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

| MAILING ONLINE SERVICE | Docket No. MC98–1 |

DIRECT TESTIMONY OF
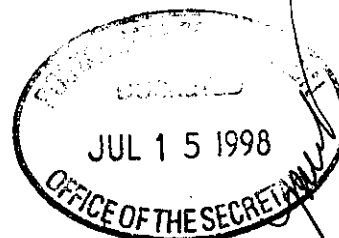BETH B. ROTHSCHILD
ON BEHALF OF
UNITED STATES POSTAL SERVICE

JUL 1 5 1998
OFFICE OF THE SECRETARY

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001094

DIRECT TESTIMONY
OF
BETH B. ROTHSCHILD

AUTOBIOGRAPHICAL SKETCH

2   I am Beth B. Rothschild, a Vice President at National Analysts, a 55-year old

3   research and consulting firm. My primary responsibilities are the management of

4   the firm's Postal Service research and consulting practice. I also manage

5   assignments in the financial services, packaged goods, retailing, and lodging

6   arenas. I bring to my Postal Service assignments business and marketing

7   strategy knowledge developed in other key industries and markets including, but

8   not limited to, hard and soft goods, foods and beverages, personal care,

9   household care products, electric utilities, public transportation, and international

10   services.

11

12   I am a member of the firm's Senior Management Committee. I supervise a staff

13   of researchers and consultants. Since joining the firm in 1971, I have managed

14   studies for clients in the public and private sectors. My most significant public

15   sector clients include the Postal Service, and the United States Departments of

16   Agriculture, Health and Human Services, Transportation, Defense, and the

17   Treasury. Private sector clients have included many top Fortune 100 companies

18   in business-to-business and business-to-consumer delivery, financial, retailing

19   and service sectors. I am well known for development of marketing strategies,

1 guidance of new product development and product positioning, and performance

2 of competitive analysis.

3

4 In this proceeding, I served as the Officer-in-Charge on the NetPost Study, which

5 appears in library reference USPS-LR-2/MC98-1.

6

7 In Docket No. R97-1, I submitted documentation on my firm's conduct of the

8 Priority Mail Delivery Confirmation Market Response Research Study as Postal

9 Service Library Reference H-166. This reference was also presented to the

10 Postmaster General and Board of Governors when they were in the process of

11 considering further investment in delivery confirmation and tracking technology.

12

13 I provided documentation to the Postal Rate Commission supporting the Postal

14 Service's proposed changes in overnight and two-day delivery standards, Docket

15 No. N89-1. In addition, I assisted in the preparation of interrogatory responses

16 regarding the qualitative research underlying the flats barcoding case, Docket

17 No. MC91-1.

18

19 I am a member of the American Association for Public Opinion Research. I have

20 served as my firm's chief sponsor of Great Lakes College Association student

21 internships since 1977. I have delivered speeches and lectures on market

22 segmentation strategies based upon needs to business executives at the

23 Institute for International Research and to students in various graduate schools,

1 including the Wharton School of the University of Pennsylvania and Marketing

2 Research Program at the University of Georgia. I am on the Board of Directors

3 of the University of Georgia's Masters in Marketing Research Program.

4

5 I attended Northwestern University, where I received my B.A. in Sociology. In

6 my senior year, I was elected to *Phi Beta Kappa*. I have also received advanced

7 training in survey sampling, research design, and epidemiological measurement

8 techniques.

9
10

PURPOSE AND SCOPE OF TESTIMONY

11 The purpose of my testimony is to adopt and incorporate the contents of

12 Library Reference USPS-LR-2/MC98-1. It was prepared under my direct

13 supervision, and I am able to respond to discovery regarding its contents.

NETPOST RESEARCH

-- Survey Methodology & Results --

prepared for

UNITED STATES POSTAL SERVICE

July 10, 1998

NATIONAL ANALYSTS, INC.

RESEARCH AND CONSULTING

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I. PROJECT OVERVIEW

National Analysts was commissioned by the Postal Service to perform research to evaluate the market response to NetPost, a new hybrid mail product.[*] The main goal of the study was to provide estimates of the volume that NetPost could realize under various product configuration and pricing scenarios. Specifically, the research assessed the demand for two versions of NetPost: a basic version, that contained a limited set of physical, delivery, and security features, and an enhanced version, that included a range of additional physical, delivery, and security features which could be purchased for additional fees. In addition, each product configuration was tested under two different rate schedules: one intended to yield a 25% contribution margin on the printing-related portion of the revenue earned by the Postal Service and one intended to yield a 50% contribution-margin on the printing-related portion of the revenue earned by the Postal Service.[**] The fee schedules were provided by the Postal Service.

The research consisted of both qualitative and quantitative phases. The qualitative phase consisted of a series of focus groups with a broad range of potential end-users and intermediaries, such as printers and graphics art shops. It was designed to assess qualitatively the overall level of interest in the NetPost concept, to identify the types of applications that appeared to have high potential for NetPost, and to identify revisions to the NetPost concept that might be required to encourage greater adoption and usage. The quantitative phase consisted of a survey of business decision-makers who were responsible for the production and/or distribution of the high potential applications identified in the qualitative phase and sampled in the quantitative phase. The latter included a telephone screening and a mail questionnaire, to be completed in either hard copy or computerized form.

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[*] At the time the research was performed, the tentative name assigned to the product was "NetPost." Since this was the name given to respondents during the survey, we will continue to refer to the Mailing Online service, as it is now called, as "NetPost."

[**] That is, [(Total price for a given piece) − (Postage for the piece given its mail class and weight) − (costs related to printing and producing the piece)]/[(Total price for the piece) − (Postage for the piece given its mail class and weight)] = 25% for one fee schedule, and 50% for the other fee schedule.

The following sections detail the qualitative phase, the survey methodology, including the sample design, and questionnaire development, data collection, data preparation procedures, and the resulting estimates and standard errors.

II. QUALITATIVE PHASE

A total of twelve focus groups were held -- three each in Chicago, Los Angeles, Tampa and Washington, D.C. during December, 1995 and January, 1996. These cities were selected to ensure that differences in practices and opinions based on geography could be detected. Ten groups were held with document producers who were hypothesized to be the most likely end-users of NetPost: 1) two with managers responsible for the production and/or distribution of catalogs and advertising; 2) two with managers responsible for the production and/or distribution of newsletters and publications; 3) two with managers responsible for the production and/or distribution of forms; 4) two with office managers who were responsible for the production and/or distribution of general correspondence; and 5) two with "virtual office workers" who work at home or "on the road" and, therefore, produce and distribute documents without the production support and infrastructure commonly housed at traditional offices. In addition, two focus groups were held with intermediaries who influence the methods used to produce and distribute their clients' applications, such as advertising agencies, graphic designers, and printers.

