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EVALUATION OF  
PROPOSED CONSOLIDATION  
OF CHILL AND FREEZE MISSION  
AT DEFENSE SUBSISTENCE  
OFFICES (DSOs) LANDOVER  
AND CHEATHAM

JUNE 1993

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OPERATIONS RESEARCH AND  
ECONOMIC ANALYSIS OFFICE  
OFFICE OF PLANNING &  
RESOURCE MANAGEMENT

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EVALUATION OF PROPOSED CONSOLIDATION OF CHILL AND FREEZE  
MISSION AT DEFENSE SUBSISTENCE OFFICES (DSOs)  
LANDOVER AND CHEATHAM

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DEBRA A. McCORKLE

OPERATIONS RESEARCH AND ECONOMIC ANALYSIS OFFICE  
OFFICE OF PLANNING AND RESOURCE MANAGEMENT  
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JUNE 1993

## EXECUTIVE SUMMARY

In an effort to reduce costs and live within ever tightening budget constraints, the Field Activities Branch of the Supply Operations Division, Directorate of Subsistence is considering moving the Chill and Freeze mission from the Defense Subsistence Office (DSO) Landover, Maryland to DSO Cheatham, Williamsburg, Virginia. At this time, Subsistence has no plan to make any changes concerning the Fresh Fruit and Vegetable (FF&V) mission that Landover currently performs.

In order to adequately evaluate the proposed consolidation, the Field Activities Branch requested the Operations Research and Economic Analysis Office conduct an economic analysis to compare the costs of the current operations to service the Landover and Cheatham customers vice consolidating the two facilities and servicing both sets of customers from the DSO Cheatham facility. The major cost elements analyzed were storage, handling and transportation costs. Storage and handling costs were available for the two DSOs from the Field Activities Branch of Subsistence, however, transportation data was only available for the current customers of each DSO. No reliable cost data was available for DSO Cheatham to service new customers. A regression model for transportation costs was developed using each DSO's actual transportation cost per 100 pounds (cwt) per mile. The correlation analysis showed a relationship between cost and distance for each customer. Using the model, prospective rates were developed for each new customer and their transportation costs were calculated.

A summary of major cost elements comparing servicing Landover and Cheatham customers from their present DSOs (status quo operations) and consolidating the two facilities and servicing both sets of customers from the Cheatham DSO showed operating costs would be approximately \$306,000 more annually if consolidated at Cheatham.

Although not part of the original request from the Directorate of Subsistence, but for the sake of completeness, the OR&EA Office considered the additional alternative of consolidating the DSO Cheatham Chill and Freeze mission at DSO Landover. Once again, the major cost elements analyzed were storage, handling and transportation costs. As mentioned previously, storage and handling costs were available from the Field Activities Branch of Subsistence and a regression model for transportation costs

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was developed using each DSO's actual transportation cost  
per 100 pounds (cwt) per mile.  
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A summary of major cost elements comparing servicing Cheatham and Landover customers from their current DSOs (status quo operations) and consolidating the two facilities and servicing both sets of customers from the Landover DSO showed operating costs out of Landover would be approximately \$1,224,000 more annually.

Therefore, having addressed the storage, handling and transportation costs of the various consolidation options, the economic analysis concluded that the least costly alternative would be to remain with the status quo Chill and Freeze operations at both DSO Landover and DSO Cheatham. Due to the close proximity of the current two sets of customers to their respective DSOs and the long distance between the two DSOs (approx. 150 miles) the transportation costs to service the new customers make consolidation an expensive consideration. However, decision makers may want to take a look at broadening the geographic area of consideration to include additional DSOs for consolidation (i.e. perhaps DSO Landover could be more economically consolidated with DSO Philadelphia and/or DSO Cheatham with DSO Columbia, S.C.)

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## **I. INTRODUCTION AND BACKGROUND.**

The Field Activities Branch of the Supply Operations Division in the Directorate of Subsistence is responsible for the daily operation of seventeen Defense Subsistence Offices (DSOs) aligned with the Defense Subsistence Region (DSR)-Atlantic and provides assistance and coordination for five West Coast DSOs aligned with DSR-Pacific. The mission of each DSO is to provide effective and economical cold storage warehousing support and buying services for fresh fruits and vegetables to authorized customers within a designated geographical area.

Due to increased budgetary constraints and the continuing need to provide effective and economical support and services to over 2100 Subsistence customers, the Field Activities Branch is currently reviewing the placement of the 21 DSOs and the customers they serve. One recommendation being considered is to move the Chill and Freeze mission from DSO Landover, Maryland to DSO Cheatham, Williamsburg, Virginia. At this time, Subsistence has no plan to make any changes concerning the Fresh Fruit and Vegetable (FF&V) mission currently performed at Landover.

The purpose of this analysis is to determine whether it is more cost effective to serve the 43 Mid-Atlantic Chill and Freeze customers out of consolidated operations at either DSO Landover or DSO Cheatham or whether it is more economical to remain with the status quo operations at both DSO facilities.

## **II. SCOPE.**

The analysis was limited to the consolidation of the Chill and Freeze Mission only. Under the guidelines established by the Directorate of Subsistence, no consideration was given to the consolidation of the Fresh Fruit and Vegetable mission. In addition, consolidation was limited to only the DSO Landover and DSO Cheatham sites. Thus, the analysis considered the following three alternatives:

- Status Quo (no consolidation)
- Consolidate Landover Chill and Freeze mission and Cheatham Chill and Freeze mission and service both sets of customers out of DSO Cheatham.
- Consolidate Cheatham Chill and Freeze mission and Landover Chill and Freeze mission and service both sets of customers out of DSO Landover.

### **III. METHODOLOGY.**

#### **A. Assumptions.**

1. Sufficient capacity exists at DSO Landover and DSO Cheatham to service all 43 Mid-Atlantic Chill and Freeze customers.
2. The current 43 Chill and Freeze customers of the two DSOs will continue to be serviced.
3. No additional government personnel costs will be incurred over and above those currently committed for this mission at the two DSOs. It is also assumed there will be no significant reduction in government personnel costs due to the fact that the majority of government personnel at each DSO are associated with the Fresh Fruit and Vegetable (FF&V) mission which is not being considered for consolidation in this analysis.

#### **B. Approach.**

The cost of servicing the combined 43 Chill and Freeze customers of the two DSOs from DSO Cheatham will be compared to the cost of servicing the same customers from DSO Landover. In addition, these costs will be compared to the costs of the status quo operations out of the two DSO facilities.

#### **C. Measurement Data.**

Developing a model to make the necessary comparisons for this analysis requires specific data elements such as: current operating costs (i.e. storage and handling costs of the warehouses) and transportation costs. Personnel costs were assumed to be the same regardless of DSO selection.

##### **1. Storage and Handling Costs.**

Appendix A displays storage and handling charges for each DSO for the years 1990 through 1992, as provided by Subsistence. No itemized storage costs are listed for DSO Cheatham because this facility is Government owned/ Contractor operated. Storage costs are included in an InterService Support Agreement (ISA) between the Defense Personnel Support Center (DPSC) which leases the warehouse, and the Navy who owns the facility. The details of this agreement are also outlined in Appendix A.

Appendix B displays the annual tonnage that passed through the two warehouses (first time pounds) and the annual tonnage stored (recurring pounds) for years 1990 through 1992. For the Cheatham facility, because it is Government owned there is no tracking of tonnage stored (recurring pounds). Thus, to estimate this number, the following formula was provided by Subsistence:

Cheatham Recurring Pounds = 1.5 \* 1st time Pounds

This information is used to develop tonnage estimates for carrier tender and service agreements.

## **2. Transportation Costs.**

The current negotiated carrier rate tender and service agreements for Landover and Cheatham were provided by Subsistence. Estimates for tonnage shipped during the year were compiled from the tender and service agreements for each DSO.

Negotiated tender rates are the actual contracted cost per 100 pounds (cwt) to transport goods from a point of origin (i.e. DSO) to a customer. Tender rates were only available for each DSO's current customers, therefore, a method to derive expected tender rates for new customers had to be developed.

