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USPS-T-18

BEFORE THE
POSTAL RATE COMMISSION
WASHINGTON, D.C. 20268-0001

Postal Rate and Fee Changes, 2000

Docket No. R2000-1

DIRECT TESTIMONY OF
MICHAEL D. BRADLEY
ON BEHALF OF
UNITED STATES POSTAL SERVICE

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AUTOBIOGRAPHICAL SKETCH

My name is Michael D. Bradley and I am Professor of Economics at George Washington University. I have taught economics there since 1982 and I have published many articles using both economic theory and econometrics. Postal economics is one of my major areas of research. I have presented my research at various professional conferences and I have given invited lectures at both universities and government agencies. Beyond my academic work, I have extensive experience investigating real-world economic problems, as I have served as a consultant to financial and manufacturing corporations, trade associations, and government agencies.

I received a B.S. in economics with honors from the University of Delaware and as an undergraduate was awarded both Phi Beta Kappa and Omicron Delta Epsilon for academic achievement in the field of economics. I earned a Ph.D. in economics from the University of North Carolina and as a graduate student I was an Alumni Graduate Fellow. While being a professor, I have won both academic and nonacademic awards including the Richard D. Irwin Distinguished Paper Award, the American Gear Manufacturers ADEC Award, a Banneker Award and the Tractenberg Prize.

I have been studying postal economics for about fifteen years, and I have participated in many Postal Rate Commission proceedings. In Docket No. R84-1, I helped in the preparation of testimony about purchased transportation and in Docket No. R87-1, I testified on behalf of the Postal Service concerning the costs of purchased transportation. In Docket No. R90-1, I presented rebuttal testimony in the area of city carrier load time costs. In the Docket No. R90-1 remand, I presented testimony concerning the methods of city carrier costing.

I returned to transportation costing in Docket No. MC91-3. There, I presented testimony on the existence of a distance taper in postal transportation costs. In Docket No. R94-1, I presented both direct and rebuttal testimony on an econometric model of access costs. More recently, in Docket R97-1, I presented three pieces of testimony. I presented both direct and rebuttal testimony in the area of mail processing costs. I also presented testimony on the costs of purchased highway transportation

Beside my work with the U.S. Postal Service, I have served as a expert on postal economics to postal administrations in North America, Europe, and Asia. For example, I currently serve as External Methodology Advisor to Canada Post.

PURPOSE AND SCOPE

The purpose of my testimony is to present updated variabilities for purchased highway transportation. The new variabilities reflect the new account structure for Postal Service purchased highway transportation.

I also investigate the use of TRACS data for estimating variabilities, and I produced the average costs required for the Alaska air adjustment factor.

A CONCORDANCE OF LIBRARY REFERENCES AND WORKPAPERS

The following Library References are associated with my testimony:

LR-I-84	Bradley/Electronic Version of Data and Programs for Econometric Results (USPS-T-18) This library reference is compact disc that contains the HCSS data used in my econometric analysis as well as electronic versions of the programs.
LR-I-85	Power Only Highway Contract Survey This library reference contains the responses to a survey of Bulk Mail Centers (BMCs) by PricewaterhouseCoopers under my direction. The survey requested that BMCs provide the sizes of the trailers used for power-only contracts. The library reference also presents the calculation of the average-size trailer for each area.
LR-I-86	Responses Concerning Unusual Observations in the HCSS Data Set. This library reference contains the responses to a survey of District Network Offices (DNOs) by PricewaterhouseCoopers under my direction. The survey requested that the DNOs provide information on the contract cost segments identified as unusual in the HCSS database.

My testimony relies upon the following workpapers:

WP-1	Estimation of Econometric Equations and Variabilities for Purchased Highway Transportation.
WP-2	Calculation of the Wald Statistics.
WP-3	Estimation of Econometric Equations and Variabilities for Purchased Highway Transportation Using All Observations.
WP-4	Calculation of the Average Costs Required for the Alaskan Air Adjustment Factor.

I. THE ESTABLISHED METHODOLOGY FOR MEASURING VOLUME VARIABLE PURCHASED HIGHWAY TRANSPORTATION COSTS IS THE RESULT OF SUBSTANTIAL ANALYSIS ON THE RECORD.

The Commission has developed the established methodology for attributing purchased highway transportation costs over the last twenty years, with active consideration of the issue in five separate rate cases.[1] In this section, I provide a brief review of the record, with the emphasis on the Commission's determinations in each case.[2] I do this to provide context for the changes that the Postal Service is proposing in this case and to illustrate that those changes are entirely consistent with, and in fact enhance, the established methodology.

A. Docket No. R80-1

Prior to Docket No. R80-1, purchased highway transportation costs were considered to be virtually 100 percent volume variable. In Docket No. R80-1, the Postal Service presented a proposal that was, for that time, considered "radical." Specifically, the Postal Service proposed reducing the cost variability of purchased transportation to take account of the fixed nature of "latent" capacity[3]:

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[1] The relevant rate cases are Dockets No. R80-1, R84-1, R87-1, R90-1, and R97-1.

[2] This point is underscored by the fact that this review is taken entirely from the various Opinions and Recommended Decisions. All quotations in this review will thus be from the Commission.

[3] See PRC Op., R80-1, Vol. 1, at 174.

> In this case, the Postal Service proposes to change radically the method to distribute the cost of purchased transportation (Cost Segment 14) to the various classes and subclasses of mail. In the past three rate cases the Commission, with the Postal Service's acquiescence, has distributed segment 14 on the basis of cost incurrence, attributing over 90 percent of these costs. In this proceeding, the Postal Service introduces a new concept – latent capacity – defined as "[s]pace acquired for postal use and available, at no additional charge, for the conveyance of mail." (Footnotes omitted.)

The concept of latent capacity came from the recognition that many trucks in the postal transportation network are not fully utilized. Latent capacity thus represented the unused capacity in the postal transportation network:[4]

> To begin its analysis, the Postal Service notes that not all the cubic capacity it purchases may be filled at any particular time. For instance, a truck the Postal Service has contracted for might be loaded only half full. The Postal Service would say the truck has 50 percent utilized capacity and 50 percent latent capacity. (Footnotes omitted.)

The Postal Service proposed treating this latent capacity as being fixed with respect to volume. That is, the Postal Service argued that factors other than volume determined the amount of latent capacity in the system:[5]

> The Postal Service believes that unused capacity and its costs are irregular and unpredictable; therefore,

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4 See PRC Op., R80-1, Vol. 1, at 175.

5 See PRC Op., R80-1, Vol. 1, at 182.

> they cannot be traced to mail volumes. Rather than being related to mail volumes, unused capacity is said to be caused by a complex set of factors including irregularity of demand, inflexibilities in the supply of transportation, and intermediate stops on routes. (Footnotes omitted.)

In the Postal Service's view, if latent capacity was unrelated to volume, then its "volume variability" must be zero. On this basis, the Postal Service argued that costs associated with latent capacity should not be attributed to products. In not doing so, it lowered the overall variability of purchased highway transportation.

The Commission rejected this interpretation of latent capacity. It seized upon the Postal Service's assertion that latent capacity does not vary in a <u>predictable</u> way with changes in volume to argue that latent capacity is unpredictable, but not fixed. The Commission then focused upon the key issue, the degree to which the unused capacity varies with volume.[6]

> We note that if a percentage change in latent capacity cost were "higher" than the related change in volume, the variability would be greater than 100 percent; if the change were "the same," variability would be 100 percent; if the change were "lower," variability would be less than 100 percent. Giving the Service's statements an interpretation most favorable to the Service, we would conclude that the variability of latent capacity cost is less than 100 percent. But we cannot conclude, on the basis of the Service's testimony, that the variability is zero.

Although the Commission apparently determined that the variability of "latent" capacity was less than one hundred percent, it did not use this

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[6] <u>See</u> PRC Op., R80-1, Vol. 1, at 183.

conclusion in determining the final variabilities. In this regard, the Commission objected to any adjustment based upon the latent capacity argument and voiced its opinion that the existence of unused capacity does not distort the relationship between changes in volume and responses in cost:[7]

> The Postal Service says that it cannot economically purchase the exact amount of highway transportation needed at any one particular place and point in time. At any particular point in time, the amount of capacity on a particular route is fixed. Accepting these assertions from the Postal Service, we do not see that they have any bearing on the issue of the relationship between mail volume and transportation costs. The amount of capacity purchased is a function of the estimates of mail volume. Looking at the Postal Service's entire transportation system, or even any particular route over a period of one to four years, <u>it appears that capacity and therefore costs change in response to changes in volume regardless of the presence of the unused capacity the Postal Service describes as unpredictable.</u> (Emphasis added, footnote omitted.)

B. Docket No. R84-1

In the next docket, the Postal Service again presented a new analysis of purchased highway transportation variability. In Docket No. R84-1, the Postal Service collected data from a small number of Transportation Management Offices (TMOs) and attempted to estimate a variability with regression analysis. The econometric estimates were then "adjusted" to account for the effect of latent capacity. Finally, the intercept of the econometric equation was assumed by the Postal Service to represent the amount of cost that did not vary with

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7 <u>See</u> PRC Op., R80-1, Vol. 1, at 186.

volume:[8]

> Witness Robers presents the theory of cost behavior the Postal Service believes is associated with the results of the statistical analysis. Witness Robers says that the costs which are not identified as varying with volume in the regression analysis are costs related to the need to provide a minimum level of service across the country and, therefore, are independent of mail volume. USPS-T-10, pp. 49-55.
>
> The Postal Service again presents it theory that unutilized capacity in highway purchased transportation is not volume variable, but residual. USPS-T-10, p. 58. Witness Robers reasons that capacity is acquired with a view toward anticipated volume and that even if anticipated volume occurs, unutilized capacity exists. He concludes that it is therefore not variable with volume.

The Commission accepted, on one level, the econometric analysis presented by the Postal Service but termed it "short run." It actually did not adopt the variabilities and continued to apply a near 100 percent variability on the basis of "longer run" costing concerns.[9]

> Witness Robers says that the costs not identified as variable by the regression analysis are not volume variable. The information in the record does not support this conclusion. Rather, the correct interpretation of the analysis, as shown by the record, supports the Commission's previous finding that those purchased transportation costs which do not vary with volume in the short run do so when a longer, but reasonable, time period is examined.

