and other appropriate open source information, a cost-benefit analysis is conducted comparing the three modes of travel (POV, car ferry, and air travel) available to service members traveling to Alaska. Ultimately, this study confirms that completing PCS travel to Alaska via POV is, indeed, to the government's advantage.

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

CONUS	continental United States
DFAS	Defense Finance and Accounting Service
DoD	Department of Defense
DTOD	Defense Table of Official Distances
JFTR	Joint Federal Travel Regulations
M&IE	meals and incidental expenses
MALT	Monetary Allowance in Lieu of Transportation
OCONUS	outside the continental United States
PCS	permanent change of station
PDS	permanent duty station
POD	point of debarkation
POE	point of embarkation
POV	privately owned vehicle
SDDC	Military Surface Deployment and Distribution Command
VPC	Vehicle Processing Center

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## **I. INTRODUCTION**

### **A. BACKGROUND**

Each year, thousands of military personnel are ordered to conduct permanent change of station (PCS) travel to military installations located in Alaska. Since Alaska is the only outside the continental United States (OCONUS) military destination accessible by privately owned vehicle (POV), service members are given the option to drive to and from Alaska. This option is in addition to traveling by air, or travel by vehicle ferry over the Alaska Marine Highway in conjunction with POV travel. Under the Joint Federal Travel Regulations (JFTR), the most inexpensive mode of travel will be used when conducting a PCS move. Air travel is “the most cost efficient and expeditious way to travel for travel of over 400 miles one way” (JFTR, U3500, para. A). The same regulation, however, states that PCS moves by POV are “to the (Government’s) advantage” (JFTR, U5105, para. B). Considering that POV travel to Alaska requires more travel time than by air and, thus, accrues more cost to the government due to per diem travel rates, the government’s conclusion that POV travel is more advantageous would seem erroneous.

### **B. PURPOSE OF RESEARCH**

The purpose of this research is to determine if PCS travel by POV to Alaska is, indeed, to the government’s advantage. To make this determination, it is necessary to accomplish the following objectives:

- Determine an estimated total cost of PCS travel to Alaska by mode of travel
- Determine which of the PCS cost drivers (specifically, per diem, contracted vehicle shipping, and air/ferry fare) has the greatest impact on government expenditures
- Calculate and project potential cost savings to the government based on the results of the cost-benefit analysis

This study questions the assumption that PCS via POV will be to the government’s advantage, due to the low cost of airfare and the significantly fewer travel days needed to accomplish a PCS move by air. Thus, the goal of the cost-benefit analysis

is to yield a valid comparison of the modes of PCS travel, in order to confirm the assumption made by the government, as regards federal travel regulation.

### **C. BENEFITS AND LIMITATIONS OF RESEARCH**

The current period of sequestration within the Department of Defense (DoD) presents an opportunity to reexamine process inefficiencies and find additional cost savings within the confines of financial austerity. While determining which major defense projects should be reduced or eliminated will prove difficult in the long term, marginal changes in routine processes, such as the mode of travel for PCS moves, can prove beneficial in the near term. Policy processes, rather than programs, regulate the conduct of PCS travel. Thus, any cost inefficiencies identified in this research have the potential to be rectified through specific policy amendments, and not costly program changes.

Within the specificity of this research lies its primary limitation. This research focuses on a fraction of all PCS travel accomplished by POV, and incorporates costs that are unique to traveling to Alaska. Thus, any potential conclusions on cost in this research should not be compared against a comprehensive study of continental United States (CONUS) PCS destinations; nor would it be appropriate to generalize the results of this study across all PCS moves. Additionally, the information gathered in this research does not reflect changes to incoming or outgoing personnel volume changes due to the deployment cycles of units stationed in Alaska. Specific statistics that would correlate surges in Alaskan personnel strength to changes in the cost of PCS travel paid by the government would, indeed, refine the evaluation of the cost-benefit analysis. Actual personnel maneuver strength figures, however, are not authorized for public release. Therefore, this research is limited to only publicly available data from thousands of PCS travel transactions, over time, to arrive at the average costs necessary to conduct a feasible cost-benefit analysis.

### **D. ORGANIZATION OF REPORT**

This research is divided into the following segments:

- Chapter II details the creation of the model used to determine the components of the average costs of a PCS move to Alaska, by travel mode
- Chapter III evaluates the data calculated in Chapter II to determine which mode of PCS travel is the most cost efficient when moving to Alaska
- Chapter IV summarizes the results of the cost-benefit analysis and discusses potential topics for continuing this research

#### **E. SUMMARY**

This research seeks to challenge an assertion made in a federal regulation by applying the assertion to a unique, but quantifiable, circumstance. The development of the cost-benefit analysis in the following chapters, then, represents an attempt to validate policies that govern a significant cost to the government. As such, the value in this research lies not just in its potential to discover any cost inefficiencies related to PCS travel associated with Alaska, but, also in the exercise of testing government policy for its stated efficacy.

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## **II. RESEARCH METHODOLOGY**

### **A. INTRODUCTION**

The objective of this study's methodology is to create a valid cost-estimation model, based upon historical data, in order to conduct a reasonable cost-benefit analysis. This cost estimation model, then, is designed to determine an estimated cost to move one service member to a major military installation in Alaska via POV versus an alternative mode of transportation. Thus, given actual costs to the government for PCS travel for service members traveling to Alaska, historical mileage, per diem, and shipping rates, coupled with reasonable assumptions, a working methodology is developed that will produce the necessary model for later analysis.

