BEFORE THE
POSTAL RATE COMMISSION



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| POSTAL RATE AND FEE CHANGES, 2000 | : | DOCKET NO. R2000-1 |

# RESPONSE OF UNITED PARCEL SERVICE WITNESS NEELS TO UNITED STATES POSTAL SERVICE INTERROGATORIES (USPS/UPS-T1-7 through 12) (June 14, 2000)

Pursuant to the Commission's Rules of Practice, United Parcel Service hereby serves the answers of UPS witness Neels to the following interrogatories of the United States Postal Service: USPS/UPS-T1-7 through 12.

Respectfully submitted,

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*Of Counsel.*

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RESPONSE OF UNITED PARCEL SERVICE WITNESS NEELS
TO INTERROGATORY OF THE UNITED STATES POSTAL SERVICE

**USPS/UPS-T1-7.** Please refer to your testimony at page 62 (Table 9).

(a) Please provide copies of all exhibits referenced in the notes to Table 9. If the referenced material is provided elsewhere in your testimony or workpapers, provide correct citations.

(b) Note 3 appears to refer erroneously to "Appendix 5." Please provide the correct reference.

(c) Please provide estimated standard errors for all quantities reported in Table 9, other than those obtained directly from Dr. Bozzo's testimony.

(d) Please describe fully the method used to compute the standard errors provided in response to part (c). If the method is described elsewhere in your testimony or workpapers, provide appropriate citations.

**Response to USPS/UPS-T1-7.**

(a) In note 3 on page 62, the reference to "Exhibit 9" should be replaced with "Table 8." In that same note, the reference to "Appendix 5" should be replaced with "Appendices E and F." In note 4 on page 62, the reference to "Exhibit 10" should be replaced with "Table 6." In note 5 on page 62, the reference to "Exhibit 11" should be replaced with "Table 7."

(b) See my response to USPS/UPS-T1-7(a), above.

(c) See the attached Table Prepared in Response to USPS/UPS-T1-7(c). In order to comply most efficiently with this request, I have recomputed volume variabilities using the procedures described in my response to (d), below. Because of the different

samples used, these variability estimates differ slightly from those presented in my testimony, but lead to identical conclusions. Although I have recomputed variabilities in a way that permits efficient computation of standard errors, I stand by my original testimony in this area.

(d) The corrections to Dr. Bozzo's volume variability ($a \equiv \frac{\partial \ln(Cost_i)}{\partial \ln(FHP_i)}$) for MODS group *i* are computed in two ways that correspond to the two different estimates presented in Table 9:

(1) The variability $a_1$ is defined as the product of the MODS variability of costs with respect to TPH/F ($b \equiv \frac{\partial \ln(Cost_i)}{\partial \ln(TPH/F_i)}$) and the MODS variability of TPH/F with respect to FHP ($d_1 \equiv \frac{\partial \ln(TPH/F_i)}{\partial \ln(FHP_i)}$).

(2) The variability $a_2$ is defined as the product of the MODS variability of costs with respect to TPH/F (*b*) and the shapes variability of TPH/F with respect to FHP ($d_2 \equiv \frac{\partial \ln(TPH/F_j)}{\partial \ln(FHP_j)}$), where *j* indexes the shape processed by MODS group *i*.

Thus, these variabilities can be expressed as:

(1') $a_1 = b \times d_1$, and

(2') $a_2 = b \times d_2$ .

Let $\hat{b}$, $\hat{d}_1$, and $\hat{d}_2$ denote estimators for *b*, $d_1$, and $d_2$, respectively, with associated variances V($\hat{b}$), V($\hat{d}_1$), and V($\hat{d}_2$). Estimates for *b*, $d_1$, and $d_2$ are presented in Table 9 of at page 62 of UPS-T-1. The associated standard errors for $\hat{b}$ (for all but

Parcels) are presented in UPS-Neels-WP-1 (UPS-T-1), in folder "Appendix – Analysis Program Files", subfolder "Replication.prg", file "Verifying Replication of Bozzo.xls" (electronic version), and in Appendix: Analysis Programs, B. Program and Log Files, "Verifying the Replication of Bozzo's Analysis Sample and Variability Estimates" (hardcopy version). The standard errors for $\hat{d}_1, \hat{d}_2$, and $\hat{b}$ for Parcels are presented in UPS-T-1, Tables 6 (page 36), 7 (page 38), and 8 (page 60), respectively.

Estimators for $a_1$ and $a_2$ are given by:

(1") $\hat{a}_1 = \hat{b} \times \hat{d}_1$, and

(2") $\hat{a}_2 = \hat{b} \times \hat{d}_2$

The associated variances are generally functions of $V(\hat{b})$, $V(\hat{d}_1)$, $V(\hat{d}_2)$, the covariance of $\hat{b}$ and $\hat{d}_1$, and the covariance of $\hat{b}$ and $\hat{d}_2$, denoted as $Cov(\hat{b}, \hat{d}_1)$ and $Cov(\hat{b}, \hat{d}_2)$. If the two parameters $b$ and $d_k$, where $k$ indexes the correction method, are estimated using the same analysis sample, $Cov(\hat{b}, \hat{d}_k) \neq 0$. Alternatively, if the two parameters are estimated using orthogonal or uncorrelated analysis samples, then $Cov(\hat{b}, \hat{d}_k) = 0$.