The Commission did provide some guidance as to its opinions about how

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8 See PRC Op., R84-1, Vol. 1, at 225.

9 See PRC Op., R84-1, Vol. 1, at 234.

the econometric analysis should proceed. It endorsed the use of cubic foot-miles as a proxy for volume and the use of a single variable model:[10]

> The Postal Service does not have information on the volume of mail carried in the individual contracts. Therefore, a proxy for volume is needed. The Postal Service uses cubic foot-miles because the information can be obtained and is closely tied to volume of mail. The parties addressing this question agree that cubic foot-miles is a reasonable proxy. See e.g. Tr. 34/17,767; Tr. 24/11,891. We conclude that cubic foot-miles is an appropriate proxy for this analysis.

and:[11]

> With the data available on this record, we are inclined to believe that a single-variable equation, using cubic foot-miles, is best suited to analyze the short-run variation in costs. We have heard a great deal of argument on both sides, and we conclude that in this instance the benefits from the single-variable equation outweigh the shortcomings we have been urged to consider. We are inclined to agree with [Postal Service] witness Manrodt that, using the present data base, the possible collinearity between route-miles and cubic foot-miles of capacity might detract from the accuracy of the determination of variability.

In Docket R84-1, The Commission again rejected the Postal Services approach to unused or latent capacity:[12]

> In Docket No. R80-1, we refused to accept both the Postal Service's theory that unutilized capacity does not vary with volume and the results of the study

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[10] See PRC Op., R84-1, Vol. 1, at 240.

[11] See PRC Op., R84-1, Vol. 1, at 241.

[12] See PRC Op., R84-1,Vol. 1, at 243.

> which attempted to measure the percentage of unutilized capacity in the Postal Service's purchased transportation system. PRC Op. R80-1, paras. 0408-19. We find we must do so again on this record.

It also clarified its reasoning for why it considered unutilized capacity to be as variable as utilized capacity:[13]

> The Commission has found that capacity as a whole varies as volume changes. We recognize that the peaking patterns in the volume do result in unutilized capacity throughout the system. However, if volume (including the peak) increases, the Postal Service reacts by acquiring additional capacity, which will turn out to be a mixture of used and unused capacity.

C. Docket No. R87-1

In Docket No. R87-1, the Postal Service abandoned its assertion that unused capacity was fixed with respect to volume and accepted the Commission's assumption that it varies to the same degree as utilized capacity. The Postal Service also presented a more extensive econometric study based upon a national cross-section of highway contracts. The econometric results indicated that the purchased highway transportation variabilities were less than 100 percent and this result was explained on the basis of returns to scale in the provision of transportation.

The Commission accepted the Postal Service's approach to both

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[13] Id.

econometrically estimating the variabilities and economically interpreting them:[14]

> This case has seen substantial improvement in the costing for purchased transportation. We have decided to accept the translog cost model presented by the Postal Service for determining variability and to replace the attribution method first adopted in Docket No. R74-1.

This acceptance was based upon the presentation of an extensive data base, and an improved and coherent view of cost causality in purchased highway transportation.[15]

> There are two primary reasons enabling us to make the improvements. The first is the extensive data bases -- particularly for highway service -- which the Postal Service gathered. The second factor is the consistency between the description of the functioning of the Postal Service's highway transportation network -- as presented by the Postal Service's operational witnesses in previous cases and accepted by the Commission -- and the Postal Service's description as used by its economic witnesses in formulating theories that go along with the econometric cost models used with the data to estimate variability.

The Commission also considered the nature of the econometric estimation. An issue discussed during the case was whether or not a cross-sectional data set was acceptable for estimating volume variabilities in this cost component. After

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[14] See PRC Op., R87-1, Vol.1 at 290. The Commission's translog model included both cubic foot-miles and route-length as variables.

[15] Id.

reviewing the record, the Commission decided that it was:[16]

> *The next time transportation costing is considered, we expect to see a cross-sectional data base comparable to the one witness Bradley presented. We hope that it is as complete and reliable. As we believe that the more comprehensive analysis, presented by the Postal Service and accepted by the Commission, picks up the cost changes that are caused by interaction among the contracts in the network, it will be unnecessary to have another time-series study for that purpose.*

D. Docket No. R90-1

The focus of analysis shifted in Docket No. R90-1, as the Postal Service presented a new approach to calculating distribution keys but maintained the same approach to measuring variability. Prior to that docket, the volume variable purchased transportation cost was distributed to products on the basis of adjusted RPW volumes. This approach suffered from the drawback that it did not accurately account for the actual use of transportation by the various classes and subclasses.

To remedy this deficiency, the Postal Service presented the TRACS system which involved directly estimating, through sampling, the proportions of transportation capacity used by the various products. TRACS tests can be time consuming, so the Postal Service constructed a sampling scheme that was feasible in terms of time required and cost involved. It could then construct

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16 See PRC Op., R87-1, Vol. 1, at 319.

reliable distribution keys without unduly delaying the mail. The Commission saw this effort as a significant advancement:[17]

> This proceeding, like Docket No. R87-1, has shown very impressive improvements in the costing of purchased transportation. In Docket No. R87-1, the Postal Service presented, and the Commission accepted, variability studies of the purchased transportation services accounting for most of the costs incurred. In this case the Postal Service presents, and the Commission accepts, a major improvement in the method used to distribute attributable purchased transportation cost to various subclasses of mail.

The acceptance was, in large part, based upon the underlying research program for measuring the capacity proportions. Moreover, this research program was examined carefully by both the Commission and the parties:[18]

> The parties, and the Commission, subjected the Postal Service's presentation describing TRACS to intensive scrutiny before approving it. It is clear that much careful analytical work has gone into its development, and the record shows that TRACS data reliably reflect the relative use of the three major purchased transportation services

The Commission also recognized the difficulty of obtaining class specific information in the purchased transportation activity[19]

> The Postal Service determines the proportion of use of the transportation services by the various mail

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[17] See PRC Op., R90-1, Vol. 1, at III-154.

[18] See PRC Op., R90-1, Vol. 1, at III-155.

[19] See PRC Op., R90-1, Vol. 1, at III-157.

> subclasses so that the attributable costs of those services can be appropriately distributed. However, the magnitude of the transportation network used by the Postal Service and the volume of the mail carried on it makes the task quite difficult.

Finally, the Commission recognized that TRACS provides an appropriate mechanism for distributing the cost of empty space to the classes and subclasses of mail. Consistent with the Commission's position that unutilized capacity is as volume variable as utilized capacity, TRACS was designed to assign the cost of that empty space to products and not assume that it is institutional:[20]

> From time to time, proposals have been made that the costs thought to be associated with this space should be treated as institutional. The problem is particularly difficult because the capacity not holding mail can be expected to change, even on one trip. On the many contracts that involve more than one stop, mail is loaded and unloaded at various facilities. Therefore, at some points the truck may be more full than at others. See Tr. 5/1538.
>
> With TRACS, all unused capacity is accounted for and distributed to the mail on a sampled vehicle. The sampled mail is allocated its"fair share" of empty space by multiplying a ratio of the percent unloaded divided by the percent unloaded plus the percent remaining times that percent empty. The mail that is loaded on the truck further upstream is charged more.

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[20] See PRC Op., R90-1, Vol. 1 at III-161-162

E. Docket No. R97-1

The Postal Service again presented a new variability analysis in Docket No. R97-1. It had been ten years since its econometric analysis of purchased highway transportation costs was accepted by the Commission and it was time for an update. For example, in the previous case, the Presiding Officer indicated that he desired such an update:[21]

> Hopefully, the Postal Service itself will see fit to update this analysis in the next rate case.

The new study was firmly grounded in the methodology established by the Commission in Docket No. R87-1, but included two improvements.

First, in the intervening time, the Postal Service created an electronic database system to manage its purchased highway transportation contracts, called HCSS (Highway Contract Support System). This system supported construction of an electronic database covering virtually all contracts in force at a given point in time. The Docket No. R97-1 econometric analysis was thus based upon approximately 15,000 observations as opposed to the approximately 2,000 observations used in R87-1. The Commission accepted the new database as an improvement[22]:

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[21] See, Docket No. R94-1, Presiding Officer's Ruling No. R94-1/48, Presiding Officer's Ruling Denying Motion of United Parcel Service to Compel Responses to Interrogatories UPS/USPS-19 and 20, June 29, 1994, at 6.

[22] See PRC Op., R97-1, Vol. 1, at 208

> In most respects witness Bradley's data set is superior to the data set used to fit similar models for R87-1. It is certainly more recent and much larger than the R87-1 sample of 2,099 contracts. It is also richer in the sense that it offers opportunities to improve the original models. It includes information allowing each contract to be assigned to one of thirteen operating regions, and it allows inter-SCF and intra-SCF contracts to be divided into routes served by tractor trailers and by fixed-body vans. For a relatively small number of observations involving multiple vehicle capacities on a single contract, the HCSS requires an approximation of CFM that is somewhat cruder than the calculated CFM for such routes in the R87-1 sample. However, the effects of this approximation are minimal.

Second, methodological refinements were included by the Postal Service. These refinement lead to more precise estimation of the cost elasticities:[23]

> The Commission accepts the revisions and reestimations presented by the Postal Service as timely improvements to the R87-1 models. Therefore, volume-variable highway transportation costs have been determined for this proceeding using the elasticities for cost drivers derived by witness Bradley. For all but box-routes, these cost drivers are cubic foot miles (CFM) of contract capacity. For box-routes, the cost driver is the number of boxes. The Commission has also used the new model for plant-load contracts as the source for the elasticity for CFM to determine the volume-variability of plant-load costs.

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23 See PRC Op., R97-1, Vol. 1, at 205.

II. A RE-STRUCTURING OF THE POSTAL SERVICE PURCHASED HIGHWAY TRANSPORTATION NETWORK NECESSITATES ESTIMATING NEW ECONOMETRIC EQUATIONS.