To qualify for group participation, respondents and their organization had to meet the following criteria: 1) must be the manager or supervisor most responsible for decisions about production of the application or general correspondence; 2) do not outsource design/layout of application; 3) produce application using desktop publishing system; 4) distribute less than 5,000 copies of the application at one time; and 5) have less than 500 employees. While organizations meeting these criteria represent only a portion of NetPost's potential users, it was hypothesized that they would be the organizations most likely to be attracted to NetPost, given its physical and economic characteristics. Focusing solely on them would provide an indication of whether there was sufficient interest to justify further evaluation of NetPost. In addition, discussions with them would

yield richer insights into potential modification to NetPost than discussions with decision-makers with less overall interest in the NetPost concept.

The focus groups were configured to represent the full range of potential end-users and intermediaries, so as to reveal the full range of issues and opinions. Therefore, each group contained a mix of participants in different industries such as education, financial services, government, manufacturing, retail, services, and telecommunications.

Participants were recruited by telephone from the general business population in each of the selected cities. They were screened using a brief questionnaire designed to ensure that they met all of the qualifying criteria. (See Attachment A -- Qualitative Screening Form). Ten to twelve participants were recruited for and included in each group discussion.

A discussion guide was prepared to facilitate the group interviews and ensure that critical points were covered. (See Attachment B -- Qualitative Discussion Guide). It explored each document producer's current production and distribution practices, problems and concerns with these practices, reactions to the NetPost concept, feelings with regard to the U.S. Postal Service as the provider of NetPost, and pricing issues.

The discussions were led by experienced National Analysts moderators who were the Officer-in-Charge and Project Manager on this project. After the initial discussion of existing production and distribution methods, needs related to the production and distribution of the applications, and awareness of existing hybrid mail products, a description of the proposed NetPost concept was distributed. (See Attachment C -- Qualitative NetPost Concept). Participants then discussed their overall reaction and likelihood of using NetPost, its perceived benefits and drawbacks, features that were liked and disliked, and additional features that would be required to encourage NetPost's adoption.

The qualitative research suggested that there was a market for NetPost among a well-defined set of applications. NetPost was deemed most appropriate for applications with

the following characteristics: 1) sent as mass mailings or repetitively; 2) have relatively unsophisticated physical output requirements; 3) require quick delivery; and 4) need a broad geographic coverage. Five applications were determined to best meet these criteria: 1) invoices and statements; 2) standardized confirmations and announcements; 3) advertising mail; 4) newsletters; and 5) forms. As a result, the subsequent quantitative research was designed to focus entirely on these five applications.

III. QUANTITATIVE PHASE

A. Sample Design

The universe for the study was defined as the subset of establishments within selected employee size and industry groupings that produced at least some documents that were hypothesized to be appropriate for NetPost, given its physical and economic characteristics (referred to as NetPost-appropriate businesses). Namely, NetPost-appropriate businesses: 1) produced one or more of the five high priority applications (invoices or statements, announcements or confirmations, advertising mail, newsletters, or forms); 2) used desktop publishing systems for the layout and design, word processing, etc. associated with the applications; 3) produced at least some of the specific application with a run size less than or equal to 5,000 pieces; 4) produced at least some of the application in non-glossy, non-four-color formats[*]; and 5) performed the design or layout functions for the application in-house.

By defining the universe in this way, the percentage of respondents for whom NetPost would be inappropriate, and, therefore, the percentage of respondents sending zero NetPost volume, would be reduced. As a result, a given level of statistical reliability could be achieved using a smaller sample in the survey. Based on this universe definition, the survey results would project to all document producers in the continental United States that generate at least some NetPost-appropriate pieces, *not* to all document producers in the continental United States. Compared with the general

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[*] Non-four-color means either black and white or spot color.

business population, small establishments are over-represented in the NetPost-appropriate universe, because they are more likely to produce NetPost-appropriate pieces than larger organizations. The two universes (one including exclusively NetPost-type document producers and the other including all businesses) should yield the same estimated NetPost volume, because organizations excluded from the NetPost-appropriate universe theoretically would not have sent or be likely to send any pieces via NetPost.

The sampling frame used to draw the sample was the Dun & Bradstreet (D&B) universe of continental commercial, governmental, and non-profit organizations. This is a list of over 10 million organizations at the *location* level. Therefore, each location of a multi-location enterprise had a chance to enter the sample.

The sample was drawn using the following employee size and industry classification scheme:

Employee Size Strata

Stratum Code	Employee Size
1	1 – 9 & Unknown
2	10 – 99
3	100+

SIC[*] Group Strata

Stratum Code	Group Name	SICs
1	Heavy Industry	0100-4999 (excl. 4215, 4513, 4300-4399)
2	Wholesale & Retail Trade	5000-5999
3	Finance & Public Administration	6000-6799, 9000-9999
4	Services	7000-8999 (excl. 8800-8899)

[*]Standard Industrial Classification

All SICs are accounted for in these four strata, with the following exceptions. The Postal Service and other courier services were excluded from SIC Group 1, and private households were excluded from Group 4. Also note that organizations were classified by the number of employees at the *sampled location*, not the total enterprise.

These employee size and industry groupings represented a logical way to segment the market, based on the patterns of needs and interest levels that emerged in the qualitative phase of research. It had been found that interest in NetPost was related to the types and time sensitivity of documents produced, which in turn, were related to the organization's industry. In addition, interest in NetPost was related to the respondent's degree of comfort with technology and the availability or unavailability of resources to assist in document production and distribution. These factors were largely related to the organization's size.

The combination of these two stratifying variables yields a twelve-cell matrix as shown in Table 1. The D&B universe sizes available at the beginning of the study are also shown:

Table 1

D&B Universe Sizes

SIC Group	Employee Size Group			Total Establishments
	1	2	3	
1	1,795,463	411,409	55,655	2,262,527
2	2,518,973	523,530	36,166	3,078,669
3	837,052	166,232	20,750	1,024,034
4	3,678,239	552,319	59,420	4,289,978
Total	8,829,727	1,653,490	171,991	10,655,208

At the outset of the study, the size of the NetPost-appropriate universe was not known. The NetPost-appropriate universe size was estimated at the conclusion of data collection, based on the eligibility rates found during the screening process.

The sample of completed interviews was allocated to the twelve employee size/industry group cells. To begin, the sample was allocated disproportionately to those industries expected to send large volumes via NetPost. In addition, large organizations were oversampled in order to obtain a readable base for them, even though their likelihood of sending NetPost volume was believed to be lower than other size groups.