The Office of Transportation and Traffic Management provided estimated tender rates based on published tariff rates for all new points of origin (see Appendix C). Tariff rates are regionalized rates for carriers to deliver to customers in a certain geographical area. The Office of Transportation computed the ratio of tender rates to tariff rates as an estimate of tender rates for new customers; however, the tender rate deviated from the tariff rate by 25 percent to 250 percent with no correlation to distance or weight category. The Operations Research and Economic Analysis Office (OR&EA) determined this variance to be extreme, thus the estimates would be unreliable predictors of the expected tender rates.

Upon further statistical review and analysis, the OR&EA Office developed a regression model based on cost of cwt per mile for both low weight and high weight shipments. Tender rates are negotiated based on weight of shipments ranging from 1,000 pounds up to 40,000 pounds. Carriers bid tenders for each weight category, however, to minimize the number of estimations in the model, two weight

categories were used: a low and high rate. The Office of Transportation and Traffic Management helped categorize these rates based on carriers minimum weight requirements per shipment.

The model was developed using the cwt per mile for Landover and Cheatham's existing customers. Appendix D displays each of the 43 customers in the Mid-Atlantic Region that must be serviced, distance from each of the alternative DSO warehouses and the cost per mile for each weight category. A non-linear regression model was then run for each DSO and each weight category. The statistical output for each regression model can be viewed in Appendices E1 through E4.

#### IV. ANALYSIS.

By conducting the correlation analysis it was determined that the variables, in this case distance and cost, were related in such a manner as to allow for estimating the tender rates for new customers at Cheatham and Landover.

Table 1 below shows the summary statistics from the regression analysis run on each DSO for each weight category. An R-squared statistic indicates the mathematical ability of the regression to predict cost (tender rate) based on distance.

| TABLE 1                                               |      |                               |           |
|-------------------------------------------------------|------|-------------------------------|-----------|
| SUMMARY STATISTICS ON REGRESSION ANALYSIS             |      |                               |           |
| DSO                                                   | RATE | REGRESSION MODEL              | R-SQUARED |
| Cheatham                                              | Low  | $Y = \exp(-0.22) * X^{-0.69}$ | 76%       |
| Cheatham                                              | High | $Y = \exp(-1.39) * X^{-0.69}$ | 67%       |
| Landover                                              | Low  | $Y = \exp(0.22) * X^{-0.76}$  | 72%       |
| Landover                                              | High | $Y = \exp(-0.94) * X^{-0.76}$ | 77%       |
| where Y = expected tender rate; X = distance in miles |      |                               |           |

An R-squared statistic of 76 percent implies that approximately 76 percent of the variability in cost is explained by the distance from Cheatham to its customers. This indicates that the tender rate charged is closely

associated with the distance traveled. Using the non-linear regression model:

$$Y = \exp(-0.22) * X^{-0.69}$$

low tender rates were generated for each new customer of Cheatham.

Similarly, the estimates for each regression in Table 1 were used to generate low and high tender rates for each of the DSO's new customers.

In Appendices F1 and F2 the estimated tender rates for each new customer of Cheatham and each new customer of Landover derived by the regression models are shown. These estimated rates were then used to calculate the transportation charges by weight for all customers. Transportation charges were calculated by multiplying the tender rate per cwt by the hundred pound tonnage shipped for each customer. The total of all customers' transportation costs for Cheatham as the consolidated DSO were compared to total transportation costs of Landover as the consolidated DSO. These consolidated costs were then compared to the transportation costs of the status quo operations. In Table 2, below, the expected annual transportation costs to service all 43 Mid-Atlantic customers out of DSO Cheatham are approximately \$411,000 more than the status quo transportation costs of shipping out of DSO Landover and DSO Cheatham, while the transportation costs at a consolidated Landover facility are expected to be \$1,074,000 more annually.

| TABLE 2                     |                  |             |              |
|-----------------------------|------------------|-------------|--------------|
| ANNUAL TRANSPORTATION COSTS |                  |             |              |
|                             | Consolidated DSO |             |              |
|                             | Status Quo       | Cheatham    | Landover     |
| Landover Customers          | \$448,000        | \$859,000   | \$448,000    |
| Cheatham Customers          | \$1,716,000      | \$1,716,000 | \$2,790,000  |
| Total Costs                 | \$2,164,000      | \$2,575,000 | \$3,238,000  |
| Differences                 |                  | +\$411,000  | +\$1,074,000 |

| TABLE 4                        |                  |             |              |
|--------------------------------|------------------|-------------|--------------|
| SUMMARY OF MAJOR COST ELEMENTS |                  |             |              |
|                                | Consolidated DSO |             |              |
|                                | Status Quo       | Cheatham    | Landover     |
| Transportation                 | \$2,165,000      | \$2,575,000 | \$3,238,000  |
| Handling                       | \$368,000        | \$347,000   | \$500,000    |
| Storage                        | \$590,000        | \$507,000   | \$609,000    |
| TOTALS                         | \$3,123,000      | \$3,429,000 | \$4,347,000  |
| DIFFERENCE                     |                  | +\$306,000  | +\$1,224,000 |

Considering the major cost elements in Table 4, the costs of consolidating operations at DSO Cheatham are expected to be approximately \$918,000 less annually than consolidating at DSO Landover. However, to consolidate the two DSOs at Cheatham would cost approximately \$306,000 more than the current status quo operations at both Landover and Cheatham.

Because transportation is the major cost factor in this analysis, a sensitivity analysis was performed on the transportation costs to determine at what level Cheatham must decrease their tender rates to be competitive with the current status quo operating costs. From the sensitivity analysis, the transportation costs for Cheatham would have to be 15 percent less than estimated in order for Cheatham to be competitive with current status quo operating costs.

## VI. CONCLUSIONS.

It appears from the economic analysis that the current status quo operations at DSO Landover and DSO Cheatham are the least costly. Transportation costs to service Landover customers out of Cheatham would have to be reduced by approximately 15 percent before consolidation of the two DSOs would begin to be cost effective.

DSO STORAGE AND HANDLING COSTS

CHEATHAM:

|                                        | <u>1990</u> | <u>1991</u> | <u>1992</u> |
|----------------------------------------|-------------|-------------|-------------|
| Chill and Freeze Handling Costs (CWT)* | 0.7523      | 0.7503      | 0.6633      |

LANDOVER:

FREEZER:

|                      |      |      |      |
|----------------------|------|------|------|
| Handling Costs (CWT) | 0.98 | 1.01 | 1.01 |
| Storage Costs (CWT)  | 0.78 | 0.80 | 0.80 |

COOLER:

|                      |      |      |      |
|----------------------|------|------|------|
| Handling Costs (CWT) | 0.78 | 0.80 | 0.80 |
| Storage Costs (CWT)  | 0.64 | 0.66 | 0.68 |

- \* Cheatham DSO is Gov't owned/Contractor operated.  
No Contractor storage costs. Navy owned-Navy/DPSC ISSA.

Cheatham Storage Costs:

Cheatham storage costs = FY'92 Navy/DPSC Interservice Support Agreement costs of \$507,420 which are DPSC's costs for the use of the entire warehouse.

DSO ANNUAL TONNAGE

FIRST TIME (POUNDS)

|                 | <u>1990</u> | <u>1991</u> | <u>1992</u> |
|-----------------|-------------|-------------|-------------|
| CHEATHAM:       | 62,624,651  | 49,564,669  | 45,879,047  |
| LANDOVER: TOTAL | 8,551,806   | 6,202,374   | 6,711,257   |
| Frozen (84%)    | 7,183,517   | 5,209,994   | 5,637,456   |
| Chill (16%)     | 1,368,289   | 992,380     | 1,073,801   |

RECURRING (POUNDS)

|                 | <u>1990</u> | <u>1991</u> | <u>1992</u> |
|-----------------|-------------|-------------|-------------|
| CHEATHAM:*      | 93,936,976  | 74,347,003  | 68,818,570  |
| LANDOVER: TOTAL | 13,591,081  | 11,938,953  | 10,604,560  |
| Frozen (84%)    | 11,416,508  | 10,028,721  | 8,907,830   |
| Chill: (16%)    | 2,174,573   | 1,910,232   | 1,696,730   |