As described above, the analysis of purchased highway transportation costs has proceeded by examining costs within the structure of the purchased highway transportation network. Sets of contracts have been individually analyzed as each set reflected a different part of the overall network. Generally, these sets of contracts were defined by the facilities that they served and the type of transportation service provided:[24]

> In Docket No. R87-1, the Commission adopted translog cost models for purchased highway transportation. These models were fit by Postal Service witness Lion to a sample derived from postal highway contracts data extracted by Postal Service witness Bradley. These models were applied by the Commission to determine the volume variability of transportation costs for several categories of highway contracts:
>
> - Inter-BMC: Contracts primarily between BMCs. Such contracts sometimes include stops at SCFs.
> - Intra-BMC: Contracts primarily between a BMC and the SCFs and Associate Offices (AOs) within the BMC's service area.
> - Inter-SCF: Contracts primarily between SCFs. Such contracts sometimes include stops at AOs.
> - Intra-SCF: Contracts primarily between an SCF and the AOs within the SCF's service area but excluding Intra-City contracts.

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[24] See PRC Op., R97-1, Vol. 1, at 204.

- Intra-City: Contracts between an SCF and the AOs within a single city.

- Box-Route: Contracts providing for delivery, collection and retail services to rural customers along a box route.

Since Docket No. R97-1, Postal Service has restructured its purchased highway accounts. It is my understanding that this restructuring was done to make the highway transportation accounting structure conform with the new Postal Service organizational structure. In the past, postal operations were organized along the following lines: Region, Division, MSC, and SCF. Now, however, the organizational structure of operations is different and makes use of the following management levels: Area, Cluster, Processing and Distribution Center (P&DC), and Customer Service District (CSD).

The new transportation account structure is designed to be consistent with this new organizational structure. In particular, the Intra-SCF and Inter-SCF accounts no longer exist. The transportation costs from these two old sets of accounts now are reported in five new sets of accounts: Intra-P&DC, Intra-CSD, Inter-P&DC, Inter-Cluster, and Inter-Area. Both the new and the old sets of accounts are listed in Table 1, below.[25]

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[25] There were no changes to the BMC and plant load accounts.

The new accounts are defined as follows:[26]

Intra-P&DC Accounts:
These accounts are used to record the expense for the transportation of mail between a processing and distribution plant (except a BMC) and stations/branches, airports, railheads, and piers within the same processing and distribution plant service area within the same cluster.

Intra-CSD Accounts:
These accounts are used to record the expense for the transportation and box delivery of mail between a postal facility (except a BMC) and stations/branches, airports, railheads, and piers within the same customer service district within the same cluster.

Inter-P&DC Accounts:
These accounts are used to record the expense for the transportation of mail between two postal processing and distribution plants (neither a BMC) within the service area of a postal cluster within a postal area.

Inter-Cluster Accounts:
These accounts are used to record the expense for the transportation of mail between a postal facility in one cluster and a postal facility in a different cluster, when both postal facilities are within the same postal area and neither are BMCs (not inter-BMC).

Inter-Area Accounts:
These accounts are used to record the expense for the transportation of mail between a postal facility (except a BMC) in one area and a postal facility (except a BMC) in a different area.

A review of these account definitions confirms that there are two new "intra" accounts which primarily capture the costs of the transportation of mail within a facility's operational area and three new "inter" accounts which primarily capture the costs of transportation between major postal facilities. Discussions

[26] The complete set of new definitions are attached to this testimony as Appendix B.

about the new account structure with Postal Service transportation experts revealed that the two new "intra" accounts replaced the Intra-SCF account and that the three new "inter" accounts replaced the Inter-SCF account. The relationship between the new and old accounts is illustrated in Table 1.

Note that the new account structure mirrors the old in terms of defining regular, emergency, and exceptional accounts. The new account structure does include a new definition, "Christmas Accounts." These accounts were designed originally to account for new contracts that run only during the Christmas rush period. However, there already was a mechanism, exceptional service, that captured the modifications to the transportation network for a short period of time, like Christmas. The Christmas accounts have not been used to any degree, as a result.

TABLE 1
OLD AND NEW PURCHASED TRANSPORTATION ACCOUNTS

Account #	Description	Account #	Description
53121	Intra-SCF Regular	53601	Intra-P&DC Regular
53122	Intra-SCF Exceptional	53602	Intra-P&DC Exceptional
53123	Intra-SCF Emergency	53603	Intra-P&DC Emergency
		53604	Intra-P&DC Christmas
		53605	Intra-CSD Regular
		53606	Intra-CSD Exceptional
		53607	Intra-CSD Emergency
		53608	Intra-CSD Christmas
53124	Inter-SCF Regular	53609	Inter-P&DC Regular
53125	Inter-SCF Exceptional	53611	Inter-P&DC Exceptional
53126	Inter-SCF Emergency	53612	Inter-P&DC Emergency
		53613	Inter-P&DC Christmas
		53614	Inter-Cluster Regular
		53615	Inter-Cluster Exceptional
		53616	Inter-Cluster Emergency
		53617	Inter-Cluster Christmas
		53618	Inter-Area Regular
		53619	Inter-Area Exceptional
		53621	Inter-Area Emergency
		53622	Inter-Area Christmas

One approach to dealing with this change is to view it simply as a pure accounting change and to recombine the new accounts into the old account structure. While this approach may have some merit, it precludes investigation of the possibility that each of the new accounts may contain a somewhat different type of transportation when compared with the old accounts. To investigate this possibility, I estimate separate equations for each of the new accounts and then test whether the equations for the new accounts should be combined into a single equation reflecting the old account structure.

III. THE ECONOMETRIC ANALYSIS.

The goal of the econometric analysis is to estimate "variabilities" or cost elasticities for each of the separate cost account activities. The research required to achieve this goal will proceed in four steps:

Step 1: Pre-Estimation

Step 2: Estimation

Step 3: Testing the Structure

Step 4 Checking Unusual Observations

A. Pre-estimation.

In the pre-estimation phase of the research two tasks are performed. First, the equations to be estimated are specified and the data are collected. These efforts are described in this section.

There are seventeen equations to be estimated. There are only eight different account categories, but some of those account categories have multiple equations. Following the established methodology, I specified separate box route, city, van, and tractor trailer equations for the Intra-CSD and Intra-P&DC accounts. In similar fashion, I specified separate van and tractor trailer equations for Inter-P&DC, Inter-Cluster and Inter-Area, because previous research has demonstrated that equation structures vary across these activity definitions.

Table 2
Econometric Equations to Be Estimated

Account Category	Transportation Activity
Intra-P&DC	Box Route
Intra-P&DC	Intra-City Transportation
Intra-P&DC	Van Transportation
Intra-P&DC	Tractor Trailer Transportation
Intra-CSD	Box Route
Intra-CSD	Intra-City Transportation
Intra-CSD	Van Transportation
Intra-CSD	Tractor Trailer Transportation
Inter-P&DC	Van Transportation
Inter-P&DC	Tractor Trailer Transportation
Inter-Cluster	Van Transportation
Inter-Cluster	Tractor Trailer Transportation
Inter-Area	Van Transportation
Inter-Area	Tractor Trailer Transportation
Intra-BMC	Tractor Trailer Transportation
Inter-BMC	Tractor Trailer Transportation
Plant Load	Tractor Trailer Transportation

The other task in specifying the equations to be estimated is choosing a functional form. Again, I will follow established precedent by estimating an augmented translog equation for each of the account category activities. The augmented translog has the form:[27]

$$\ln Cost_j = \alpha + \sum_{i=1}^{n} \delta_i D_i + \beta_1 \ln\left(\frac{CFM_j}{\bar{CFM}}\right) + \beta_2 \ln\left(\frac{CFM_j}{\bar{CFM}}\right)^2 + \beta_3 \ln\left(\frac{RL_j}{\bar{RL}}\right) + \beta_4 \ln\left(\frac{RL_j}{\bar{RL}}\right)^2 + \beta_5 \ln\left(\frac{CFM_j}{\bar{CFM}}\right) \ln\left(\frac{RL_j}{\bar{RL}}\right) \quad (1)$$

In this equation, $Cost_j$ represents the total cost on a contract cost segment, the D_i represent categorical variables capturing region specific effects, CFM stand for cubic foot-miles, and RL stands for route length. The values for CFM and RL with the bars over them represent the mean values for those variables. The α, β, and δ terms are estimated parameters.

As the equation shows, the established methodology includes estimating the equations on mean-centered data. This approach allows the relevant elasticity to be derived easily from the estimated equation. Evaluation of an equation estimated on mean-centered data is equivalent to evaluation of the econometric equation at the sample means of the independent variables. Consequently, when the data are mean-centered, the desired variability is simply the first-order coefficient on cubic foot-miles (or the first-order coefficient on

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[27] Cubic foot-miles is replaced with the number of boxes in the box-contract equations.

boxes for box route contracts). This coefficient is represented by β_1 in the translog equation presented above.

The other task required in the pre-estimation stage is the collection of data. As was done in Docket No. R97-1, a data set was constructed from the Highway Contract Cost System (HCSS).[28] The current data collection effort nearly replicates the one described in detail in Docket No. R97-1. In fact, there are only two minor differences in the current data collection effort. First, there are now thirteen DNOs instead of twelve from which HCSS data must be collected.[29] Second, the data are now retrieved directly from the thirteen regional computers by the Postal Service computer programmers in St. Louis. Because the Postal Service computer system is sufficiently interconnected, there is no longer any necessity for creating disks at the local DNOs' and sending them to St. Louis for collation. The data set was drawn in August of 1998 and represents the purchased highway transportation contracts in force at that time.

There are 16,791 observations in the data set, a number that is larger than the number of contracts in force. The basic unit of observation is the "contract cost segment" not the contract itself.[30] A contract cost segment is a

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[28] For a discussion of HCSS, see Direct Testimony of Michael D. Bradley on Behalf of the United States Postal Service, Docket No. R97-1, USPS-T-12.

[29] The new DNO is called "Capital Metro," and covers the Washington, D.C. metro area.

[30] A contract cost segment is also known as a "route part" in Postal Service highway transportation contracting jargon.

discrete part of a highway contract that has its own transportation specifications and its own payment type. The most common example of contract cost segments on an individual contract is the combination of tractor trailer and straight body (van) transportation in one contract. Each contract cost segment has its own annual cost, truck specification and routing.

The additional detail is useful because it permits breaking a relatively heterogenous contract into two relatively homogenous cost segments. Because the cost of each contract cost segment (and thus type of transportation) is associated with just the cubic foot miles on that contract cost segment, there is a separate path of cost causality. As demonstrated in Docket No. R97-1, the greater level of detail permits separate equations to be estimated for van and tractor trailer transportation, leading to a more accurate estimation of the overall variability.