### **B. HISTORICAL DATA SET**

#### **1. Background**

Service members assigned to military installations in Alaska are given orders for three-year tours of duty. Due to the nature of changes in professional status (unit moves, promotion, mid-tour re-assignment) or personal circumstances (hardship re-assignment, early retirement, release from active duty), service members assigned to Alaska must serve at least two of the three years of duty before an outbound PCS is authorized. Therefore, this study focuses on a two-year period beginning 01 May 2010, and ending 30 April 2012. For major military installations in Alaska, per diem costs are calculated based on two separate rates during a calendar year: a higher summer rate, to accommodate for higher prices during peak tourism months, from approximately 01 May through 15 September; and a slightly lower winter rate from roughly 16 September through 30 April (the exact date these rate changes begin varies slightly, depending on the rate chart used). Accordingly, this study divides this two-year sample into four travel periods to account for these seasonal cost changes:

- Period 1: 01 May 2010 through 15 September 2010
- Period 2: 16 September 2010 through 30 April 2011
- Period 3: 01 May 2011 through 15 September 2011
- Period 4: 16 September 2011 through 30 April 2012

## **2. Collection and Processing of Raw Cost Data**

The Defense Finance and Accounting Service (DFAS) is the government agency responsible for all accounts and payments to government travelers. As it pertains to PCS travel, DFAS processes all government costs into two categories: costs associated with POV travel and costs accrued for travel without a POV. POV travel costs include the Monetary Allowance in Lieu of Transportation (MALT: the mileage reimbursement for service members and their dependents during a PCS move) rate per mile traveled (reimbursed to the service member driving a POV to or from the PCS destination), plus the per diem amount accrued while traveling using a POV. DFAS accounts for both POV PCS travel costs separately, but tracks costs by associating a distinct same-claim number with each traveling service member. Non-POV costs accrue only from per diem during PCS travel that uses an alternate mode of travel. DFAS does not identify alternate modes of travel used by non-POV PCS travelers. Additionally, for the purposes of accounting, the agency does not differentiate between the military installations in Alaska (e.g., if one service member was assigned to Fort Wainwright in Fairbanks, Alaska, and another assigned to Elmendorf Air Force Base in Anchorage, Alaska, DFAS would consider both moves as, simply, a move to Alaska.).

A query was generated at DFAS for all PCS travel terminating in Alaska, separated by POV and non-POV costs, encompassing the two-year period of this study (divided into the four separate travel periods discussed above). The query returned 43,970 data points, serialized into 21,985 separate 7-digit claim numbers. Each claim was divided into two parts: costs accrued by the service member, and those accrued by the dependents of the service member. With this raw cost data, a database was created using the following assumptions for the purposes of this study:

- As noted by DFAS, 99% of the claim numbers returned by the query are military claims. Therefore, this study assumes that travel claims are military claims.
- To reduce large cost variations due to varying family sizes, dependent costs were excluded from this study. Therefore, one claim number accounts for all costs associated with either POV or non-POV moves for one service member.

The resulting database yielded 13,527 separate claim numbers: 7,394 POV travel cost claim numbers, and 6,133 non-POV cost claim numbers, with each claim identified and classified by one of the four travel periods.

**C. DETERMINATION OF ESTIMATED AVERAGE COSTS**

The JFTR and other federal regulations regarding PCS travel do not detail which calculations are used by the government to determine how PCS moves by POV are more advantageous than any other travel mode. Therefore, using the actual data collected from DFAS, and publicly available historical travel and cost information from government outlets, estimated average travel costs are determined (calculated, in some cases, by weighted average), for each travel mode, for use in the cost-benefit analysis portion of this study.

**1. POV Travel Costs**

This travel cost is the sum of the estimated average MALT and per diem costs incurred by a service member during PCS travel using a POV. MALT and POV per diem data can be consolidated based on pairs created between the two data sets, through matches of claim numbers and period of travel (7,393 out of 7,394).

To determine the estimated average MALT cost, the data obtained from DFAS is used. To account for the varying number of travelers in each period, a weighted average is used to calculate the estimated average cost of MALT that will be used during the cost-benefit analysis segment of this study (Table 1):

<b>Arrival Period</b>	<b>Number of Travelers</b>	<b>Average Cost of POV MALT</b>
1	1,679	\$507
2	2,321	\$511
3	2,086	\$635
4	1,308	\$675
<b>Total</b>	7,394	
<b>Weighted Average Cost of POV MALT</b>		<b>\$574</b>

Table 1. Estimated Average Cost of POV MALT Calculation (after Defense Finance

and Accounting Service, data compiled by C. Dawson, personal communication, June 26, 2013).

