TW-RT-1

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

POSTAL RATE AND FEE CHANGES, 2000	:	Docket No. R2000-1

REBUTTAL TESTIMONY
OF
HALSTEIN STRALBERG
ON BEHALF OF
ALLIANCE OF NONPROFIT MAILERS
AMERICAN BUSINESS MEDIA
COALITION OF RELIGIOUS PRESS ASSOCIATIONS
DOW JONES & COMPANY, INC.
MAGAZINE PUBLISHERS OF AMERICA, INC.
THE McGRAW-HILL COMPANIES, INC.
NATIONAL NEWSPAPER ASSOCIATION
AND
TIME WARNER INC.

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TABLE OF CONTENTS

AUTOBIOGRAPHICAL SKETCH

My name is Halstein Stralberg. I am a consultant to Time Warner Inc. on issues related to distribution of magazines through the postal system. For a detailed sketch of my autobiography, please see my direct testimony in this docket (TW-T-1).

I. PURPOSE OF TESTIMONY

The purpose of this testimony is to address the much-debated question of how mail processing costs vary with mail volume, in rebuttal to witness Neels (UPS-T-1). I will focus on two areas where the present record urgently needs clarification.

First, I will explain why total piece handlings, TPH in MODS terminology, indeed is the appropriate workload measure for analyzing economies of scale at mail processing piece distribution operations. Contrary to repeated assertions by witness Neels, MODS estimates of first handling pieces, FHP, have no useful interpretation related to economies of scale or the variability of mail processing costs with volume.

Second, I will explain, based on my own observations and knowledge, why I believe there are economies of scale in mail processing and why the variability of costs with regard to mail volume therefore must be less than 100%.

II. SUMMARY

In this docket, witness Bozzo (USPS-T-15) has presented an econometric analysis of certain MODS cost pools, which indicates that mail processing costs at those pools vary substantially less than 100% with variations in mail volume. The cost pools analyzed by Bozzo share two characteristics that distinguish them from most other mail processing cost pools: (1) near uniformity in the shape of mail handled (e.g., letters, flats or parcels); and (2) availability of work load measures, called "total piece handlings" (TPH) produced by the MODS system. *Id.* at 42. Bozzo uses a "panel data" approach (regression over data representing multiple facilities and multiple time periods). *Id.* at 67-71. While his method is similar to that used by witness Bradley in Docket No. R97-1, Bozzo has modified Bradley's approach in response to the

Commission's criticism in its R97-1 Opinion, and makes a painstaking effort to address the specific points raised by the Commission. *Id.* at 16-31.

Witness Degen (USPS-T-16) has presented various operational arguments, based on his knowledge of mail processing operations, that support Bozzo's econometric findings.

On the other hand, witnesses Neels and Smith (OCA-T-4) have produced, as they did in Docket R97-1, a seemingly endless list of objections. My rebuttal focuses on witness Neels, as witness Smith has added little of substance to his R97-1 testimony. Neels introduces new claims and purported new "findings" that, if left unchallenged, would leave the record on this issue seriously distorted.

A most interesting aspect of Neels's current testimony is that he appears to confirm Bozzo's finding that the variability of costs (strictly speaking, clerk/mailhandler manhours) with regard to piece handlings (TPH) is substantially less than 100%. In fact, he presents this conclusion as having a high degree of statistical confidence. Tr. 27/12830-32. The catch, according to Neels, is that volume should be represented not by piece handlings (TPH) but by FHP (first handling pieces), estimated in MODS as the number of mail pieces entering a plant that receive at least one individual piece handling in that plant. He further claims to have found, using a "reverse regression" that on Postal Service cross-examination was shown to be a non-reversible regression (Tr. 27/13052-56), that TPH has a very high (substantially more than 100%) variability relative to FHP. Combining this with an estimated variability of hours relative to TPH, Neels claims to have proven a larger than 100% variability of manhours with respect to "volume."[1] Tr. 27/12805-08, 12832-35.

[1] Neels also attempts to prove much more than 100% variability through a time series analysis which he claims will "capture the effects of structural changes in the underlying technology and organizational design of the postal system." Tr. 27/12835-43. This analysis can be characterized both in terms of the extremely poor statistical confidence intervals it produces (in fact, these confidence intervals include variabilities much higher as well as much lower than 100%, i.e., the results are totally useless [Tr. 27/13061-64]) and in terms of the variables Neels assumes did not vary over the 20 year period he claims to have analyzed. Tr. 27/13058-60, 13064-65.

Section III below focuses on the most seriously misleading claim presented by Neels, namely that FHP, an archaic and essentially meaningless byproduct of the MODS system, is the most appropriate workload measure for mail processing operations. That section also discusses how Neels arrived at the highly counterintuitive conclusion that TPH varies much more than 100% with FHP, and the relative merits of analyzing variability by more narrowly defined cost pools, as done by Bozzo, versus the analysis by shape category proposed by Neels.