The other reason that there are more observations in the HCSS data set than highway contracts is because sometimes there are multiple truck sizes on a given contract cost segment. On rare occasions, a single contract cost segment will contain different sized trucks.[31] In these instances, the HCSS data set lists multiple records. The only difference between the records is the different truck capacities. These records are combined into a single observation for the contract cost segment before the regressions are estimated. The distribution of

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[31] There are 218 such observations out of a data set of 16,791 observations. For example, HCRID 27930 required both a 1000 cube truck and an 800 cube truck. It thus has two observations in the raw data set.

observations across accounts is listed in Table 3 below.

One other data collection effort had to be performed in the construction of the analysis data set. Many BMC contracts are 'power-only' contracts.[32] These are contracts in which the contractor provides the tractor, but the Postal Service provides the trailer from its leased trailer fleet. Postal transportation experts have informed me that the cost of the trailer represents less than 5 percent of the total cost of a tractor-trailer contract. As a result, small inaccuracies in estimating the size of the trailers will not affect the econometric results. Approximating the cubic capacity for trailers on power-only contracts is thus an appropriate exercise. This exact procedure was followed in the last rate case. It was reviewed by the Commission and was accepted as part of the established methodology:[33]

> The record for a contract from HCCS includes annual cost, annual miles traveled, number of trucks, cubic capacity of the trucks, route length, the highway cost account and additional information in the form of identification codes and the regional office source. Witness Bradley can reliably infer equipment types, operating regions and identify box-route contracts from this information. For power-only contracts in seven regions the cubic capacity of trucks is taken to equal the average trailer size for BMC leased fleets as found in a Price-Waterhouse survey. *See* Docket No. MC97-2 LR PRC-13.

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[32] These contracts were identified with vehicle capacity that is in "Vehicle Group 12." Being in this group signifies that the capacity of the vehicle used in the contract has zero cubic feet, suggesting the possibility that only a power unit was provided.

[33] <u>See</u> PRC Op., R97-1, Vol. 1, at 208

Table 3 HCSS Data set By Account Category		
Account Number	Account Description	Number of Observations
53121	Intra-SCF	1
53127	Intra-BMC	389
53129	Intra-BMC Emergency	14
53131	Inter-BMC	186
53133	Inter-BMC Emergency	3
53134	Plant- Load Annual	157
53135	Plant-Load Trip	539
53136	Intra-BMC Leased Trailer Fleet	49
53139	Area Bus	1
53183	Domestic Inland Water	67
53184	Offshore Domestic Water	1
53191	Empty Equipment	87
53601	Intra-P&DC Regular	7,500
53602	Intra-P&DC Exceptional	2
53603	Intra-P&DC Emergency	654
53064	Intra-P&DC Christmas	1
53605	Intra-CSD Regular	4,886
53607	Intra-CSD Emergency	336
53609	Inter-P&DC Regular	427
53612	Inter-P&DC Emergency	73
53613	Inter-P&DC Christmas	4
53614	Inter-Cluster Regular	464
53616	Inter-Cluster Emergency	64
53617	Inter-Cluster Christmas	1
53618	Inter-Area Regular	577
53621	Inter-Area Emergency	275
53622	Inter-Area Christmas	29
No Account #	---	4
TOTAL		16,791

As in Docket No. R97-1, PricewaterhouseCoopers surveyed the BMCs to find out which use leased trailer fleets and the sizes of the trailers in their fleets. The survey and its results are presented in LR-I-85, Power Only Highway Contract Survey. Of the thirteen areas, nine reported using power only contracts and using leased trailer fleets in FY1998. The survey requested data on the number of trailers of each size in the fleets of each of the BMCs that have leased trailer fleets. Cubic capacities for power-only contracts for the areas containing these BMCs were calculated using the average trailer size in each of the BMC's fleets. The nine areas and the average vehicle capacity for each is listed below:[34]

Table 4
Average-Size Trailers in Leased Trailer Fleets

Area	Average Trailer Capacity (cubic feet)
Allegheny	2,596
Great Lakes	2,692
New York	2,578
Mid-West	2,849
Northeast	2,692
Pacific	3,012
Southeast	2,879
Southwest	2,770
Western	3,228

[34] In some areas, more than one BMC uses a leased trailer fleet. The average vehicle capacity was calculated using all of the BMCs in an area.

Review of the data revealed one other account in which there were a significant number of power only contracts and that account is Plant Load. In plant load transportation, it is not unusual for the Postal Service to provide the trailer that the contractor pulls from the mailer's plant. Discussions with Postal Service transportation experts revealed that a standard size trailer is used for plant load transportation. Because many plant load contracts transport the mail from the mailers facility to a rail head, the trailers must be consistent with TOFC (Trailer on Flat Car) specifications. Consequently, a 2700 cubic trailer was used to calculate cubic foot-miles for all plant load power only contracts.

B. Estimation

In this phase of the research, the econometric equations were estimated. To estimate the econometric equations, the HCSS data set was separated into 17 subsets, one for each of the econometric equations being estimated. In preparing the econometric equations accepted by the Commission in Docket No. R97-1, I recognized that in each account activity, there were a small number of contract cost segments that were greatly different from the rest of the data. Given the diversity of the Postal Service's nationwide highway transportation network, it is not surprising that a small number of atypical situations arise. HCSS contains information on virtually all highway contracts, so these unusual situations are included in the database. Because these contact cost segments are so different from the body of the data, they hold the possibility for clouding the cost tracing established by the econometric analysis.

As a result, as in Docket No. R97-1, I estimated the econometric equations with these unusual observations removed. To determine the effect of the removal, I also estimated the equations with all observations and the results of that analysis are also presented in this testimony.

To identify any unusual observations, I reviewed each of the seventeen data subsets to be used in the econometric estimation. In other words, I performed seventeen separate reviews, so that each of the data sets used to estimate the individual equation received its own inspection. Those reviews revealed that there are indeed a small number of observations in each of the data sets that seem to be quite different from the other observations.

These observations were identified by examining the values for the following six variables in each of the seventeen data sets:

a. Extremely low or high annual cost;
b. Extremely low or high annual CFM;
c. Extremely short or long route length;
d. Extremely low or high annual miles;
e. Extremely low or high cost per CFM;
f. Extremely low or high cost per mile.

As a result of this analysis, I identified 250 unusual observations. When compared with the original data set size of 16,791 observations, this represents under 1.5 percent of the data.[35]

Seventeen mean-centered translog equations were then estimated, one for each account activity. In the initial estimation, a full set of regional categorical variables were included, because there is no *a priori* guidance as to which to include in each equation.[36] However, these variables are not part of the formal translog approximation and the efficiency of the estimation can be improved by including only those which are statistically significant.

Ordinarily, one could rely upon traditional t-tests or f-tests to test the

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[35] To identify the nature of these unusual observations, I asked PricewaterhouseCoopers to contact the DNO's and obtain information about the nature of these observations. Their investigation revealed many different interesting circumstances in the unusual observation set. They include but are not limited to :

a. A contract to move baby chicks from the hatchery to the post office.
b. A contract to move mail 0.9 miles from the main office to a station.
c. An inland water contract.
d. A contract to transport live "Honey Bees."
e. A passenger car route to move mail to a local airport on an "as needed" basis.
f. A contract for which 45% of the annual cost is attributable to tolls.
g. A contract that was in place solely for the UPS strike that has been terminated
h. A contract which utilizes an armored vehicle about which the DNO "could not go into detail on this route due to security reasons."
i. A contract that required the use "of a boat, a wind-sled, or a passenger vehicle depending on the weather, lake, and road conditions."

The set of responses received by PricewaterhouseCoopers is contained in LR-I-86, Responses Concerning Unusual Observations in the HCSS Data Set.

[36] Note that a full set of categorical variables necessarily implies dropping one from the regression. To include them all along with the intercept would generate a singular and thus non-invertible maxtrix. Complete results for the econometric equations estimated with all possible regional variables are included in my Workpaper WP-1 accompanying this testimony.

significance of individual coefficients or groups of coefficients. The purchased highway transportation equations suffer from heteroscedasticity, however, and this must be accounted for in performing statistical tests. Therefore, the statistical test for each categorical variable is a chi-square test based upon the heteroscedasticity-corrected variance covariance matrix[37]. Those categorical variables whose coefficients were not significantly different from zero were dropped from the specification and the models were re-estimated.

The full results of this estimation procedure are provided in my Workpaper WP-1, but summaries of the results are presented in Tables 5 through 7.

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[37] White, Halbert, "A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity," Econometrica, Vol. 48, 1980,pp. 817-838.

Table 5
Econometric Results for the Intra-P&DC and Intra-CSD Accounts

Account Activity	**Intra-P&DC Box**	**Intra-P&DC City**	**Intra-P&DC Van**	**Intra-P&DC Trailer**
Estimated Variability	0.319	0.661	0.646	0.868
χ^2 Test on Variability	654.4	624.7	372.1	104.8
p-value	0.0000	0.0000	0.0000	0.0000
χ^2 Test on Regionals	215.0	11.1	11465.7	3048.4
p-value	0.0000	0.0040	0.0000	0.0000
# of Obs.	1,279	375	5,500	664
R^2	.693	.855	.875	.879
Mean Cost	$25,571	$78,325	$66,938	$198,823
Mean CFM/Box	286	34,138,560	52,782,720	333,130,893
Mean RL	36.5	20.2	50.6	63.1
Account Activity	**Intra-CSD Box**	**Intra-CSD City**	**Intra-CSD Van**	**Intra-CSD Trailer**
Estimated Variability	0.310	0.734	0.508	1.096
χ^2 Test on Variability	1,518.3	254.0	367.7	367.8
p-value	0.0000	0.0000	0.0000	0.0000
χ^2 Test on Regionals	768.0	39.3	14.3	353.8
p-value	0.0000	0.0000	0.0008	0.0000
# of Obs.	4,721	92	291	28
R^2	0.703	0.870	0.749	0.916
Mean Cost	$24,767	$89,719	$49,570	$240,832
Mean CFM/Box	279	39,506,520	26,317,068	368,094,803
Mean RL	32.4	7.835	34.6	31.2