Table 2

Sample Allocation

SIC Group	Employee Size Group			Total Establishments
	1	2	3	
1	12.0%	5.0%	1.0%	18.0%
2	18.0%	7.33%	1.33%	26.7%
3	13.7%	5.3%	1.0%	20.0%
4	23.3%	10.0%	2.0%	35.3%
Total	67.0%	27.7%	5.3%	100.0%

Quotas were also set for the number of respondents responsible for each of the applications included in the study, to ensure that a readable base was obtained for each application. Initially, the sampling plan called for 300 interviews to be completed for each of the five applications. However, early field experience indicated that the incidence of companies that had NetPost-appropriate advertising mail, newsletters, and forms was so low that the number of screening interviews required to obtain 300 completed interviews for each would be prohibitive. Therefore, the quotas for interviews by application were revised, as follows:

Table 3

Completed Interview Quotas

Application	Target Number of Interviews
Invoices/Statements	300
Announcements/Confirmations	300
Advertising Mail	150
Newsletters	292
Forms	260
Total	1,302

In addition, a split sample design was utilized, with half the respondents randomly assigned to be exposed to a lower priced fee schedule that would yield a 25% contribution margin on printing-related costs and half randomly assigned to be exposed to a higher priced fee schedule that would yield a 50% contribution margin on printing-related costs. The difference in demand at the two price points could, therefore, be assessed by comparing each sample group's results. This split sample design precludes the potential bias that could result when respondents are exposed to multiple price points, and purposely understate their demand at higher prices relative to their demand at lower prices.

The sample used to complete these interviews was drawn from the D&B universe in each of the twelve cells. Approximately 45,000 records were drawn in order to ensure that we could complete the requisite number of interviews, given the contact and cooperation rates that we expected. The samples were drawn as systematic random samples from the D&B universe and divided into 30 replicates with 1,500 records each.

The replicates were used to control the telephone screening: screenings on a replicate, once opened, had to be attempted before the study was completed. This would ensure that screening attempts had been made on a sample which replicated the disproportionate sampling imposed by the design in Table 2. Once the interview quotas had been filled, no additional replicates were opened. The first replicate screened was

the large one, since we were confident that the quotas would not be filled before that replicate was screened.

Table 4 displays the screening, eligibility and cooperation rates that were realized.

Table 4

Screening, Eligibility and Cooperation Rates

Employee Size*	SIC*	Total Records	Sample Used		Number Eligible		Cooperators	
			#	% of Total Records	#	% of Sample Used	#	% of Eligible
1	1	5,400	3,436	64%	285	8%	276	97%
1	2	8,100	5,124	63%	406	8%	383	94%
1	3	6,150	3,940	64%	500	13%	473	95%
1	4	10,500	6,593	63%	780	12%	741	95%
2	1	2,250	1,437	64%	262	18%	243	93%
2	2	3,300	2,086	63%	220	11%	212	96%
2	3	2,400	1,499	62%	274	18%	261	95%
2	4	4,500	2,800	62%	619	22%	579	94%
3	1	450	298	66%	66	22%	57	86%
3	2	600	400	67%	38	10%	35	92%
3	3	450	227	50%	40	18%	38	95%
3	4	900	593	66%	143	24%	136	95%

B.   Questionnaire Development and Pretesting

Two documents, a screening form and a questionnaire, were used for data collection.

1.   Content of the Screening Form

The screening form had five objectives: 1) determine if the organization is a NetPost-appropriate organization (as defined above) and consequently eligible for the study; 2)

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*See page 5 for definitions of employee size and SIC group categories.

place the organization in a sampling cell; 3) identify the individual most qualified to complete the survey; 4) solicit participation in the main study; and 5) identify the respondent's preferred data collection methodology. To achieve these objectives, it included questions about the following (See Attachment D -- Quantitative Screening Form):

- Verification of location name and address

- Determination of which of the five applications included in the study were produced by the organization

- Determination/confirmation of respondent's production and distribution-related responsibilities, to ensure that the most knowledgeable decision-maker at each location was interviewed

- "Security questions" to ensure that interviews were not conducted with individuals having family members who worked for mail/delivery service businesses, market research companies, or advertising agencies

- Determination of the percentage of the location's volume of the sampled application for which the respondent was responsible, to be used to project the respondent's responses to his or her total organization*

- Determination of whether the location was NetPost-appropriate (i.e., design/layout functions were performed in-house, at least some of the sampled application was produced on a personal computer, at least some of the sampled application was produced in non-glossy and non-four-color formats (advertising mail only), and the typical production run size was less than 5,000 pieces)

- Determination of whether the respondent had the hardware and software capacity to complete a computerized version of the questionnaire

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*For example, if a respondent was responsible for the production of 20% of the location's forms which represented 200 pieces then the location's total volume of forms was uplifted to 1,000 pieces.

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2. Content of the Main Questionnaire

The questionnaire contained questions to collect the data required to gauge market response to NetPost, under both of the pricing scenarios and both of the product configuration scenarios. (See Attachment E -- Quantitative Questionnaire.) It began by asking questions about the current volume of the sampled application for which the respondent had decision-making responsibility, including both NetPost-appropriate and NetPost-inappropriate pieces. Current volume was asked because it helped to ground respondents' switched volume estimates and elicited more consistent/realistic estimates overall. Individuals are better able to estimate their behaviors in hypothetical situations when they have first been forced to consider their actual behaviors. Respondents were then asked to estimate their current production and distribution costs per piece, including printing and other contracted services, labor, equipment depreciation and maintenance, space, consumables, postage, transportation to mail facilities, administration, and overhead. This question was asked so that respondents would evaluate the NetPost rate schedules in a realistic, comparative context.

Respondents were then asked about the number and characteristics of pieces they would send via the basic NetPost concept. Specifically, they were asked how many basic NetPost pieces they would send, and how this volume would break out by delivery time frame (First-Class or Standard), number of pages, size of pages, black and white versus spot color, and simplex versus duplex.[*] Furthermore, they were asked how they currently send the pieces that they would send via the basic NetPost service.

The additional, fee-based features that would be included in an enhanced NetPost service were then presented, and this series of questions was repeated for the enhanced NetPost. In this section of the questionnaire, respondents were also asked how likely they would be to use each of the individual fee-based service enhancements, and how many of their enhanced NetPost pieces they would send using each.

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[*]Simplex means printed on one side of a page; duplex means printed on both sides of a page.