Neels's rebuttal of Degen makes some valid points in that not all the conditions Degen cites by themselves prove economies of scale. For example, his observation that the existence of peak load conditions in itself proves nothing regarding economies of scale (Tr. 27/12825) is well taken but is hardly dispositive. Some of Neels's other arguments, however, reveal a serious lack of understanding and knowledge of mail processing in Postal Service facilities. In section IV, below I analyze these arguments and explain why my own observations of mail processing lead me to conclude that the variability of costs with volume must be substantially less than 100%.

III. TOTAL PIECE HANDLINGS (TPH) IS THE MOST APPROPRIATE "COST DRIVER" IN THE STUDY OF COST/VOLUME VARIABILITY AT MAIL PROCESSING PIECE SORTING OPERATIONS

Most of the cost pools analyzed by witness Bozzo are piece sorting operations that operate on mail with uniform shape.[2] In the following I will explain why I believe TPH indeed is the proper cost driver and the proper variable to use in the analysis of economies of scale and variability of costs relative to volume for those operations.

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[2] The only exceptions are: (1) the meter prep/cancellation pool; and (2) the "SPBS Other" pool. The latter normally sorts flats bundles rather than individual pieces. These two pools were included in Bozzo's analysis because, as with the proper piece sorting operations, TPH data provide a well defined cost driver, whereas the proper cost drivers are unknown at allied operations.

A. TPH IS PRIMARILY A FUNCTION OF MAIL VOLUME AND DEGREE OF PRESORTATION PERFORMED BY MAILERS

Total piece handlings (TPH) is essentially a function of: (1) the number of letters, flats or parcels entered into the postal system; and (2) the degree of presort with which those pieces are entered. The relationship between pieces, presort and total piece handlings is quite simple for higher degrees of presort and somewhat more complex for pieces with little or no presort. Taking flats pieces as an example, it is generally accurate that:

(1) pieces with carrier route presort incur no piece handling;

(2) pieces with a 5-digit presort incur exactly one piece handling, commonly referred to as "incoming secondary" sortation; and

(3) pieces with a 3-digit presort incur two piece handlings, commonly referred to as "incoming primary" and "incoming secondary" sortations.[3]

For lower presort levels, the relationship is somewhat more complex.[4]

The relationship between pieces, presortation and TPH is relatively unaffected by network changes. This is because the number of sorting steps needed to bring mail from its original sort level to a carrier route sort level is the same whether the actual sorting occurs in one facility or is divided between several facilities.

The relationship between pieces entered at various presort levels on one hand, and piece handlings and costs on the other hand, is explicitly recognized in the various worksharing models that the Commission and the Postal Service use to determine cost savings produced by degrees of worksharing, and to set presort discounts. These models estimate costs of mail with given characteristics in terms of the number of piece

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[3] By "piece handlings" I am referring to sortations performed by clerks, not to the additional handling performed by mail carriers after the mail already is sorted by carrier route.

I say "generally accurate" because there are, of course, exceptions, such as occur in cases of machine rejects, missorting or bundle breakage, which may cause extra piece handlings. Additionally, flats addressed to a P.O. box may receive an additional sort, usually at the delivery units. But such exceptions, which occur with measurable probabilities, do not change the fact that piece handlings fundamentally are a function of pieces and presortation.

[4] Generally, the number of sorts required to finish pieces with a given presort level will be less if the pieces originate and destinate in the same city or at least in the same area.

sorts and bundle sorts such mail requires. To the extent that such results are incorporated in the rate structure, one could say that postal rates for categories within a subclass are based on the number of piece handlings mail requires, and that piece handlings required therefore indeed represent the most appropriate measure of "volume" at mail piece sorting operations.

Just as in a study of transportation costs cubic-foot miles is a more relevant workload measure than cubic feet alone, in mail processing total piece handlings, which is a function of presortation, is more relevant as a workload measure than pieces alone.

Another MODS volume measure is "total pieces fed" (TPF). The difference between TPF and TPH at a mechanized or automated sorting operation is the number of pieces that are rejected by the machine. The ratio TPH/TPF is the machine accept rate. Bozzo's analysis of machine driven operations is actually based on TPF, rather than TPH. For simplicity, I focus in this testimony on TPH, however, the arguments made here for use of TPH apply also to TPF.[5]

Because TPH is a function of presortation, a variability analysis using TPH as the independent variable has the considerable advantage that it already is adjusted for differences in presort levels over time and among facilities. This is certainly far superior to the feeble attempt at adjusting for "worksharing" in Neels's time-sharing analysis. Neels uses just a single variable, which he claims represents the changes in "worksharing" for all mail classes over the twenty year period he analyzed. Tr. 27/12838-39. In fact, there are numerous degrees of presortation for different classes of mail, some of which are recognized in the rate structure and therefore reported in the billing determinants and others that are not. An analysis attempting to adjust for changes in all these presort levels using separate explanatory variables would be