\* Cheatham Recurring Pounds = 1.5 x 1st Time Pounds - 45 day Safety Level

## TRANSPORTATION DATA FOR DSOS

| ORIGIN DESTINATION VA        | LOW RATE | MIN. WT. | CURRENT CHEATMAN |         |           | MIN. WT. | CURRENT CHEATMAN |         |           | ORIGIN POINT CHEATMAN VA |         |           |          |
|------------------------------|----------|----------|------------------|---------|-----------|----------|------------------|---------|-----------|--------------------------|---------|-----------|----------|
|                              |          |          | RATE             | PERCENT | HIGH RATE |          | RATE             | PERCENT | HIGH RATE | LOW RATE                 | LOW FOR | HIGH RATE | HIGH FOR |
| NAVAL ACADEMY MD             | \$9.60   | 5        | \$1.76           | 18.00%  | \$4.92    | 20       | \$1.59           | 20.00%  | \$4.56    | \$10.34                  | \$3.62  | \$5.57    | \$11.6   |
| MIDSHIPMEN FOOD SERVICE MD   | \$6.57   | 10       | \$1.20           | 26.84%  | \$3.51    | 40       | \$1.66           | 18.00%  | \$4.68    | \$9.23                   | \$1.48  | \$4.01    | \$6.75   |
| FORT BELVOIR MD              | \$7.90   | 10       | \$1.65           | 20.76%  | \$3.19    | 40       | \$1.47           | 19.73%  | \$3.57    | \$10.36                  | \$1.54  | \$4.20    | \$6.20   |
| NAVAL MED CTR MD             | \$11.60  | 5        | \$1.50           | 37.77%  | \$4.50    | 20       | \$1.00           | 22.22%  | \$3.00    | \$10.34                  | \$4.11  | \$5.57    | \$11.24  |
| BOLLING AFB DC               | \$5.80   | 5        | \$2.00           | 22.73%  | \$3.41    | 30       | \$0.68           | 19.94%  | \$1.65    | \$10.45                  | \$2.37  | \$4.37    | \$6.87   |
| HOWARD UNIV HOSP DC          | \$5.80   | 5        | \$3.76           | 42.73%  | \$7.90    | 10       | \$1.69           | 33.92%  | \$3.45    | \$10.45                  | \$4.45  | \$9.37    | \$2.24   |
| NAVAL STATION DC             | \$9.60   | 5        | \$3.36           | 35.00%  | \$3.75    | 30       | \$1.15           | 30.62%  | \$3.45    | \$10.34                  | \$3.62  | \$4.33    | \$11.53  |
| NAVAL STATION DC             | \$6.80   | 5        | \$3.76           | 42.73%  | \$7.90    | 10       | \$1.69           | 33.92%  | \$3.45    | \$10.45                  | \$4.45  | \$9.37    | \$2.24   |
| SOLDIERS & SAILORS HOME DC   | \$8.80   | 5        | \$3.50           | 39.77%  | \$7.90    | 10       | \$1.90           | 24.05%  | \$3.68    | \$11.54                  | \$3.37  | \$6.81    | \$6.81   |
| FT. MEADE MD                 | \$7.90   | 10       | \$1.59           | 20.13%  | \$3.19    | 40       | \$0.75           | 27.51%  | \$3.23    | \$11.86                  | \$4.00  | \$6.94    | \$6.94   |
| FT. RYER DC                  | \$7.90   | 10       | \$1.35           | 17.09%  | \$3.19    | 40       | \$0.52           | 16.30%  | \$3.37    | \$10.58                  | \$1.34  | \$3.22    | \$6.22   |
| PATUZENT NAV. AIR STATION MD | \$10.84  | 5        | \$4.16           | 38.36%  | \$4.45    | 30       | \$1.15           | 25.84%  | \$3.41    | \$11.81                  | \$5.68  | \$6.39    | \$11.65  |
| MARINE CORPS BASE VA         | \$9.72   | 10       | \$2.30           | 23.66%  | \$4.32    | 40       | \$2.00           | 46.30%  | \$9.72    | \$12.50                  | \$4.32  | \$2.00    | \$2.00   |
| FT. RICHIE MD                | \$9.92   | 5        | \$4.97           | 50.10%  | \$5.07    | 20       | \$1.25           | 24.26%  | \$3.45    | \$10.45                  | \$5.24  | \$5.71    | \$11.59  |
| VA HOSPITAL MD               | \$5.60   | 5        | \$2.76           | 42.73%  | \$3.41    | 30       | \$0.70           | 20.53%  | \$3.45    | \$10.45                  | \$4.46  | \$4.37    | \$6.90   |
| VA HOSPITAL WV               | \$6.47   | 10       | \$2.97           | 25.06%  | \$5.02    | 20       | \$1.67           | 33.27%  | \$3.61    | \$9.61                   | \$3.37  | \$5.98    | \$11.99  |
| VA HOSPITAL MD               | \$6.57   | 10       | \$2.49           | 29.05%  | \$3.51    | 40       | \$0.68           | 19.37%  | \$3.23    | \$10.45                  | \$2.69  | \$4.00    | \$6.77   |
| VA HOSPITAL MD               | \$9.44   | 5        | \$5.99           | 63.45%  | \$5.02    | 20       | \$1.40           | 27.89%  | \$3.84    | \$12.44                  | \$1.96  | \$6.55    | \$6.55   |
| VINT HILL FARMS VA           | \$9.60   | 5        | \$4.45           | 50.57%  | \$3.41    | 30       | \$1.05           | 30.79%  | \$3.88    | \$11.96                  | \$1.47  | \$6.45    | \$6.45   |
| N. REED A.M.C. DC            | \$8.80   | 5        | \$2.89           | 32.84%  | \$4.50    | 20       | \$0.87           | 19.52%  | \$3.45    | \$11.71                  | \$5.71  | \$11.10   | \$11.10  |
| U.S. NAVAL SHIPS MD          | \$6.57   | 10       | \$2.49           | 29.05%  | \$3.51    | 40       | \$0.68           | 19.37%  | \$3.23    | \$10.45                  | \$2.69  | \$4.00    | \$6.77   |
| VA LOCH RAVEN MD             | \$8.57   | 10       | \$2.77           | 32.32%  | \$3.51    | 40       | \$0.77           | 21.94%  | \$3.23    | \$12.98                  | \$4.00  | \$6.88    | \$6.88   |
| VA HOSPITAL WV               | \$12.44  | 10       | \$5.74           | 46.14%  | \$7.88    | 20       | \$2.87           | 36.42%  | \$11.95   | \$5.51                   | \$7.56  | \$2.75    | \$2.75   |
| VA HOSPITAL WV               | \$11.69  | 10       | \$5.00           | 42.77%  | \$7.39    | 20       | \$2.62           | 35.45%  | \$12.96   | \$5.34                   | \$8.22  | \$2.91    | \$2.91   |
| COMBO 1                      | \$6.57   | 10       | \$4.24           | 49.47%  | \$3.51    | 40       | \$0.74           | 21.08%  | \$3.23    | \$10.45                  | \$4.57  | \$4.00    | \$6.84   |
| COMBO 2                      | \$6.47   | 10       | \$4.24           | 50.06%  | \$3.60    | 40       | \$0.74           | 20.56%  | \$2.68    | \$11.34                  | \$1.01  | \$6.21    | \$6.21   |
| COMBO 3                      | \$8.47   | 10       | \$8.49           | 100.24% | \$3.60    | 40       | \$0.74           | 20.56%  | \$2.68    | \$12.69                  | \$1.01  | \$6.21    | \$6.21   |
| COMBO 4                      | \$8.57   | 10       | \$2.99           | 34.89%  | \$3.51    | 40       | \$0.74           | 21.08%  | \$3.23    | \$13.22                  | \$4.00  | \$6.84    | \$6.84   |
| COMBO 5                      | \$8.57   | 10       | \$1.55           | 18.09%  | \$3.51    | 40       | \$0.60           | 22.79%  | \$3.23    | \$11.67                  | \$4.00  | \$6.91    | \$6.91   |
| COMBO 6                      | \$8.47   | 10       | \$4.24           | 50.06%  | \$3.60    | 40       | \$0.74           | 20.56%  | \$2.90    | \$11.45                  | \$1.10  | \$6.23    | \$6.23   |
| COMBO 7                      | \$9.72   | 10       | \$2.25           | 23.15%  | \$4.32    | 40       | \$0.70           | 16.20%  | \$3.72    | \$12.25                  | \$4.32  | \$6.70    | \$6.70   |
| COMBO 8                      | \$8.47   | 10       | \$2.15           | 27.74%  | \$3.89    | 30       | \$1.05           | 26.99%  | \$3.61    | \$12.67                  | \$4.52  | \$1.22    | \$1.22   |
| COMBO 9                      | \$11.69  | 10       | \$5.74           | 49.10%  | \$5.46    | 40       | \$1.43           | 26.19%  | \$12.96   | \$6.36                   | \$6.10  | \$1.60    | \$1.60   |
| COMBO 10                     | \$12.44  | 10       | \$5.74           | 46.14%  | \$5.90    | 30       | \$1.91           | 32.37%  | \$11.95   | \$5.51                   | \$5.75  | \$1.66    | \$1.66   |
| COMBO 11                     | \$9.44   | 5        | \$6.05           | 63.88%  | \$5.89    | 20       | \$1.20           | 20.85%  | \$3.34    | \$12.13                  | \$1.17  | \$6.36    | \$6.36   |
| COMBO 12                     | \$6.47   | 10       | \$2.50           | 29.52%  | \$3.60    | 40       | \$0.65           | 18.06%  | \$2.90    | \$10.86                  | \$1.10  | \$6.20    | \$6.20   |
| COMBO 13                     | \$9.60   | 5        | \$6.38           | 66.46%  | \$3.75    | 30       | \$0.85           | 22.79%  | \$10.34   | \$6.87                   | \$4.33  | \$6.99    | \$6.99   |
| COMBO 14                     | \$7.90   | 10       | \$1.57           | 19.87%  | \$3.19    | 40       | \$0.51           | 15.99%  | \$3.37    | \$10.67                  | \$1.34  | \$3.21    | \$3.21   |
| COMBO 15                     | \$7.90   | 10       | \$1.70           | 21.52%  | \$3.19    | 40       | \$0.52           | 16.30%  | \$3.23    | \$11.99                  | \$4.00  | \$6.65    | \$6.65   |
| COMBO 16                     | \$7.90   | 10       | \$1.40           | 17.72%  | \$3.19    | 40       | \$0.51           | 15.99%  | \$3.37    | \$11.66                  | \$4.07  | \$6.65    | \$6.65   |
| COMBO 17                     | \$7.90   | 10       | \$1.70           | 21.52%  | \$3.19    | 40       | \$0.51           | 15.99%  | \$3.23    | \$11.99                  | \$4.00  | \$6.64    | \$6.64   |
| COMBO 18                     | \$8.80   | 5        | \$2.50           | 28.41%  | \$3.41    | 30       | \$0.68           | 19.94%  | \$10.45   | \$2.97                   | \$4.37  | \$6.87    | \$6.87   |
| COMBO 19                     | \$8.80   | 5        | \$2.20           | 25.00%  | \$3.19    | 30       | \$0.70           | 21.94%  | \$10.45   | \$2.61                   | \$4.07  | \$6.89    | \$6.89   |
| COMBO 20                     | \$7.90   | 10       | \$1.35           | 17.09%  | \$3.19    | 40       | \$0.51           | 15.99%  | \$3.37    | \$11.60                  | \$4.07  | \$6.65    | \$6.65   |
| COMBO 21                     | \$8.80   | 5        | \$1.80           | 20.45%  | \$3.41    | 30       | \$0.55           | 16.13%  | \$10.45   | \$2.14                   | \$4.37  | \$6.70    | \$6.70   |
| COMBO 22                     | \$6.80   | 5        | \$1.50           | 14.77%  | \$3.41    | 30       | \$0.55           | 16.13%  | \$3.68    | \$10.57                  | \$1.47  | \$6.24    | \$6.24   |
| COMBO 23                     | \$5.80   | 5        | \$1.50           | 14.77%  | \$3.41    | 30       | \$0.55           | 16.13%  | \$3.88    | \$10.57                  | \$1.47  | \$6.24    | \$6.24   |