Table 6
Econometric Results for the Inter-P&DC, -Cluster, and -Area Accounts

Account Activity	**Inter-P&DC Van**	**Inter-P&DC Trailer**	**Inter-Cluster Van**	**Inter-Cluster Trailer**
Estimated Variability	.645	.963	.685	.962
χ^2 Test on Variability	655.4	1,513.9	516.0	1,863.5
p-value	0.0000	0.0000	0.0000	0.0000
χ^2 Test on Regionals	336.0	16.9	183.5	14.1
p-value	0.0000	0.0008	0.0000	0.0001
# of Obs.	294	143	216	230
R^2	0.813	0.944	0.823	0.913
Mean Cost	$79,424	$261,952	$83,706	$305,361
Mean CFM	72,949,484	578,623,766	81,152,300	713,381,012
Mean RL	79.7	116.3	87.8	166.1
Account Activity	**Inter-Area Van**	**Inter-Area Trailer**		
Estimated Variability	.671	.944		
χ^2 Test on Variability	531.4	2,827.5		
p-value	0.0000	0.0000		
χ^2 Test on Regionals	18.4	120.5		
p-value	0.0004	0.0000		
# of Obs.	250	425		
R^2	.840	.940		
Mean Cost	$87,984	$400,152		
Mean CFM	85,368,369	1,062,250,402		
Mean RL	102.9	366.8		

Table 7 Econometric Results for the Intra-BMC, Inter-BMC and Plant Load Accounts				
Account Activity	**Intra-BMC**	**Inter-BMC**	**Plant Load**	
Estimated Variability	.983	.979	.898	
χ^2 Test on Variability	8,333.4	1,445.2	1,966.0	
p-value	0.0000	0.0000	0.0000	
χ^2 Test on Regionals	74.5	43.6	52.8	
p-value	0.0000	0.0000	0.0000	
# of Obs.	370	179	614	
R^2	0.971	0.960	0.938	
Mean Cost	$566,055	$1,308,168	$36,464	
Mean CFM	1,332,704,452	3,432,890,995	71,720,246	
Mean RL	174.8	820.2	184.6	

C. Testing the Structure

Now that we have estimated the econometric equations, we can test the structure of our overall cost model. For example, we can test the null hypothesis that the Intra-P&DC equations are one and the same as the similar Intra-CSD equations. Rejecting this hypothesis justifies the estimation of separate equations. A similar set of tests can be made for the inter-P&DC, inter-Area and Inter-Cluster equations.

As a general matter, blind application of such tests is likely of little value. Without the basis of an underling hypothesis to motivate the test, it is not clear what such tests reveal. In the current purchased highway transportation analysis, however, we are helped by having non-sample information on the structure of disaggregation. For example, in the past we have used information on the transportation "technology" to disaggregate account level data into tractor trailer cost pools and straight truck cost pools.

In the instant analysis, we are fortunate that the disaggregation we are investigating is defined by the new set of accounts. We have a well formed set of hypotheses to test and can directly compare the equations for each of the new account activity cost pools with the possibility of a single equation based upon the "old" aggregated cost pools.

The traditional method of testing for equation heterogeneity is the "Chow test," a form of the F-test. This simple test compares the coefficients from two equations to see if they can be restricted to be equal to one another. However, the Chow test relies upon the equality of the two variances of the equations being tested. If they are not equal, the Chow test is no longer valid. Because we have heteroskedastic errors, it is highly unlikely that we have equal variances across our subsets. We therefore pursue a more robust approach.

To test the equality of the coefficients, or a subset of the coefficients across two equations in the face of unequal variances, we use the Wald statistic. Suppose that we have J coefficients that we wish to test and thus want to place J restrictions on the least squares coefficient vector. The null hypothesis that we wish to test is the set of restrictions given by:

$$H_0\colon\ R\beta = q, \tag{2}$$

where R is the matrix of restrictions, β is the vector of regression coefficients and q embodies the nature of the restriction. For example, suppose that we had three coefficients that we wish to test for equality across two regressions. Then, R would be a 3x6 partioned matrix [I : -I], β would be the 6x1 column vector of coefficients from the two equations, and q would be a 3x1 vector of zeros. The null hypothesis embodies the three restrictions, $\beta_{11} = \beta_{21}$, $\beta_{12} = \beta_{22}$, and $\beta_{13} = \beta_{23}$.

We can think about testing these restrictions by recognizing that there will always be some discrepancy among the estimated coefficients. We are interested, therefore, in the degree of actual discrepancy between the theoretical restrictions and the estimated parameters. To test whether or not the actual discrepancy is within the bounds of sampling error, we an construct a discrepancy vector, "d," which is defined as:

$$d = R\beta - q. \tag{3}$$

Because d is a linear transformation on a vector of normally distributed βs, it too is normally distributed:

$$d \sim N(0, V(d)), \tag{4}$$

where:

$$V(d) = V(R\beta - q) = R\,V(b)R' = \sigma^2 R(X'X)^{-1}R' \qquad (5)$$

This formulation allows testing the statistical significance of d using the Wald statistic, which is distributed as a chi square with J degrees of freedom:

$$W = d'V(d)d. \qquad (6)$$

Unfortunately σ^2 is not known and is, of course, not constant across subsamples. Thus, we must modify the Wald statistic to render it calculable. When the sample is reasonably large, as it is here, the Wald statistic is valid whether or not the variance in the two subsamples are the same. In more general formulation, we can rewrite the discrepancy vector as:

$$d = (\hat{\beta}_1 - \hat{\beta}_2) \sim N\big(0,(\Omega_1 + \Omega_2)\big). \qquad (7)$$

We can derive the Ω_i directly from the variance/covariance matrices from the subsample regressions. This is of particular advantage in the instant case because we can derive the Ω_i from the heteroskedasticity corrected variance/covariance matrices. The set of Wald statistics are presented in Table 8. The calculations supporting the Wald statistics are presented in my Workpaper WP-2 accompanying this testimony.

Table 8
Wald Tests of Disaggregation

Accounts Tested	Equation	# of Restrictions	Wald Statistic	Critical Value
Intra-P&DC v. Intra-CSD	Box	22	105.6	33.9
Intra-P&DC v. Intra-CSD	City	15	84.2	25.0
Intra-P&DC v. Intra-CSD	Van	18	408.9	28.9
Intra-P&DC v. Intra-CSD	Tractor Trailer	13	357.9	22.4
Inter-P&DC v. Inter-Cluster	Van	17	149.5	27.6
Inter-P&DC v. Inter-Cluster	Tractor Trailer	17	86.6	27.6
Inter-P&DC v. Inter-Area	Van	17	29.8	27.6
Inter-P&DC v. Inter-Area	Tractor Trailer	16	757.6	26.3
Inter-Cluster v. Inter-Area	Van	17	55.1	27.6
Inter-Cluster v. Inter-Area	Tractor Trailer	17	236.3	27.6

A review of Table 8 shows that the Wald tests reject the null hypothesis of equal coefficients in all tests. This would imply that estimating disaggregated equations is the appropriate course. I also note that the number of restrictions varies as the number of included variables varies. In some instances, certain accounts do not have any observations from certain areas. Coefficients on the dummy variables from those areas therefore cannot be estimated and the total number of estimated coefficients is thus reduced.

D. Checking Unusual Observations

As discussed above, a small number of unusual observations were excluded from each of the seventeen regressions. To precisely determine the effect of this removal, I re-estimated the equations with all of the observations including the unusual ones. The results of this analysis are presented in Workpaper 3 and a summary of those results is presented in Table 9.

Table 9
Effects of Eliminating a Small Number of Unusual Observations
Intra-P&DC and Intra-CSD Accounts

	# Of Observations			R^2			Variabilities		
Category	Before	After	Change	Before	After	Change	Before	After	Change
Intra-P&DC Box Route	1,282	1,279	3	0.692	0.693	0.001	31.8%	31.9%	0.1%
Intra-P&DC Intra-City	388	375	13	0.742	0.855	0.113	56.9%	66.1%	9.2%
Intra-P&DC Vans	5,524	5,500	24	0.797	0.875	0.078	57.0%	64.6%	7.6%
Intra-P&DC Trailers	677	664	13	0.894	0.879	-0.015	83.5%	86.8%	3.3%
Intra-CSD Box Route	4,735	4,721	14	0.700	0.703	0.003	30.2%	31.0%	0.8%
Intra-CSD Intra-City	94	92	2	0.859	0.870	0.011	69.7%	73.4%	3.7%
Intra-CSD Vans	295	291	4	0.606	0.749	0.143	34.0%	50.8%	16.8%
Intra-CSD Trailers	32	28	4	0.445	0.716	0.271	108.2%	109.6%	1.4%

Table 10
Effects of Eliminating a Small Number of Unusual Observations
Inter-P&DC, Inter-Cluster, Inter-Area, Intra-BMC, Inter-BMC and Plant Load Accounts

	# Of Observations			R^2			Variabilities		
Category	Before	After	Change	Before	After	Change	Before	After	Change
Inter-P&DC Vans	300	294	6	0.823	0.813	-0.010	51.8%	64.5%	12.7%
Inter-P&DC Trailers	149	143	6	0.962	0.944	-0.018	89.8%	96.3%	6.5%
Inter-Cluster Vans	226	216	10	0.820	0.823	0.003	64.5%	68.5%	4.0%
Inter-Cluster Trailers	235	230	5	0.939	0.913	-0.026	96.2%	96.2%	0.0%
Inter-Area Vans	268	250	18	0.588	0.840	0.252	78.2%	67.1%	-11.1%
Inter-Area Trailers	470	425	45	0.907	0.940	0.033	89.0%	94.4%	5.4%
Intra-BMC	387	370	17	0.823	0.971	0.148	101.0%	98.3%	-2.7%
Inter-BMC	183	179	4	0.975	0.960	-0.015	97.9%	97.9%	0.0%
Plant Load	676	614	62	0.670	0.938	0.268	88.5%	89.8%	1.3%

IV. THE ROLE OF TRACS IN MEASURING VOLUME VARIABLE COST.

In its opinion in Docket No. R97-1, the Commission indicated that it felt that there might be a problem with the way TRACS allocates costs to individual classes and subclasses of mail. The issue centers on the joint determination of transportation costs and the imputation of a particular transportation leg's cost to the mail being transported on the that leg.[38] In this section, I address the Postal Service's response to this potential issue and will explain why that response alleviates the potential problem in this area. As part of that process, I will review the analytical foundation for measuring volume variable costs in purchased highway transportation and show why the new method is more consistent with both directly measuring "attributable" cost and marginal cost.[39]

A. The issue raised by TRACS' allocation of the costs on a particular route trip to the volume on that trip.

From Docket No. R90-1, when TRACS was introduced, through Docket No. R97-1, the distribution of attributable costs to classes and subclasses of mail was accomplished through a procedure in which the costs on the sampled

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[38] Technical issues about TRACS methods of measurement are beyond the scope of my testimony.