[5] The difference between pieces fed and pieces handled (read) is most relevant for sorting operations that employ OCR technology. Since that technology is improving, leading to higher accept rates over time, Bozzo is in my opinion correct in choosing to focus on TPF at such operations.

extremely complex and probably impossible to carry out. But the adjustment is made automatically when one focuses on total piece handlings.[6]

Besides presort, sorting costs are affected by the sorting technology used, which again is affected by mail piece characteristics and decisions made by facility managers. In my opinion, this speaks in favor of analyzing separately the economies of scale in pools that represent different technologies, e.g., separate analyses of the FSM and manual flats cost pools. Neels appears to prefer combining the pools that sort mail of similar shapes, on the ground that these cost pools are not truly independent of each other. As discussed further in Section IV.E, my preference would be to stay with the pool-by-pool analysis of volume variability, in spite of the considerable interactions between these pools. One reason to prefer pool-by-pool analysis is that it is consistent with the way the Postal Service and the Commission currently distribute costs.

B. ESTIMATES OF FIRST HANDLING PIECES (FHP) ARE IRRELEVANT FOR THE STUDY OF ECONOMIES OF SCALE IN POSTAL FACILITIES

Considerable confusion has been generated in this case by Neels's insistence that the proper measure of "volume" in mail processing is so-called FHP (first handling pieces), defined as the number of letters, flats and parcels that receive piece sorting at least once in a given facility. FHP estimates do not necessarily reflect the workload in a facility, since each piece is counted only once, even if it requires several sorts. Nor do they represent total mail volume, since they exclude pieces that bypass all piece sorts. Tr. 27/13056-58.[7]

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[6] For example, assume that from one year to another in the time period analyzed a significant proportion of First Class Presort and Standard A mail pieces shifted from 3-digit to 5-digit presort. Since 3-digit and 5-digit pay the same postal rates both in First Class and Standard A, billing determinants would not reflect the change and the Postal Service would have no way of detecting the change except through a special survey. But there would be a major impact on costs, since 5-digit mail requires one less sort per piece than does 3-digit mail. This change would not affect the accuracy of a study that focuses on TPH, which is adjusted for presortation changes, but it would cause major and undetectable distortions in a study that focuses on costs versus number of pieces.

[7] The only real purpose of FHP estimates is for use in estimating the TPH at manual sorting operations. The practice of pushing all mail that comes out of opening units destined for piece sorting across scales

Additionally, FHP counts in postal facilities can be affected in a dramatic fashion by network changes that have little or no impact on TPH. For example, consider mail going to a 3-digit ZIP code area served by a small SCF that is in turn served by a larger plant, an ADC (area distribution center). Suppose that mail in 3-digit trays or bundles to the smaller SCF is sorted at that SCF and therefore gets counted as FHP. However, at a certain point in time, it is decided that the sortation of the 3-digit mail from then on will be done at the larger ADC.[8] The result is that these pieces no longer are counted as FHP at the smaller SCF. But since many of them already were being counted as FHP at the larger ADC as well, there is no corresponding increase in FHP at that facility. The total FHP count in the Postal Service thereby drops, while the TPH count remains unaffected by network changes of this type.

C. NEELS'S PURPORTED FINDING THAT TPH VARIES MUCH MORE THAN 100% WITH FHP CONTRADICTS COMMON SENSE AND IS BASED ON AN IMPROPER STATISTICAL METHOD

1. Neels's Finding Contradicts Common Sense

A puzzling aspect of Neels's testimony is his claim to have "proven" that TPH varies much more than 100% with variations in FHP. If one believes this, one must conclude that an increase in FHP would lead to a much higher percent increase in TPH. For letters, the increase in TPH would be more than twice the FHP increase. Tr. 27/12835,

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in order to convert recorded weights into FHP estimates seems archaic in facilities with only a few remaining manual letter and flats cases. In fact, they serve only to estimate a small fraction of the manually sorted volume, since most such volume tends to come from mechanized, automated or other manual operations. I suspect that the Postal Service could realize substantial cost avoidances by eliminating the useless practice of estimating FHP at operations where TPH is determined by machine counts anyway.

[8] Such consolidations into larger facilities have been occurring in the Postal Service for many years, evidently because Postal Service operations managers believe that there indeed are economies of scale in mail processing.

13049-52. Based on these "findings," Neels claims to demonstrate major diseconomies of scale in mail processing.[9]

In fact, if there were diseconomies as large as Neels's results seem to suggest, then a large drop in volume, caused for example by migration of First Class mail and advertising to the internet, would cause a much larger drop in piece handlings, leading to lower unit processing costs for the remaining mail.