Along with the questionnaire, respondents were sent a detailed description of the NetPost concept, including: 1) an overview of how it would work and the roles played by each party in the transaction (e.g., printer, USPS, etc.); 2) a catalog of NetPost's features, including the appearance of printed pieces, delivery performance, personalization and customization features, security features, and access requirements; and 3) rate cards (relevant to the respondent's split sample group) displaying the combined printing and postage rates being evaluated for both commercial and non-profit mailers. They were also sent several worksheets, to assist them in calculating their current volumes and costs (See Attachment F -- NetPost Service and Optional Worksheets 1 and 2.)

3.   Questionnaire Pretesting and Programming

The screening forms and questionnaires were subjected to rigorous pretesting prior to data collection. Prior to programming, the hard copy documents were pretested with respondents to ensure that the questions were unambiguous, that the questionnaire flowed smoothly, and that it was not overly burdensome. Business respondents were screened by National Analysts' project management staff using a sample of Philadelphia businesses from the Dun & Bradstreet list of businesses and organizations. Nine respondents were recruited to participate in the pretest. Each cooperating business was mailed a hard copy version of the questionnaire, which they were asked to complete at their convenience. Each of the respondents then attended a group debriefing held at National Analysts' facilities which was led by the National Analysts' Project Manager on this assignment. In this session, the respondents' understanding and ability to answer each question were probed extensively.

After the initial pretests, revisions were made to the survey documents, and final versions with programming instructions were produced. A final hard copy of the main questionnaire was also produced, to be sent to respondents who did not have access to a compatible computer or who preferred to complete a hard copy, as opposed to a computerized, version of the questionnaire.   The screening forms were then

programmed into a CATI[*] system. The main interview was programmed into NA-Quest™, National Analysts' proprietary Windows-based interviewing program, by members of National Analysts' systems staff, and copied onto diskettes to be mailed to respondents. Both computer programs were tested extensively for logic and wording, by both National Analysts' data processing and project management staff.

C.   Data Collection Procedures and Results

1.   The Interviewing Process

Sampled business locations were contacted by telephone and the screening questionnaire was administered. Depending on the application, 14% to 28% of businesses were found to be eligible for the study as shown in the following table.

Table 5

Study Eligibility Rates

	Produce Application	Produce NetPost-Appropriate Pieces of Application
Invoices/Statements	58%	28%
Announcements/ Confirmations	26%	15%
Advertising Mail	24%	11%
Newsletters	23%	12%
Forms	28%	14%

Organizations were placed in a sampling cell based on their employee size, industry, and applications produced. If an organization produced multiple applications, they were randomly assigned to one using an algorithm which assigned respondents to low incidence applications with a greater probability than by chance alone. They were not

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[*]Computer Assisted Telephone Interviewing.

simply assigned to the lowest incidence application in order to ensure that there would be respondents in each application that have other types of application of interest as well. The method maintained the probabilistic nature of the sample while reducing the number of screening interviews required to fill the quotas.

The following probabilities of selection were assigned to each of the five applications.

Advertising	Invoices	Forms	Newsletters	Announcements
.33	0	.19	.22	.26

Based on which of the five applications the respondent had, one was selected with probabilities proportional to the above. For example, if a respondent had three applications, advertising, forms, and announcements, one of the three was selected with the following probabilities.

Forms	.2436	$(=.19/[.33+.19+.26])$
Announcements	.3333	$(=.26/[.33+.19+.26])$
Advertising	.4231	$(=.33/[.33+.19+.26])$

Mechanically, this would be accomplished as follows:

- Generate a random number, r, in the range from 0-1
- If $r \leq .2436$, then Forms is the selected application
- If $.2436 < r \leq (.2436+.3333)$, then Announcements is the selected application
- If $(.2436+.3333) < r \leq 1.0$, then Advertising is the selected application

If the quota had been reached for one of the respondent's applications, we treated that application as though the respondent did not have it.

Respondents were able to choose between computerized and hard copy versions of the questionnaire, in order to avoid the potential bias associated with excluding those

who lacked access to or who were uncomfortable with computers. Overall, 76% of all recruited respondents opted to receive the computerized questionnaire.

At the end of the screening process, recruited respondents were randomly assigned to receive either the 25% or 50% contribution questionnaire. Those assigned to the 25% contribution questionnaire were exposed to a lower set of fees than those assigned to the 50% contribution questionnaire. The questionnaire and accompanying materials were mailed to them. They were instructed to return the questionnaire to National Analysts within two weeks from receipt. By the date on which National Analysts stopped accepting completed interviews, 1,237 questionnaires, or 36% of those mailed out, had been returned.

Table 6

Questionnaire Returns

	Computerized	Hard Copy	Total
Mailed			
Invoices/Statements	540	212	752
Announcements/Confirmations	584	166	750
Ad Mail	330	102	432
Newsletters	579	169	748
Forms	<u>582</u>	<u>164</u>	<u>746</u>
Total	**2,615**	**813**	**3,428**
# Complete			
Invoices/Statements	225	52	277
Announcements/Confirmations	213	39	252
Ad Mail	121	27	148
Newsletters	265	41	306
Forms	<u>212</u>	<u>42</u>	<u>254</u>
Total	**1,036**	**201**	**1,237**
% Complete			
Invoices/Statements	41.7%	24.5%	36.8%
Announcements/Confirmations	36.5%	23.5%	33.6%
Ad Mail	36.7%	26.5%	34.3%
Newsletters	45.8%	24.3%	40.9%
Forms	<u>36.4%</u>	<u>25.6%</u>	<u>34.0%</u>
Total	**39.6%**	**24.7%**	**36.1%**

2.   *Interviewing Quality Control Procedures*

An extensive interviewer training and quality control program was employed to assure that accurate data were collected during the screening process. Using CATI for the screening interviews and a computerized main questionnaire substantially reduced potential data collection errors. As is customary during the CATI screening interview,

questions were displayed on a computer screen for the interviewer to read, and the interviewer recorded responses through a keyboard. Similarly, in the computerized mail questionnaire, questions were displayed on a computer screen for the respondent to read, and the respondent recorded responses using a mouse. In either case, use of computerized questionnaire reduces errors by automatically performing skip patterns and logic tests that are built into the program ahead of time based upon instructions outlined in the paper questionnaire. Interviewers and respondents are signaled when responses are inconsistent, so that errors can be corrected before the data are sent to National Analysts.

A data collection team was assigned to the screening portion of the study that included executive interviewers and interviewing supervisors, many of whom had been interviewing for quite some time. Supervisor and interviewer training manuals were developed for use during training and to serve as references during data collection. (See Attachment G -- Interviewer Reference Guide.) The interviewers' manual included an overview of the project and specific instructions for administering the screener. All data collection team members attended a personal training session led by the senior National Analysts Field Manager responsible for this project. Although the training was comprehensive, it was informal, in that team members were free to ask questions and give suggestions at any time during the training process. It was designed to foster maximum learning and give interviewers sufficient grounding to handle all possible situations.

