USPS-T-19

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DIRECT TESTIMONY OF
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ON BEHALF OF
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AUTOBIOGRAPHICAL SKETCH

My name is Michael A. Nelson. I am an independent transportation systems analyst with offices in Stamford, Vermont and Wellesley, Massachusetts. Prior to February 1984, I was a Senior Research Associate at Charles River Associates, an economic consulting firm in Boston, Massachusetts.

I have directed or participated in numerous consulting assignments and research projects in the general field of transportation. My work typically involves developing and applying methodologies based on operations research, microeconomics, statistics and/or econometrics to solve specialized analytical problems. On behalf of United Parcel Service, I provided testimony before this Commission in Docket No.'s RM86-2B, R87-1 and R90-1, and served as principal investigator for the studies of city delivery carrier street time underlying the testimony of A. Lawrence Kolbe in Docket No. R84-1. I have also provided testimony regarding competitive and/or statistical issues in six railroad merger proceedings before the Interstate Commerce Commission, including control of C&NW by Union Pacific (Finance Docket No. 32133), the acquisition by Rio Grande Industries of portions of the CM&W and Soo Line railroads (Finance Docket Nos. 31522 and 31505, respectively), the consolidation of Southern Pacific with DRGW (Finance Docket No. 32000), the acquisition of MKT by Union Pacific (Finance Docket No. 30800), and extensive testimony regarding the

anticompetitive effects of the proposed merger of Southern Pacific and Santa Fe (Finance Docket No. 30400). I have assisted in the preparation of numerous other verified statements presented before various regulatory and legal bodies, and authored many technical reports and articles in transportation journals.

I received my bachelor's degree from the Massachusetts Institute of Technology in 1977. In 1978, I received two master's degrees from MIT, one in Civil Engineering (Transportation Systems) and one from the Alfred P. Sloan School of Management, with concentrations in economics, operations research, transportation systems analysis and public sector management.

PURPOSE AND SCOPE OF THIS TESTIMONY

This testimony presents the development of portions of the costs in Cost Segments 6 (City Delivery Carriers, Office Activity), 7 (City Delivery Carriers, Street Activity) and 9 (Special Delivery Messengers). In particular, it presents the results of a series of analytical refinements and new data collections related to special purpose route carrier activities, special delivery messenger activities and driving time on motorized letter routes. These refinements include improvements in the accuracy of methods used to compute volume variable costs, as well as the development of other information. This testimony also documents changes that have been introduced in the cost segment spreadsheets (see Exhibit USPS-19A).

I. Analytical Refinements - Volume Variable Costs

Specific analytical refinements that have been implemented in the computation of volume variable costs are described below. These refinements have been implemented using data derived from four new field surveys of carrier and messenger activities:

- Motorized Letter Route Survey
- Special Purpose Route Survey
- Expedited Mail Survey
- LDC 24 Survey

These surveys are described in Exhibit USPS-19B.

A. Labor Distribution Code (LDC) 24 overlap

In general, special delivery messenger activity is charged to LDC 24, which accrues in Cost Segment 9. However, messenger craft employees only account for a portion of CS 9 costs. Significant charges to LDC 24 (and CS 9) result from the activities of carrier craft employees assigned to routes that perform interfacility distribution of Express Mail and/or delivery of Express Mail and special delivery items.

In the past, IOCS tallies reflecting observations of carrier street time on Route Type 98 that can be associated with activity involving Express Mail have been attributed to Express Mail in Cost Segment 6.[1] This has served as a type of "proxy" for attributing the street costs of special purpose route carriers associated with Express Mail

[1] Summary Description of USPS Development of Costs by Segments and Components (Fiscal Year 1996), USPS-LR-H-1.

distribution and delivery activities.[2] However, such activities are routinely charged to LDC 24, and therefore also appear as accrued costs in Cost Segment 9 (which are largely distributed to Express Mail). The net result of this situation has been an overlap, or double-count, in which the subject carrier distribution and delivery activities have caused costs to be borne by Express Mail in both Cost Segment 6 and Cost Segment 9.

In the new data collections, messenger and special purpose route carrier activities that accrue to LDC 24 have been observed directly (in the Expedited Mail Survey and LDC 24 Survey, respectively). Analysis of these activities is performed in Cost Segment 9. Similarly, messenger and special purpose route carrier activities that accrue to carrier street time LDC's have been observed directly (in the Expedited Mail Survey and Special Purpose Route Survey, respectively) and are analyzed in Cost Segment 7. The use of data from these different surveys to develop variability parameters, distribution keys and other needed information is shown in Exhibit USPS-C, Workpaper 1 and Workpaper 2.