To determine the estimated average distance traveled, historical mileage rates are used. Since the actual mileage rate changed several times during the four travel periods, a weighted average mileage rate is calculated for the affected periods, based on the proportion of the number of days within those periods. This assumption is made to account for the fact that DFAS does not include specific dates of travel with each claim number (to preclude any potential privacy issues). Tables 2 and 3, respectively, contain the actual mileage rates for each year and the calculated rates used in this study:

Effective Date	MALT Rate
1-Jan-10	\$0.165 / Mile
1-Jan-11	\$0.19 / Mile
1-Jul-11	\$0.235 / Mile
1-Jan-12	\$0.23 / Mile

Table 2. Actual MALT Rates (after DTMO, 2013a)

Travel Period	Calculated MALT Rate
01 May - 15 Sep 2010	\$0.165/ Mile
16 Sep 2010 - 30 Apr 2011	\$0.18/ Mile
01 May - 15 Sep 2011	\$0.21/ Mile
16 Sep 2011 - 30 Apr 2012	\$0.23/ Mile

Table 3. Calculated MALT Rates

Each MALT cost is, then, divided by the corresponding calculated MALT rate for that period and averaged over all four periods to determine the estimated average distance traveled by each service member (Table 4):

<b>Travel Period</b>	<b>Average Distance Traveled By POV (in miles)</b>
1	3,070
2	2,838
3	3,023
4	2,933
<b>Estimated Average Distance Traveled</b>	<b>2,966</b>

Table 4. Estimated Average Distance Traveled Calculation

Based on the estimated average cost of MALT (\$574) and the estimated average distance traveled (2,966 miles), a MALT rate of \$0.19/mile is derived for use throughout this study.

To determine the estimated average cost of POV per diem, the data obtained from DFAS is used. To account for the varying number of travelers in each period, a weighted average is used to calculate the estimated average cost of POV per diem that will be used during the cost-benefit analysis segment of this study (Table 5):

<b>Travel Period</b>	<b>Number of Travelers</b>	<b>Average Cost of POV Per Diem</b>
1	1,678	\$1,076
2	2,321	\$1,111
3	2,086	\$1,169
4	1,308	\$1,130
<b>Total</b>	7,393	
<b>Weighted Average Cost of POV Per Diem</b>		<b>\$1,123</b>

Table 5. Estimated Average Cost of POV Per Diem Calculation (after Defense Finance and Accounting Service, data compiled by C. Dawson, personal communication, June 26, 2013).

To determine the estimated average days of POV travel to Alaska, historical per diem rates are used. According to 37 USC, Section 474, the flat standard CONUS per

diem rate for the applicable year will be used for PCS via POV (DTMO, 2013b). Since the actual per diem rate changed during this study's second travel period, a weighted average per diem rate is calculated for that period, based on a proportion of the number of days during that time. Again, just as in the historical MALT rates, this assumption is made to account for the fact that DFAS does not include specific dates of travel with each claim number. Tables 6 and 7, respectively, contain the actual CONUS flat per diem rates for each year and the calculated CONUS flat per diem rates used in this study:

<b>Effective Date</b>	<b>CONUS Flat Per Diem Rate</b>
Jan.- Dec. 2010	\$116
Jan.- Dec. 2011	\$123
Jan.- Dec. 2012	\$123

Table 6. Actual CONUS Flat Per Diem Rates (after DTMO, 2013c)

<b>Travel Period</b>	<b>Calculated Per Diem Rate</b>
1	\$116
2	\$120
3	\$123
4	\$123

Table 7. Calculated CONUS Flat Per Diem Rates

Each POV per diem cost is, then, divided by the corresponding calculated CONUS flat per diem rate for that period, averaged for each period and, finally, weighted by the proportional number of days in each period to determine the estimated average number of days of POV travel to Alaska by each service member (Table 8):

<b>Travel Period</b>	<b>Average Number of Days of POV Travel to Alaska</b>
1	9
2	9
3	10
4	9
<b>Weighted Average Number of Days of POV Travel to Alaska</b>	<b>9</b>

Table 8. Estimated Average Days of Travel to Alaska Calculation

Based on the estimated average cost of POV per diem (\$1,123) and the estimated average days of POV travel to Alaska (nine days), a POV per diem rate of \$125 is derived for use throughout this study.

## 2. Ferry Travel Costs

This travel cost is the sum of the cost of a government procured ferry fare, the estimated cost of MALT, the calculated cost of meals and incidental expenses (M&IE) while aboard the ferry, and the estimated cost of POV per diem during a PCS move via ferry.

According to the Alaska Marine Highway System (AMHS, 2013), the cost to transport one passenger includes the following (Table 9):

<b>Ferry Item</b>	<b>Cost</b>
Adult Fare	\$353
One Vehicle Up to 10'	\$462
Berthing	\$337
<b>Total Fare</b>	<b>\$1,152</b>

Table 9. Ferry Fare Calculation (after AMHS, 2013)

The point of embarkation (POE) for all service members traveling via ferry for a PCS move to Alaska is Bellingham, Washington; the point of debarkation (POD) is

Haines, Alaska. Chapter 3 of the JFTR states that, “MALT is authorized for the official distance from the old permanent duty station (PDS) to the car ferry POE and from the car ferry POD to the new PDS” (JFTR, U3700, para. B, section 3). According to the Defense Table of Distances (DTOD), the official distance between Bellingham and Haines is 1,537 miles (DTS, 2013). Thus, the estimated cost of MALT for a PCS via ferry is calculated by subtracting the distance between Bellingham and Haines from the calculated estimated average distance traveled by POV to Alaska (2,966 miles), and multiplying that value by the derived MALT rate (\$0.19/mile). Table 10 depicts this process:

Estimated Average Distance Traveled by POV to Alaska	2,966
Distance Between Bellingham, WA and Haines, AK	1,537
Mileage Difference	1,429
<b>Estimated Cost of Ferry MALT (Mileage Difference x \$0.19/mile)</b>	<b>\$272</b>

Table 10. Estimated Cost of Ferry MALT Calculation

The most expeditious and, therefore, the most commonly government-procured car ferry sailing is a three-day, eleven-hour sailing between Bellingham, Washington, and Haines, Alaska. Lodging accommodations are included in the cost of the ferry fare; meals and incidental expenses (M&IE) are calculated separately during the ferry transit. According to Chapter 5 of the JFTR, “M&IE is based on and computed for the member...using the highest CONUS M&IE rate for the arrival day (embarkation) on the ferry through the day before the departure day (debarkation) from the ferry” (JFTR, U5116, para. C, section 3[b]). The highest historical CONUS M&IE rate for the years encompassed in this study is \$71/day (GSA, 2013); since the ferry sailing includes three full days aboard, the calculation for estimated M&IE cost for ferry travel is (Table 11):

Highest CONUS M&IE Rate (per day)	\$71
Number of Full Days Embarked on Ferry	3
<b>Estimated Cost of Ferry M&amp;IE (M&amp;IE Rate x Number of Days)</b>	<b>\$213</b>

Table 11. Estimated Cost of Ferry M&IE Calculation

Once a service member debarks the ferry in Haines, AK, there still remains an appreciable distance for the service member to drive before arriving to one of the four most populous installations in Alaska (minimum, 2,000 personnel). Assuming that most service members will be assigned to or near one of these installations, a weighted average of the distance traveled from Haines is determined by the proportion of the size of the installation most service members are assigned to in Alaska (Table 12).

<b>Military Installation</b>	<b>Approximate Military Personnel Population</b>	<b>Distance From Haines, AK (in miles)</b>
Eielson AFB	2,500	617
Elmendorf AFB	6,000	754
Fort Richardson	2,400	749
Fort Wainwright	4,800	637
<b>Weighted Average Distance</b>		<b>696</b>

Table 12. Estimated Average Distance from Haines, AK to Major Alaskan Military Installations Calculation (after GlobalSecurity.org, 2013a, 2013b; PACAF, 2006; and USAF 2012)

The JFTR stipulates that no more than 350 miles will be traveled by POV each day (JFTR, U3025, para. C, section 2); therefore, two days of travel are required after debarking in Haines. As previously calculated, the estimated average number of days of PCS travel to Alaska is nine days; thus, assuming three embarked days on the ferry (where only M&IE is accrued), and two days of POV travel after debarking the ferry, an estimated average of four days are traveled by service members by POV prior to embarking on the ferry. Thus, the estimated cost of ferry per diem is calculated by multiplying the sum of the POV travel days (six by the derived per diem rate of \$125) (Table 13):

Estimated Average Number of Days Traveled by POV Prior to Embarkation	4
Estimated Number of Days Traveled by POV After Debarkation	2
Total Number of Days of POV Travel	6
<b>Estimated Cost of Ferry Per Diem (Number of Days x \$125)</b>	<b>\$750</b>

Table 13. Estimated Cost of Ferry Per Diem Calculation

### 3. Air Travel Costs

These travel costs are the sum of the estimated average of per diem costs incurred by a service member not using a POV during PCS travel, and the cost of a non-POV mode of travel.

To determine the estimated average cost of non-POV per diem, the data obtained from DFAS are used. To account for the varying number of travelers in each period, a weighted average is used to calculate the estimated average cost of non-POV per diem that will be used during the cost-benefit analysis segment of this study (Table 14):

Travel Period	Number of Travelers	Average Cost of Non-POV Per Diem
1	1,454	\$75
2	2,574	\$75
2	1,061	\$115
4	1,044	\$118
<b>Total</b>	6,133	
<b>Weighted Average Cost of Non-POV Per Diem</b>		<b>\$89</b>

Table 14. Estimated Average Cost of Per Diem Calculation (after Defense Finance and Accounting Service, data compiled by C. Dawson, personal communication, June 26, 2013).

To determine the estimated average days of non-POV travel to Alaska, historical per diem rates are used. According to 37 USC, Section 474, when government procured

commercial travel is used to complete a PCS move, the destination per diem rate will be used to calculate the per diem costs. Since DFAS does not disclose which installations service members traveled to in Alaska, an average of the per diem rates, by period, of the four most populous installations in Alaska is used (Table 15):

	Eielson AFB	Elmendorf AFB	Fort Richardson	Fort Wainwright	Average
Period 1	\$263	\$278	\$278	\$263	<b>\$271</b>
Period 2	\$154	\$188	\$188	\$154	<b>\$171</b>
Period 3	\$282	\$285	\$285	\$282	<b>\$284</b>
Period 4	\$173	\$195	\$195	\$173	<b>\$184</b>

Table 15. Average Per Diem Rate of Major Military Installations in Alaska (after DTMO, 2013c)

Each non-POV per diem cost is, then, divided by the corresponding calculated average per diem rate for that period, averaged for each period and, finally, weighted by the proportional number of days in each period to determine the estimated average number of days of non-POV travel to Alaska by each service member (Table 16):

Travel Period	Average Number of Days of Non-POV Travel to Alaska
1	0.28
2	0.44
3	0.41
4	0.67
<b>Weighted Average Number of Days of Non-POV Travel to Alaska</b>	<b>0.47</b>

Table 16. Estimated Average Number of Days of Non-POV Travel to Alaska

Based on the estimated average cost of non-POV per diem (\$89) and the estimated average number of days of POV travel to Alaska (0.47 days), a non-POV per diem rate of \$189 is derived for use throughout this study.

