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

SPECIAL SERVICES REFORM, 1996	Docket No. MC96–3

RESPONSE OF UNITED STATES POSTAL SERVICE
WITNESS ELLARD TO INTERROGATORIES OF
THE OFFICE OF THE CONSUMER ADVOCATE
(OCA/USPS–T6—13-16)

The United States Postal Service hereby provides responses of witness Ellard to

the following interrogatories of the Office of the Consumer Advocate: OCA/USPS–

T6—13-16, filed on July 11, 1996.

Each interrogatory is stated verbatim and is followed by the response.

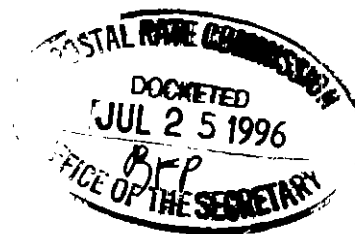Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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July 25, 1996

OCA/USPS-T6-13.   Please refer to the formula for the Design Effect on page 73 of SSR-111:

$$\delta_d = 1 + [RV(F_{di})]^2 = 1 + \frac{\sum_i \frac{(F_{di} - \overline{F}_d)^2}{n-1}}{\overline{F}_d^2} .$$

a.   Please confirm that RV in your formula refers to relative variance. If you do not confirm, please define the function RV.

b.   Please confirm that an estimate of the variance of the variance of F_{di} is given by $\sum_i \frac{(F_{di} - \overline{F}_d)^2}{n-1}$. If you do not confirm, then please explain what the numerator of the last term on the right side of your equation for Design Effect represents.

c.   Please confirm that relative variance is defined as the variance of an estimate divided by the square of the estimate, so that the relative variance of F_{di} would be given by

$$RV(F_{di}) = \frac{\sum_i \frac{(F_{di} - \overline{F}_d)^2}{n-1}}{\overline{F}_d^2} .$$ If you confirm, then please explain why the relative variance is not squared in the right hand side of your equation, since your formula states that $\delta_d = 1 + [RV(F_{di})]^2$. If you do not confirm, please provide a formula for the RV function.

d.   Please state whether or not you square the $RV(F_{di})$ figure in computing your Design Effect figures.

e.   Please confirm that your formula for the Design Effect, $\delta_d = 1 + [RV(F_{di})]^2$, always produces a value greater or equal to 1. If you do not confirm, please explain considering that $RV(F_{di})$ is nonnegative. If you do confirm, then

i.   Please confirm that it is possible for some sample designs to produce smaller variances than a simple random sample design of the same size. If you do not confirm, please explain. If you do confirm, then please explain how to interpret and use δ_d when the sample is more efficient than simple random sampling.

ii.   Suppose we have a simple random sample, and that using sample weights for F_{di}, we have $\delta_d=1$ because $F_{di} = F_{ej}$. If we decide to refine the weights by making a ratio estimation adjustment to the factors so that $F_{di} \neq F_{ej}$, then $\delta_d > 1$. Please explain how this can make sense when the motivation for ratio estimation is to decrease sampling error.

f.   Please provide an illustration of how to apply the δ_d values and the confidence interval formula given on page 74 of SSR-111 to form confidence intervals for the Group 1 estimates of Table 5, page 13 of your testimony. Please indicate what values are used for each variable in the confidence interval formula.

RESPONSE to OCA/USPS-T6-13.

a.   In the equation of the Design Effect, $RV(F_{di})$ refers to the square root of the relative variance of F_{di}..

b.   Confirmed.

c.   Confirmed. Again, as stated in (13a) above, $RV(F_{di})$ refers to

$$\frac{\sqrt{\sum_i \frac{\left(F_{di} - \overline{F_d}\right)^2}{n-1}}}{\overline{F_d}}$$

d.   Confirmed.

e.   This is confirmed.

e.i.   Confirmed, but with the following reservation. For complex surveys involving nonresponse and undercoverage (hence weights) the Design Effect, which reflects the loss in precision due to weighting, is always greater than unity. In an ideal situation with a perfect sampling frame and fully cooperating respondents, it is possible to design surveys to produce smaller variances than a simple random sample design. Nonetheless, such situations are rarely encountered in practice.

e.ii.   This question makes an assumption that I cannot accept. With simple random samples there are no weights. Survey weights are calculated to reflect the probabilities of selection and to reduce the bias due to differential nonresponse and undercoverage. These weight factors should not be confused with factors obtained from a ratio estimation procedure.