With this approach, the cost analysis procedures are properly matched with the pools of accrued costs to which they apply, and the overlap problem is eliminated. As a

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[2]The Support Route Cost Survey, which has provided much of the information used to attribute the costs of special purpose routes, predates the proliferation of Express Mail distribution and delivery responsibilities among such carriers.

result, the proxy for Express Mail-related street activity previously used in Cost Segment 6 is unneeded and has been removed.

B. Express Mail collection box load time

To date, the cost of sweeping Express Mail collection boxes has been estimated using a proportional allocation of all collection load costs between Express Mail collection boxes and ordinary collection boxes. However, this approach does not account for differences between Express Mail collection boxes and ordinary collection boxes with respect to their volume and load time characteristics. In particular, the new survey data reveal that Express Mail collection boxes rarely contain many pieces when swept, and that it is reasonably commonplace for such boxes to be empty.[3] By comparison, regular collection boxes almost always contain mail, and may have to be swept repeatedly during a day to avoid overflowing.

To account for these operational differences, the new analysis procedures include separation of accrued costs for each box type, and development and application of new load time factors to determine volume-variable costs associated with sweeps of Express Mail collection boxes.[4]

C. Letter route driving time

In Docket No. R90-1, the Commission adopted a new analysis of park-and-loop driving time. That analysis was

[3]See, for example, LR-USPS-H-153.
[4]See Exhibit USPS-19A.

less developed and accurate than might be desirable because (a) it contained no information regarding parking point activities other than routine looping; (b) even given its limitation to looping points, it did not utilize a distribution key that reflected the underlying (weight-related) cost causality for such points; and (c) it did not account for the occurrence of similar driving activities on other route types.

Under the new analytical procedures I have employed, (noncurbline) driving time between parking points on all types of motorized letter routes is identified and studied separately. The different activities that occur at parking points are accounted for[5], and volume variability is estimated for routine looping points/dismounts[6], "deviation" deliveries[7] and collection-related driving. New distribution keys are developed in which the role of the weight of mail in the formation of routine loops is accounted for[8], as is the role of the types of mail that cause deviation deliveries[9].

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[5]See Workpaper 1.2.
[6]See Workpaper 1.14.
[7]Deviation deliveries are nonroutine delivery stops, such as those sometimes made for expedited items or large parcels. The effect of volume on the number of such stops is estimated in Exhibit USPS-19C.
[8]See Workpaper 1.10.
[9]See Workpaper 1.9.

D. Special purpose routes

The time proportions (by function) and major class distribution keys used to analyze special purpose route costs are approximately 17 years old, and are in need of updating. Similarly, the models used to analyze SPR load time and coverage-related variability are somewhat out of date.

In my analysis, new data are developed regarding time proportions[10] and delivery distribution keys[11]. A refined estimate of drive time-to-stop variability is used[12], and new econometric models are developed for analyzing coverage-related variability and the time spent at delivery stops. These models are described in Exhibit USPS-19C, and presented in USPS-LR-H-160.

E. Special delivery messengers

To date, messenger run time has been analyzed in the aggregate as a function of delivery-related parameters. This has obscured functional differences in cost causality (e.g., driving time vs. delivery stop time vs. nondelivery stop time), as well as differences related to mail characteristics (e.g., accountables vs. nonaccountables).

[10]See Workpaper 1.5.
[11]See Workpapers 1.6, 1.7 and 1.8.
[12]In Docket No. R90-1, the Commission adopted changes in the methods used to compute SPR driving time-to-stop variability from the results of the "Parcel Access Test (PAT)". I have reviewed those changes and concluded that they reasonably correct for the influences of walk and travel activities in the original PAT. In my analysis, I use the adjusted drive time-to-stop variability estimate of 0.6342.

Also, the data used to develop distribution keys have become somewhat outdated.

In my analysis, new data are developed that provide a substantial enhancement in functional detail. Volume variable costs associated with driving, customer delivery and collection activities are identified. This includes development of new econometric models for analyzing coverage-related variability and the time spent at delivery stops[13], and the creation of new delivery distribution keys[14].

II. Other Work

A. Express Mail interfacility service

To date, there has been no explicit analysis to differentiate interfacility distribution movements dedicated to Express Mail from other types of carrier or messenger activities. Such movements typically involve modest piece volumes moving in small vehicles on schedules established entirely by Express Mail distribution requirements. As a result, these movements have cost characteristics that are quite different from most other carrier and messenger activities. In particular, they are caused by the existence of Express Mail service, but do not vary measurably with piece volume.

[13]See Exhibit USPS-19C and USPS-LR-H-160.
[14]See Workpapers 2.5, 2.6 and 2.7.

In my analysis, messenger and carrier activities associated with interfacility distribution are identified separately in Cost Segment 7 and Cost Segment 9.