The estimated average cost of a non-POV mode of travel is calculated based on the following facts and assumptions, and shown in Table 17:

- DFAS does not account for which mode of non-POV travel (commercial air or otherwise) was used by the individual service member.
- For the purposes of this study, air travel is assumed to be the single non-POV mode of PCS travel. Thus, the estimated average cost of airfare was calculated using current government airfare rates (commercial rates as of July 2013, as historical flight costs are not maintained by the government; the City Pair program is not used for PCS travel). This average cost is based upon travel between the twelve cities that contain Vehicle Processing Centers (VPC) to either Anchorage or Fairbanks, Alaska. Assuming that the volume of service members traveling between each city is proportional to the volume of vehicles shipped between each VPC to either of the Alaskan cities, a proportional percentage is applied to the government airfare rates to determine the estimated average cost of airfare:

<b>Origin City</b>	<b>To ANC</b>	<b>VPC Volume</b>
Atlanta, GA	\$426	4%
Baltimore, MD	\$465	4%
Charleston, SC	\$508	4%
Dallas, TX	\$272	11%
Los Angeles, CA	\$459	4%
New Orleans, LA	\$557	4%
NY/NJ (Newark)	\$479	3%
Norfolk, VA	\$569	3%
Orlando, FL	\$456	1%
San Francisco, CA	\$439	2%
Saint Louis, MO	\$419	8%
Seattle, WA	\$359	8%
<b>Origin City</b>	<b>To FAI</b>	
Atlanta, GA	\$735	5%
Baltimore, MD	\$999	1%
Charleston, SC	\$879	4%
Dallas, TX	\$529	10%
Los Angeles, CA	\$579	3%
New Orleans, LA	\$919	2%
NY/NJ (Newark)	\$684	3%
Norfolk, VA	\$599	2%
Orlando, FL	\$795	1%
San Francisco, CA	\$524	1%
Saint Louis, MO	\$784	7%
Seattle, WA	\$454	5%
<b>Total</b>		100%
<b>Weighted Average Cost of Air Travel to Alaska</b>	<b>\$531</b>	

Table 17. Estimated Average Cost of Air Travel to Alaska (after Naval Postgraduate School Travel Office, data compiled by J. Lim, personal communication, August 15, 2013).

#### 4. Vehicle Shipping Costs

Regardless of the mode of travel, service members may choose to ship one vehicle. Government procured vehicle shipping is contracted; thus, actual shipping costs and number of vehicles shipped to Alaska are not made available to the public. Furthermore, DFAS does not include shipping costs as a component of personnel travel. However, since the government cost to ship a vehicle represents the opportunity cost of

driving one vehicle to Alaska, it is valid to include the cost to ship a vehicle in the cost-benefit analysis. Therefore, the estimated average vehicle shipping cost used is based on stabilized billing rates published by the Military Surface Deployment and Distribution Command (SDDC). The weighted average cost was determined by using contractor projections of the total number of vehicles shipped annually to Alaska, also published by the SDDC (Table 18).

FY10 Stabilized Billing Rate	\$2,782
FY10 Projected Grand Total Shipped to AK	3,526
FY10 Estimated Grand Total	\$9,808,204
<b> </b>	
FY11 Stabilized Billing Rate	\$2,847
FY11 Projected Grand Total Shipped to AK	3,516
Estimated Grand Total	\$10,011,529
<b> </b>	
FY12 Stabilized Billing Rate	\$3,151
FY12 Projected Grand Total Shipped to AK	3,516
Estimated Grand Total	\$11,077,650
<b> </b>	
<b>Weighted Average Shipping Cost</b>	<b>\$2,926</b>

Table 18. Weighted Average Shipping Cost Calculation (after SDDC, 2010a, 2010b, 2011a, 2011b, 2012a, and 2012b)

#### D. SUMMARY

The data provided by DFAS, and the information available through the public domain, allowed for the creation of a cost estimation model that fulfills the requirements of this study's cost-benefit analysis. Fewer assumptions would have been necessary had more specific traveler information been provided with the raw data set. The same can be said for actual shipping data, which the SDDC could not provide due to proprietary contracting. Nevertheless, with such a large data set in hand, paired with published rates, estimations, and projections provided by government agencies, this model can be applied with a reasonable measure of confidence.

### III. COST-BENEFIT ANALYSIS

#### A. INTRODUCTION

This cost-benefit analysis is performed from the perspective of the government as the primary stakeholder. Using the estimated costs calculated in the research methodology, an impacts-based comparison will be made between the PCS travel alternatives. Since the JFTR makes use of examples to explain a variety of travel scenarios, this cost-benefit analysis will do the same. Thus, at the conclusion of this analysis, a recommendation will be made as to whether PCS travel to Alaska by POV is to the government's advantage.

#### B. SET OF ALTERNATIVES

##### 1. Travel by POV

The estimated average cost paid by the government for service members choosing to complete a PCS move to Alaska by POV is depicted in Figure 1.