f.   As stated on page 73 of SSR-111, lower- and upper-confidence endpoints, L and U, for a point estimate, $\vec{p}$, are given by:

$$L \cong \vec{p} - 1.96 \sqrt{\frac{\vec{p} \times (1 - \vec{p})}{n-1} \left(\frac{N-n}{N}\right)} \times \delta$$

and

$$U \cong \vec{p} + 1.96 \sqrt{\frac{\vec{p} \times (1 - \vec{p})}{n-1} \left(\frac{N-n}{N}\right)} \times \delta$$

where d represents estimate of design effect for the corresponding sub-domain. Specifically, for point estimates on Table 5, the 95% confidence endpoints are as follow:

95% Confidence endpoints for point estimates on Table 5

Question	Group	$\vec{p}$	n	d	L	U
Accept the fee	1	41%	366	2.109	33.67%	48.33%
Try to find alternative	1	56%	366	2.109	48.60%	63.40%
Don't know	1	3%	366	2.109	0.46%	5.54%
Accept the fee	2	23%	226	2.047	15.13%	30.87%
Try to find alternative	2	71%	226	2.047	62.52%	79.48%
Don't know	2	5%	226	2.047	0.93%	9.07%

OCA/USPS-T6-14.   Please refer to the formula for the Design Effect on page 73 of SSR-111. In this formula, the F_{di} represent the "final weight of the i-th respondent in the d-th sub-domain of interest."

a.   Please confirm that the F_{di} used in the Design Effect formula has been trimmed and include a ratio estimation adjustment. If you do not confirm, please provide a formula for F_{di} in terms of the variables defined on pages 52-53 of SSR-111.

b.   Please describe other types of weighting adjustment factors that could be incorporated into the F_{di} factors to compute valid Design Effect estimates.

c.   Suppose that a particular respondent could have one of several different ratio estimation adjustment factors applied, depending on the specific characteristic being tabulated.[1] Then a different weighting factor would be used for each question given to a respondent. In such a situation, which ratio estimation factor should be incorporated into the F_{di} to compute the Design Effect?

d.   Please explain whether the Design Effect can be interpreted as a property of the survey design for a particular sub-domain of interest. For example, a simple random sample would have a δ of 1.0, a sample design that is more efficient could have a δ less than 1.0, and a less efficient sample design could have a δ considerably larger than 1.0.

RESPONSE to OCA/USPS-T6-14.

a.   Confirmed.

b.   The estimates of Design Effect are valid. Further fine tuning, albeit minimal, could be achieved through replication.

c.   Design Effect is a function of ultimate weights applied to each respondent. If for different tabulations different weights are applied to respondents, then for each tabulation different Design Effects must be estimated

d.   Confirmed.

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[1] For example, in MC95-1 the market research survey used a different ratio estimation factor for each rate tabulation cell, for each scenario tested.

OCA/USPS-T6-15.   Please refer to the survey questionnaire at pages 16-23 of SSR-111.

a.   Please confirm that each respondent is only questioned on two of the proposed three tested rates for his tier and box size. If you do not confirm, please explain.

b.   Please explain why it would have been inappropriate to ask each of the respondents whether they would have accepted each of the three rate alternatives.

RESPONSE to OCA/USPS-T6-15.

    a.   Confirmed.

    b.   It is not inappropriate to ask each of the respondents whether they would have accepted each of the three rate alternatives. However, as reflected in the questionnaire design, I do not believe it is the best way to approach the subject at hand.

    In my questionnaire, every respondent is asked about two levels of rates. This held down respondent burden while collecting appropriate information.

OCA/USPS-T6-16.   Please refer to tables 2 to 7 of your testimony.

a.   Please confirm that the figures in Table 7 are summaries of the figures in Tables 2 to 6 of your testimony. If you do not confirm, please provide the source for each figure in Table 7.

b.   Please confirm that Table 7 states that the Group 1 total that would accept no increase is 16653. If you do not confirm, please explain.

c.   Please confirm that Table 4 shows that 8129 out of 27642 would accept the lowest new price, so that 19513 = 27642-8129 would not accept the lowest price. If you do not confirm, please explain.

d.   Please explain any discrepancy between the number that would not accept the lowest price for Group 1 in Table 7 and the equivalent figure derived from Table 4.

e.   Please confirm that the row labeled "Would accept lowest price" in Table 7 should be labeled "Would accept lowest price and nothing higher." If you do not confirm, please explain.

f.   Please confirm that the row labeled "Would accept mid price" should be labeled "Would accept mid price and nothing higher." If you do not confirm, please explain.

RESPONSE to OCA/USPS-T6-16.

a.   Confirmed. This is stated on page 7, lines 23-25 of my Testimony.

b.   This is not confirmed. The weighted frequency of those in Group 1 who would accept no increase is 16,653. The actual number is one hundred times that or 1,665,300.