B. Express Mail collection box access and fixed stop time

The method previously used by the Postal Service and the Commission to analyze volume variable collection access costs involved allocation of such costs to Express Mail in proportion to the fraction that Express Mail collection boxes form of all collection boxes. This did not account for the fact that (a) the two types of boxes tend to be located at the same points and are often serviced together; or, (b) sweeps of Express Mail boxes are governed by outbound distribution requirements and are essentially never made for volume-related reasons. Neither the volume of Express Mail pieces nor the existence of Express Mail service can properly be viewed as causing a vehicle stop where both types of boxes are swept.

In my analysis, driving time and fixed stop time associated with sweeps of Express Mail collection boxes are identified separately in Cost Segment 7 and Cost Segment 9.

C. Allocation of Cost Segment 9 fixed costs

The allocation of residual fixed costs in Cost Segment 9 clearly does not identify volume variable costs, and has no legitimate purpose when product-specific costs have been accounted for. The lack of a foundation for such an allocation is demonstrated by the functional diversity evident in the new survey data. Over 11% of messenger

vehicle stops, and almost 23% of the time spent at stops, are associated with such activities as interfacility movements not dedicated to Express Mail, pickup service and sweeps of ordinary collection boxes.[15] These activities are caused by multiple mail subclasses and services. For example, pickup service entails its own fee, and is conducted for Priority Mail and parcel post as well as Express Mail. Indeed, the new survey data show that by far the majority of the pieces handled by messengers in pickup service are Priority Mail or parcel post. In light of this type of diversity in messenger activities, there is no causal foundation for allocating to the fixed portion of messenger street time beyond the costs that are properly identified as incremental.

D. Express Mail rate category cost differentials

See Exhibit USPS-19D.

E. Cost basis for pickup fees

See Exhibit USPS-19E.

[15]See Workpapers 2.1 and 2.2.

Exhibit USPS-19A

SPREADSHEET REFINEMENTS

New spreadsheets have been created for analysis of driving time on motorized letter routes (W/S 7.0.4.X, with cost distributions on W/S 7.0.6.17) and special delivery messenger street time (W/S 9.0.3, with cost distributions on W/S 9.0.5.1-9.0.5.5). In addition, substantial changes have been made in the spreadsheet containing the analysis of special purpose routes (W/S 7.0.5), as well as in other spreadsheets in Cost Segments 6, 7 and 9. These new spreadsheets and changes are described in further detail below:

1. W/S 7.0.4.X

Line	Description
1	Accrued cost input from W/S 7.0.4.1.
3	Drive-to-stop variability - the figure of 0.5 has been used previously by the Commission, and is based on the "Traveling Salesman Model". It is the best available estimate for this variability parameter.
4	Stop-to-activity variability - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the number of vehicle stops varies with the number of carrier activities.
5	Deviation delivery-to-piece variability - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the number of deviation delivery stops varies with the number of pieces requiring deviation delivery.
6	Variability of routine loops/dismounts - As documented in Workpaper 1.14, an estimate was developed of the degree to which the number of routine loop/dismount points varies with volume (weight).

Line	Description
8	Activity-related drive costs = L1 x L3 x L4, based on the Chain Rule.
9a-9g	Activity-related drive costs distributed to activities based on Workpaper 1.2.
10	Volume-variable deviation delivery costs = L9d x L5. These costs are distributed in W/S 7.0.6.17, based on the data developed in Workpaper 1.9.
11	Volume-variable routine loop/dismount costs = L9g x L6. These costs are distributed in W/S 7.0.6.17 based on the estimated distribution of mail weight developed in Workpaper 1.10.

2. W/S 7.0.5

Line	Description
1-7	Development of accrued costs.
8	Drive-to-stop variability - See USPS-T-19, Section I.D.
9	Stop-to-activity variability - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the number of vehicle stops varies with the number of carrier activities.
10	Individual delivery-to-piece variability - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the number of individual delivery stops varies with the number of pieces requiring individual delivery.
14-16	Delivery stop time variabilities - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the time spent at individual delivery stops varies with the number of such stops made, the number of accountable pieces delivered and the number of nonaccountable pieces delivered.
17	Activity-related drive costs = L6C5 x L8 x L9, based on the Chain Rule.
19-25	Activity-related drive costs distributed to activities based on Workpaper 1.3.
26a	Volume-variable individual delivery driving costs = L10 x L22C5. These costs are distributed in W/S 7.0.6.13, based on the data developed in Workpaper 1.8.

Line	Description
35	Volume-variable accountable delivery costs = L15 x L22C6. These costs are distributed in W/S 7.0.6.4 based on the data developed in Workpaper 1.7.
36	Volume-variable nonaccountable delivery costs = L16 x L22C6. These costs are distributed in W/S 7.0.6.3 based on the data developed in Workpaper 1.6.
44	Volume-variable fixed time at stop costs = L10 x L14 x L22C6. These costs are distributed in W/S 7.0.6.10 based on the data developed in Workpaper 1.8.