I believe econometric results should always be tested against common sense and known facts. With the exception of network changes or changes in the degree of presort, as discussed above, Neels's finding regarding the relationship between changes in FHP and TPH fails such a test. It is very unlikely that a percent change in FHP in a facility would lead to a much larger percent change in TPH, which Neels claims to have discovered. Since the piece handlings required for a given number of pieces is a function of presortation, an increase in FHP, assuming it is distributed proportionately among the different presort categories, will tend to give the same percent increase in TPH.[10]

2. Neels's Counterintuitive Result Is Based On A Highly Questionable "Reverse" Regression Method

How then did Neels arrive at his counterintuitive results? A possible simple explanation is offered below. It is my understanding that Postal Service rebuttal testimony will provide a more in-depth evaluation of Neels's statistical method, demonstrating that it is not well founded in statistical theory and that his results therefore are worthless.

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[9] Upon questioning, Neels retreated to his and his client's official position that volume variability in mail processing is exactly 100%. Apparently, even Neels himself doesn't really believe in his results. Tr. 27/13028, 13068-69.

[10] The assumption that the added volume is distributed proportionately among the different presort categories is necessary to conform with the definition of volume variability as the change in costs in response to a volume change with all other factors being constant.

Essentially, the ratio TPH/FHP indicates the degree of re-handling that occurs in a mail processing plant. If the ratio is one, then each piece that is handled in the given plant is handled only once. This is unlikely, since plants will always have at least some mail with local destination that requires more than one handling.[11]

Large facilities are likely to have larger TPH/FHP ratios, i.e., more re-handling than small facilities. This is due not to diseconomies of scale but to network characteristics, as I explain below. But first, let us simply assume it is true that large facilities have more re-handlings. Then assume that one performs a regression on "panel" FHP and TPH data, including cross-sectional as well as time series data, as Neels did. Unless such a regression is properly and fully adjusted for "fixed effects" such as network related variations in the TPH/FHP ratio, it would end up showing precisely the type of results that Neels reports, i.e., TPH growing faster than FHP.

Neels's regression is unusual in several respects. He chose TPH as the independent variable and FHP as the dependent variable, purportedly to reduce the impact of less reliability in the FHP data. Tr. 27/13052-53. The regression he chose is, as Neels admits, not reversible, i.e., it does not produce the reverse results of what would be obtained if he had used FHP as independent and TPH as dependent variable, as one normally would do if the objective were to study how TPH is affected by variations in FHP. Tr. 27/13055. In fact, Neels is not able to specify the functional form by which the real dependent variable, TPH, is presumed related to the real independent variable, FHP, in his analysis. *Id.* He claims it is given implicitly as the inverse of the functional form which he assumed expresses FHP as a function of TPH. Tr. 27/13053. Consequently, it is not even possible to evaluate the properties of the presumed TPH to FHP relationship, and it is not clear what, if anything, his results mean - except that they appear to reflect network characteristics that he did not properly correct for.

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[11] However, in the case of flats with a 5-digit presort, such as the majority of non-carrier route presorted Standard A and Periodicals flats, the ratio TPH/FHP is exactly one, since such flats require one and only one sort to carrier route.

In fact, as I understand will be fully demonstrated in a Postal Service rebuttal testimony, Neels's method does not prove that the variance of TPH with FHP is different from one, which is where it would be based on the test of common sense.[12]

3. Variations In TPH/FHP Are Caused By Network Characteristics

The reason larger facilities generally perform more re-handlings than small facilities has to do with the way the Postal Service has assigned sorting responsibility in its network. Generally, a plant is required to perform a finer sort (e.g., to the 5-digit or even carrier route level) on the mail that destinates within its SCF service area.

Consider first unpresorted mail that originates in a plant's SCF service area. The plant must sort this mail at least once, and the portion of it that also destinates to its service area must then be sorted one or two more times. But if one compares a small and a large plant, say one serving an area with 100,000 people and the other serving an area with 5,000,000 people, it is clear that mail originating at the larger area has a higher probability of also destinating within the same area. In other words, there will be a higher percent of re-handling of the originating mail at the larger plant. Additionally, most larger plants are ADC's. The ADC service area is wider than the service area of an individual SCF. A plant that is an ADC must do further sorting not only on its own SCF mail, but on the mail destinating anywhere within its ADC area.

Now consider incoming mail. A small plant that is not an ADC receives only incoming mail that already is sorted to the 3-digit or 5-digit ZIP code levels, requiring respectively two and one additional sorts. But an ADC, generally a larger facility, will also receive mail sorted only to the ADC level, which requires an additional sort. In some cases, ADC's also perform additional sorts on behalf of the smaller SCF's that they serve, generally because the Postal Service tends to concentrate most of its sorting operations in large plants, believing as it does that there indeed are economies of scale.

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[12] More specifically, it will be demonstrated that: (1) a "direct" regression using TPH as the dependent variable gives a TPH to FHP variability close to one, as one would expect; (2) the FHP error component is too small to have justified Neels's decision to rely on a reverse, rather than direct, regression; and (3) all that can be concluded from Neels's reverse regression is that the variability lies in a certain wide interval that includes the value of one.