## COST STUDY OF NORTHERN REGION

| COST STATE OF MONTANA REGION       |  |             |             |                     |         |               |             |                     |         | ORIGIN POINT LANDOVER MD |         |              |          |                          |  |  |  |  |  |
|------------------------------------|--|-------------|-------------|---------------------|---------|---------------|-------------|---------------------|---------|--------------------------|---------|--------------|----------|--------------------------|--|--|--|--|--|
| ORIGIN CHEATMAN VA<br>DESTINATIONS |  | LOW<br>RATE | MIN.<br>WT. | CURRENT<br>CHEATMAN |         |               | MIN.<br>WT. | CURRENT<br>CHEATMAN |         |                          | PROS    |              | PROS     |                          |  |  |  |  |  |
|                                    |  |             |             | TENDER<br>RATE      | PERCENT | HIGH<br>TASTE |             | TENDER<br>RATE      | PERCENT | LOW<br>RATE              | LOW FOR | HIGH<br>RATE | HIGH FOR |                          |  |  |  |  |  |
| FT. EUSTIS VA                      |  | \$11.05     | 10          | \$1.13              | 49.18%  | \$1.18        | 40          | \$0.40              | 33.90%  | \$10.42                  | \$5.12  | \$4.90       | \$1.66   | FT EUSTIS VA             |  |  |  |  |  |
| NAVAL NEAPLES STATION VA           |  | \$10.50     | 5           | \$2.00              | 35.71%  | \$1.76        | 20          | \$0.75              | 42.86%  | \$11.66                  | \$9.99  | \$6.29       | \$2.81   | NAVAL NEAPLES STATION VA |  |  |  |  |  |
| FT. MONROE VA                      |  | \$11.50     | 5           | \$2.50              | 100.00% | \$1.76        | 20          | \$0.90              | 51.14%  | \$11.66                  | \$11.66 | \$6.59       | \$3.27   | FT. MONROE VA            |  |  |  |  |  |
| FORT LEE VA                        |  | \$12.90     | 10          | \$1.90              | 65.52%  | \$1.10        | 40          | \$0.55              | 50.00%  | \$3.47                   | \$6.20  | \$4.14       | \$2.67   | FORT LEE VA              |  |  |  |  |  |
| LANGLEY AFB VA                     |  | \$13.05     | 10          | \$1.20              | 39.34%  | \$1.18        | 40          | \$0.42              | 35.59%  | \$10.42                  | \$4.10  | \$4.90       | \$1.74   | LANGLEY AFB VA           |  |  |  |  |  |
| FT. A.P. HILL VA                   |  | \$12.90     | 10          | \$2.20              | 75.86%  | \$1.10        | 40          | \$0.62              | 77.27%  | \$3.47                   | \$6.43  | \$3.60       | \$2.60   | FT. A.P. HILL VA         |  |  |  |  |  |
| FT. FIDELITY VA                    |  | \$13.34     | 5           | \$4.00              | 119.76% | \$1.17        | 20          | \$0.78              | 66.67%  | \$10.60                  | \$12.69 | \$4.49       | \$2.99   | FT. FIDELITY VA          |  |  |  |  |  |
| NAVAL AIR STATION VA               |  | \$13.05     | 10          | \$1.85              | 60.66%  | \$1.18        | 40          | \$0.47              | 39.62%  | \$10.42                  | \$6.32  | \$4.90       | \$1.95   | NAVAL AIR STATION VA     |  |  |  |  |  |
| VA HOSPITAL VA                     |  | \$13.50     | 5           | \$4.00              | 114.29% | \$1.30        | 30          | \$0.70              | 53.85%  | \$11.66                  | \$13.33 | \$5.02       | \$2.70   | VA HOSPITAL VA           |  |  |  |  |  |
| FED. CORP. INSTITUTE VA            |  | \$13.34     | 5           | \$4.00              | 119.76% | \$1.17        | 20          | \$0.78              | 66.67%  | \$10.60                  | \$12.69 | \$4.49       | \$2.66   | FED. CORP. INSTITUTE VA  |  |  |  |  |  |
| FT. BRAGG NC                       |  | \$6.61      | 10          | \$4.17              | 63.09%  | \$2.81        | 40          | \$1.14              | 29.92%  | \$7.71                   | \$4.66  | \$4.45       | \$1.33   | FT. BRAGG NC             |  |  |  |  |  |
| FED CORP INST NC                   |  | \$6.61      | 10          | \$4.01              | 60.67%  | \$2.81        | 40          | \$1.05              | 27.03%  | \$7.71                   | \$4.66  | \$4.45       | \$1.20   | FED CORP INST NC         |  |  |  |  |  |
| LEJEUNE AFB NC                     |  | \$6.88      | 10          | \$4.21              | 61.19%  | \$2.97        | 40          | \$1.15              | 28.97%  | \$7.71                   | \$4.72  | \$4.45       | \$1.29   | LEJEUNE AFB NC           |  |  |  |  |  |
| SEYMOUR JOHNSON AFB NC             |  | \$6.61      | 10          | \$3.95              | 59.76%  | \$2.81        | 40          | \$1.09              | 26.61%  | \$7.71                   | \$4.61  | \$4.45       | \$1.27   | SEYMOUR JOHNSON AFB NC   |  |  |  |  |  |
| VA HOSPITAL NC                     |  | \$7.30      | 5           | \$5.00              | 109.59% | \$6.61        | 10          | \$4.20              | 65.34%  | \$8.52                   | \$7.34  | \$7.71       | \$4.90   | VA HOSPITAL NC           |  |  |  |  |  |
| VA HOSPITAL NC                     |  | \$6.82      | 5           | \$10.75             | 121.74% | \$7.99        | 10          | \$5.40              | 67.56%  | \$10.15                  | \$12.36 | \$9.05       | \$6.12   | VA HOSPITAL NC           |  |  |  |  |  |
| VA HOSPITAL NC                     |  | \$6.69      | 5           | \$6.00              | 115.56% | \$6.65        | 10          | \$4.20              | 67.42%  | \$7.61                   | \$9.10  | \$6.66       | \$4.76   | VA HOSPITAL NC           |  |  |  |  |  |
| NSC NORFOLK VA                     |  | \$12.05     | 10          | \$1.20              | 39.34%  | \$1.16        | 40          | \$0.42              | 35.59%  | \$10.42                  | \$4.10  | \$4.90       | \$1.74   | NSC NORFOLK VA           |  |  |  |  |  |
| NSC CHEATMAN VA                    |  | \$12.29     | 5           | \$2.50              | 75.99%  | \$2.80        | 10          | \$1.25              | 43.40%  | \$10.34                  | \$7.66  | \$5.23       | \$4.01   | NSC CHEATMAN VA          |  |  |  |  |  |
| COMBO 1                            |  | \$6.66      | 10          | \$4.42              | 64.24%  | \$3.97        | 40          | \$1.21              | 30.48%  | \$7.71                   | \$4.95  | \$4.45       | \$1.36   | COMBO 1                  |  |  |  |  |  |
| COMBO 2                            |  | \$7.99      | 10          | \$6.01              | 75.23%  | \$4.61        | 40          | \$1.32              | 33.19%  | \$9.05                   | \$6.81  | \$5.33       | \$1.78   | COMBO 2                  |  |  |  |  |  |
| COMBO 3                            |  | \$7.99      | 10          | \$6.01              | 75.23%  | \$4.61        | 40          | \$1.32              | 33.19%  | \$9.05                   | \$6.81  | \$5.33       | \$1.78   | COMBO 3                  |  |  |  |  |  |