3. W/S 9.0.3

Line	Description
1-3	Development of accrued costs.
4	Drive-to-stop variability - unchanged.
5	Stop-to-activity variability - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the number of vehicle stops varies with the number of messenger activities.
6	Customer delivery-to-piece variability - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the number of customer delivery stops varies with the number of pieces requiring customer delivery.
10-12	Delivery stop time variabilities - As documented in Exhibit USPS-19C, econometric analysis was undertaken to measure the degree to which the time spent at customer delivery stops varies with the number of such stops made, the number of accountable pieces delivered and the number of nonaccountable pieces delivered.
13	Activity-related drive costs = L3C5 x L4 x L5, based on the Chain Rule.
14a-14f	Activity-related drive costs distributed to activities based on Workpaper 2.1.
15	Volume-variable customer delivery driving and fixed time at stop costs = L6 x (C5L14c + (C6L14c x L10)). These costs are distributed in W/S 9.0.5.1 based on the data developed in Workpaper 2.5.

Line	Description
20	Volume-variable accountable delivery costs = L11 x L14C6. These costs are distributed in W/S 9.0.5.4 based on the data developed in Workpaper 2.6.
21	Volume-variable nonaccountable delivery costs = L12 x L14C6. These costs are distributed in W/S 9.0.5.5 based on the data developed in Workpaper 2.7.

4. Other Spreadsheet Changes

Other significant spreadsheet changes include the following:

a. The analysis of letter route collection costs is retained on the letter route spreadsheets (see W/S 7.0.4.1, L33a-L33m). This replaces the previous practice of transferring letter route collection costs to W/S 7.0.5, and enhances the validity of the allocation of street support costs.

b. The analyses of collection costs appearing in W/S 7.0.4.1, 7.0.5 and 9.0.3 have the following common features:

- separate accrual of time at ordinary vs. Express Mail collection boxes;

- new, separate estimate of volume variability for time at Express Mail collection boxes (see Workpapers 1.13 and 2.4); and,

- a new estimate of fixed time at stop[1] (replacing former estimate of coverage-related time), which, along with driving time, is variable to the degree the number of collection stops is variable with volume.

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[1]The time associated with sweeps of empty Express Mail collection boxes is used as a measure of the fixed time associated with sweeps of Express Mail collection boxes, and as a proxy for the fixed time associated with sweeps of ordinary collection boxes (see Workpapers 1.1 and 2.4).

c. The analysis of letter route vehicle use (W/S 7.0.4.3) is enhanced by refining the applicability of the vehicle use factor to different time components.

d. The analysis of carrier training activities in W/S 6.0.3 is refined to rectify a pre-existing logical error, which resulted in the omission of the training portion of office activity in the computation of street support costs.

e. In W/S 9.0.6, messenger in-office training activities are treated as support rather than mail-related, following the analogous treatment for carriers.

A description of individual line item spreadsheet changes is presented in USPS-LR-H-161.

Exhibit USPS-19B

DATA COLLECTION AND ANALYSIS PROCEDURES

1. General

The analyses described in USPS-T-19 have been implemented using data derived from four field surveys[1] of carrier and messenger activities. The procedures used to gather and analyze the data from these surveys are presented in the following library references:

Survey	Data Gathering	Data Analysis
Motorized Letter Route (MLR) Survey	USPS-LR-H-151	USPS-LR-H-156
Special Purpose Route (SPR) Survey	USPS-LR-H-152	USPS-LR-H-157
Expedited Mail (EXP) Survey	USPS-LR-H-153	USPS-LR-H-158
LDC 24 (LDC) Survey	USPS-LR-H-154	USPS-LR-H-159

Each of these surveys involved the gathering of information using (i) log forms to record information regarding street activities, and (ii) in-office worksheets to record needed mail classification data. Before clocking out, survey ID numbers were assigned to each delivery item that might cause a dedicated stop (e.g., a parcel or expedited piece), and classification and other relevant information associated with such pieces was recorded. Log forms were then completed by the carriers/messengers during the course of their normal street work. These log forms provided information regarding, for example, the clock times of arrival and departure associated with vehicle stops, the activities

[1]A fifth data collection, the Express Mail Study, was undertaken to provide information needed in the development of Express Mail rates. See USPS-LR-H-155.

undertaken at those stops, and the (previously assigned) ID numbers of any delivered items.

A number of steps were undertaken to ensure the quality of the data resulting from this process, including the following:

- careful development of forms and procedures, including field pretesting;
- extensive involvement of supervisors to ensure data integrity and adherence to survey procedures;
- comprehensive teleconference training;
- field monitoring of surveys in process; and,
- use of call-backs and other follow-up procedures[2].

After the raw data were received from the field and keypunched, further steps were taken in the analysis to ensure the rigor of the reported results. These steps include data editing and weighting procedures, and are described further below.