The results contained in UPS-T-1 present estimates of $b$ and $d_k$ that are constructed using essentially the same analysis samples. Thus, calculation of standard errors for $\hat{a}_1$ and $\hat{a}_2$ requires either: (1) joint estimation of $b$ and $d_k$, which would then

permit construction of an estimate of Cov($\hat{b}$, $\hat{d}_k$), or (2) re-estimation of $b$ and $d_k$ using orthogonal analysis samples, which would render Cov($\hat{b}$, $\hat{d}_k$) = 0.

In order to avoid introduction of new joint estimation methods, I employ the latter approach. Using a random number generator that draws from the uniform distribution, I randomly partition the 321 facilities in the analysis sample into two unique sets of facilities. The data in the first set are referred to as Sample 1, and the data in the second set are referred to as Sample 2. Samples 1 and 2 are orthogonal by construction, under the maintained assumptions of USPS-T-15. I have included the data and programs used in these calculations along with information on how the sample was partitioned in library reference UPS-LR-2.

I estimate the parameter $b$ for each of the groups in the table using Sample 1. Parameters $d_k$ are estimated using Sample 2. These estimates along with their standard errors are presented in columns (2)-(4) of the attached Table Prepared in Response to USPS/UPS-T1-7(c). I have included the programs used to generate these results in library reference UPS-LR-2.

Estimates for $a_1$ and $a_2$ are presented in columns (5) and (6) of the attached Table Prepared in Response to USPS/UPS-T1-7(c). I calculate the variance of $\hat{a}_1$ and $\hat{a}_2$ using a Taylor series approximation around the product of the estimated values of $b$ and $d$. The associated standard errors, presented in parentheses below the estimates, are thus computed as:

$$se(\hat{a}_k) = ((\hat{d}_k \times se(\hat{b}))^2 + ((\hat{d}_k \times se(\hat{b}))^2)^{\frac{1}{2}}$$

The T-test statistics presented in columns (7) and (8) of the attached Table Prepared in Response to USPS/UPS-T1-7(c) show that using the MODS-level adjustment, the resulting volume variabilities are statistically different from Dr. Bozzo's variabilities in column (2) in all but three instances. Using the shapes-level adjustment, the resulting variabilities are statistically different in all but one instance.

## Table Prepared in Response to USPS/UPS-T1-7(c)

**MODS-Level Estimates of the Elasticity of Labor Costs with Respect to First Handled Pieces**

| *Group* | Bozzo's Variability *of Costs w.r.t. TPH* | Re-estimation of Bozzo's Variability *of Costs w.r.t. TPH* using Sample 1 | MODS Level Variability of TPH *w.r.t. FHP using* Sample 2 | Shapes Level Variability of *TPH w.r.t. FHP* using Sample 2 | Volume Variability With MODS Level Correction | Volume Variability With Shapes Level Correction | T-test Statistic for Ho: Volume Variability (col(2)) = TPH/F Variability (col(5)) | T-test Statistic for Ho: Volume Variability (col(2)) = TPH/F Variability (col(6)) |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **OCR** | 0.751 | 0.798 | 1.623 | 1.632 | 1.295 | 1.302 | 5.264 | 5.361 |
| std error | (0.038) | (0.054) | (0.044) | (0.041) | (0.094) | (0.094) | | |
| sample size | 5088 | 2683 | 2405 | 2236 | | | | |
| **LSM** | 0.955 | 0.966 | 1.029 | 1.632 | 0.994 | 1.577 | 0.559 | 9.673 |
| std error | (0.021) | (0.030) | (0.041) | (0.041) | (0.050) | (0.063) | | |
| sample size | 3894 | 1959 | 1882 | 2236 | | | | |
| **BCS** | 0.895 | 0.817 | 1.721 | 1.632 | 1.406 | 1.333 | 7.685 | 7.170 |
| std error | (0.030) | (0.039) | (0.045) | (0.041) | (0.077) | (0.072) | | |
| sample size | 5390 | 2773 | 2617 | 2236 | | | | |
| **Manual Letters** | 0.735 | 0.788 | 1.238 | 1.632 | 0.976 | 1.286 | 4.322 | 7.918 |
| std error | (0.024) | (0.033) | (0.019) | (0.041) | (0.043) | (0.063) | | |
| sample size | 5499 | 2816 | 2685 | 2236 | | | | |
| **FSM** | 0.817 | 0.809 | 1.663 | 1.344 | 1.345 | 1.087 | 8.473 | 5.893 |
| std error | (0.026) | (0.033) | (0.039) | (0.020) | (0.063) | (0.047) | | |
| sample size | 4357 | 2295 | 2057 | 2272 | | | | |
| **Manual Flats** | 0.772 | 0.776 | 1.018 | 1.344 | 0.790 | 1.043 | 0.323 | 4.559 |
| std error | (0.027) | (0.042) | (0.008) | (0.020) | (0.043) | (0.059) | | |
| sample size | 4879 | 2567 | 2312 | 2272 | | | | |
| ***Parcels*[3]** | 0.750 | 0.700 | 1.613 | 1.613 | 1.129 | 1.129 | 3.894 | 3.894 |
| std error | (0.034) | (0.047) | (0.114) | (0.114) | (0.110) | (0.110) | | |
| sample size | 3651 | 1954 | 1737 | 1737 | | | | |
| **Priority** | 0.522 | 0.573 | 1.015 | 1.015 | 0.582 | 0.582 | 0.197 | 0.197 |
| std error | (0.025) | (0.043) | (0.004) | (0.004) | (0.044) | (0.044) | | |
| sample size | 3240 | 1612 | 1630 | 1630 | | | | |