[39] Because of the absence of specific fixed costs in these components, volume variable costs are the same as the Commission's "attributable" cost. I will thus use the terms interchangeably in this discussion.

transportation were linked to the corresponding TRACS estimates:[40]

> [A]ll agree that TRACS assigns all of the cost of the contracted CFM for the segment, backhaul or route trip destination day to the subclass of mail found on the truck when it is sampled at the destination.
>
> In economic terminology, TRACS imputes the cost of the CFM for the route trip destination day entirely and only to the mail found on the truck at the destination where it is sampled.

This apparent imputation was a cause of discussion in the last case and the Commission was seemingly troubled by the conflict between this costing method and its view that transportation costs are jointly caused across all transportation in a given type:[41]

> There would be little reason for concern if transportation was purchased by the Postal Service independently in the same units in which it is sampled by TRACS. This would be the case if the Service's transportation could be purchased in units that corresponded to route trip destination days. But it can't. Transportation services for route trip destination days are purchased jointly by routes or in other blocks specified in the HCSS contracts. In the simplest case, an outhaul from a facility and a backhaul to the same facility comprise a pair of route trip destination days that must be purchased together. The purchased cost of the route is a joint cost of the mail carried on both the outhaul and the backhaul. When TRACS samples either the outhaul or the backhaul as a route trip

[40] See PRC Op., R97-1, Vol. 1, at 212-213.

[41] See PRC Op., R97-1, Vol. 1, at 213.

> destination day, the cost of the outhaul or backhaul is part of the joint cost of the route. When TRACS assigns this cost to the *mail* found on the truck at its destination, it is making an arbitrary division of a joint cost.

In other words, a potential difficulty arises if the costs on a particular leg are imputed solely to the volumes on that leg when, in actuality, the capacity and associated costs are caused jointly with volume on other legs in the transportation mode. A clearly preferred approach is to distribute the jointly determined volume variable costs to the classes and subclasses that jointly determine the costs. This is what the new TRACS distribution procedure does.[42]

Under the new procedure, costs are no longer imputed to the individual observations in TRACS. Instead, the TRACS tests are designed to produce a set of proportions that accurately represent the *total* proportion of cubic foot-miles a class or subclass causes in each specific transportation mode. For example, within the Intra-BMC account category, TRACS now produces an estimate of the proportion of cubic foot-miles caused by a subclass throughout the Intra-BMC

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[42] Under an alternative approach, the TRACS procedure could have been revised so that it sampled all stops on given contract. This approach would have given an accurate measure of the cubic foot-mile proportions on that contract. Given limited resources, however, this would not have permitted selecting sufficient contracts to be representative of the national network. Under this alternative, the Postal Service could be reasonably confident that it had the cubic foot-mile proportions right on a small set of contracts, but no confidence that the small set was nationally representative. Instead, it is my understanding that the Postal Service focused on designing a sample that produces nationally representative proportions of cubic foot-miles. For details of the sampling plan and procedures in TRACS please see the testimony of witness Xie (USPS-T-1).

portion of the transportation network. The fact that the costs are jointly produced on a given leg does not affect this calculation. A class or subclass will receive its portion of Intra-BMC attributable costs on the basis of its overall use of capacity in Intra-BMC transportation.

B. The Analytical Basis for Measuring Volume Variable Cost in Purchased Highway Transportation.

The logical basis for the Postal Service method of measuring volume variable cost has been described before and will only be briefly reviewed here. First presented in Bradley, Colvin, and Smith[43], this description of the analytical structure has been reiterated and verified in testimony by both witness Panzar[44], and witness Christensen.[45]

The fundamental goal of the costing algorithm is to calculate volume variable (attributable) cost by class of mail. The volume variable costs are defined by the product of the accrued cost in the cost component (C_j) and the volume variabilities of the classes handled in the cost component (ε_{ij}).

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[43] See Michael D. Bradley, Jeffrey L. Colvin and Marc A. Smith, "Measuring Product Costs for Ratemaking: The United States Postal Service," in Regulation and the Nature of Postal and Delivery Services, Kluwer Academic Publishers, 1993, 133-157.

[44] See Direct Testimony of John Panzar on Behalf of the United States Postal Serivce, Docket No. R97-1, USPS-T-11.

[45] See Rebuttal Testimony of Laurtis Christensen on Behalf of the United States Postal Serivce, Docket No. R97-1, USPS-RT-7, Tr.34/18212-46.

$$VVC_{ij} = C_j \lambda_{ij} \tag{8}$$

The volume variability for a specific class *i* in component *j* (v_{ij}) is defined as:

$$\lambda_{ij} = \frac{\partial C_j}{\partial v_{ij}} \frac{v_{ij}}{C_j}. \tag{9}$$

However, it is often not practical to directly measure volume variability. One reason for not directly measuring volume variability is that it may be prohibitively expensive. Accurately measuring class specific volumes at the cost component level may take several million dollars per year for a single component. In addition, even if the resources were available for making such measurements, the measurement itself may delay the timely handling of the mail. This is the case in purchased highway transportation where it is difficult and time consuming to measure volume. For example, taking a TRACS test, which is far less rigorous than actually measuring transportation volume by class of mail, may require several hours.[46] The nature of the mail flow also limits the possibilities for making the required measurements. For example:[47]

> Once mail is loaded on the truck, it is not available for sampling without disruption to postal operations.

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[46] See Rebuttal Testimony of John Pickett on Behalf of the United States Postal Service, Docket No. R97-1 , USPS-RT-2, Tr. 35/18771.

[47] See Rebuttal Testimony of John Pickett on Behalf of the United States Postal Service, Docket No. R97-1 , USPS-RT-2, Tr. 35/18770.

> Unloading mail specifically for TRACS sampling is out of the question; it must be sampled as it is normally loaded or unloaded.

Or:[48]

> Also, origin sampling cannot be used because the mail loaded at the last minute would be unavailable for sampling. It is only at destinations that the data collector can be confident that he can draw a sample of all the mail that has received transportation on a vehicle without disrupting operations.

Fortunately, volume variable costs can still be measured even when it is impractical to measure volume at the component level. If it is possible to measure a cost driver at the component level, then the cost driver approach can be used to calculate volume variable costs. This method, also known as the "volume variability/distribution key" method employs a costing algorithm in which the assignment of costs to products is broken into two steps. The first step identifies the pool of total volume variable costs and the second step distributes the volume variable costs to the individual products that caused them.

In the volume variablity/distribution key method, a product's volume variable cost is calculated as:

$$VVC_{ij} = C_j \varepsilon_j \theta_{ij}, \tag{10}$$

[48] Id.

where:

$$\varepsilon_j = \frac{\partial C_j}{\partial D_j} \frac{D_j}{C_j}$$

$$\theta_{ij} = \frac{D_{ij}}{D_j} \tag{11}$$

In these expressions, D_j represents the total amount of the cost driver in the cost component and D_{ij} equals the amount of the cost driver caused by product i. The natural question is: under what conditions will volume variable costs measured by the cost driver method equal volume variable costs measured directly? Mathematically, equality between the two methods requires:

$$C_j \lambda_{ij} = C_j \varepsilon_j \theta_{ij}. \tag{12}$$

Substituting the various expression yields:

$$C_j \frac{\partial C_j}{\partial v_i} \frac{v_i}{C_j} = C_j \frac{\partial C_j}{\partial D_j} \frac{D_j}{C_j} \frac{D_{ij}}{D_j} \tag{13}$$

Cancellation of like terms and application of the chain rule provides the following expression:

$$\frac{\partial C_j}{\partial D_j}\frac{\partial D_j}{\partial D_{ij}}\frac{\partial D_{ij}}{\partial v_i}v_i = \frac{\partial C_j}{\partial D_j}D_{ij}. \tag{14}$$

One can recognize that the change in the total amount of the driver with respect to the change in the amount of the any product-specific driver is just one.[49] Using this fact, further cancellation provides a clear, intuitive condition:

$$\frac{\partial D_{ij}}{\partial v_i} = \frac{D_{ij}}{v_i}. \tag{15}$$

This condition establishes that the two methods of calculating volume variable cost (direct method and volume variability/distribution key method) will be the same when the partial derivative of the driver with respect to changes in class i is equal the current ratio of the class-specific driver to volume. Intuitively, this means that, at the margin, additional volume "incurs" additional amounts of the driver at a rate equal to the current average amount of the driver per piece. This can also be interpreted as requiring that the growth rate in the driver is proportional to the growth rate in volume at current levels of network utilization.

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[49] To see that this condition holds, consider that $D_j = \Sigma D_{ij}$. Differentiating this equation yields $\partial D_j / \partial D_{ij} = 1$.

In the case of purchased highway transportation, this requires assuming that the growth in cubic foot-miles per piece just equals the calculated cubic foot-miles per piece using the most recently updated TRACS data.

It is easy to show that this assumption also ensures equivalence between unit volume variable costs, measured in this way, and marginal cost. Marginal cost is simply the derivative of cost with respect to the volume of the class being organized. Using the definition of volume variable cost, equality between marginal cost and volume variable cost per piece requires:

$$\frac{\partial C_j}{\partial v_i} = \frac{C_j \varepsilon_j \theta_{ij}}{v_i} \qquad (16)$$

Substituting the relevant definitions yields:

$$\frac{\partial C_j}{\partial v_i} = \frac{C_j \dfrac{\partial C_j}{\partial D_{ij}} \dfrac{D_j}{C_j} \dfrac{D_{ij}}{D_j}}{v_i} \qquad (17)$$

Canceling terms and applying the chain rule yields:

$$\frac{\partial C_j}{\partial D_j} \frac{\partial D_j}{\partial D_{ij}} \frac{\partial D_{ij}}{\partial v_i} = \frac{\partial C_j}{\partial D_j} \frac{D_{ij}}{v_i}, \qquad (18)$$

Thus, the volume variable cost per piece will equal marginal cost when:

$$\frac{\partial D_{ij}}{\partial v_i} = \frac{D_{ij}}{v_i}. \tag{19}$$

C. Can TRACS Data Be Used to Directly Estimate a Volume Variability?

The analysis in the previous section shows that the volume variability / distribution key methodology is an approximation to directly estimating the volume variability. Consequently, when feasible, the direct method is preferred. This raises the questions as to whether or not TRACS data could be used to directly estimate the volume variability. In Docket No. R97-1, it was asserted to the Commission that such an analysis could be done, although no such analysis was presented.[50] Unfortunately, that assertion was mistaken and was probably the result of a less than complete understanding of the nature of TRACS data.