2. Data Editing

Three types of editing were performed that resulted in modifications of the original survey data. These included (a) computerized procedures for correcting data problems that fit simple patterns; (b) manual review to address missing data or other potential inconsistencies; and, (c) treatment of outliers in specific tabulations.

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[2]For example, when the initial MLR Survey revealed an unanticipated diversity in the composition of routine looping points and dismounts, a supplemental worksheet was developed and sent to relevant survey participants. See Workpaper 1.14.

a. Computerized Procedures - The following criteria were used to apply systematic edits to the survey data:

- If a piece is Express Mail, change any checks for special services other than COD or return receipt to missing values.

- If piece weight is greater than 11 oz. and First Class is checked, change the check for First Class to a missing value, and add a check for Priority Mail.

- If piece weight is greater than 10 lb. and Fourth Class - Bound Printed is checked, change the check for Fourth Class - Bound Printed to a missing value and add a check for Fourth Class - Zone Rate/Other.

- Assign a check to "individual" or "deviation" delivery if the street form contains an assigned ID number (or a check) but no other delivery activity is shown.

- For numerical values other than time values, replace colons with decimal points (e.g., 9:5 is changed to 9.5).

- Interpret time values as decimals or minutes based on the presence/absence of colons and the values observed.

b. Manual Review - A manual review was performed to identify circumstances where missing information could be supplied or potential inconsistencies could be rectified using information available on the survey forms. For example, if a carrier reported total hours and street hours, but failed to report office hours, manual review could permit the value for office hours to be filled in (e.g., using subtraction).

c. Outliers - In the development of time proportions (only), a very small number of observations were excluded because they contained total elapsed amounts of driving time, travel time and/or time at stops that appeared to be excessive in comparison to normal work day limits.

3. Weighting Procedures

The sampling procedures used in the gathering of the subject survey data explicitly provided for different probabilities of

selection for different portions of the universes under study. For example, large messenger delivery units were intentionally sampled with disproportionately high probability in the EXP Survey, while collection routes were intentionally sampled with disproportionately low probability in the SPR Survey.

The use of such stratified sampling facilitates the efficient use of survey resources, but necessitates that appropriate weighting factors be applied. In general, weighting factors have been developed and applied that reflect the inverse of the sampling rates used to develop the survey observations. This ensures that the resulting estimates are representative of the universe from which they were drawn.

In the case of the SPR Survey, an additional consideration arose due to the use of IOCS tallies to identify carrier/route type combinations for sampling. Basically, because IOCS tallies reflect the time spent in different activities, the probability that an individual employee will be observed by IOCS to be working on a particular type of route is proportional to the amount of time that the employee actually works on that type of route. To account for this, the SPR Survey weighting factors included terms that weight each sampled carrier/route type combination in inverse proportion to the amount of time it was observed to operate in the sampled time period.

Exhibit USPS-19C

ECONOMETRIC ANALYSES

The econometric analyses performed on data from the carrier/messenger surveys are summarized below:

	Model 1: Stops = f(Activities)	Model 2: Deliveries = f(Volume)	Model 3: Time at Delivery Stops = f(# Stops, # Accountables, # Nonaccountables
Theory	The number of vehicle stops is caused by the number of activities that must be performed	The number of stops required to perform individual delivery is caused by the number of pieces requiring individual delivery; "high volume" stops are fixed, and do not vary with piece volume	The time spent performing individual delivery is caused by the number of stops that must be made for individual delivery, as well as the numbers of accountable and nonaccountable pieces; "high volume" stops differ from other stops in these relationships
Model Specification/ Rationale	Quadratic/ Plot of data, simplicity, flexibility	Quadratic/ Plot of data, simplicity, flexibility, alternative model	Quadratic/ Simplicity, flexibility, alternative model
Dependent Variable	STOPS = # vehicle stops on sampled run	DELS = # delivery points receiving 1-4 individual delivery pieces on sampled run	TIME = Cumulative time at individual delivery stops on sampled run
Independent Variables	ACTS = # activities undertaken on sampled run	VOL = # pieces delivered to points receiving 1-4 individual delivery pieces on sampled run	N_i = # individual delivery stops on sampled run at location i

	Model 1: Stops = f(Activities)	Model 2: Deliveries = f(Volume)	Model 3: Time at Delivery Stops = f(# Stops, # Accountables, # Nonaccountables
	ACTS**2	VOL**2	VA = # accountable pieces to individual delivery stops on sampled run VO = # nonaccountable pieces to individual delivery stops on sampled run VA**2; VO**2 Separate models estimated for 1-4 piece and 5+ piece stops
Datasets (each used to estimate separate model)	MLR, SPR, EXP (LDC 24 portion), EXP (LDC 22, 23, 27 portion), LDC	MLR, SPR, EXP (LDC 24 portion), EXP (LDC 22, 23, 27 portion), LDC	SPR, EXP (LDC 24 portion)
Alternative Model	None[1]	Same, but without limitation to 1-4 piece stops[2]	Same, but with single N variable (and N**2), with and without[3] separate estimation for 1-4 and 5+ pc. stops