*Notes and Sources:*

1. Volume variability is defined as :

$$\frac{\partial \ln C}{\partial \ln FHP} = \frac{\partial \ln C}{\partial \ln TPH} \times \frac{\partial \ln TPH}{\partial \ln FHP}$$

2. Bozzo's variabilities from USPS-T-15, pp. 119-120, have been re-estimated using Sample 1 sites.
3. For Parcels, the elasticity of costs with respect to (w.r.t.) TPH was estimated by combining the SPBS and Manual Parcels MODS groups, as described in the text of my report and presented in UPS-T-1, Table 8. These variabilities have been re-estimated using Sample 2 sites.
4. The MODS-level variability of TPH w.r.t. FHP, from Table 6 in UPS-T-1, have been re-estimated using Sample 2 sites.
5. The Shapes-level variability of TPH w.r.t. FHP, from Table 7 in UPS-T-1, have been re-estimated using Sample 2 sites. Letter variability of TPH w.r.t. FHP applied to MODS groups OCR, LSM, BCS, and Manual Letters. Similarly, Flats variabilities applied to Manual Flats and FSM.
6. Because the regression equations used to estimate the volume variability and the variability of TPH w.r.t. FHP rely on different sets of variables, the usable samples for the two sub-sample regressions do not always sum to the full usable sample.

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**USPS/UPS-T1-8.** Please refer to your testimony on page 62 (Table 9).

(a) Confirm that the number (1.597) reported in the OCR line of Table 9 in the column labeled "MODS Level Variability of TPH w.r.t. FHP" is an estimate of the elasticity of OCR TPH with respect to OCR FHP. If you do not confirm, please provide the interpretation you believe to be correct.

(b) Confirm that the number (2.062) reported in the OCR line of Table 9 in the column labeled "Shapes Level Variability of TPH w.r.t. FHP" is an estimate of the elasticity of total TPH for letter-shape operations with respect to total FHP for letter-shape operations. If you do not confirm, please provide the interpretation you believe to be correct.

(c) Confirm that the numbers reported in the lines of Table 9 other than OCR, in the column labeled "MODS Level Variability of TPH w.r.t. FHP," are estimates of the elasticity of TPH in the specified "MODS Group" with respect to FHP in the specified "MODS Group." If you do not confirm, please provide the interpretation you believe to be correct.

(d) Confirm that the numbers reported in the lines of Table 9 other than OCR, in the column labeled "Shapes Level Variability of TPH w.r.t. FHP," are estimates of the elasticity of total TPH for the shape of mail corresponding to the specified "MODS Group" with respect to total FHP for shape of mail corresponding to the specified "MODS Group." If you do not confirm, please provide the interpretation you believe to be correct.

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**Response to USPS/UPS-T1-8.**

(a) Confirmed.

(b) Confirmed.

(c) Confirmed.

(d) Confirmed.

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**USPS/UPS-T1-9.** Please refer to your testimony at page 26, lines 7-9. You state, referring to Dr. Bozzo's response to UPS/USPS-T15-13 (Tr. 15/6387-6388), "For Site #6 in particular, Dr. Bozzo indicates that the gaps in the data series corresponded to periods where the data for the SPBS and Manual Parcels MODS activities were commingled and reported together as data for the SPBS MODS group."

(a) Confirm that the "data series" for site #6 addressed in UPS/USPS-T15-13 are the TPH series for manual parcels and manual Priority Mail operation groups. If you do not confirm, please explain.

(b) Confirm that in response to oral examination by counsel for UPS, Dr. Bozzo indicated that he used the term "commingled" to mean "that site [#6] had handled manual and SPBS parcels together up to a point prior to separating them according to the mail processing technology that was used to sort them" (Tr. 15/6431, lines 2-5).

(c) Where did Dr. Bozzo state, either in the cited response to UPS/USPS-T15-13, or in response to oral examination at Tr. 15/6430-6431, that "data for the SPBS and Manual Parcels MODS activities were commingled and reported together as data for the SPBS MODS group"? If Dr. Bozzo did not make this statement, please so indicate.

**Response to USPS/UPS-T1-9.**

(a) Confirmed.

(b) Dr. Bozzo's response at Tr. 15/6431, lines 2-5, addressed the following question posed by counsel for UPS:

"Does that mean that manual parcels and SPBS parcels were handled together in the same operation, or let me just [ask] you what did you mean by commingled?" (Tr. 15/6430, line 24 - Tr. 15/6431, line 1).

The question as asked refers not to the logging of data, but rather to the handling of parcels. Dr. Bozzo's response appears to address this operational question, and indicates that until the introduction of new technology created separate processing streams, all parcels were handled together in the same operation.

I confirm that the question quotes Tr. 15/6431, lines 2-5, accurately.

(c) In his response to UPS/USPS-T15-13, Dr. Bozzo stated that "the intermittent reporting of manual parcel piece handlings may reflect periods in which manual and SPBS parcels were commingled" (Tr. 15/6387). His response to oral cross-examination by counsel for UPS raises the question of whether he was referring to the commingling of data, or to the commingling of parcels in a single operation. At the time I prepared my Direct Testimony, I interpreted his response to refer to the commingling of data, and I still believe that this is the only interpretation that makes sense.