To summarize, due to network characteristics there is more re-handling in larger facilities. But it would be fallacious to therefore conclude that the number of re-handlings would grow faster than the arriving volume, if the volume did grow, in either small or large facilities. An analysis properly adjusted for all network-related reasons why larger facilities have more re-handlings would show what really should be obvious, namely that a percent change in FHP, spread proportionately over all categories of mail, would cause approximately the same percent change in TPH.

IV. LOGIC AND OPERATIONAL REALITIES INDICATE THAT VOLUME VARIABILITY MUST BE LESS THAN 100 PERCENT

The operational reasons for concluding that there must be economies of scale in mail processing, and that increasing volumes therefore will lower the average unit costs, are in my opinion overwhelming. I doubt if any Postal Service operations manager would disagree with this view. But witness Neels still raises a number of reasons to question this conclusion, even suggesting that volume variability might be more than 100%. Tr. 27/12822, 13030-32. Many of his points are in response to witness Degen, whose direct testimony presents various operational reasons for concluding that economies of scale do exist.

In the following sections, I address the specific points raised by Neels. The discussion is organized as follows:

(a) setup times and equipment utilization;
(b) effect of peak load conditions;
(c) automation and mechanization of mail processing plants
(d) why volume variabilities are lower at manual sorting operations; and
(e) the real significance of Neels's shape-based analysis.

A. SETUP TIMES AND EQUIPMENT UTILIZATION

Degen referred to the extensive setup times required before utilizing some sorting equipment as indicating economies of scale, since adding more mail volume would not add to the setup costs. Neels replies that this would occur only in certain narrow volume ranges, after which a facility would need to acquire another machine of the

same type, for which it would also incur setup costs, etc. Figure 8 in Neels's testimony illustrates how he imagines the Postal Service's setup problem, with more and more machines requiring setup and take-down as mail volume grows. Tr. 27/12822-23.

Neels apparently does not realize that the Postal Service's sorting machines are used for multiple sorting schemes, each of which requires separate clearing from one scheme and setup for the next scheme. The Postal Service has far more sorting schemes than it has machines with which to perform those schemes. This leads to non-productive time in between schemes. With larger volumes, the runs of each scheme would be longer. This might eventually require acquisition of more machines, but would not lead to any more setups and take downs. The cost of the same number of setups would be spread over more mail pieces, leading to lower average costs.

Consider, for example, the effect of setup times for two types of machines commonly used in mail processing: (1) small parcel and bundle sorters (SPBS); and (2) flat sorting machines (FSM's).

Small Parcel and Bundle Sorters (SPBS). These machines have various configurations and are used to sort either Priority packages or flats bundles. Even very large facilities have just a few SPBS. They are typically configured with either four or six keying stations. The cost of adding a fifth or sixth station is probably considerably less than for each of the first four, both in capital outlays and manpower required, since adding them would have relatively little impact on the feeding and sweeping functions of the machines.

When flats bundles are sorted, Periodicals and Standard A bundles are usually kept separate, requiring separate schemes for each. Additionally, a facility may need to run several sorting schemes for each class. An ADC may, for example, need to sort bundles that come in ADC containers – it typically sorts these to 3-digit and some large 5-digit zones in the ADC service area. Then for each of its 3-digit areas to which the bundles have been sorted it may need to set up a new scheme in order to sort the bundles further to the 5-digit level.

According to my observations, setting up an SPBS for a given sort scheme is very time consuming. For example, at a visit to the mail processing annex in Charlotte, around midnight, the Joint Industry/USPS Periodicals Review Team was told that the SPBS used for flats bundles (a different machine was dedicated to Priority Mail) would take about 20 minutes to set up for a new sort scheme, since they had just finished a preceding scheme. Even though the SPBS employees seemed to be working at a good pace, the setup actually took well over 30 minutes. Considering the different classes and schemes run on this machine every day, it is clear that a substantial portion of SPBS employees' time is spent setting up for the actual sorting. Once the SPBS operation starts it appears quite efficient, certainly much more efficient than manual bundle sorting and other manual opening unit work that is among the least efficient operations one observes in mail processing plants.

With more volume, a facility that already uses one SPBS to sort flats bundles might be able to acquire another machine. In that event it would do fewer schemes on each machine and thereby reduce the per piece setup costs. Perhaps more significantly, facilities that today lack the volume to justify getting their own SPBS might be able to justify acquiring one, thereby eliminating many hours currently spent in manual opening units.