[1]The preferred model was also estimated on a preliminary, incomplete dataset.
[2]This alternative model was only estimated on a preliminary, incomplete dataset.
[3]This alternative model was also estimated on a preliminary, incomplete dataset with a specification that included cross-product terms (VA*VO, VA*N, VO*N). The cross-product terms were eliminated (due to lack of an operational foundation) prior to the estimation of the alternative model on the full dataset.

	Model 1: Stops = f(Activities)	Model 2: Deliveries = f(Volume)	Model 3: Time at Delivery Stops = f(# Stops, # Accountables, # Nonaccountables
Econometric technique	Data weighted by inverse of sampling rate	Data weighted by inverse of sampling rate	Data weighted by inverse of sampling rate

The econometric results from the preferred models, as well as from the preliminary data and/or alternative models, are presented below. It is noted that for both Model 1 and Model 2, a weighted sum of SPR and EXP (LDC 22, 23, 27 portion) results is output to the special purpose route analysis in Cost Segment 7. Similarly, a weighted sum of EXP (LDC 24 portion) and LDC results is output to Cost Segment 9.

Computer programs used in the econometric analysis are presented in USPS-LR-H-160.

SUMMARY OF ECONOMETRIC ANALYSES

Model 1: Stops = f(Activities)

Model	Preliminary Data Adj. R^2	N	Var.	Complete Data/ Preferred Model Adj. R^2	N	Var.	% STOPS[4]	Total Var.
- MLR	0.9831	206	0.99538	0.9831	213	0.99440		0.9944
- SPR	0.9647	571	1.00909	0.9606	684	1.0[5]	0.99372	
- EXP 27	0.9583	52	0.96460	0.9376	65	0.92280	0.00628	0.9995
- EXP 24	0.9634	1128	1.01018	0.9049	1399	0.96750	0.92101	
- LDC 24	0.8967	220	0.94985	0.9196	261	0.94962	0.07899	0.9661

Output to W/S 7.0.4.X, C3L4 = 0.9944
Output to W/S 7.0.5, C9L9 = 0.9995 (BY value = 0.9996)
Output to W/S 9.0.3, C9L5 = 0.9661 (BY value = 0.9657)

[4]Estimated from activity and activity/stop data contained in USPS-LR-H-157, USPS-LR-H-158 and USPS-LR-H-159.
[5]Model value of 1.007 truncated to 1.0 due to absence of operational foundation for diseconomies of scale.

SUMMARY OF ECONOMETRIC ANALYSES (cont'd)

Model 2: Deliveries = f(Volume)

Model	Preliminary Data/ Alternative Model Adj. R^2	N	Var.	Complete Data/ Preferred Model Adj. R^2	N	Var.	% DELS (1-4pc)	Rt.Type Var. xxx
- MLR	0.7261	116	0.94421	0.8799	117	0.99575	0.98904	0.9848
- SPR	0.5912	334	0.83171	0.9102	373	1.0[6]	0.95472	0.95472
							Tot.-	0.9519[7]
- EXP 27	0.3064	35	0.41286	0.9465	44	0.70963	0.95049	0.67450
- EXP 24	0.5638	979	0.66254	0.9461	1197	0.96091	0.97685	0.93866
							Tot.-	0.9396[8]
- LDC 24	0.9099	172	0.91965	0.9550	201	0.96206	0.98845	0.95095

Output to W/S 7.0.4.X, C3L5 = 0.9848 (BY value = 0.9852)
Output to W/S 7.0.5, C9L10 = 0.9519
Output to W/S 9.0.3, C9L6 = 0.9396 (BY value = 0.9395)

[6]Model value of 1.015 truncated to 1.0 due to absence of operational foundation for diseconomies of scale.
[7]Weighted mean of SPR and EXP 27; weight = # DELS (from WP 1.3).
[8]Weighted mean of EXP 24 and LDC 24; weight = # DELS (from WP 2.1).

SUMMARY OF ECONOMETRIC ANALYSES (cont'd.)