As Dr. Bozzo himself points out in his response to UPS/USPS-T15-13, during the time from period 294 through period 295 when manual parcel TPH for site #6 are reported as zero, positive manual parcel work hours are reported. The table below, which confirms Dr. Bozzo's response, shows TPH/F and work hours for manual parcels and SPBS for site #6. Based on these data, it appears that site #6 introduced SPBS technology in period 194, after which time it reports positive piece handlings and work

hours for its SPBS operation. From periods 294 through 295 and from 296 through 397, site #6 reports zero piece handlings for manual parcels but positive work hours for manual parcels. The fact that work hours are reported separately for manual parcels and SPBS during these periods clearly indicates that both operations were up and running, and that it is the TPH ***data*** for the two operations that are commingled.

| MODS Pieces and Labor Hours for Site # 6 | | | | |
|---|---|---|---|---|
| Quarter | Manual Parcels | | SPBS | |
| | TPH | HRS | TPF | HRS |
| 193 | 181 | 3473 | 0 | 0 |
| 293 | 181 | 3820 | 0 | 0 |
| 393 | 188 | 3153 | 0 | 0 |
| 493 | 157 | 3370 | 0 | 0 |
| 194 | 138 | 4316 | 1014 | 4894 |
| 294 | 0 | 3603 | 1860 | 14191 |
| 394 | 0 | 3282 | 1933 | 12854 |
| 494 | 0 | 2721 | 2068 | 13423 |
| 195 | 0 | 3157 | 3162 | 16031 |
| 295 | 0 | 2418 | 3276 | 16918 |
| 395 | 20 | 1788 | 3039 | 12513 |
| 495 | 96 | 1454 | 3374 | 9641 |
| 196 | 109 | 1787 | 3658 | 11522 |
| 296 | 0 | 854 | 3302 | 8621 |
| 396 | 0 | 1047 | 2971 | 6894 |
| 496 | 0 | 1586 | 2309 | 7638 |
| 197 | 0 | 1800 | 3380 | 9570 |
| 297 | 0 | 1162 | 2699 | 7894 |
| 397 | 0 | 950 | 3159 | 9369 |
| 497 | 724 | 307 | 3114 | 9278 |
| 198 | 445 | 16 | 3491 | 10228 |
| 298 | 2516 | 72 | 2475 | 6523 |
| 398 | 1600 | 11 | 3016 | 8072 |
| 498 | 1321 | 0 | 2627 | 9581 |

Parcels entering a processing plant become either manual parcels or SPBS parcels by virtue of their characteristics and how and where they are processed. For

the most part, machinable parcels are processed at BMCs, using primary and secondary parcel sorters and small parcel and bundle sorters (USPS-T-10, pp. 19-20). Loose parcels, parcels in 5-digit sacks, non-machinable outside parcels, and First-Class odd shapes are sorted manually (USPS-T-16, p. 44, lines 7-9); these parcels either are not or cannot be processed in the SPBS operation. In other words, if all parcels were processed together in the SPBS operation, as the TPH data suggests, they would all by definition be SPBS parcels, and it would not make sense to talk of "commingling" manual parcels and SPBS parcels in SPBS operations.

Webster's Revised Unabridged Dictionary defines "commingle" as: "To mingle together; to mix in one mass." Thus, I expected to find the manual parcel and SPBS THP/F data for periods 294 through 295 in site #6 to be reported together "in one mass." These data were clearly not reported as manual parcel TPH/F, since those values appear as zeros in Dr. Bozzo's data set. The other logical place where the commingled data could have appeared – namely, the SPBS TPH/F data series – held positive values. I assumed that this represented the commingled manual parcel and SPBS data, and that still seems to be the most likely situation. However, I cannot exclude the possibility that the numbers shown as SPBS TPH/F for periods 294 through 295 in site #6 actually represent something completely different, and that the commingled parcel TPH/F data appear elsewhere, in some illogical place, as the result of data reporting errors.

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**USPS/UPS-T1-10.** Please refer to your testimony at page 24, line 15, to page 25, line 2. Also refer to Table 4 on page 25.

(a) Confirm that the data in Table 4 do not reflect the errata to USPS-T-15 filed on January 25, 2000. If you do not confirm, please explain.

(b) Confirm that Table 4, corrected to reflect the errata to USPS-T-15, filed on January 25, 2000, would read as follows:

**Table 4**
**MODS Data Quality**

| MODS Group | Non-Missing | Threshold | Threshold and Productivity | % of Observations Exhibiting Gross Data Errors |
|---|---|---|---|---|
| BCS | 6885 | 6883 | 6780 | 1.53% |
| OCR | 6644 | 6639 | 6495 | 2.24% |
| FSM | 5442 | 5442 | 5424 | 0.33% |
| LSM | 5156 | 5150 | 5127 | 0.56% |
| Manual Flats | 6914 | 6914 | 6420 | 7.14% |
| Manual Letters | 6914 | 6914 | 6824 | 1.30% |
| Manual Parcels | 5808 | 5625 | 4718 | 19.23% |
| Priority | 5717 | 5644 | 4995 | 12.63% |
| SBPS | 2244 | 2239 | 2213 | 1.38% |
| Metered Cancellations | 6746 | 6718 | 6599 | 2.18% |

*Notes and Sources:*
1. Data from USPS-T-15, p. 107 (revised 1/25/00).
2. Because Dr. Bozzo records both true missing values and bad data as zeros, these data underestimate the percent of gross errors.

If you do not confirm, explain fully.

(c) Confirm that the percentages of observations you report for the manual flats, manual parcels, and manual Priority Mail operations at page 24 (lines 17-18) of UPS-T-1 are inconsistent with the corrected version of Table 4 from part (b). If you do not confirm, please explain fully.