<b>Estimated Average Cost of POV Per Diem:</b>	<b>\$1,123</b>
<b>Estimated Average Cost of POV MALT:</b>	<b><u>+ \$574</u></b>
<b>Estimated Cost of PCS by POV:</b>	<b>\$1,697</b>

Figure 1. Estimated Cost of PCS by POV

Accordingly, the amount of \$1,697 is used to represent the cost of PCS travel by POV throughout the cost-benefit analysis.

##### 2. Travel by Ferry

The estimated cost paid by the government for service members choosing to complete a PCS move to Alaska by car ferry is depicted in Figure 2.

<b>Ferry Fare:</b>	<b>\$1,152</b>
<b>Estimated Cost of Ferry MALT:</b>	<b>\$272</b>
<b>Estimated Cost of Ferry M&amp;IE:</b>	<b>\$213</b>
<b>Estimated Cost of Ferry Per Diem</b>	<b><u>+ \$750</u></b>
<b>Estimated Cost of PCS by POV:</b>	<b>\$2,387</b>

Figure 2. Estimated Cost of PCS by Ferry

Accordingly, the amount of \$2,387 is used to represent the cost of PCS travel by ferry throughout the cost-benefit analysis.

### 3. Travel by Air

The estimated cost paid by the government for service members choosing to complete a PCS move to Alaska by air travel is depicted in Figure 3.

<b>Estimated Average Cost of Air Travel to Alaska:</b>	<b>\$531</b>
<b>Estimated Average Cost of Non-POV Per Diem:</b>	<b><u>+\$89</u></b>
<b>Estimated Cost of PCS by Air Travel:</b>	<b>\$620</b>

Figure 3. Estimated Cost of PCS by Air Travel

Accordingly, the amount of \$620 is used to represent the cost of PCS travel by air throughout the cost-benefit analysis.

### 4. Vehicle Shipping

The option to conduct a PCS by POV travel provides a means to transport service members, as well as their vehicles, to Alaska. Furthermore, service members electing to PCS by POV or travel by air have the option to ship an additional vehicle at the government's expense. Therefore, it is necessary to include in the alternatives the cost to the government to ship a POV. Thus, the calculated average vehicle shipping amount of \$2,926 is used to represent the cost of shipping a vehicle throughout the cost-benefit analysis.

## **C. DISCUSSION OF IMPACTS**

### **1. Identification of Impacts**

There are two significant impacts that affect the decision of this analysis. The first impact, most obviously, is cost: How much does the government pay for services associated with PCS travel to and from Alaska? Multiple variables (inflation rate, season of travel, and tempo of military operations) influence the amount that the government must pay to transport personnel between a CONUS duty station and one in Alaska. Thus, by using a fixed, historical data set, comparing average costs between PCS travel modes (the lowest being the most desirable) becomes the quantitative metric of the impact of cost. The second impact, value, is more qualitative: What does the government receive (services rendered) for the amount that it pays? Associated with each cost is an outcome (number of service members or vehicles transported) that the government must consider valuable enough to pay for the expense. Thus, as a function of cost, value should be considered inseparable due its inverse relationship with cost (more personnel transported and vehicles shipped for less cost). Therefore, in order for a particular mode of travel to be considered to the government's advantage, the impacts of cost and value should be such that the number of personnel and vehicles shipped to Alaska exceeds those of another mode of travel, at a lesser cost.

### **2. Evaluation of Impacts**

Figure 4 depicts costs of the options presented to a service member who has PCS orders associated with an Alaskan duty station. The service member, who has two vehicles, may choose to travel by POV, by ferry, or by air travel to complete his PCS. If the service member chooses to complete the PCS by POV or ferry, he may also choose to ship a second vehicle. If the service member chooses to PCS via air, he can choose to ship only one vehicle. In all cases, the service member can choose to leave behind one or both vehicles.