FSM's. The Postal Service has more FSM's than SPBS machines. On the other hand, there are many more sorting schemes that need to be run on the FSM's. Most sorting schemes are "incoming secondary" schemes, where mail already sorted to the 5-digit ZIP code level is further broken down to carrier route. Incoming secondary is the largest flats sorting task, because it must be performed on all flats except those already sorted to carrier route. The problem facing postal managers is that the number of five-digit zones for which they must sort the mail far exceeds the number of machines available for sorting, and a machine can sort only one, or at most two, zones at a time. Furthermore, most of this sorting must be done in a relatively short time period before dispatch to delivery units. The result is a series of short runs, in between which substantial setup time is needed to clear a machine of the mail to the zone just sorted and set up for the next zone. As I pointed out in my R97-1 rebuttal testimony, there are

about 800 FSM's and over 400 SCF's, so that an SCF is likely to have no more than a few machines while it may have hundreds of zones for which the mail must be sorted.

Assume, however, that mail volume doubled and that the Postal Service adjusted by doubling the number of FSM's. Facilities could then not only double the length of sorting runs, cutting average setup costs in half, but would be able to use FSM sorting to additional zones where, due to insufficient volumes, manual sorting is today considered more economical.[13] The result would be lower average costs per piece.

B. EFFECT OF PEAK LOAD CONDITIONS

There can be no doubt that peak load conditions exist in mail processing. In a typical 24 hour cycle at a processing plant there is a strong peak that starts with the arrival of originating collection mail and is caused by the need to perform many operations on this mail in just a few hours in order to meet First Class service commitments. There is typically another peak, in the early morning, caused by the need to dispatch processed incoming mail to its stations, branches and associate offices in time for those offices to meet service commitments.

Neels criticizes Degen for regarding peak loads as evidence of low volume variability. Tr. 27/12825. In one respect, Neels is correct. If mail volume simply doubles, with mail arriving in the same peak patterns as before, then the peak load conditions will not change. Facilities will still have to staff for peak demand, thereby incurring the same proportion of employee idle time in between peaks.

However, there are ways in which increased volumes would likely help ameliorate peak load conditions. An increase in collection mail could, for example, make it cost effective for a processing plant to make extra runs to pick up early collections. Such mail would then arrive at the plant literally on "the shoulder of the peak," to use Neels's terminology.

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[13] Adding to the large number of schemes to be run on the FSM's is the fact that facilities try to keep pre-barcoded and non-barcoded flats, as well as FSM-881 machinable flats and flats that are machinable only on FSM-1000 machines, segregated.

Or consider the low volume variability in off-peak hours. To the extent that facilities do staff for peaks of less than eight hour duration, it is almost true by definition that the variability of cost with respect to volume is higher during the peak and lower outside the peak.[14] Assume that a postal facility maintains a small crew at a postal platform during an off-peak period when one truck arrives with mail every hour. Assume that the off-loading of a truck and subsequent platform handling of the arrived mail takes 20 minutes, leaving 40 minutes in which this crew has no work assignment. If mail volume doubles, there will on the average be one truck arriving every half hour. No increase in crew size will be needed, but the existing crew will be busy two thirds of the time versus only one third of the time previously.

Bozzo's analysis is an econometric estimation of the average variability of cost when volume varies in certain mail processing operations. While peak load conditions by themselves do not demonstrate low volume variability, neither do they constitute evidence of high variability or invalidate Bozzo's analysis, which is confirmed by many other operational realities. Since the minimum unit of time used by Bozzo was postal quarters, it is in any case unlikely that his study would have picked up the effects of volume and processing variations within individual 24 hour periods. Clearly, Bozzo's analysis did not address such very short-run phenomena.

C. AUTOMATION AND MECHANIZATION OF MAIL PROCESSING PLANTS

The Postal Service's newest and fastest sorting machines can generate substantial economies if there is enough mail volume to use them fully. But these economies will be diminished to the extent that the machines are used for too many different sort schemes, each having low volume and requiring extensive setup and take-down time. This would appear to indicate that the Postal Service, in its current automated

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[14] This fact is not recognized by the current postal costing method, and cannot possibly be analyzed properly based on IOCS tallies alone. The Postal Service's costing method is flawed in that it estimates the average volume variability only in a given pool, then distributing the costs estimated to be volume variable to subclasses and special services based on IOCS tallies. In fact, this process is likely to assign higher, rather than lower, unit costs to the mail that is processed outside the peak, a period when employees tend to work at a slower tempo, especially at manual operations.

processing environment, depends on high mail volumes to minimize its per piece processing costs.

Witness Neels appears to recognize this fact. He describes a general scenario, illustrated in Figure 1 of his testimony, that depicts the response of a hypothetical service to increases in volume. Tr. 27/12783-85. As volume increases, processing is gradually shifted to technologies with lower unit costs but higher setup costs. This picture, which appears to correspond well with the automation strategy pursued by Postal Service management for many years, strongly suggests low and declining volume variability.