Because of its theoretical advantages, I investigated the possibility of using TRACS data to directly estimate the variabilities. Direct estimation requires comparable data on costs and volumes. The first question to be investigated, then, is whether or not TRACS actually produces the requisite volume data.[51]

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[50] See Testimony of Leonard Merewitz on Behalf of the Florida Gift Fruit Shippers Association, Docket No. R-97-1, FGFSA-T-1, Tr. 22/11413.

[51] It was also suggested that the weight of mail, by class, might be an acceptable proxy for volume in the direct approach. I thus investigated the possibility of getting reliable weight measures as well as volume measures.

The answer, unfortunately, is no. In my investigation, I found out that as the data are currently collected, TRACS does not provide the information required for direct estimation because TRACS does not actually measure the the total volume of mail on a truck. That is, TRACS is not designed to collect piece volume in a manner similar to the Carrier Cost System or the Revenue, Pieces and Weight System. Instead, TRACS is designed to measure the utilization of trucks by the various classes and subclasses of mail. What TRACS does measure is the proportions of truck space and mileage caused by classes and subclasses of mail unloaded at various stops along the truck's route. In some instances, to find the proportions required for estimating distribution keys, TRACS does not have to collect piece information. Instead, it collects information on capacity utilization. That is, TRACS does not need to always collect piece information because piece information is not always required for measuring capacity utilization.

It is my understanding that substantial and expensive modifications would thus be required to TRACS data collection procedures to allow direct estimation of either weight or piece volumes transported through the network. Moreover, I am told that some of the required modifications may not be operationally feasible. Unlike other systems, like RPW and CCS which are designed to estimate volumes, a significant number of TRACS tests are conducted at a time and place that would preclude having the necessary time to literally count all of the mail.

TRACS tests are taken at BMCs or processing and distribution centers during the period of time that the mail is either being transferred to other transportation or is being sorted. This means that the time window for conducting a TRACS test is substantially smaller than at delivery units, where RPW and CCS tests are conducted. Consequently, the TRACS data collection procedures are tailored to work within this type of operational environment. They allow the Postal Service to collect the information required for accurately estimating national distribution keys yet, at the same time, the tests to not significantly impede operations.

Below I list two modifications that I have been told would be required for TRACS to begin collecting piece volume information. A review of these modifications reveals them to be substantial and time consuming, and I understand that they would be likely to seriously impede operations and delay mail delivery.

First, I have been told that total volume counts are not currently obtained for the TRACS category of items referred to as *non-containerized loose other items.* A count of this mail would be required to expand the volume counts of sampled *non-containerized loose other items* to the population they represent. Moreover, I have been informed that it would not be operationally feasible to obtain these counts because of the time required to count them, particularly for trucks with large numbers of bed-loaded sacks or parcels. TRACS does not need the piece counts to measure capacity utilization because TRACS needs only the floor space used by the bed-loaded sacks or parcels.

Second, TRACS does not currently obtain counts of all items, by type, within sampled wheeled containers or postal paks. I understand that to obtain such counts would require unloading all mail from each sampled wheeled container. Again, this would be time consuming and frequently not operationally feasible without substantially impeding mail operations or delaying delivery of the mail. TRACS does not require piece counts in this instance for the same reason that it did not require piece counts from bed-loaded sacks or parcels.

In investigating the feasibility of using TRACS data for directly estimating volume variabilities, one does not want to give up just yet. Despite the difficulties described above, one should go on and ask the "what if" question. What if the TRACS data were collected in such a way so as to provide the requisite volume data? Would one then be able to use the data to estimate the required volume variability equations? The reason to ask this question is two-fold. If problems remain even after the data collection difficulties are surmounted, then there is little reason to further investigate ways to surmount them. On the other hand, if no other difficulties remain, then one can focus on the cost of collecting the required data and balance that cost against any improved accuracy in measured volume variable cost.

Alternatively, one may decide to simply try to use the TRACS data as they are, imperfections and all. One is often forced to use imperfect data in costing analyses and should not raise a higher standard here than in other costing analyses.

Further investigation was undertaken and I discovered that even if TRACS were modified to provide volume estimates, problems would still remain in using it to estimate volume variability regressions. This is because of the fundamental mismatch between HCSS data and TRACS data. Recall that HCSS provides the cost data while TRACS would provide the volume data. Further recall that HCSS provides data on the annual cost for a contract or contract cost segment. This means that HCSS provides a single value for cost for all routes and stops within the contract. As discussed above, this cost is jointly determined by the route trips and stops and cannot be accurately allocated to them individually.

In contrast, TRACS samples volume on a single contract "route-trip-stop-day." This is a very disaggregated level of sampling and illustrates the difficulty in matching TRACS to HCSS. Putting aside, for now, the fact that TRACS volume is for one day and HCSS costs are for a year, a complete match would require a TRACS test on every stop on the contract. Because TRACS counts mail at destination stops, all such destinations would have to be sampled to ensure that all of the volume on the contract is represented. A check of this possibility is discouraging, however. In FY98, there were over 16,000 contract cost segments in the HCSS data base. I am informed by the Postal Service that of these contracts, only 10 of them had all of their trips and stops sampled. [52] These numbers do not imply that TRACS is inaccurate at its job of estimating total proportions by class of mail. It is the essence of sampling theory that a small number of appropriately chosen tests can represent the parent population.

There are very few matches between the TRACS sample and the HCSS data, so regression equations cannot be estimated.[53] One way around this problem would be to abandon the current approach to collecting TRACS data and use those data collection resources to collect volume data in a way which supports regression analysis. This approach could be justified on the basis that if the direct estimation of the volume variabilities is successful, a traditional distribution key is not necessary.

One approach to alleviating the mismatch between TRACS and HCSS would be by randomly selecting contract cost segments in TRACS, and sampling all trips and stops on the selected contract cost segments on a given day. This would produce a data set which matched complete TRACS volume data on a

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[52] Recall that in the HCSS data base a contract cost segment includes the transportation requirements and total cost for all trips and all stops covered by the contract cost segment. Complete coverage of the transportation provided by the contract cost segment thus requires information on all legs covered. As TRACS samples at the destination facility, complete coverage would require sampling at all stops made on all trips covered by the contract cost segment. Given that most contract cost segments have multiple routes and multiple stops, this low number should not be surprising.

[53] We should keep in mind that using incomplete data from a contract to estimate the volume variability would violate the joint production condition that is generating the cost. Doing so would thus be subject to the same bias that concerned the Postal Rate Commission in its review of the distribution keys presented in the last case.

contract cost segment for one day to the annual HCSS cost for that same contract cost segment. To estimate the nature of the data set that would have to be collected under this procedure, I was informed that each contract cost segment in HCSS has an average of 11.2 stops per day.

Sampling all stops on a contract cost segment on a given day would thus require a district to perform 11.2 TRACS tests on the scheduled day. This would also require numerous TRACS data collectors within a district on days when tests are scheduled, and no TRACS data collectors on other days. Such an imbalance in testing would create substantial peak workload problems for data collection staff, and I understand that these problems would be extremely difficult to alleviate within current labor agreement guidelines.

A move to complete sampling of contracts would also cause a substantial reduction in the number of primary sampling units tested. TRACS currently samples nearly 7,000 route-trip-stop-days. Ignoring the peak workload data collection problems, based upon the average number of stops per day listed above, only about 625 contract routes could be sampled for the same data collection costs. Thus, instead of being able to rely upon 16,000 observations for the regression analysis, fewer than 625 would be available. While 625 is certainly enough for a single regression analysis, recall that these observations would have to be split over the 17 different equations estimated. This leaves an average of only 36.8 observations per equation.

One additional issue bears on the use of TRACS data to estimate variability equations. As TRACS is currently designed, it measures proportions. This means the that possible values for each class and subclass are bounded between zero and one. It is my understanding that this restriction substantially reduces the variance of the estimates and reduces the coefficients of variation for the TRACS distribution keys. If TRACS were to be converted to a volume measurement system, then the measured volumes would be unbounded. This implies that the same number of TRACS tests would lead to a much higher variance for volume estimates than for proportion estimates.

The motivation for investigating the use of TRACS data to directly estimated the volume variability of purchased highway transportation is to obviate the need for an assumption about the relationship between mail volume and transportation capacity. The current method assumes a proportional relationship between volume growth and capacity growth. An alternative to direct estimation, however, is the estimation of the relationship between volume and capacity. For example, if widespread information about total volume were available, even if there was no class or subclass identification, it might be possible to determine the relationship between volume changes and capacity responses.

To investigate this possibility, I investigate the status of the Transportation Information Management Evaluation System (TIMES). TIMES is a computerized data collection and reporting system designed to assist management in monitoring both purchased highway contract and postal vehicle utilization and service levels. As of February 1999, the system was operational at over 400 sites. At each facility, data are input into TIMES by dock personnel. The variables that are collected in TIMES are listed in Table 11. Note that some variables are required to be collected while other are optional.

Table 11
Variables Recorded in TIMES

Variable	**Status**
Driver's Name	Not Required
Seal Number	Not Required
Arrival or Departure Time	Required
Time Loading or Unloading started	Required
What was Loaded or Unloaded	Required
Time Loading or Unloading Was Completed	Required
Percent Utilized Floor Space	Required
Load Information	Not Required

It is also important to recognize that what TIMES measures in terms of the load information on the truck includes neither piece volume nor cubic feet of mail. Specifically, the Load Information variable contains rolling stock counts by container type, the percent bedloaded, and the number of Express Mail sacks.