The screening interviews were monitored closely throughout the data collection period. Each interviewer was monitored by both Data Collection and Project Management staff, and feedback was provided on an ongoing basis. Monitoring was performed via telephone and CRT (computer remote terminal), which allowed the monitor to watch what the interviewer was entering into the computer at the same time he or she was listening to the interview.

Respondents were given a toll-free telephone number to call if they had any questions while completing the questionnaire. These questions were fielded by one of two Project

Managers who were intimately involved in the questionnaire design and analytic phase of the study.

Each day, the results of all screening interviews were downloaded, and the completed questionnaires that had been received that day were uploaded into the questionnaire database. Progress reports were prepared daily to ensure that the sample was being worked according to the research protocol and that we were on target toward reaching the study quotas. The reports included the number of eligible and ineligible respondents, non-contacts and completed interviews by various demographic segments, including employee size and industry type.

D. Data Preparation Procedures

1. Cleaning Programs and Consistency Checks

Once collected, the data were subjected to a rigorous interviewing set of electronic and manual checks. Each day's data collected from the screening interviews were downloaded from the interviewing facility to our headquarters' offices. These were run through an electronic cleaning program (see Attachment H – Electronic Cleaning Program) which verified that the skip patterns and consistency checks built into the CATI program were working appropriately. In addition, the cleaning program checked that the Result of Call codes (ROCs) that had been assigned to each respondent matched the results of their screening questions and that only eligible respondents had been recruited for the main interview. (See Attachment I – Result of Call Summary Report.) These initial cleanings provided assurance that the CATI program was working correctly, the data layout provided from the interviewing facility was accurate, and that no corruption of the data occurred during the downloading process. Only after a day's data had passed the initial cleaning step was it merged into the master database, with the previous day's screening interviews.

When completed hard copy questionnaires were received, they were edited manually before the data were keyed. The editing process verified that all skip patterns were

correctly adhered to, all responses were within the permissible range, there were no multiple responses to single response questions, all critical questions were answered in order to consider the questionnaire complete, all blanks were filled in with zeroes as appropriate, and all associated logic was correctly followed. After editing, the data were entered with 100% key verification. An electronic cleaning was then executed. Any error detected by the cleaning programs resulted in the paper document being pulled and presented to the Field or Project Manager for problem resolution. If resolution was not possible, the interview was tagged for a callback.

When completed computerized questionnaires were received, they were subjected to a comparable series of cleanings, as well. After a questionnaire passed this initial cleaning, it was merged into the master database.

2.   *Outlier Checking and Callbacks*

The next step in preparing the data was a check of unweighted outliers. Frequency distributions were produced for question 1 (i.e., current volume) by application and by employee size, question 2 (i.e., per piece cost) by application, and questions 4d (i.e., total volume of basic NetPost pieces) and 11d (i.e., total volume of enhanced NetPost pieces). Within each cell, all respondents whose volumes were more than three standard deviations from the mean, were flagged for inspection and possible callback. After these distributions were reviewed, it was determined that several respondents whose answers were less than three standard deviations from the mean but unusually large should also be called back. In addition, special outlier checks were written to evaluate respondents who switched a high percentage of their current volume to either the basic or enhanced NetPost services.

The complete set of interviewing data, along with a list of problems, was printed for every respondent who had one or more flags. These data were then examined manually on a respondent-by-respondent basis by comparing to the printout of all responses. Respondents were called back by the Field or Project Manager on this

assignment to confirm or correct the reported and recorded responses. If a respondent could not be reached, the interview was voided.

Upon completion of all callbacks and associated data changes, the data were weighted (see weighting section below for a detailed description of the weighting model and procedures.) After the weighting procedures were applied, a set of weighted frequencies were run for Question 1. The respondents were sorted according to the percentage of the total weighted volume accounted for by that respondent. Respondents who represented more than 20% of the total estimate were flagged for possible callback. Each case was examined carefully and many things were considered in determining the appropriateness of a callback. These included the number of variables for which a respondent appeared to be an outlier, the impact on the total estimate of their weight versus their actual reported volume, the type of business they were in, as well as whether they had been called back previously. Calls resulted in either data changes or confirmations with possible weight adjustments.

The callback process yielded a total of 118 questionnaires with data changes. In addition, 35 respondents were voided, either because they could not be reached, or because corrections could not be determined.

3.   *Weighting the Survey Data*

Weights were created in order to project the sample's results to the universe and to correct for disproportionate sampling and response bias. Two different sets of weights were required:

- An "Application Weight" for those questions that were answered by the *entire* sample (i.e. questions about current volume and production and distribution costs), and
- A "Price Point Weight" for those questions that were answered by *only half* of the sample, under the split sample design described previously (i.e. questions about the response to NetPost assuming either the 25% or 50% price point).

The Application Weight consisted of two components: 1) an "Organization Projection Factor" to project the volume for which each respondent had decision-making responsibility (and, therefore, about which he or she completed the questionnaire) to his or her organization's total volume, and 2) a "Universe Projection Factor" to project the sampled organization's results to the universe of NetPost-appropriate businesses. The Application Weight was equal to the Universe Projection Factor divided by the Organization Projection Factor.

The Organization Projection Factor was simply the percentage of the respondent's organization's total volume for which he or she was responsible.

The Universe Projection Factor was derived using a multi-staged process:

For each application, the eligible universe in each employee size/industry cell was obtained by multiplying the total number of establishments in the D&B universe (displayed in Table 1) by two factors derived from responses to the screening questionnaire: 1) percentage of establishments that produced the application, and 2) percentage of the application producers that qualified on all of the other NetPost-appropriate criteria (i.e., they had pieces produced on desktop systems with run sizes less than or equal to 5,000 pieces, which were not four-color or glossy, for which design/layout functions were performed in-house.) This process yielded the following NetPost-appropriate universe sizes for each application:

Table 7

NetPost-Appropriate Universe Sizes[*]

Invoices & Statements			
SIC Group	Employee Size Group			Total Establishments
	1	2	3	
1	390,752	185,519	2,441	**578,713**
2	497,792	124,641	0	**622,433**
3	410,236	34,175	2,441	**446,852**
4	1,199,227	166,188	7,554	**1,372,969**
Total	**2,498,007**	**510,523**	**12,436**	**3,020,967**

Announcements & Confirmations			
SIC Group	Employee Size Group			Total Establishments
	1	2	3	
1	186,765	34,628	18,615	**240,008**
2	288,958	53,837	2,145	**344,940**
3	213,428	68,201	13,863	**295,492**
4	601,615	142,341	20,453	**764,409**
Total	**1,290,766**	**299,007**	**55,076**	**1,644,849**

Advertising Mail			
SIC Group	Employee Size Group			Total Establishments
	1	2	3	
1	43,547	1,879	1,879	**47,305**
2	337,812	32,403	0	**370,215**
3	211,148	33,591	21,993	**266,732**
4	347,227	78,012	18,125	**443,364**
Total	**939,734**	**145,885**	**41,997**	**1,127,616**

[*]See page 5 for definitions of employee size and SIC group categories.