(d) Confirm that to be consistent with the corrected version of Table 4 from part (b), the percentages reported at page 24 (lines 17-18) of UPS-T-1 for manual flats, manual parcels and manual Priority Mail should be (respectively) 7 percent, 19 percent, and 13 percent, when rounded to the nearest percentage point. If you do not confirm, please explain fully.

**Response to USPS/UPS-T1-10.**

(a) I am unaware of errata filed on January 25, 2000. The data in the table in part (b) of this interrogatory appear to reflect the errata to USPS-T-15 filed on January 28, 2000. The errata filed on January 28, 2000, contain revised versions of Tables 3, 6, and 10 for USPS-T-15. As best as I can determine, those errata do not contain any accompanying programs or description of the changes implemented. The notice of those errata merely states, "All changes are peripheral to the proposed variabilities presented in the testimony."

(b) The data in the table in this interrogatory reflect the January 28, 2000, errata. However, I note that these data do not reflect the later errata to USPS-T-15 filed on March 22, 2000, as part of Dr. Bozzo's response to UPS/USPS-T15-9 (Tr. 15/6381-86).

My original implementation of the sample selection methodology described in USPS-T-15 produced the data sample shown in the errata to USPS-T-15 filed on March 22, 2000. However, in an effort to replicate Dr. Bozzo's analysis results, I expended considerable resources to isolate Dr. Bozzo's deviations from his described methodology to generate the results in the tables originally contained in his testimony.

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At the technical conference with Dr. Bozzo held on March 1, 2000, UPS asked a number of questions about Dr. Bozzo's implementation of his sample selection scrubs. However, UPS was asked to submit these questions in interrogatories, which were submitted on March 8, 2000 as interrogatories UPS/USPS-T15-9 through 17. On March 22, 2000, Dr. Bozzo conceded in his answer to interrogatory UPS/USPS-T15-9 that certain "observations were inadvertently omitted" from his analysis and that certain observations with "missing or invalid NWRS wage" data were included in the summary of his regression samples. Tr. 15/6381. Recognizing these oversights, he presented a corrected version of the data in that interrogatory answer.

Having already generated the correct analysis sample and then reverse engineered Dr. Bozzo's analysis sample, I was in the middle of extensions of the volume variability calculations when the new errata were filed. Given the time constraints imposed by the deadline for filing of intervenor testimony and the nature of Dr. Bozzo's data revisions, I judged that the expenditure of time and resources to re-generate the tables and the extensions of the variability calculations presented in UPS-T-1 using Dr. Bozzo's revised data was unwise, especially in view of Dr. Bozzo's assertion that those changes had no substantive effect on the results of his study.

In response to this interrogatory, however, I have prepared the attached Table Prepared in Response to USPS/UPS-T1-10(b), which reflects the errata to USPS-T-15 filed on March 22, 2000. This table reflects the sample sizes (in columns (1), (2), and (3)) which emerge from implementation of the sample selection criteria described in

USPS-T-15. Column (4) shows the percent of Dr. Bozzo's "non-missing" observations exhibiting gross data errors using the threshold and productivity scrubs.

As I stated in note 2 to my Table 4 at page 25 of UPS-T-1, these figures understate the extent of the error in the MODS data because they fail to account for gaps in reporting. Dr. Bozzo calculates error rates by dividing the number of observations excluded by his threshold and productivity checks by the number of observations with complete data. Gaps in reporting are inappropriately excluded from both the numerator and the denominator of his calculations.

If all activities were present in all facilities in all periods, the number of potential observations for Dr. Bozzo's analyses would equal 7,704 (321 sites times 24 quarters). Potential sample sizes are generally less than this, however, because some activities are not present in all facilities. Some activities initiate operations at particular sites after the start of Dr. Bozzo's sample period, others terminate before the end of the sample period. Excluding cases where the activity is truly absent yields the maximum possible sample for Dr. Bozzo's analysis, and the appropriate denominator for calculating error rates. Missing values for non-MODS variables (e.g., wages or capital index) sometimes reduce the size of this potential sample. To focus on the error rate for the MODS data, I exclude observations with missing values for non-MODS variables from both the numerator and the denominator of the error rate calculation. Following Dr. Bozzo, I also exclude the observation for the first quarter of 1993 in each site.

The numerator for the MODS gross error rate calculations should include not just observations deleted by the productivity and/or threshold calculations, but also

observations that fail to record either TPH/F or work hours when the activity is present. Thus, in the Table Prepared in Response to USPS/UPS-T1-10(b), I add to the threshold and productivity counts shown in column (3) observations with complete non-MODS data and either {TPH/F > 0 and work hours ≤ 0}, {TPH/F ≤ 0 and work hours > 0}, or {TPH/F ≤ 0, work hours ≤ 0, and TPH/F ≤ 0 is intermittent ("gaps", as defined on page 25 of UPS-T-1)}. Observations in each of these three sets should be taken into account as data problems in the overall measure of MODS data quality.

Column (5) of the attached Table Prepared in Response to USPS/UPS-T1-10(b), shows the percentage of observations exhibiting gross data errors after giving proper treatment to non-positive values for the MODS data series TPH and work hours. This column includes the observations that would have been "non-missing" but for poor quality MODS data for either TPH/F or work hours, and provides a count of the number of the total number of gross data errors, including those unaccounted for by Dr. Bozzo's calculation. All of these observations fail the threshold and productivity scrubs. The percent of observations exhibiting gross data errors shown in column (5) of the attached Table is computed as the fraction of non-missing observations that include both non-missing observations that fail the threshold and productivity scrubs, as well as those identified by the selection criteria described in the paragraph above.