There are four important characteristics of TIMES that are relevant for estimating the relationship between volume and capacity. First, load information other than percent of utilized floor space are not required fields for the data collectors. Second, when measuring the percent of floor space utilized, space is considered to be utilized even if it contains empty equipment. Third, any container not 100 percent empty is considered full. Thus, a container that contains just one piece is considered "full" in TIMES. Finally, the system has not undergone any audit of data reliability.

Taken together, these considerations mean that TIMES is currently not a feasible alternative for use in the transportation costing analysis. Primarily, the system does not calculate the load information required to estimate the relationship between volume and capacity. Future enhancements to TIMES may make it a useful data system, however. The enchantments could include advanced technology that enables detailed load data to be collected automatically or may be as simple as changing the data collection instructions to make load information a required field.

V. CALCULATING THE AVERAGE COSTS REQUIRED FOR THE ALASKA AIR ADJUSTMENT FACTOR

It is my understanding that the Postal Service requires some average costs per cubic foot and average costs per cubic foot-mile for certain purchased highway accounts for the purposes of calculating the Alaskan Air Adjustment Factor. I also understand that in the past, the averages were calculated by finding the cost per cube or cubic foot-mile on each contract cost segment in the relevant account category and then averaging those values. I would suggest that this is inaccurate and does not provide the correct average costs required for the calculation.

To see why this is the case, consider the following example. Suppose that an account has three contract cost segments with the following cost and cubic foot-mile data:

HCRID	Cost	CFM	Cost/CFM
12345	$100,000	100,000,000	0.00100
98765	$200,000	200,000,000	0.00100
999RB	$100	100	1.00000
Average of Ratios			0.334
TOTALS	$300,100	300,000,100	0.00100033

The total cubic foot-miles in the account is 300,000,100 CFM provided at a total cost of $300,100. The average cost per cubic foot-mile, independent of how it is distributed across contracts, is $0.00100033 which is virtually equal to the cost per cubic foot-mile on the two large contracts. Calculating the average cost per cubic foot-mile by the method used previously would provide a greatly different answer. In the old method, the tiny 100 cubic foot-mile contract cost segment takes on an importance equal to the other two large contract cost segments. Thus, the disproportionately high cost per cubic foot-mile from that contract cost segment skews the calculation of the overall average and causes it to be inaccurate.

The more accurate costs per cubic foot-mile are provided in Table 12 below along with the average calculated by the erroneous average of the ratios method. The calculation of these ratios is presented in Workpaper WP-4 accompanying this testimony.

Table 12
Average Costs per Cubic Foot-Mile

Averages Based upon the Ratios of the Totals		
Account	Number of Observations	Cost per CFM
53127	362	$0.000425
53609	378	$0.000572
53614	402	$0.000483
53618	499	$0.000415
Averages of the Ratios		
Account	Number of Observations	Cost per CFM
53127	362	$0.000474
53609	378	$0.001452
53614	402	$0.001169
53618	499	$0.000990

APPENDIX A

CALCULATION OF VARIABILITIES FOR SPLIT COST ACCOUNTS

The Intra-P&DC, Intra-CSD, Inter-P&DC, Inter-Cluster, and Inter-Area cost accounts are split into subsets for the calculation of variabilities. To create variabilities for the entire cost account, these subset variabilities must be combined. The calculations used to compute the combined variabilities are presented in this appendix.

The combined variability is calculated in three steps:

Step 1: Multiply each subset variability times the accrued cost for the contract cost segments used to estimate that variability.

Step 2: Sum the products found in Step 1.

Step 3: Divide the sum found in Step 2 by the total accrued costs for all contracts used in Step 1.

Mathematically, these steps can be expressed as:

$$\varepsilon_C = \frac{\sum_{j=1}^{n} \varepsilon_j C_j}{\sum_{j=1}^{n} C_j},$$

where ε_C is the combined variability, ε_j is a subset variability, and C_j is a subset accrued cost.

The calculations are presented in Table A1 below:

Table A1
Calculating Variabilities for Mixed Accounts

ACCOUNT		BOX	CITY	VAN	TRACTOR TRAILER	**ACCOUNT**
INTRA-PDC	COST	$32,705,104	$29,371,984	$367,912,820	$132,018,665	$562,008,573
	VARIABILITY	31.9%	66.1%	64.6%	86.8%	**68.0%**
INTRA-CSD	COST	$116,928,453	$8,254,160	$14,424,791	$6,743,306	$146,350,711
	VARIABILITY	31.0%	73.4%	50.8%	109.6%	**39.0%**
INTER-PDC	COST			$23,350,518	$37,459,139	$60,809,657
	VARIABILITY			64.5%	96.3%	**84.1%**
INTER-CLUSTER	COST			$18,240,828	$70,233,065	$88,473,892
	VARIABILITY			68.0%	96.2%	**90.4%**
INTER AREA	COST			$21,996,033	$170,064,609	$192,060,641
	VARIABILITY			67.1%	94.4%	**91.3%**

APPENDIX B

DEFINITIONS OF THE NEW PURCHASED HIGHWAY TRANSPORTATION ACCOUNTS

This appendix contains the official Postal Service definitions for the new purchased highway transportation accounts.

UNITED STATES
POSTAL SERVICE

November 18, 1999

(SEE DISTRIBUTION LIST)

SUBJECT: Miscellaneous Account Number Changes (F-8-2000-04)

Effective Accounting Period (A/P) 02, PFY 2000, the following should be reflected on the Account Description Master File.

Account Description and Title Changes

The account descriptions and titles for highway transportation accounts are being changed as indicated below.

53601 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Processing and Distribution Plant Service Area - Regular Contracts

This account is used to record the expense under regular highway contracts for the transportation of mail between a processing and distribution plant (except a BMC) and stations/branches airports, railheads, and piers within the same processing and distribution plant service area within the same cluster.

53602 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Processing and Distribution Plant Service Area - Exceptional Service

This account is used to record the expense under regular highway contracts for exceptional service for the transportation of mail between a processing and distribution plant (except a BMC) and stations/branches airports, railheads, and piers within the same processing and distribution plant service area within the same cluster.

53603 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Processing and Distribution Plant Service Area - Emergency Contracts

This account is used to record the expense under emergency highway contracts for the transportation of mail between a processing and distribution plant (except a BMC) and stations/branches airports, railheads, and piers within the same processing and distribution plant service area within the same cluster.

53604 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Processing and Distribution Plant Service Area - Christmas Mail

This account is used to record the expense under all highway contracts for the transportation of Christmas mail between a processing and distribution plant (except a BMC) and stations/branches airports, railheads, and piers within the same processing and distribution plant service area within the same cluster.

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53605 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Customer Service Districts - Regular Contracts

This account is used to record the expense under regular highway contracts for the transportation and box delivery of mail between a postal facility (except a BMC) and stations/branches airports, railheads, and piers within the same customer service district within the same cluster.

53606 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Customer Service Districts - Exceptional Service

This account is used to record the expense under regular highway contracts for exceptional service for the transportation and box delivery of mail between a postal facility (except a BMC) and stations/branches airports, railheads, and piers within the same customer service district within the same cluster.

53607 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Customer Service Districts - Emergency Contracts

This account is used to record the expense under emergency highway contracts for exceptional service for the transportation and box delivery of mail between a postal facility (except a BMC) and stations/branches airports, railheads, and piers within the same customer service district within the same cluster.

53608 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Intra Customer Service Districts - Christmas Mail

This account is used to record the expense under all highway contracts for the transportation and box delivery of Christmas mail between a postal facility (except a BMC) and stations/branches airports, railheads, and piers within the same customer service district within the same cluster.

53609 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Processing and Distribution Plant Service Area - Regular Contracts

This account is used to record the expense under regular highway contracts for the transportation of mail between two postal processing and distribution plants (neither a BMC) within the service area of a postal cluster within a postal area.

53611 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Processing and Distribution Plant Service Area - Exceptional Service

This account is used to record the expense under regular highway contracts for exceptional service for the transportation of mail between two postal processing and distribution plants (neither a BMC) within the service area of a postal cluster within a postal area.

53612 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Processing and Distribution Plant Service Area - Emergency Contracts

This account is used to record the expense under emergency highway contracts for the transportation of mail between two postal processing and distribution plants (neither a BMC) within the service area of a postal cluster within a postal area.

53613 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Processing and Distribution Plant Service Area - Christmas Mail

This account is used to record the expense under all highway contracts for the transportation of Christmas mail between two postal processing and distribution plants (neither a BMC) within the service area of a postal cluster within a postal area.

53614 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Cluster - Regular Contracts

This account is used to record the expense under regular highway contracts for the transportation of mail between a postal facility in one cluster and a postal facility in a different cluster, when both postal facilities are within the same postal area and neither are BMCs (not inter-BMC).

53615 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Cluster - Exceptional Service

This account is used to record the expense under regular highway contracts for exceptional service for the transportation of mail between a postal facility in one cluster and a postal facility in a different cluster, when both postal facilities are within the same postal area and neither are BMCs (not inter-BMC).

53616 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Cluster - Emergency Contracts

This account is used to record the expense under emergency highway contracts for the transportation of mail between a postal facility in one cluster and a postal facility in a different cluster, when both postal facilities are within the same postal area and neither are BMCs (not inter-BMC).

53617 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Cluster – Christmas Mail

This account is used to record the expense under all highway contracts for the transportation of Christmas mail between a postal facility in one cluster and a postal facility in a different cluster, when both postal facilities are within the same postal area and neither are BMCs (not inter-BMC).

53618 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Area - Regular Contracts

This account is used to record the expense under regular highway contracts for the transportation of mail between a postal facility (except a BMC) in one area and a postal facility (except a BMC) in a different area.

53619 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Area - Exceptional Service

This account is used to record the expense under regular highway contracts for exceptional service for the transportation of mail between a postal facility (except a BMC) in one area and a postal facility (except a BMC) in a different area.

53621 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Area - Emergency Contracts

This account is used to record the expense under emergency highway contracts for the transportation of mail between a postal facility (except a BMC) in one area and a postal facility (except a BMC) in a different area.

53622 Transportation of Mail/Empty Mail Equipment – Domestic – Highway Service – Inter Area – Christmas Mail

This account is used to record the expense under all highway contracts for the transportation of Christmas mail between a postal facility (except a BMC) in one area and a postal facility (except a BMC or a Christmas Network Hub) in a different area.

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