Model 3: Time = f(Stops, Accountables, Nonaccountables)

Model	Adj. R^2	N	Var.	% TIME	Total Var.
SPR					
1. Preliminary Data/Single N/Cross-products (All Stops)	0.3092	281			
N			0.0689		
VA			0.1907		
VO			0.5025		
2. Complete Data/Single N (All Stops)	0.2772	317			
N			0.0485		
VA			0.1277		
VO			0.4547		
3. *Complete Data/Single N* (1-4 Pc. Stops)	*0.1721*	321			
N			-0.0518		
VA			0.1398		
VO			0.4915		
4. Complete Data/Single N (5+ Pc. Stops)	0.8612	70			
N			0.5300		
VA			0.1251		
VO			0.2624		
5. Complete Data/N_i (1-4 Pc. Stops)	0.8828	321		0.8466	
N			0.9528[9]	→	0.9117
VA			0.0472		0.0479
VO			0[10]	→	0.0461
6. Complete Data/N_i (5+ Pc. Stops)	0.9527	70		0.1534	
N			0.6846		
VA			0.0520		
VO			0.3002		

[9]Model values of 1.0148 and 0.0503 prorated due to lack of operational foundation for diseconomies of scale.
[10]Model value of -0.0907 treated as 0 due to absence of operational foundation for negative volume variability. Neither of the VO variables in this model is statistically significant.

Output to W/S 7.0.5, C9L14 = 0.9117 (BY value = 0.8963)
Output to W/S 7.0.5, C9L15 = 0.0479 (BY value = 0.0592)
Output to W/S 7.0.5, C9L16 = 0.0461 (BY value = 0.0445)

Model	Adj. R^2	N	Var.		
EXP					
7. Preliminary Data/Single N/Cross-products (All Stops)	0.5720	857			
N			0.5570		
VA			0.2369		
VO			0.0403		
8. Complete Data/Single N (All Stops)	0.6058	1052			
N			0.7982		
VA			0.0980		
VO			-0.0145		
9. Complete Data/Single N (1-4 Pc. Stops)	0.6324	1049			
N			0.7048		
VA			0.1550		
VO			0.0237		
10. Complete Data/Single N (5+ Pc. Stops)	0.2034	127		% TIME	Total Var.
N			0.7411		
VA			0.1168		
VO			-0.0555		
11. Complete Data/N_i (1-4 Pc. Stops)	0.7152	1049		0.9317 ↓	
N			0.69530	→	0.6860
VA			0.13438		0.1342
VO			0.02297	→	0.0219
12. Complete Data/N_i (5+ Pc. Stops)	0.6647	143		↑ 0.0683	
N			0.55934		
VA			0.13215		
VO			0.00680		

Output to W/S 9.0.3, C9L10 = 0.6860 (BY value = 0.6865)
Output to W/S 9.0.3, C9L11 = 0.1342 (BY value = 0.1334)
Output to W/S 9.0.3, C9L12 = 0.0219 (BY value = 0.0237)

Exhibit USPS-19D

EXPRESS MAIL RATE CATEGORY COST DIFFERENTIALS

The Express Mail Cost Study (1980) has served as the primary source for determining cost differentials among the Express Mail rate categories. This study, which is now outdated, involved tabulation of the labor times and piece volumes associated with each Express Mail rate category for different functions (acceptance, outgoing distribution, etc.).

Because of changes in the mailstream that have during the intervening period, the methodology employed in the 1980 study could not now be repeated. Basically, Express Mail in rate categories other than PO-to-Addressee is now extremely scarce. This makes it impractical or impossible to reliably measure the costs associated with those rate categories through direct field observation. Because of this, it has been necessary to develop a new methodology in order to determine current cost differentials among the Express Mail rate categories.

Under this methodology, costs are analyzed with respect to causal factors, and rate category cost differentials are determined based on differences between rate categories with respect to cost-causing factors. There is no evidence of significant differentials in unit acceptance or distribution costs related to causal factors. Therefore, aside from transportation costs[1], the four Express Mail rate categories

[1]This analysis omits any quantification of transportation cost differentials.

differ from one another primarily with respect to delivery-related costs.

The delivery-related costs associated with different rate categories are determined through the unit costs associated with different delivery methods, as follows:

Determination of Unit Delivery-Related Cost by Method of Delivery

	Cost Segment:	3[2]	6+7	9	10	Total
1.	Express Mail Cost ($000)	27,488 98,098	24,747	51,217	5,479	
2.	Delivery/Total	.0259[3] .0088[7]	.9456[4]	.9972[5]	.9820[6]	
3.	Delivery Cost ($000)	712 863	23,401	51,074	5,380	
4.	Piggyback	1.41854 1.41024	1.41823	1.49538	1.19693	
5.	Delivery-Related Costs ($000)	2,227	33,188	76,375	6,439	118,229
6.	Piece Volume (000)[8]	19,307.562	19,017.852	21,882.762	4,171.824	64,380
7.	Delivery-Related Cost/Piece ($)	0.115	1.745	3.490	1.543	1.836

[2]Window service and platform operations are reported separately in Lines 1-4, and consolidated in Lines 5-7.
[3]Source: FY96 IOCS tally analysis.
[4]Source: Cost Segment 7, W/S 7.0.3.
[5]Source: Cost Segment 9, W/S 9.0.4.
[6]Source: Cost Segment 10 spreadsheets.
[7]Source: FY96 IOCS tally analysis.
[8]Total distributed based on results of Express Mail Study.