Table 7
(Continued)

Newsletters			
SIC Group	Employee Size Group			Total Establishments
	1	2	3	
1	33,416	19,897	6,077	**59,390**
2	107,840	23,921	6,059	**137,820**
3	166,524	51,956	11,125	**229,605**
4	611,931	154,067	54,152	**820,150**
Total	**919,711**	**249,841**	**77,413**	**1,246,965**

Forms			
SIC Group	Employee Size Group			Total Establishments
	1	2	3	
1	83,701	59,916	10,741	**154,358**
2	202,485	23,090	1,213	**226,788**
3	273,174	61,073	2,693	**336,940**
4	584,172	122,034	52,205	**758,411**
Total	**1,143,532**	**266,113**	**66,852**	**1,476,497**

Completed interviews (defined as those with a final result of call code greater than or equal to 80) were arrayed in the same employee size/industry group matrix.

Table 8

Completed Interviews[*]

Invoices & Statements				
SIC Group	Employee Size Group			
	1	2	3	Total
1	31	28	1	60
2	35	16	0	51
3	35	10	1	46
4	86	32	2	120
Total	187	86	4	177
Announcements & Confirmations				
SIC Group	Employee Size Group			
	1	2	3	Total
1	36	14	7	57
2	22	18	1	41
3	36	25	5	66
4	45	37	6	88
Total	139	94	19	252
Advertising Mail				
SIC Group	Employee Size Group			
	1	2	3	Total
1	11	1	1	13
2	31	10	0	41
3	29	5	2	36
4	20	25	4	58
Total	100	41	7	148

[*]See page 5 for definitions of employee size and SIC group categories.

Table 8
(Continued)

Newsletters				
SIC Group	Employee Size Group			Total
	1	2	3	
1	6	10	6	22
2	13	10	3	26
3	36	30	8	74
4	76	85	23	184
Total	131	135	40	306
Forms				
SIC Group	Employee Size Group			Total
	1	2	3	
1	15	23	5	43
2	20	14	1	35
3	35	25	2	62
4	65	34	15	114
Total	135	96	23	254

The NetPost-appropriate universe size in each cell was then divided by the number of completed interviews in the corresponding cell, to arrive at the initial universe projection factors displayed in Table 9.

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Table 9

Initial "Universe Projection Factors"

Invoices & Statements			
SIC Group	Employee Size Group		
	1	2	3
1	12,605	6,626	2,441
2	14,223	7,790	0
3	11,721	3,418	2,441
4	13,945	5,193	3,777
Announcements & Confirmations			
SIC Group	Employee Size Group		
	1	2	3
1	5,188	2,473	2,659
2	13,134	2,991	2,145
3	5,929	2,728	2,773
4	13,369	3,847	3,409
Advertising Mail			
SIC Group	Employee Size Group		
	1	2	3
1	3,959	1,879	1,879
2	10,897	3,240	0
3	7,281	6,718	10,997
4	11,973	3,120	4,531
Newsletters			
SIC Group	Employee Size Group		
	1	2	3
1	5,569	1,990	1,013
2	8,295	2,392	2,020
3	4,626	1,732	1,391
4	8,052	1,813	2,354

001125

Table 9
(Continued)

SIC Group	Employee Size Group		
	1	2	3
1	5,580	2,605	2,148
2	10,124	1,649	1,213
3	7,805	2,443	1,347
4	8,987	3,589	3,480

The range of these projection factors was deemed to be too large because the sample size (i.e., completed interviews) in each cell was too small. To reduce the range, the strata were collapsed as follows: 1) employee size groups 2 and 3 were combined; 2) SIC groups 2 and 4 were combined; and 3) SIC groups 1 and 3 were combined. Employee size groups 2 and 3 were combined because group 3 had small sample sizes and group 2 was the next closest size group. In terms of SICs, in all but one application, groups 1 and 2 had the smallest sample sizes so combining them would still result in a large range of projection factors. Therefore, we combined SIC groups 1 and 3 and 2 and 4 to smooth out the weights. A new set of projection factors were then calculated by dividing the NetPost-appropriate universe in each stratum by the number of completed interviews in that stratum. These Final Universe Projection Factors are displayed in Table 10.

Table 10

Final "Universe Projection Factors"

Invoices & Statements		
SIC Group	Employee Size Group	
	1	2/3
1/3	12,136	5,614
2/4	14,025	5,968
Announcements & Confirmations		
SIC Group	Employee Size Group	
	1	2/3
1/3	5,558	2,653
2/4	13,292	3,529
Advertising Mail		
SIC Group	Employee Size Group	
	1	2/3
1/3	6,367	6,594
2/4	11,417	3,296
Newsletters		
SIC Group	Employee Size Group	
	1	2/3
1/3	4,760	1,649
2/4	8,087	1,969
Forms		
SIC Group	Employee Size Group	
	1	2/3
1/3	7,138	2,444
2/4	9,255	3,102

Each respondent's Universe Projection Factor was divided by his or her Organization Projection Factor to arrive at an initial "Application Weight." After applying these

weights to the survey results, "weighted outliers," or respondents who accounted for more than 20% of the total estimated current volume, were identified. These respondents were downweighted, and the Application Weights for the remaining respondents were correspondingly adjusted upward. After making these adjustments, no respondent accounted or more than 1.8% of the total current volume estimate. In addition, the range of Final Application weights met our criteria for weight ranges; all but two respondents fell into the range of 313:1.[*]

The process described above was repeated on each of the two split sample groups, to arrive at an initial "Price Point Weight." In addition, a subsequent step called "raking" was required. Theoretically, when respondents are assigned randomly to a split sample group, each group should be a microcosm of the total sample that is identical to the total sample on all characteristics. However, when using split samples in reality, this seldom occurs. Raking is a technique that adjusts the survey weights to equate each split sample to the overall sample on critical measures, based on the assumption that any differences are due to an unmeasured non-response bias.