| COMBO 4                            |  | \$12.88     | 10          | \$2.10              | 72.92%  | \$1.08        | 40          | \$0.65              | 60.19%  | \$3.23                   | \$6.73  | \$4.00       | \$2.41   | COMBO 4                  |  |  |  |  |  |
| COMBO 5                            |  | \$6.41      | 10          | \$4.76              | 71.10%  | \$3.81        | 40          | \$1.37              | 35.96%  | \$7.71                   | \$5.48  | \$4.45       | \$1.60   | COMBO 5                  |  |  |  |  |  |
| COMBO 6                            |  | \$12.90     | 10          | \$2.20              | 75.86%  | \$1.10        | 40          | \$0.75              | 66.18%  | \$9.47                   | \$7.18  | \$4.14       | \$2.82   | COMBO 6                  |  |  |  |  |  |
| COMBO 7                            |  | \$13.05     | 10          | \$1.80              | 52.46%  | \$1.18        | 40          | \$0.49              | 41.53%  | \$10.42                  | \$5.17  | \$4.90       | \$1.63   | COMBO 7                  |  |  |  |  |  |
| COMBO 8                            |  | \$13.05     | 10          | \$1.73              | 56.77%  | \$1.18        | 40          | \$0.58              | 49.15%  | \$10.42                  | \$5.91  | \$4.90       | \$1.41   | COMBO 8                  |  |  |  |  |  |
| COMBO 9                            |  | \$13.05     | 10          | \$1.95              | 67.92%  | \$1.18        | 40          | \$0.58              | 49.15%  | \$10.42                  | \$6.76  | \$4.90       | \$1.41   | COMBO 9                  |  |  |  |  |  |
| COMBO 10                           |  | \$12.90     | 10          | \$2.75              | 94.63%  | \$1.10        | 40          | \$0.65              | 77.27%  | \$6.47                   | \$6.13  | \$2.66       | \$2.66   | COMBO 10                 |  |  |  |  |  |

ACTUAL TENDER RATES BY MILES FOR EACH DSO

| CHEATHAM CUSTOMERS                   | MILES<br>LANDOVER | MILES<br>CHEATHAM | LOW<br>TENDER RATE | LOW<br>COST/MILE | HIGH<br>TENDER RATE | HIGH<br>COST/MILE |
|--------------------------------------|-------------------|-------------------|--------------------|------------------|---------------------|-------------------|
| FT. EUSTIS, NEWPORT NEWS, VA.        | 177               | 19                | \$1.50             | \$0.0789         | \$0.40              | \$0.0211          |
| NAVAL WEAPONS STATION, YORKTOWN, VA. | 166               | 17                | \$3.00             | \$0.1785         | \$0.75              | \$0.0441          |
| FT. MONROE, HAMPTON, VA.             | 167               | 40                | \$3.50             | \$0.0675         | \$0.90              | \$0.0225          |
| FORT LEE, PETERSBURG, VA.            | 136               | 72                | \$1.90             | \$0.0264         | \$0.55              | \$0.0076          |
| LANGLEY AFB, HAMPTON, VA.            | 187               | 35                | \$1.20             | \$0.0343         | \$0.42              | \$0.0120          |
| FT. A.P. HILL, FREDERICKSBURG, VA.   | 75                | 100               | \$2.20             | \$0.0220         | \$0.85              | \$0.0085          |
| FT. PICKETT, BLACKSTONE, VA.         | 187               | 119               | \$4.00             | \$0.0336         | \$0.78              | \$0.0086          |
| NAVAL AIR STATION, OCEANA, VA.       | 189               | 67                | \$1.65             | \$0.0276         | \$0.47              | \$0.0070          |
| VA HOSPITAL, HAMPTON, VA.            | 187               | 30                | \$4.00             | \$0.1333         | \$0.70              | \$0.0233          |
| FED CORR INSTITUTE, PETERSBURG, VA.  | 136               | 64                | \$4.00             | \$0.0625         | \$0.75              | \$0.0117          |
| FT. BRAGG, FAYETTEVILLE, NC.         | 317               | 245               | \$4.17             | \$0.0170         | \$1.14              | \$0.0047          |
| FED CORR INSTITUTE, BUTNER, NC.      | 249               | 235               | \$4.01             | \$0.0171         | \$1.03              | \$0.0044          |
| LEJEUNE AFB, JACKSONVILLE, NC.       | 326               | 246               | \$4.21             | \$0.0171         | \$1.15              | \$0.0047          |
| SEYMOUR JOHNSON AFB, GOLDSBORO, NC.  | 275               | 195               | \$3.95             | \$0.0203         | \$1.09              | \$0.0056          |
| VA HOSPITAL, FAYETTEVILLE, NC.       | 317               | 244               | \$6.00             | \$0.0326         | \$4.20              | \$0.0172          |
| VA HOSPITAL, SAUSBURY, NC.           | 336               | 265               | \$10.75            | \$0.0377         | \$5.40              | \$0.0189          |
| VA HOSPITAL, DURHAM, NC.             | 261               | 205               | \$6.00             | \$0.0390         | \$4.20              | \$0.0205          |
| NSC NORFOLK, NORFOLK, VA.            | 183               | 56                | \$1.20             | \$0.0214         | \$0.42              | \$0.0075          |
| NSC CHEATHAM, WILLIAMSBURG, VA.      | 157               | 2                 | \$2.50             | \$1.2500         | \$1.25              | \$0.6250          |
| COMBO 1                              | 326               | 246               | \$4.42             | \$0.0180         | \$1.21              | \$0.0049          |
| COMBO 2                              | 336               | 265               | \$6.01             | \$0.0211         | \$1.53              | \$0.0054          |
| COMBO 3                              | 336               | 265               | \$6.01             | \$0.0211         | \$1.53              | \$0.0054          |
| COMBO 4                              | 136               | 72                | \$2.10             | \$0.0292         | \$0.85              | \$0.0090          |
| COMBO 5                              | 317               | 245               | \$4.70             | \$0.0192         | \$1.37              | \$0.0056          |
| COMBO 6                              | 167               | 119               | \$2.20             | \$0.0185         | \$0.75              | \$0.0063          |
| COMBO 7                              | 177               | 19                | \$1.60             | \$0.0842         | \$0.49              | \$0.0256          |
| COMBO 8                              | 187               | 40                | \$1.73             | \$0.0433         | \$0.56              | \$0.0145          |
| COMBO 9                              | 187               | 40                | \$1.66             | \$0.0495         | \$0.56              | \$0.0145          |
| COMBO 10                             | 136               | 100               | \$2.75             | \$0.0275         | \$0.85              | \$0.0085          |