But when it serves his purpose, Neels then describes a very different scenario, one in which there appear to be strong diseconomies of scale. In that scenario, illustrated in Neels's Figure 2, management uses a fixed and highly productive processing resource to the limit of its capacity, and then handles the remaining volume with a slower technology (e.g., manual sorting). Tr. 27/12785-86. Obviously, such a scenario implies diseconomies of scale: as soon as mail volume has filled up the capacity of the efficient technology, every extra piece raises the overall unit cost.

In presenting these two scenarios as if they were equivalent and equally probable, Neels fails to acknowledge that whereas the first corresponds to the long term Postal Service strategy, the second is merely a short term response of facility management when on a given shift it has more mail than it can handle on its automated equipment. Such situations do tend to occur, either because machines break down, or because mail arrives late, or because of unusually high volume. Based on many years study of mail processing operations, I believe that management, in anticipation of such events, tends to maintain a relatively large manual workforce that is fully utilized only in emergencies. This, as I have argued in earlier testimonies, is one reason why the apparent cost of manual processing has become higher in the automated environment, and it is the likely reason why Bozzo's analysis shows lower volume variability in manual than in mechanized and automated sorting operations.

Such conditions do not indicate diseconomies of scale. Many of the reasons why mail is diverted to manual processing have nothing to do with volume, but rather with factors

such as late arrivals due to weather or traffic conditions combined with service commitments, unexpected machine breakdown during peak hours and non-machinability of certain mail pieces. The only economically logical long term response for Postal Service management to consistent shortfall of capacity in its most advanced technology is, of course, to expand that capacity. As advanced technology capacity is expanded, processing costs in the given facility will become less volume variable.

D. WHY VOLUME VARIABILITIES CALCULATED BY BOZZO ARE LOWER AT MANUAL OPERATIONS

Neels claims it is counterintuitive that the volume variabilities resulting from Bozzo's analysis are lower for manual cost pools than for mechanized and automated pools. He argues that this would mean that, as volume grows, manual processing eventually would become cheaper than mechanized and automated processing. Tr. 27/12811-12.

The fallacy in this argument is that per definition volume variability is the partial derivative of costs with regard to volume. That is, it indicates the percent change in cost that would result from a small percent change in volume. One would not expect this derivative to remain constant under very large volume changes. [15]

In the larger plants, which today perform most of the mail processing, the manual letter and flat sorting operations are much smaller than they used to be. Their interrelationship with their automated/mechanized counterparts is actually quite simple: on some occasions they are required in short time periods and on short notice to handle large volumes diverted from the other operations. These manual operations

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[15] If C denotes costs and V volume, then the variability of costs with respect to volume is the limit of the expression $(\Delta C/C)/(\Delta V/V)$ for small ΔV. In the simple case where costs are determined by a fixed component plus a fully variable component, i.e., C=a+b*V, it can easily be verified that the variability increases as volume increases. If volume becomes very high, the fixed term no longer is significant. It therefore is fallacious to extrapolate a variability that is affected strongly by high fixed costs to much higher volumes where fixed costs are less significant. The high fixed costs at manual sorting operations in today's environment are at least partly related to their role as backup for high-volume automated and mechanized operations. USPS-T-16 at 43-44 (Degen); *see also* Docket No. R97-1, USPS-T-4 at 21 and Tr. 11/5856 (Moden); and Docket No. MC95-1, USPS-T-11 at 12-13, 21 (Byrne).

tend to be overstaffed most of the time; in fact, they must be overstaffed to some extent in order to be prepared for such surges in workload. When an operation is overstaffed, it stands to reason that adding some volume requires little extra personnel time. That is why volume variabilities for these manual operations are so low, as reflected in Bozzo's analysis.

E. THE REAL SIGNIFICANCE OF NEELS'S SHAPE-BASED ANALYSIS

Based on his assertion that Bozzo's finding of lower variability at manual operations is anomalous, and arguing that all operations involving a given shape are interrelated, Neels suggests that a shape aggregated analysis might be preferable to an analysis of individual cost pools. Tr. 27/12793-95. He does in fact carry out such an analysis, using an approach similar to Bozzo's, except that he aggregates the MODS observations of manhours and piece handlings by shape (i.e., letters, flats and parcels). Tr. 27/12809-18.

While Neels's interpretation of his own results is rendered worthless by his misguided insistence that FHP is an appropriate cost driver, the results themselves are noteworthy in that they reveal, for all three shapes, and with a high degree of statistical confidence, that the variability of costs (manhours) with regard to total piece handlings is substantially less than 100%. Tr. 27/13039-40.

Beyond this, and equally important, Neels is correct in arguing that there are strong interrelationships between the different MODS cost pools, certainly among pools that sort mail pieces of the same shape. But if one accepts the premise that there indeed are interactions between these cost pools and that the pools cannot be viewed as entirely separate universes, then this must also have implications for cost distribution.