Because the respondents in this questionnaire were assigned to a split sample group randomly, each group's projected current volume should have been roughly equivalent to the current volume projected from the total sample. To ensure that this would be the case, a revised "Price Point Weight" was developed using raking. The exact algorithm for raking is described fully in Attachment J entitled "Description of the Raking Algorithm." The control files used for raking the sample is shown in Attachment K entitled "Raking Program Specifications."

After the revised Price Point Weights were developed, weighted outliers, who accounted for more than 20% of the total NetPost volume estimate, were identified and downweighted. After making these adjustments, no single respondent accounted for

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[*]Note that the range of weights was inflated by the use of the Organization Projection Factor in the weighting process. Alternatively, the Organization Projection Factor could have been applied to each respondent prior to weighting, to derive a set of "total organization" variables, which would have then been weighted by the Universe Projection Factor alone.

more than 17.3% of the weighted NetPost volume estimate for the basic service and no more than 14.9% of the weighted NetPost volume estimate for the enhanced service. (See Attachment L -- Outlier Checking Program.) In addition, the final weights fell into a reasonable range: 401:1 with the exception of one respondent at the 25% price point and 452:1 for the 50% price point.

It is important to note that the weights were calculated on an application-specific basis and that they do not account for the overlap of organizations across applications.[*] For output measures that are additive (i.e., overlap across applications does not produce double counting), such as estimated NetPost volume, total market results can be calculated as the sum across all applications.

E.   Survey Results

1.   Adjustments to Raw Volume Estimates

The weighted survey results for questions 4, 7, 8, 11, 14, and 15 provide raw estimates of NetPost volume under each price and product configuration scenario. The raw estimates under the 25% contribution scenario are the weighted NetPost volume estimates for the split sample group that was exposed to the 25% contribution fee schedule. The raw estimate under the 50% contribution scenario are the weighted average NetPost estimates for the split sample group exposed to the 50% contribution fee schedule. The raw estimates for the basic product scenario are the weighted NetPost volume estimates generated when respondents were exposed to the basic NetPost concepts, that contained a limited set of physical, delivery and security features. The raw estimates for the enhanced product scenario are the weighted NetPost volume estimates generated when respondents were exposed to the enhanced NetPost concept, that included a range of additional physical, delivery and security features that could be purchased for additional fees.

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[*] Given the number of permutations of applications produced and the impracticality of obtaining full eligibility information on all applications in multiple application organizations, no attempt was made to measure the full extent of overlapping eligibility and, consequently, no total market weight was produced.

To produce more reasonable estimates of the volume NetPost would be likely to realize over time, these raw estimates were adjusted by four factors, commonly used for this purpose:

- **Awareness**: In the questionnaire, we presented respondents with a description of NetPost before asking them if they would use it. This approach essentially produces a 100% awareness for NetPost. In reality, not everyone would be aware of NetPost's existence or features even with advertising and other promotions. To adjust for this over-awareness, the Postal Service provided us with an estimate of the percentage of the eligible universe whom they believe would be aware of NetPost after each of its first five years in the marketplace, given the marketing plans that they envision for the product:

Table 11

Awareness Adjustment Factor

Year 1	25%
Year 2	32%
Year 3	35%
Year 4	39%
Year 5	41%

- **Access to Compatible Hardware and Software**: The NetPost concept included with the questionnaire stated that NetPost would be compatible with all standard hardware and software platforms. In reality, this is unlikely, given the multitude of different hardware and software platforms in use. To adjust for this, the Postal Service provided us with an estimate of the percentage of the eligible universe whom they believe would have compatible hardware and software platforms in each of NetPost's first five years in the marketplace.

Table 12

Access to Compatible Hardware and Software Adjustment Factor

Year 1	98%
Year 2	99%
Year 3	100%
Year 4	100%
Year 5	100%

- **Access to the Internet**: After the questionnaire was fielded, it was decided that the most effective way for users to access NetPost would be through the Internet. Since the concept statement included with the questionnaire did not specify this requirement (i.e., must have access to the Internet), it is likely that some of the respondents who said they would send pieces via NetPost would, in fact, be unable to do so, because they would lack Internet access. To adjust for this situation, we applied an adjustment factor equal to the expected penetration of Internet access among the business population over the next five years. The actual number of businesses with Internet access over the next five years was supplied to us by the Postal Service.

Table 13

Internet Access Adjustment Factor

Year 1	18%
Year 2	25%
Year 3	35%
Year 4	44%
Year 5	49%

- **Overstatement of Intentions**: Respondents in survey research are known to overstate their intentions because it is difficult to gauge exactly what behavior will be undertaken until a product/service is actually marketed.

Based on our experience with new product research across a broad range of industries, we assumed that adoption among those who would be aware of and have access to NetPost would be 50% lower than indicated by the raw estimates in the survey.

The raw estimates in Year 1, the most critical year, were adjusted downward by a factor of .0221.

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Table 14

Combined Adjustments

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Year 1 25% x 98% x 18% x 50%	= .0221
Year 2 32% x 99% x 25% x 50%	= .0396
Year 3 35% x 100% x 35% x 50%	= .0613
Year 4 39% x 100% x 44% x 50%	= .0858
Year 5 41% x 100% x 49% x 50%	= .1005

2.   Adjusted Volume Estimates

The final estimates of NetPost's volume under each of the price and product configuration scenarios were derived by multiplying the raw survey estimates of NetPost's volume by each of these four adjustment factors. Table 15 illustrates the final, adjusted estimates, of NetPost's volume for each of its first five years in the marketplace, assuming the basic NetPost service offering using the 25% contribution margin rate schedule. Tables 16 through 18 illustrate the same results assuming the basic NetPost service offering using the 50% contribution margin rate schedule, the enhanced NetPost offering using the 25% contribution margin rate schedule, and the enhanced NetPost offering using the 50% contribution margin rate schedule.

In addition, in Year 1, 38% of the total volume of the basic NetPost service at the 25% contribution margin is likely to be incremental pieces to the Postal Service.