| LANDOVER CUSTOMERS                    | MILES<br>CHEATHAM | MILES<br>LANDOVER | LOW<br>TENDER RATE | LOW<br>COST/MILE | HIGH<br>TENDER RATE | HIGH<br>COST/MILE |
|---------------------------------------|-------------------|-------------------|--------------------|------------------|---------------------|-------------------|
| NAVAL ACADEMY, ANNAPOLIS, MD.         | 173               | 27                | \$3.36             | \$0.1244         | \$1.59              | \$0.0589          |
| MIDSHIP FOOD SERVICE, ANNAPOLIS, MD.  | 173               | 27                | \$2.30             | \$0.0652         | \$0.66              | \$0.0244          |
| FORT BELVOIR, ALEXANDRIA, VA.         | 135               | 28                | \$0.85             | \$0.0304         | \$0.47              | \$0.0166          |
| NAVAL MEDICAL CENTER, BETHESDA, MD.   | 156               | 11                | \$3.50             | \$0.3182         | \$1.00              | \$0.0909          |
| BOLLING AFB, WASH D.C.                | 146               | 11                | \$2.00             | \$0.1616         | \$0.66              | \$0.0616          |
| HOWARD UNIVERSITY HOSPITAL, WASH D.C. | 146               | 8                 | \$3.76             | \$0.4700         | \$1.89              | \$0.2363          |
| NAVAL STATION, ANNAPOLIS, MD.         | 173               | 27                | \$3.36             | \$0.1244         | \$1.15              | \$0.0426          |
| NAVAL STATION, WASH D.C.              | 146               | 10                | \$3.76             | \$0.3760         | \$1.89              | \$0.1890          |
| SOLDIERS AND SAILORS HOME, WASH D.C.  | 146               | 10                | \$3.50             | \$0.3500         | \$1.90              | \$0.1900          |
| FT. MEADE, ODENTON, MD.               | 162               | 20                | \$1.59             | \$0.0795         | \$0.75              | \$0.0375          |
| FT. MEYER, ARLINGTON, VA.             | 154               | 13                | \$1.35             | \$0.1036         | \$0.52              | \$0.0400          |
| PAX NAVAL STATION, CEDAR POINT, MD.   | 144               | 89                | \$4.16             | \$0.0467         | \$1.15              | \$0.0129          |
| HQ MARINE CORPS, QUANTICO, VA.        | 80                | 45                | \$2.30             | \$0.0511         | \$2.00              | \$0.0444          |
| FT. RICHIE, FT. RICHIE, MD.           | 211               | 84                | \$4.67             | \$0.0582         | \$1.23              | \$0.0146          |
| VA HOSPITAL, WASH D.C.                | 146               | 10                | \$3.76             | \$0.3760         | \$0.70              | \$0.0700          |
| VA HOSPITAL, MARTINSBURG, WV.         | 200               | 70                | \$2.97             | \$0.0424         | \$1.67              | \$0.0239          |
| VA HOSPITAL, FT. HOWARD, MD.          | 186               | 45                | \$2.49             | \$0.0553         | \$0.66              | \$0.0151          |
| VA HOSPITAL, PERRY POINT, MD.         | 221               | 43                | \$5.99             | \$0.1393         | \$1.40              | \$0.0326          |
| VINT HILL FARMS, WARRENTON, VA.       | 136               | 66                | \$4.45             | \$0.0674         | \$1.05              | \$0.0159          |
| WALTER REED MEDICAL, WASH D.C.        | 146               | 14                | \$2.89             | \$0.2064         | \$0.87              | \$0.0621          |
| U.S. NAVAL SHIPS, BALTIMORE, MD.      | 186               | 40                | \$2.49             | \$0.0623         | \$0.66              | \$0.0170          |
| VA LOCH HAVEN, BALTIMORE, MD.         | 186               | 40                | \$2.77             | \$0.0693         | \$0.77              | \$0.0193          |
| VA HOSPITAL, BECKLEY, WV.             | 310               | 350               | \$5.74             | \$0.0184         | \$2.87              | \$0.0082          |
| VA HOSPITAL, CLARKSBURG, WV.          | 312               | 225               | \$5.00             | \$0.0222         | \$2.62              | \$0.0116          |
| COMBO 1                               | 186               | 43                | \$4.24             | \$0.0986         | \$0.74              | \$0.0172          |
| COMBO 2                               | 221               | 43                | \$4.24             | \$0.0986         | \$0.74              | \$0.0172          |
| COMBO 3                               | 173               | 27                | \$6.49             | \$0.3144         | \$0.74              | \$0.0274          |
| COMBO 4                               | 173               | 27                | \$2.99             | \$0.1107         | \$0.74              | \$0.0274          |
| COMBO 5                               | 221               | 27                | \$1.55             | \$0.0574         | \$0.80              | \$0.0296          |
| COMBO 6                               | 144               | 66                | \$4.24             | \$0.0476         | \$0.74              | \$0.0083          |
| COMBO 7                               | 136               | 66                | \$2.25             | \$0.0341         | \$0.70              | \$0.0106          |
| COMBO 8                               | 200               | 70                | \$2.35             | \$0.0336         | \$1.05              | \$0.0150          |
| COMBO 9                               | 312               | 350               | \$5.74             | \$0.0184         | \$1.43              | \$0.0041          |
| COMBO 10                              | 312               | 350               | \$5.74             | \$0.0184         | \$1.91              | \$0.0055          |
| COMBO 11                              | 173               | 27                | \$6.03             | \$0.2233         | \$1.20              | \$0.0444          |
| COMBO 12                              | 80                | 45                | \$2.50             | \$0.0556         | \$0.65              | \$0.0144          |
| COMBO 13                              | 162               | 20                | \$6.36             | \$0.3190         | \$0.85              | \$0.0425          |
| COMBO 14                              | 154               | 26                | \$1.57             | \$0.0561         | \$0.51              | \$0.0182          |
| COMBO 15                              | 156               | 14                | \$1.70             | \$0.1214         | \$0.52              | \$0.0371          |
| COMBO 16                              | 146               | 11                | \$1.40             | \$0.1273         | \$0.51              | \$0.0464          |
| COMBO 17                              | 153               | 11                | \$1.70             | \$0.1545         | \$0.51              | \$0.0464          |
| COMBO 18                              | 146               | 11                | \$2.50             | \$0.2273         | \$0.66              | \$0.0616          |
| COMBO 19                              | 146               | 11                | \$2.20             | \$0.2000         | \$0.70              | \$0.0636          |
| COMBO 20                              | 150               | 11                | \$1.35             | \$0.1227         | \$0.51              | \$0.0464          |
| COMBO 21                              | 146               | 11                | \$1.60             | \$0.1636         | \$0.55              | \$0.0500          |
| COMBO 22                              | 135               | 26                | \$1.30             | \$0.0464         | \$0.55              | \$0.0196          |
| COMBO 23                              | 162               | 26                | \$1.30             | \$0.0464         | \$0.55              | \$0.0196          |

# LANDOVER (LOW RATE)

Regression Analysis - Multiplicative model:  $Y = aX^b$

Dependent variable: CHETRATE.var2/CHETRA Independent variable: CHETRATE.v

| Parameter  | Estimate  | Standard Error | T Value  | Prob. Level |
|------------|-----------|----------------|----------|-------------|
| Intercept* | 0.21276   | 0.256015       | 0.831042 | .41044      |
| Slope      | -0.758347 | 0.0714362      | -10.5157 | .00000      |

\* NOTE: The Intercept is equal to Log a.