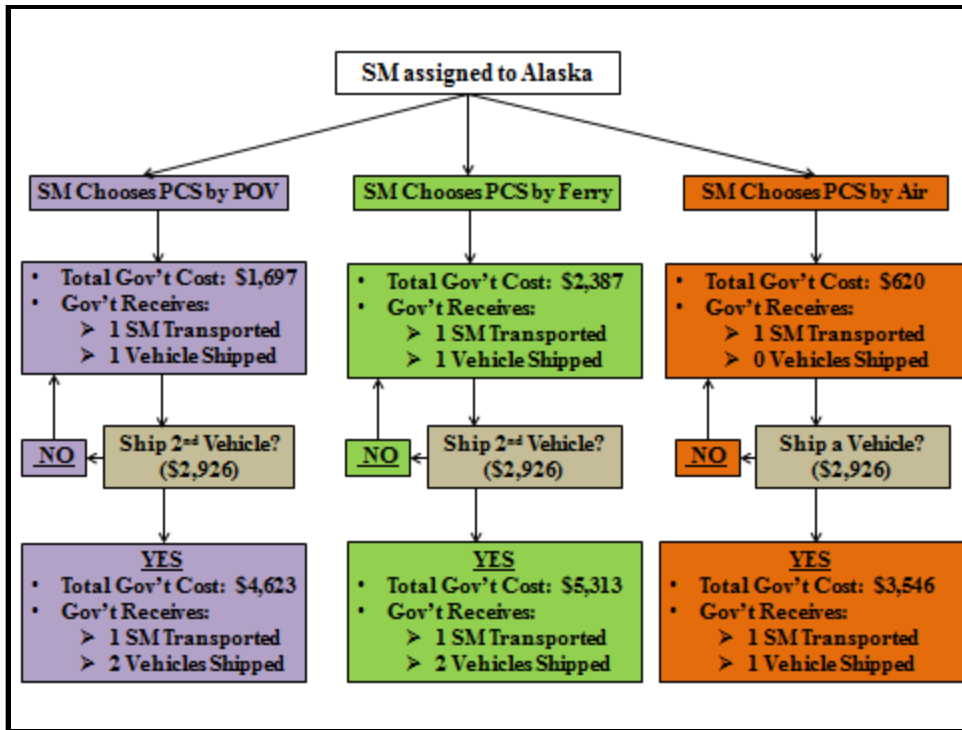


Figure 4. Alaska PCS Mode of Travel Cost Comparison

### 3. Comparison of Impacts

The cost and value of each mode of PCS travel must be compared in a manner that each of the government's receivables (number of service members transported and number of vehicles shipped) are equal for the given cost. For example, to compare the cost of modes of travel against one another after the first decision node (PCS via POV = \$1,697; Ferry = \$2,387; Air = \$620) would be inaccurate; PCS travel by air after the first decision node does not include the cost of shipping or transporting a vehicle. The most accurate impact comparison, then, is a scenario that compares travel alternatives when all of the outcomes are equal. The only scenario that fits this requirement is one where one service member is transported and one POV is, effectively, "shipped"; Figure 5 depicts this comparison.

POV	Ferry	Air
<ul style="list-style-type: none"> <li>• Total Gov't Cost: \$1,697</li> <li>• Gov't Receives: <ul style="list-style-type: none"> <li>➢ 1 SM Transported</li> <li>➢ 1 Vehicle Shipped</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Total Gov't Cost: \$2,387</li> <li>• Gov't Receives: <ul style="list-style-type: none"> <li>➢ 1 SM Transported</li> <li>➢ 1 Vehicle Shipped</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Total Gov't Cost: \$3,546</li> <li>• Gov't Receives: <ul style="list-style-type: none"> <li>➢ 1 SM Transported</li> <li>➢ 1 Vehicle Shipped</li> </ul> </li> </ul>

Figure 5. Comparison of Impacts

In this case, PCS by POV offers the most value for the cost by providing transport and shipping for \$690 less than a PCS move by ferry, and \$1,849 less than a PCS move by air.

#### D. EFFECT OF IMPACTS

The comparison of impacts above illustrates the costs and values associated with each PCS travel mode in a single scenario. Each of the 13,527 claim numbers in the data set, however, represents the number of times service members chose one mode of PCS travel over another. In order to estimate the effect of these choices on the impacts to the government, a realistic scenario utilizing the actual number of travelers is appropriate. This scenario assumes that

- service members traveling to Alaska chose either to move by POV (the travel mode with the least cost to the government) or by air travel (the highest cost mode of travel)
- all service members choosing to conduct PCS moves by POV do not choose to ship a second vehicle
- all service members choosing PCS via air also choose to ship a vehicle

Figure 6 depicts the results of this scenario.

Number of SM Choosing a PCS move by POV: 7,394 Cost of PCS by POV: <u>x \$1,697</u> Total Cost: \$12.5M	Number of SM Choosing a PCS move by Air: 6,133 Cost of PCS by Air: <u>x \$3,546</u> Total Cost: \$21.7M
Government Receives: <ul style="list-style-type: none"> <li>• 7,394 Service Members Transported</li> <li>• 7,394 Vehicles Shipped</li> </ul>	Government Receives: <ul style="list-style-type: none"> <li>• 6,133 Service Members Transported</li> <li>• 6,133 Vehicles Shipped</li> </ul>

Figure 6. Comparison of Modes of PCS Travel Using Actual Values

As Figure 6 demonstrates, the cost to conduct PCS moves by air far exceeds the cost to PCS by POV. In this scenario, with service members driving to Alaska, the government receives 1,261 more service members and 1,261 more vehicles for \$9.2 million less than PCS moves by air travel.

**E. CONSIDERATION OF DISTANCE AS A COST DRIVER**

The cost-benefit analysis above assumes that a service member traveling to an Alaskan military installation by POV will take an average of nine days to reach his destination. Nine days of travel at 350 miles per day yields a distance of 3,150 miles, or roughly the distance between Fort Wainwright, Alaska and Monterey, California (3,055 miles). Since the distance traveled by a service member choosing to conduct a PCS move by POV directly correlates with the government’s cost to move that service member, an additional question arises: would the maximum distance that a service member can travel by POV to Alaska cause the estimated cost of POV travel to exceed that of a PCS move by air travel? A scenario that incorporates the extremes of CONUS and Alaskan installation locations, and the travel rates derived in the study, then, is appropriate to consider.