	Cost Segment:	3[9]	6+7	9	10	Total
8.	Pcs. by Label					
A.	PO-to-PO	287.914				287.914
B.	PO-to-Addressee	18,432.792	19,001.978	21,815.648	4,171.824	63,422.242
C.	Same Day Airport	0.042				0.042
D.	Custom Designed	586.814	15.874	67.114	0	669.802
9.	Fraction by Label					
A.	PO-to-PO	1.0000				$0.115
B.	PO-to-Addressee	0.2906	0.2996	0.3440	0.0658	$1.858
C.	Same Day Airport	1.0000				$0.115
D.	Custom Designed	0.8761	0.0237	0.1002	0.0000	$0.492

The differences between the delivery-related cost for each rate category and the mean delivery-related cost per piece of $1.836 provide the basis for establishing the "per piece" cost differentials across rate categories:

Rate Category	Delivery-Related Cost Per Piece	Cost Per Piece Differential From Mean
PO-to-PO	$0.115	($1.721)
PO-to-Addressee	$1.858	$0.022
Same Day Airport	$0.115	($1.721)
Custom Designed	$0.492	($1.836)[10]

[9]Window service and platform operations are reported separately in Lines 1-4, and consolidated in Lines 5-7.
[10]Reflects omission of delivery-related costs from per-piece charge. Cost basis for per delivery charge = $0.492.

Exhibit USPS-19E

COST BASIS FOR PICKUP FEES

The general approach is to calculate costs for on-call and scheduled pick-ups based on driving time/stop plus time at stop (by type) for special delivery messengers and special purpose route carriers. Information is drawn from the recent carrier/messenger surveys to support this approach, which replaces the previous use of messenger delivery costs as a proxy.

	SPR Carriers	On-call	Scheduled	Total
1.	SPR Indiv. Del. Stop Time/Stop[1]			301.69
2.	SPR Drive Time/Stop Time (Indiv. Dels.)			0.7173[2]
3.	SPR Drive Time/Stop (L1 x L2)	216.40	216.40	
4.	SPR Pickup Time at Stop (sec.)[3]	288.28	315.57	Includes volume-related time
5.	Total SPR Pickup Time (L3 + L4)	504.68	531.97	
6.	Street Support Factor[4]	1.33102	1.33102	
7.	Productive Hourly Rate - City Delivery Carriers	26.083	26.083	
8.	City Delivery Carrier Piggyback Ratio	1.31468	1.31468	
9.	SPR Pickup Cost [(L5 x L6 x L7 x L8)/3600]	$6.3985	$6.7445	

[1]Source: USPS-LR-H-157; USPS-LR-H-158.
[2]Source: Cost Segment 7, W/S 7.0.5, C5L22/C6L22.
[3]Source: USPS-LR-H-157; USPS-LR-H-158.
[4]Source: Cost Segment 7, W/S 7.0.1.

	Messengers	On-call	Scheduled	Total
10.	SDM Cust. Del. Stop Time/Stop[5]			249.58
11.	SDM Drive Time/Stop Time (Cust. Dels.)			0.6828[6]
12.	SDM Drive Time/Stop (L1 x L2)	170.41	170.41	
13.	SDM Pickup Time at Stop (sec.)[7]	515.69	505.60	Includes volume-related time
14.	Total SDM Pickup Time (L12 + L13)	686.10	676.01	
15.	Support Factor[8]	1.57627	1.57627	
16.	Productive Hourly Rate - Special Delivery Messengers	24.411	24.411	
17.	Special Delivery Messenger Piggyback Ratio	1.49520	1.49520	
18.	SDM Pickup Cost [(L14 x L15 x L16 x L17)/3600]	$10.9648	$10.8035	

	On-Call	Scheduled
% SPR[9]	0.5974	0.7902
% Messenger[10]	0.4026	0.2098
Wtd. Ave. Cost	$8.2369	$7.5961

[5]Source: USPS-LR-H-158; USPS-LR-H-159.
[6]Source: Cost Segment 9, W/S 9.0.3, C5L14c/C6L14c.
[7]Source: USPS-LR-H-158; USPS-LR-H-159.
[8]Source: Cost Segment 9, W/S 9.0.4. Includes portion of C6 associated with activity codes 6519 (Training), 6522 (Clocking In/Out) and 6430 (Obtaining Mail, etc.).
[9]Source: USPS-LR-H-157; USPS-LR-H-158; USPS-LR-H-159.
[10]Source: USPS-LR-H-157; USPS-LR-H-158; USPS-LR-H-159.