## Analysis of Variance

| Source | Sum of Squares | Df | Mean Square | F-Ratio  | Prob. Level |
|--------|----------------|----|-------------|----------|-------------|
| Model  | 25.83697       | 1  | 25.83697    | 112.6935 | .00000      |
| Error  | 10.087776      | 44 | .229268     |          |             |

Total (Corr.) 35.924748 45

Correlation Coefficient = -0.848055  
Std. Error of Est. = 0.478819

R-squared = 71.92 percent

# LANDOVER (HIGH RATE)

Regression Analysis - Multiplicative model:  $Y = aX^b$

Dependent variable: CHETRATE.var3/CHETRA Independent variable: CHETRATE

| Parameter  | Estimate  | Standard Error | T Value  | Prob. Level |
|------------|-----------|----------------|----------|-------------|
| Intercept* | -0.935632 | 0.227533       | -4.11208 | .00017      |
| Slope      | -0.762111 | 0.0634886      | -12.0039 | .00000      |

\* NOTE: The Intercept is equal to Log a.

## Analysis of Variance

| Source | Sum of Squares | Df | Mean Square | F-Ratio  | Prob. Level |
|--------|----------------|----|-------------|----------|-------------|
| Model  | 26.09409       | 1  | 26.09409    | 144.0935 | .0000       |
| Error  | 7.968020       | 44 | .181091     |          |             |

Total (Corr.) 34.062105 45

Correlation Coefficient = -0.875256

R-squared = 76.61 percent

Std. Error of Est. = 0.425548

# CHEATHAM (LOW RATE)

Regression Analysis - Multiplicative model:  $Y = aX^b$

Dependent variable: CHETRATE.var2

Independent variable: CHETRATE.

| Parameter  | Estimate  | Standard Error | T Value   | Prob. Level |
|------------|-----------|----------------|-----------|-------------|
| Intercept* | -0.218666 | 0.341154       | -0.640958 | .52695      |
| Slope      | -0.689294 | 0.0751313      | -9.17453  | .00000      |

\* NOTE: The Intercept is equal to Log a.

## Analysis of Variance

| Source | Sum of Squares | Df | Mean Square | F-Ratio  | Prob. Level |
|--------|----------------|----|-------------|----------|-------------|
| Model  | 17.732386      | 1  | 17.732386   | 84.17204 | .00000      |
| Error  | 5.688046       | 27 | .210668     |          |             |

|               |           |    |
|---------------|-----------|----|
| Total (Corr.) | 23.420433 | 28 |
|---------------|-----------|----|

Correlation Coefficient = -0.870134

R-squared = 75.71 percent

Std. Error of Est. = 0.458986

# CHEATHAM (HIGH RATE)

Regression Analysis - Multiplicative model:  $Y = aX^b$

Dependent variable: CHETRATE.var3

Independent variable: CHETRATE.

| Parameter  | Estimate  | Standard Error | T Value  | Prob. Level |
|------------|-----------|----------------|----------|-------------|
| Intercept* | -1.39319  | 0.431002       | -3.23246 | .00323      |
| Slope      | -0.695587 | 0.0949181      | -7.32829 | .00000      |

\* NOTE: The Intercept is equal to Log a.

## Analysis of Variance

| Source        | Sum of Squares | Df | Mean Square | F-Ratio  | Prob. Level |
|---------------|----------------|----|-------------|----------|-------------|
| Model         | 18.057631      | 1  | 18.057631   | 53.70378 | .0000       |
| Error         | 9.078617       | 27 | .336245     |          |             |
| Total (Corr.) | 27.136248      | 28 |             |          |             |

Correlation Coefficient = -0.815747

R-squared = 66.54 percent

Std. Error of Est. = 0.579866

LANDOVER ESTIMATES BASED ON REGRESSION ANALYSIS

| CUSTOMER                               | MILES | \$/MILE<br>LOW | \$/MILE<br>HIGH | ESTIMATED<br>LOW TENDER | ESTIMATED<br>HIGH TENDER |
|----------------------------------------|-------|----------------|-----------------|-------------------------|--------------------------|
| MIDSHIP FOOD SERVICE, ANNAPOLIS, MD.   | 173   | \$0.0230       | \$0.0088        | \$3.98                  | \$1.19                   |
| FORT BELVOIR, ALEXANDRIA, VA.          | 135   | \$0.0273       | \$0.0081        | \$3.69                  | \$1.11                   |
| NAVAL MEDICAL CENTER, BETHESDA, MD.    | 156   | \$0.0247       | \$0.0074        | \$3.86                  | \$1.15                   |
| BOLLING AFB, WASH. D.C.                | 148   | \$0.0258       | \$0.0078        | \$3.80                  | \$1.14                   |
| HOWARD UNIVERSITY HOSPITAL, WASH. D.C. | 148   | \$0.0256       | \$0.0078        | \$3.80                  | \$1.14                   |
| NAVAL STATION, ANNAPOLIS, MD.          | 173   | \$0.0230       | \$0.0088        | \$3.98                  | \$1.12                   |
| NAVAL STATION, WASH. D.C.              | 148   | \$0.0258       | \$0.0078        | \$3.80                  | \$1.14                   |
| SOLDIERS AND SAILORS HOME, WASH. D.C.  | 148   | \$0.0256       | \$0.0076        | \$3.80                  | \$1.10                   |
| FT. MEADE, ODENTON, MD.                | 162   | \$0.0241       | \$0.0072        | \$3.90                  | \$1.17                   |
| FT. MEYER, ARLINGTON, VA.              | 154   | \$0.0249       | \$0.0074        | \$3.84                  | \$1.16                   |
| PAX NAVAL STATION, CEDAR POINT, MD.    | 144   | \$0.0281       | \$0.0073        | \$3.76                  | \$1.13                   |
| HQ MARINE CORPS, QUANTICO, VA.         | 80    | \$0.0391       | \$0.0117        | \$3.14                  | \$0.94                   |
| FT. RICHIE, FT. RICHIE, MD.            | 211   | \$0.0200       | \$0.0060        | \$4.24                  | \$1.27                   |
| VA HOSPITAL, WASH. D.C.                | 148   | \$0.0268       | \$0.0076        | \$3.80                  | \$1.14                   |
| VA HOSPITAL, MARTINSBURG, WV.          | 200   | \$0.0208       | \$0.0062        | \$4.17                  | \$1.25                   |
| VA HOSPITAL, FT. HOWARD, MD.           | 198   | \$0.0200       | \$0.0082        | \$4.16                  | \$1.24                   |
| VA HOSPITAL, PERRY POINT, MD.          | 221   | \$0.0194       | \$0.0058        | \$4.30                  | \$1.26                   |
| VINT HILL FARMS, WARRENTON, VA.        | 136   | \$0.0271       | \$0.0081        | \$3.70                  | \$1.11                   |
| WALTER REED MEDICAL, WASH. D.C.        | 148   | \$0.0268       | \$0.0078        | \$3.60                  | \$1.14                   |
| U.S. NAVAL SHIPS, BALTIMORE, MD.       | 186   | \$0.0219       | \$0.0085        | \$4.08                  | \$1.22                   |
| VA LOCH RAVEN, MD.                     | 186   | \$0.0219       | \$0.0085        | \$4.08                  | \$1.22                   |
| VA HOSPITAL, BECKLEY, WV.              | 310   | \$0.0154       | \$0.0045        | \$4.78                  | \$1.42                   |
| VA HOSPITAL, CLARKSBURG, WV.           | 312   | \$0.0192       | \$0.0057        | \$4.32                  | \$1.29                   |
| COMBO 1                                | 166   | \$0.0219       | \$0.0086        | \$4.08                  | \$1.22                   |
| COMBO 2                                | 221   | \$0.0194       | \$0.0058        | \$4.30                  | \$1.28                   |
| COMBO 3                                | 173   | \$0.0284       | \$0.0088        | \$3.98                  | \$1.19                   |
| COMBO 4                                | 173   | \$0.0230       | \$0.0088        | \$3.98                  | \$1.19                   |
| COMBO 5                                | 221   | \$0.0194       | \$0.0058        | \$4.30                  | \$1.28                   |
| COMBO 6                                | 144   | \$0.0281       | \$0.0078        | \$3.76                  | \$1.13                   |
| COMBO 7                                | 136   | \$0.0271       | \$0.0081        | \$3.70                  | \$1.11                   |
| COMBO 8                                | 200   | \$0.0208       | \$0.0062        | \$4.17                  | \$1.25                   |
| COMBO 9                                | 312   | \$0.0163       | \$0.0045        | \$4.78                  | \$1.43                   |
| COMBO 10                               | 312   | \$0.0153       | \$0.0045        | \$4.78                  | \$1.43                   |
| COMBO 11                               | 173   | \$0.0230       | \$0.0065        | \$3.98                  | \$1.19                   |
| COMBO 12                               | 80    | \$0.0391       | \$0.0117        | \$3.14                  | \$0.94                   |
| COMBO 13                               | 162   | \$0.0241       | \$0.0072        | \$3.90                  | \$1.17                   |
| COMBO 14                               | 164   | \$0.0249       | \$0.0074        | \$3.84                  | \$1.15                   |
| COMBO 15                               | 158   | \$0.0247       | \$0.0074        | \$3.88                  | \$1.15                   |
| COMBO 16                               | 148   | \$0.0258       | \$0.0076        | \$3.80                  | \$1.14                   |
| COMBO 17                               | 153   | \$0.0250       | \$0.0075        | \$3.84                  | \$1.16                   |
| COMBO 18                               | 148   | \$0.0256       | \$0.0076        | \$3.80                  | \$1.14                   |
| COMBO 19                               | 148   | \$0.0256       | \$0.0076        | \$3.80                  | \$1.14                   |
| COMBO 20                               | 150   | \$0.0254       | \$0.0076        | \$3.81                  | \$1.14                   |
| COMBO 21                               | 148   | \$0.0256       | \$0.0078        | \$3.80                  | \$1.14                   |
| COMBO 22                               | 136   | \$0.0273       | \$0.0081        | \$3.89                  | \$1.11                   |
| COMBO 23                               | 162   | \$0.0241       | \$0.0072        | \$3.90                  | \$1.17                   |