I note that Table 4 in UPS-T-1 at page 25, the attached Table Prepared in Response to USPS/UPS-T1-10(b), and the version of Table 4 presented by the Postal Service in this interrogatory *all* suggest that the MODS data series for SPBS and

Manual Parcels exhibit gross data errors that exceed acceptable levels, as defined by Dr. Bozzo himself in USPS-T-15.

I respond to the remaining parts of the question below in light of the attached Table Prepared in Response to USPS/UPS-T1-10(b).

(c) Confirmed, except that the version of Table 4 presented by the Postal Service in part (b) of this interrogatory is not "the" corrected version of Table 4, since it does not reflect the later corrections made by Dr. Bozzo in response to UPS/USPS-T15-9 (Tr. 15/6381-86). See my response to USPS/UPS-T1-10(b), above.

(d) Confirmed that the percentages stated reflect the (incorrect) data shown in the version of Table 4 presented by the Postal Service in part (b) of this interrogatory. It would be more accurate to replace the percentage of observations exhibiting gross data errors reported at page 24 (lines 17-18) of UPS-T-1 for manual flats, manual parcels, and manual Priority Mail with 7 percent, 28 percent, and 22 percent, for the reasons given in (b), above. It is also noteworthy that the percentage of observations exhibiting gross data errors for LSM and SPBS should be replaced with 7 percent and 8 percent, respectively.

## Table Prepared in Response to USPS/UPS-T1-10(b)

| MODS Group | Non-Missing | Threshold | Threshold and Productivity | % of Observations Exhibiting Gross Data Errors | |
|---|---|---|---|---|---|
| | | | | Ignoring Non-Positive MODS Data | Accounting for Non-Positive MODS data |
| | (1) | (2) | (3) | (4) | (5) |
| OCR | 6642 | 6637 | 6493 | 2.24% | 3.19% |
| LSM | 5155 | 5149 | 5126 | 0.56% | 6.94% |
| BCS | 6882 | 6880 | 6777 | 1.53% | 1.54% |
| FSM | 5441 | 5441 | 5423 | 0.33% | 1.00% |
| Manual Flats | 6910 | 6910 | 6416 | 7.15% | 7.16% |
| Manual Letters | 6910 | 6910 | 6820 | 1.30% | 1.32% |
| SPBS | 2241 | 2236 | 2210 | 1.38% | 8.45% |
| Manual Parcels | 5831 | 5621 | 4709 | 19.24% | 28.07% |
| Priority | 5713 | 5640 | 4992 | 12.62% | 22.04% |

*Notes and Sources:*

1. Data from USPS-T-15 (revised 3/22/00), Tr. 15/6383, and Reg9398.xls in USPS-LR-I-107.
2. "Accounting for Bad MODS data" column shows the percentage of observations exhibiting gross data errors when properly accounting for true missing value and bad TPH or work hours data.
3. Column (5) counts as bad data observations with complete non-MODS data, but non-positive values for either TPH or HRS.

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**USPS/UPS-T1-11.** Please refer to the analysis you describe in UPS-T-1 at pages 63-71 (line 10).

(a) Provide, using mathematical notation (see, e.g., USPS-T-15 at page 118, line 4), the estimating equation for each reported "volume-variability" result in Table 11 and Table 12.

(b) Did you explore any alternative model(s) or specification(s) to those provided in response to part (a)? If so, for each alternative model or specification, describe the alternative model or specification, indicate the difference(s) between the alternative and the corresponding model from part (a), and provide a statement of the reasons for rejecting that alternative.

**Response to USPS/UPS-T1-11.**

(a) As requested, I re-state the estimating equation, separately for Tables 11 and 12.

This estimating equation for column (1), Table 11 at page 68 of UPS-T-1, can be written as:

$$\ln(MPCH) = \alpha_0 + \alpha_1 \ln(LHWSHRAV) + \varepsilon_1$$

where MPCH is GDP-deflator deflated accrued costs for mail processing clerks and mailhandlers, LHWSHRAV is labor hours and workshare-adjusted volume, with lamda = 0.6, 0.7, or 0.8, and $\varepsilon_1$ is the stochastic error term.

The estimating equation for column (2), Table 11, can be written as:

$$\ln(MPCHOM) = \alpha_0 + \alpha_1 \ln(LHWSHRAV) + \varepsilon_2$$

where MPCHOM is GDP deflator deflated accrued costs for mail processing clerks, handlers, and operating equipment maintenance, and $\varepsilon_2$ is the stochastic error term.

The estimating equation for column (3), Table 11 can be written as:

$$\ln(MPCHSOM) = \alpha_0 + \alpha_1 \ln(LHWSHRAV) + \varepsilon_3$$

where MPCHSOM is GDP deflator deflated accrued costs for mail processing clerks, handlers, supervisors, and operating equipment maintenance, and $\varepsilon_3$ is the stochastic error term.