Figure 7 depicts the estimated cost to the government if a service member chooses to conduct a PCS move by POV from the most remote major CONUS military installation, Key West Naval Air Station, Florida, to the most remote major Alaskan military installation considered in this study, Fort Wainwright, Alaska:

<b>Distance Between Key West NAS and Fort Wainwright, AK:</b>	<b>5,025 miles</b>
<b>Days of Travel (5,025 miles/350 miles per day):</b>	<b>14 days</b>
<b>Thus:</b>	
<b>Estimated Cost of POV MALT (5,025 miles x \$0.19 per mile [derived]):</b>	<b>\$955</b>
<b>Estimated Cost of POV Per Diem (14 days x \$125 per day [derived]):</b>	<b><u>+\$1,750</u></b>
<b>Estimated Cost of PCS by POV:</b>	<b>\$2,705</b>

Figure 7. Estimated Cost of PCS by POV from Key West NAS, FL to Fort Wainwright, AK

As shown by Figure 7, even when considering the most extreme distance that could be traveled by a service member moving to Alaska, a PCS move by POV still offers the most value for the cost by providing transport and shipping for \$841 less than a PCS move by air. Thus, regardless of the distance traveled, a PCS move by POV from a CONUS installation to an Alaskan installation will cost the government less than air travel as an alternative.

#### **F. RECOMMENDATION**

Through scenarios that encompassed the PCS travel alternatives to service members and the corresponding cost to the government, the higher value of PCS via POV continued to emerge. While transporting a single person to and from Alaska by air is significantly less expensive than POV travel, the cost to ship a vehicle must be included in order to create scenarios that would yield valid results. Based on these results, it was confirmed that the amount the government pays when members PCS by POV to or from Alaska is less for the number of service members transported and vehicles shipped than by PCS via air travel. Therefore, PCS by POV to or from Alaska is, indeed, to the government's advantage.

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## **IV. CONCLUSION**

### **A. RESULTS**

Contrary to the original thesis, the cost-benefit analysis conducted by this study strengthened the government's assertion that PCS travel accomplished by POV is indeed to its advantage. In proving this assertion, the objectives of this study were accomplished:

- Through this study's research methodology, plausible estimations of the cost to complete a PCS move to Alaska were developed for each travel mode alternative. In the absence of amplifying details from government agencies such as actual dates of travel, the destination installation of military travelers to Alaska, and the actual costs to ship vehicles, it was the wealth of information available through publicly accessible government resources that made this research possible.
- The cost-benefit analysis conducted in this study revealed that the contract cost to ship a service member's vehicle is the cost driver that has the greatest impact on the cost to complete a PCS move to Alaska. Identifying contract shipping as the opportunity cost alternative to driving a POV to Alaska quantified the benefits to the government, thus allowing a cost comparison across travel modes to be made.
- Most compelling, however, is the direct comparison of travel costs using actual travel data, as highlighted in Figure 6. While this scenario assumes that all POV travel conducted did not include ferry PCS per diem, by comparing extremes, the potential cost saved (in this case, over \$9 million) lends weight to the government's statement that a PCS move by POV is to its advantage.

### **B. FURTHER RESEARCH**

This study revealed several areas for potential examination that could expand upon this research:

#### **1. Inclusion of Dependents**

Dependent travel costs represented over half of the data received from DFAS. The JFTR provides great detail in explaining the entitlements and allowances of dependents included in a PCS move. A logical advancement of this research, then, would be the incorporation of the unique calculations associated with determining dependent PCS costs. The challenge in this task would be similar to the one faced in this study: how

to disaggregate cost data that requires the knowledge of specific personal information such as number and ages of dependents? PCS moves are planned at the unit level; by the time the monetary requirements reach DFAS, personally identifiable information has been removed, and only an account of the costs of “service member” and “dependents” remain. Undertaking an endeavor of this complexity would produce a robust study, providing further insight into the efficacy of PCS travel cost-control policy.

## **2. Widening the Scope**

This study is intentionally narrow in its view to explore the nuances of government funded travel to a remote location. Using the models, projections, and cost estimation techniques developed in this study, a future, broader investigation could either include other OCONUS locations (Europe or the Pacific) or more commonly assigned CONUS locations. Undertaking a study of that scope would be considerably more voluminous and would require more time committed to developing models more suited to the locations being examined. Nevertheless, the continued broadening of this research would serve to further test the policy assertions of the JFTR.

## **3. Cost of Vehicle Shipping**

The market for military contracts is competitive and secretive. Yet, when the competitions are complete, and a contract is awarded, the secrets of the contracting bids are manifested in costs to the government and taxes on the public. By far, the single most significant cost documented in this study is the contracted cost to ship vehicles; it is the single reason why a PCS move by air travel is less cost effective than a PCS by POV. While the specific details of vehicle shipping volume and cost were not made available by the SDDC, the process by which the costs to the government from vehicle shipping are determined presents a potential research opportunity. By delving into critical components of the cost to ship the vehicles of military personnel, potential cost savings to the government may be revealed.

## **C. CLOSING**

In developing the policies and regulations that govern PCS travel, analyses similar to that conducted in this research had to have been performed by countless policy

analysts with unlimited access to actual historical data. The advantage that policymakers have, then, is that their assumptions, projections, and estimations are grounded in the validity of the data available to them. At the same time, the creators of these regulations and policies have the tremendous responsibility of, not only safely moving military personnel from one permanent duty station to another, but doing so within the confines of fiscal constraint. With this in mind, the core of this research lies not in the degree of accuracy in the calculation or estimation of costs, but rather within the fundamental and necessary exercise of qualifying written policy with quantitative analysis. Continually examining fiscal policy in this manner, then, refreshes the discussion on government efficiencies and focuses future fiscal planning.

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