Please see my Response to OCA/USPS T6-7 and Library Reference SSR-111 at 91.

c.   This is not confirmed. See Library Reference SSR-111 at 91.

I calculated the proportion not accepting the lowest price as the total (27,642) minus those who would accept the lowest price (8,129) minus those saying "don't know" (2,860).

$$27,642 - 8,129 - 2,860 = 16,653$$

The don't know percentage is reported separately on Table 7, which is a summary table.

Those who say don't know to the mid-price question do not accept the mid-price and therefore are asked the lower price question.

Those who say don't know to the high price question are not considered to accept the high price. By the questionnaire logic, they did accept the mid-price.

In the summary table, those accepting the high price plus those accepting the mid-price plus those accepting the low price, plus those accepting no price, plus those saying don't know to the low price equal the total sample.

In the interest of clarity, I have included a revised Table 4 which includes the don't know response.

Similar revisions to Tables 1-3 (pg. 78) and 2-3 (pg. 85) in Library Reference SSR-111 have been made and are attached.

d.   Please see my Response to OCA/USPS-T-6-16.c.

e-f.   Not confirmed. While your suggestions are not incorrect, I do not believe they are necessary.

TABLE 4

4.   Suppose the rental fee for your box was changed to $ (lowest price) for six months? In that case, what would you do?

	Base = Asked of those who would not accept the mid price in Q3 or would not continue renting at the mid price in Q3a.	
	Total Tier 1	Total Tier 2
Unweighted Base	234	380
Weighted Base	27642	47854
Rely on regular carrier delivery	11165 40%	9404 20%
Continue renting at new price	8129 29%	31882 67%
Apply for smaller box	1037 4%	841 2%
Don't Know	2860 4%	3167 4%
Rent from a mail receiving firm	2374 9%	1476 3%

(principal mentions)

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SUPPLEMENTARY TABLE 1-3
GROUP 1 BY BOX SIZE

4. Suppose the rental fee for your box was changed to $ (lowest price) for six months? In that case, what would you do?

	Base = Asked of those who would not accept the mid price in Q3 or would not continue renting at the mid price in Q3a.		
	GROUP 1		
	SIZE1	SIZE 2	SIZE 3
Unweighted Base	70	91	73
Weighted Base	15973	9208	2461
Rely on regular carrier delivery	7357 46%	3098 34%	710 29%
Continue renting at new price	3819 24%	3524 38%	786 32%
Apply for smaller box	0 -	770 8%	266 11%
Don't Know	1758 4%	747 4%	355 5%
Rent from a mail receiving firm	1797 11%	424 5%	154 6%

(principal mentions)

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SUPPLEMENTARY TABLE 2-3
GROUP 2 BY BOX SIZE

4.   Suppose the rental fee for your box was changed to $ (lowest price) for six months? In that case, what would you do?
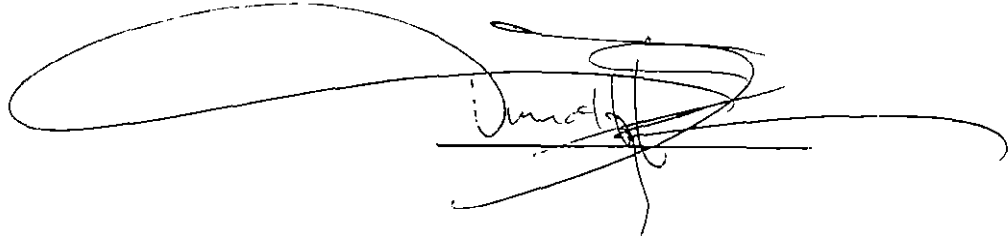
	Base = Asked of those who would not accept the mid price in Q3 or would not continue renting at the mid price in Q3a.		
	GROUP 2		
	SIZE1	SIZE 2	SIZE 3
Unweighted Base	125	123	132
Weighted Base	31388	12881	3586
Rely on regular carrier delivery	5625 18%	2975 23%	804 22%
Continue renting at new price	22653 72%	7271 56%	1958 55%
Apply for smaller box	0 -	622 5%	220 6%
Don't Know	2052 4%	875 4%	240 4%
Rent from a mail receiving firm	794 3%	472 4%	210 6%

(principal mentions)

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DECLARATION

I, Timothy D Ellard, declare under penalty of perjury that the foregoing answers are true and correct, to the best of my knowledge, information and belief.

Dated: _July 25, 1996_

CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon all

participants of record in this proceeding in accordance with section 12 of the Rules of

Practice.

K. 2. Hollies

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