The estimating equation for column (1), Table 12 at page 70 of UPS-T-1 can be written as

$$\ln(MPCH) = \alpha_0 + \alpha_1 \ln \left\{ \left( \frac{Laborwt_{first}}{Vfirst_{98} - \lambda \times Wfirst_{98}} \right) \times (Vfirst - \lambda Wfirst) \right.$$
$$+ \left( \frac{Laborwt_{priority}}{Vpriority_{98} - \lambda \times Wpriority_{98}} \right) \times (Vpriority - \lambda Wpriority)$$
$$+ \left( \frac{Laborwt_{express}}{V\,express_{98} - \lambda \times W\,express_{98}} \right) \times (V\,express - \lambda W\,express)$$
$$+ \left( \frac{Laborwt_{periodical}}{Vperiodical_{98} - \lambda \times Wperiodical_{98}} \right) \times (Vperiodical - \lambda Wperiodical)$$
$$\left. + \left( \frac{Laborwt_{stda}}{Vstda_{98} - \lambda \times Wstda_{98}} \right) \times (Vstda - \lambda Wstda) + \left( \frac{Laborwt_{stdb}}{Vstdb_{98} - \lambda \times Wstdb_{98}} \right) \times (Vstdb - \lambda Wstdb) \right\} + \varepsilon_1$$

where

- MPCH is the GDP-deflator deflated accrued costs for mail processing clerks and mailhandlers,
- $LABORWT_{first}$ is the share of MODS labor hours in Reg9398.xls processing First Class Mail,
- Vfirst is the RPW volume for First Class Mail,

- Wfirst is the workshare volume for First Class Mail,
- $Vfirst_{98}$ is the RPW volume for First Class Mail in 1998,
- $Wfirst_{98}$ is the workshare volume for First Class Mail in 1998,
- $LABORWT_{priority}$ is the share of MODS labor hours in Reg9398.xls processing Priority Mail,
- Vpriority is the RPW volume for Priority Mail,
- Wpriority is the workshare volume for Priority Mail,
- $Vpriority_{98}$ is the RPW volume for Priority Mail in 1998,
- $Wpriority_{98}$ is the workshare volume for Priority Mail in 1998,
- $LABORWT_{express}$ is the share of MODS labor hours in Reg9398.xls processing Express Mail,
- Vexpress is the RPW volume for Express Mail,
- Wexpress is the workshare volume for Express Mail,
- $Vexpress_{98}$ is the RPW volume for Express Mail in 1998,
- $Wexpress_{98}$ is the workshare volume for Express Mail in 1998,
- $LABORWT_{periodical}$ is the share of MODS labor hours in Reg9398.xls processing Periodicals mail,
- Vperiodical is the RPW volume for Periodicals mail,
- Wperiodical is the workshare volume for Periodicals mail,
- $Vperiodical_{98}$ is the RPW volume for Periodicals mail in 1998,
- $Wperiodical_{98}$ is the workshare volume for Periodicals mail in 1998,

- $LABORWT_{stda}$ is the share of MODS labor hours in Reg9398.xls processing Standard A mail,
- Vstda is the RPW volume for Standard A mail,
- Wstda is the workshare volume for Standard A mail,
- $Vstda_{98}$ is the RPW volume for Standard A mail in 1998,
- $Wstda_{98}$ is the workshare volume for Standard A mail in 1998,
- $LABORWT_{stdb}$ is the share of MODS labor hours in Reg9398.xls processing Standard B mail,
- Vstdb is the RPW volume for Standard B mail,
- Wstdb is the workshare volume for Standard B mail,
- $Vstdb_{98}$ is the RPW volume for Standard B mail in 1998,
- $Wstdb_{98}$ is the workshare volume for Standard B mail in 1998, and
- $\varepsilon_1$ is the stochastic error term.

Similarly, the estimating equations for column (2) and (3) of Table 12 can be written as:

$$\ln(MPCHOM) = \alpha_0 + \alpha_1 \ln \left\{ \left( \frac{Laborwt_{first}}{Vfirst_{98} - \lambda \times Wfirst_{98}} \right) \times (Vfirst - \lambda Wfirst) \right.$$
$$+ \left( \frac{Laborwt_{priority}}{Vpriority_{98} - \lambda \times Wpriority_{98}} \right) \times (Vpriority - \lambda Wpriority)$$
$$+ \left( \frac{Laborwt_{express}}{V express_{98} - \lambda \times W express_{98}} \right) \times (V express - \lambda W express)$$
$$+ \left( \frac{Laborwt_{periodical}}{Vperiodical_{98} - \lambda \times Wperiodical_{98}} \right) \times (Vperiodical - \lambda Wperiodical)$$
$$\left. + \left( \frac{Laborwt_{stda}}{Vstda_{98} - \lambda \times Wstda_{98}} \right) \times (Vstda - \lambda Wstda) + \left( \frac{Laborwt_{stdb}}{Vstdb_{98} - \lambda \times Wstdb_{98}} \right) \times (Vstdb - \lambda Wstdb) \right\} + \varepsilon_2$$

and

$$\ln(MPCHSOM) = \alpha_0 + \alpha_1 \ln \left\{ \left( \frac{Laborwt_{first}}{Vfirst_{98} - \lambda \times Wfirst_{98}} \right) \times (Vfirst - \lambda Wfirst) \right.$$
$$+ \left( \frac{Laborwt_{priority}}{Vpriority_{98} - \lambda \times Wpriority_{98}} \right) \times (Vpriority - \lambda Wpriority)$$
$$+ \left( \frac{Laborwt_{express}}{V express_{98} - \lambda \times W express_{98}} \right) \times (V express - \lambda W express)$$
$$+ \left( \frac{Laborwt_{periodical}}{Vperiodical_{98} - \lambda \times Wperiodical_{98}} \right) \times (Vperiodical - \lambda Wperiodical)$$
$$\left. + \left( \frac{Laborwt_{stda}}{Vstda_{98} - \lambda \times Wstda_{98}} \right) \times (Vstda - \lambda Wstda) + \left( \frac{Laborwt_{stdb}}{Vstdb_{98} - \lambda \times Wstdb_{98}} \right) \times (Vstdb - \lambda Wstdb) \right\} + \varepsilon_3$$

respectively, where

- MPCHOM is the GDP-deflator deflated accrued costs for mail processing clerks, mailhandlers, and operating equipment maintenance,
- MPCHSOM is the GDP-deflator deflated accrued costs for mail processing clerks, mailhandlers, supervisors, and operating equipment maintenance, and
- $\varepsilon_2$ and $\varepsilon_3$ are the stochastic error terms.