There has been a significant evolution evident in the viewpoints of the parties in this docket. Both the Postal Service and UPS now appear to support the view, presented by MPA witness Cohen and me in Docket No. R97-1, that serving downstream mail processing operations is a major function of allied operations and that it therefore is appropriate to distribute the allied non-direct costs more broadly. Tr. 27/12791-95; USPS-T-15 at 136-37.

Unfortunately, there has not yet occurred a similar evolution with regard to the individual piece distribution operations, which were the object of Bozzo's analysis. The Postal Service's cost distribution method, which UPS supports (Tr. 27/13124-25), essentially treats each of these pools as if it were a separate universe. This method assumes that all mixed mail and not handling costs within each pool are causally related to subclasses and special service in exactly the same proportion as are the "direct" IOCS tallies. USPS-T-16 at 58-59.

It is highly incongruous to preach about pool interrelationships in an academic discussion aimed at derailing all Postal Service attempts to develop realistic estimates of volume variability, while at the same time pretending such interrelationships do not exist when it comes to the issue of pool cost distribution.

As I have argued in several previous testimonies, a side effect of postal automation has been increased costs in manual sorting and opening unit operations. This has had the further effect that while the Postal Service overall has become more efficient, mail that continues mostly to be processed manually is being held responsible for higher and higher costs. This fundamental unfairness can be addressed only by a system that distributes costs based on recognition of the true causal relationships between volumes of different types of mail and costs incurred by the Postal Service.

The Postal Service does not have such a costing system. All it has are the IOCS tallies combined with MODS pool cost data. I believe that since the different piece distribution pools are treated separately in cost distribution they should also be treated separately in the estimation of volume variability.[16] By recognizing the lower variabilities that Bozzo's analysis shows exist at manual sorting operations, the

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[16] The shape aggregated analysis presented by Neels gives fairly similar results. Tr. 27/13039-40.

Separate analysis by pool, where pools are defined both by shape and by sorting technology, would also appear to be more accurate, in the sense of being less affected by the migration towards more advanced technologies that has occurred in the time period Bozzo analyzed, and by the different degree to which these technologies are used at different facilities. Neels has criticized Bozzo's use of the so-called manual ratio as inadequate for accounting for the interaction between the different pools that handle the same shape. Tr. 27/12791-92. But one hardly improves on the accuracy by pretending that the differences in sorting technology, over time and between facilities, do not exist.

Commission would help undo some of the unintended negative effect that automation has had on mail which continues to be handled manually.

V. CONCLUSIONS

I have focused in this testimony on two main ideas.

First, despite the confusion generated by witness Neels and others, piece handlings, measured as TPH in MODS facilities, is indeed the proper workload measure for Postal Service piece sorting operations. TPH is, as explained above, essentially a function of the degree of presort with which mail is entered into the postal system. In an ideal world TPH, along with other relevant workload measures such as required bundle sorts, sack and pallet handlings, etc., should be the elements on which postal rates are based. To some extent this is already true within certain subclasses, due to the presort and other worksharing discounts that are in place today.

What a supervisor at a mail sorting operation must know, be it manual or fully automated, is how many piece sorts (TPH) are required on his shift. Based on an estimate of the TPH he can plan his work and determine whether he has enough workers available to get it done in time. He does not need to know the number of first handling pieces (FHP) at his operation, and he normally would not know it.

Second, despite numerous facile objections raised by witness Neels, based on my own observations and conversations with Postal Service managers at all levels over the years, I am convinced that there are economies of scale in mail processing, and that volume variability therefore must be less than 100%. In fact, the Postal Service has come to depend on volume growth to keep its unit costs in check. The more it automates its operations, the more true it becomes that adding more mail will lower unit costs, while loss of mail volumes, as many fear might happen due to the internet revolution, would leave the Postal Service unable to reduce its costs proportionately.

I recommend adoption of the volume variability factors computed by witness Bozzo. The mail processing cost attribution package offered by the Postal Service is not a

perfect approach. In fact, I have been extremely critical of that approach, especially its reliance on numerous unverified assumptions in the application of IOCS data.

Nonetheless, Bozzo's results give the best estimates currently available of the average volume variability at certain sorting operations. Ideally, the process of determining volume variability and distributing volume variable costs among subclasses should be accomplished with a unified approach that would yield the partial derivatives of costs in each cost pool with respect to each subclass. This, however, would require use of data and modeling approaches not available through IOCS and MODS. It should be a goal for future rate cases.

But in order to move towards a correct costing methodology, numerous misconceptions must first be put aside, such as reliance on the archaic and irrelevant FHP data that seem at times to have dominated the debate on mail processing volume variability. I hope that my testimony will have helped set the stage for a more useful debate in future cases. For regardless of what the Commission decides in this case, the question of volume variability in mail processing is too important to be neglected, and will continue to be an issue also in future cases.

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document on all participants of record in this proceeding in accordance with section 12 of the Rules of Practice.

Timothy L. Keegan

August 14, 2000