CHEATHAM ESTIMATES BASED ON REGRESSION ANALYSIS

| CUSTOMER                              | MILES | \$/MILE<br>LOW | \$/MILE<br>HIGH | ESTIMATED<br>LOW TENDER | ESTIMATED<br>HIGH TENDER |
|---------------------------------------|-------|----------------|-----------------|-------------------------|--------------------------|
| FT. EUSTIS, NEWPORT NEWS, VA.         | 117   | \$0.0334       | \$0.0104        | \$3.91                  | \$1.22                   |
| NAVAL WEAPONS STATION, YORKTOWN, VA.  | 166   | \$0.0256       | \$0.0079        | \$4.25                  | \$1.32                   |
| FT. MONROE, HAMPTON, VA.              | 187   | \$0.0234       | \$0.0072        | \$4.38                  | \$1.36                   |
| FORT LEE, PETERSBURG, VA.             | 136   | \$0.0298       | \$0.0092        | \$4.05                  | \$1.26                   |
| LANGLEY AFB, HAMPTON, VA.             | 187   | \$0.0234       | \$0.0072        | \$4.38                  | \$1.36                   |
| FT. A.P. HILL, FREDERICKSBURG, VA.    | 75    | \$0.0468       | \$0.0146        | \$3.51                  | \$1.10                   |
| FT. PICKETT, BLACKSTONE, VA.          | 167   | \$0.0255       | \$0.0079        | \$4.26                  | \$1.33                   |
| NAVAL AIR STATION, OCEANA, VA.        | 199   | \$0.0223       | \$0.0069        | \$4.45                  | \$1.38                   |
| VA HOSPITAL, HAMPTON, VA.             | 187   | \$0.0234       | \$0.0072        | \$4.38                  | \$1.36                   |
| FED. CORR. INSTITUTE, PETERSBURG, VA. | 136   | \$0.0298       | \$0.0092        | \$4.05                  | \$1.26                   |
| FT. BRAGG, FAYETTEVILLE, NC.          | 317   | \$0.0156       | \$0.0048        | \$4.97                  | \$1.54                   |
| FED. CORR. INSTITUTE, BUTNER, NC.     | 249   | \$0.0188       | \$0.0058        | \$4.69                  | \$1.46                   |
| LEJEUNE AFB, JACKSONVILLE, NC.        | 328   | \$0.0152       | \$0.0047        | \$5.02                  | \$1.56                   |
| SEYMOUR JOHNSON AFB, GOLDSBORO, NC    | 275   | \$0.0174       | \$0.0054        | \$4.81                  | \$1.49                   |
| VA HOSPITAL, FAYETTEVILLE, NC.        | 317   | \$0.0156       | \$0.0048        | \$4.97                  | \$1.54                   |
| VA HOSPITAL, SALISBURY, NC.           | 336   | \$0.0150       | \$0.0046        | \$5.05                  | \$1.57                   |
| VA HOSPITAL, DURHAM, NC.              | 261   | \$0.0181       | \$0.0056        | \$4.75                  | \$1.47                   |
| NSC NORFOLK, NORFOLK, VA.             | 193   | \$0.0228       | \$0.0071        | \$4.41                  | \$1.37                   |
| NSC CHEATHAM, WILLIAMSBURG, VA.       | 157   | \$0.0267       | \$0.0083        | \$4.20                  | \$1.31                   |
| COMBO 1                               | 328   | \$0.0152       | \$0.0047        | \$5.02                  | \$1.56                   |
| COMBO 2                               | 336   | \$0.0150       | \$0.0046        | \$5.05                  | \$1.57                   |
| COMBO 3                               | 336   | \$0.0150       | \$0.0046        | \$5.05                  | \$1.57                   |
| COMBO 4                               | 136   | \$0.0298       | \$0.0092        | \$4.05                  | \$1.26                   |
| COMBO 5                               | 317   | \$0.0156       | \$0.0048        | \$4.97                  | \$1.54                   |
| COMBO 6                               | 167   | \$0.0255       | \$0.0079        | \$4.26                  | \$1.33                   |
| COMBO 7                               | 177   | \$0.0244       | \$0.0075        | \$4.32                  | \$1.34                   |
| COMBO 8                               | 187   | \$0.0234       | \$0.0072        | \$4.38                  | \$1.36                   |
| COMBO 9                               | 187   | \$0.0234       | \$0.0072        | \$4.38                  | \$1.36                   |
| COMBO 10                              | 136   | \$0.0298       | \$0.0092        | \$4.05                  | \$1.26                   |

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| 13. ABSTRACT (Maximum 200 words)<br>This study evaluates the costs of the current operations to service the DSO Landover and DSO Cheatham chill and freeze customers vice consolidating the two facilities and servicing both sets of customers from the DSO Cheatham facility. The major cost elements analyzed were storage, handling and transportation costs. The results of the study conclude that the least costly alternative would be to remain with the status quo chill and freeze operations at both DSO Landover and DSO Cheatham. Due to the close proximity of the current two sets of customers to their respective DSOs and the long distance between the two DSOs (approx. 150 miles) the transportation costs to service the new customers make consolidation an expensive consideration. |                                                             |                                                            |                                                   |                                           |
| 14. SUBJECT TERMS<br>Consolidation, chill and freeze, Landover, Cheatham                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                             |                                                            | 15. NUMBER OF PAGES<br>7                          |                                           |
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