(b) I explored three alternatives to the model specification described above. The first involved the use of alternative indices to adjust for the effects of inflation. As I describe in footnote 43 on page 65 of my testimony, I selected the GDP deflator because of all the indices, it most closely tracked the available data on wage and salary costs per hour for the Postal Service. It also came the closest of all the indices to direct proportionality with average wage and salary cost per hour.

The second set of alternative specifications closely resembled the model specification set forth above. They differed, however, in that they took the natural logarithm of nominal costs as the dependent variable, and included the log of the inflation index as an explanatory variable. These alternatives included the specification

shown above as a special case. I rejected these alternative specifications because I had strong a priori reasons to expect an estimated coefficient of one for the inflation index variable, and did not see a need to waste a degree of freedom in confirming those reasons.

In early work I explored specifications that used three alternative ways of weighting volumes by class, and that failed to include adjustments for changes in worksharing volume. I computed weights by calculating by class, alternatively, base year revenue per piece, pounds per piece, and incremental labor cost per piece. I rejected the revenue-based weights because of concerns that I might simply be building into the model the effects of past Commission decisions rather than measuring the extent of worksharing. I rejected the weight-based weights because of doubts as to whether average weight per piece for a mail class adequately reflects the per piece mail processing costs associated with a class. The labor cost weights were derived from the testimony of Postal Service witness Smith in this proceeding, and reflected the Postal Service's volume variabilities and distribution keys. As a result, these weights introduced an element of circularity into the analysis that caused me to reject them. Finally, I rejected specifications that did not control for worksharing, since changes in worksharing appear to be an important factor affecting the relationship between volume and cost over the period covered by the data.

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**USPS/UPS-T1-12.** For each reported "volume-variability" result in Table 11 and Table 12, please provide the data actually employed in the corresponding regression (i.e., after any transformations performed in program volume.prg in UPS-Neels-WP-1). Please provide the data in Microsoft Excel spreadsheet format, and include column labels consistent with the response to USPS/UPS-T1-11(a).

**Response to USPS/UPS-T1-12.**

Data used to produce the Table 11 and 12 results at pages 68 and 70 of UPS-T-1 are contained in UPS-Neels-WP-1 (UPS-T-1), in files Volume.xls (contained in the directory labeled "Appendix - Source Data", subdirectory "Volume") and Laborwt.dat and Laborwt.dht (shown in Appendix H of UPS-T-1, page H-26, and contained in the directory labeled "Appendix – Construction of Analysis Data", subdirectory "Transition.prg", subdirectory "Laborwt - Gauss (Output Data)"). See "Overview of Analysis Programs.xls" contained in the subdirectory labeled "Appendix – Analysis Program Files" in the electronic version of UPS-Neels-WP-1 (UPS-T-1).

As requested, the transformed data used to produce the Table 11 results are included in library reference UPS-LR-3, in the subdirectory marked "data for table 11 in response to USPS/UPS-T1-12." This subdirectory contains three Excel spreadsheets. The file labeled "data with lamda=0.8.xls" contains data used to generate the results shown in the first (horizontal) panel of Table 11, marked "Work Share Parameter = 0.8." The file labeled "data with lamda=0.7.xls" contains data used to generate the results shown in the second (horizontal) panel of Table 11, marked "Work Share Parameter =

0.7." The file labeled "data with lamda=0.6.xls" contains data used to generate the results shown in the third (horizontal) panel of Table 11, marked "Work Share Parameter = 0.6."

Similarly, transformed data used to generate the Table 12 results are contained in the subdirectory labeled "data for table 12 in response to USPS/UPS-T1-12." (Note, however, that Table 12 data can readily be used to generate Table 11 results). This subdirectory contains two files. The first file, called "volume2.xls," is a modified version of Volume.xls. The modifications are that the cost segment data have been deflated by the GDP deflator, the workshare data have been aggregated by class, and non-essential variables (such as the CPI) have been removed. Further simplifications are not possible because the workshare parameter is estimated along with the other model parameters using nonlinear least squares for the model specified on page 66, line 12, of UPS-T-1 and restated in response to USPS/UPS-T1-11(a). The other file in library reference UPS-LR-3, "Laborwt.xls", contains the term "laborwt" shown in the estimating equation for Table 12.

## DECLARATION

I, Kevin Neels, hereby declare under penalty of perjury that the foregoing answers are true and correct to the best of my knowledge, information, and belief.

Kevin Neels

Dated: June 14, 2000

CERTIFICATE OF SERVICE

I hereby certify that I have this date served the foregoing document by first class mail, postage prepaid, in accordance with Section 12 of the Commission's Rules of Practice.

John E. McKeever
Attorney for United Parcel Service

Dated: June 14, 2000
Philadelphia, Pa.

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