Table 15

Basic NetPost Service and 25% Contribution Margin

Rate Schedule Volume Estimate (000's)

	Adjusted Volume Estimate				
	Year 1	Year 2	Year 3	Year 4	Year 5
Total	295,665	516,015	804,531	1,127,826	1,317,404
First-Class	91,745	160,119	249,646	349,964	408,790
Standard	203,920	355,895	554,885	777,862	908,613
1-2 pages	200,490	349,910	545,552	764,779	893,331
3-4 pages	31,547	55,059	85,843	120,339	140,567
5-6 pages	28,059	48,970	76,350	107,031	125,022
7-10 pages	9,432	16,461	25,665	35,978	42,025
11-15 pages	5,263	9,185	14,321	20,075	23,450
15+ pages	20,844	36,379	56,719	79,512	92,877
8.5 x 11"	233,250	407,084	634,694	889,742	1,039,300
8.5 x 14"	26,048	45,461	70,879	99,361	116,063
11 x 17"	36,396	63,521	99,038	138,835	162,172
Black & White	164,153	286,491	446,675	626,169	731,422
Spot Color	131,512	229,523	357,855	501,657	585,981
Simplex	142,067	247,945	386,577	541,920	633,012
Duplex	153,598	268,070	417,954	585,906	684,391

Table 16

Basic NetPost Service and 50% Contribution Margin Rate

Schedule Volume Estimate (000's)

	Adjusted Volume Estimate				
	Year 1	Year 2	Year 3	Year 4	Year 5
Total	204,195	356,374	555,631	778,908	909,836
First-Class	24,034	41,945	65,398	91,678	107,088
Standard	180,161	314,429	490,234	687,231	802,748
1-2 pages	128,193	223,732	348,825	488,999	571,195
3-4 pages	45,964	80,220	125,073	175,332	204,804
5-6 pages	13,742	23,984	37,394	52,421	61,232
7-10 pages	9,475	16,536	25,781	36,141	42,216
11-15 pages	2,981	5,203	8,112	11,372	13,284
15+ pages	3,839	6,700	10,446	14,643	17,105
8.5 x 11"	176,281	307,658	479,677	672,431	785,461
8.5 x 14"	12,252	21,382	33,338	46,734	54,590
11 x 17"	15,662	27,334	42,617	59,742	69,784
Black & White	133,033	232,178	361,994	507,459	592,758
Spot Color	71,162	124,196	193,638	271,450	317,078
Simplex	110,000	191,979	299,319	419,598	490,129
Duplex	94,195	164,395	256,313	359,310	419,707

Table 17

Enhanced NetPost Service and 25% Contribution Margin

Rate Schedule Volume Estimate (000's)

	Adjusted Volume Estimate				
	Year 1	Year 2	Year 3	Year 4	Year 5
Total	354,275	618,305	964,014	1,351,397	1,578,555
First-Class	90,340	157,668	245,824	344,606	402,531
Standard	263,935	460,637	718,191	1,006,791	1,176,023
1-2 pages	239,136	417,356	650,710	912,193	1,065,524
3-4 pages	48,146	84,028	131,010	183,655	214,526
5-6 pages	28,484	49,712	77,507	108,652	126,916
7-10 pages	12,152	21,208	33,066	46,353	54,144
11-15 pages	5,385	9,398	14,653	20,541	23,994
15+ pages	20,973	36,604	57,070	80,003	93,450
8.5 x 11"	269,710	470,716	733,904	1,028,818	1,201,754
8.5 x 14"	25,402	44,332	69,120	96,895	113,182
11 x 17"	59,164	103,257	160,990	225,683	263,619
Black & White	179,653	313,543	488,852	685,293	800,485
Spot Color	174,622	304,763	475,163	666,103	778,070
Simplex	168,493	294,066	458,485	642,724	750,761
Duplex	185,782	324,239	505,529	708,672	827,794

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Table 18

Enhanced NetPost Service and 50% Contribution Margin

Rate Schedule Volume Estimate (000's)

	Adjusted Volume Estimate				
	Year 1	Year 2	Year 3	Year 4	Year 5
Total	261,837	456,975	712,481	998,786	1,166,674
First-Class	27,807	48,531	75,665	106,071	123,901
Standard	234,030	408,445	636,815	892,715	1,042,773
1-2 pages	156,762	273,591	426,562	597,973	698,487
3-4 pages	54,357	94,868	147,911	207,348	242,201
5-6 pages	25,215	44,007	68,612	96,183	112,351
7-10 pages	14,741	25,728	40,113	56,232	65,684
11-15 pages	4,713	8,226	12,825	17,978	21,000
15+ pages	6,022	10,510	16,387	22,972	26,833
8.5 x 11"	228,741	399,214	622,423	872,540	1,019,206
8.5 x 14"	13,197	23,032	35,909	50,339	58,800
11 x 17"	19,900	34,730	54,149	75,908	88,667
Black & White	174,409	304,391	474,583	665,292	777,121
Spot Color	87,427	152,584	237,897	333,495	389,552
Simplex	143,303	250,103	389,941	546,636	638,520
Duplex	118,533	206,873	322,540	452,151	528,153

The number of NetPost adopters is equal to 2.5% x Number of Business with Internet Access x Awareness Factor (see Table 11) x Access to Compatible Hardware and Software (see Table 12) x Overstatement of Intentions (see page 33). The number of businesses with Internet access was provided to us by the Postal Service.

Table 19a

Businesses with Internet Access

Year 1	Year 2	Year 3	Year 4	Year 5
1,953,000	2,636,000	3,720,000	4,680,000	5,200,000

Table 19b

NetPost Adopters

Year 1	Year 2	Year 3	Year 4	Year 5
5,981	10,439	16,275	22,815	26,650

3.   *Standard Error Calculations*

Because of the fact that weights are used in the estimates of NetPost volumes, and because the volumes being estimated are somewhat complex functions, there are no closed-form approaches to estimating standard errors. To precisely estimate the standard errors associated with such variables, "bootstrapping" is the customary, and preferred, technique to use. Bootstrapping is a procedure in which repeated sub-samples are drawn from the study sample, the study's weighting model is applied to each, and the standard error of the resulting estimate is calculated.[*] The computer programming and run time required for bootstrapping are substantial. Therefore, it was decided that an approximation of the standard error estimates, which could be produced with minimal effort, would suffice.

A standard formula for estimating weighted variance was used. In most statistical textbooks, the standard formula for estimating the sampling variability of a total assumes that the observations contained in the sample are selected by simple random sampling; that is, all observations in the sample have an equal probability of being selected, and thus have an equal weight. On the other hand, respondents in this survey were selected using a complex stratified sampling scheme and, therefore, had an unequal probability of being selected in the sample. To account for this

disproportionate sampling, weights were assigned to each respondent in order to project the estimates to the correct eligible universe. The disproportionate sampling and accompanying weights must also be taken into account the by procedure used to estimate sampling variance or standard errors:

Let   N: total population size

n: sample size

W_i: weight for respondent i (note $N = \sum w_i$)

Y_i: measure of a variable for respondent i

Define $T_y = \sum w_i y_i$ where T_y represents the estimated population total for y

Define a new variable: $t_{yi} = n w_i y_i$

If we want to estimate the variability associated with the statistic T_y, one can show that the approximate variance of T_y is given by:

$$Var(T_y) = \frac{(N-n)}{N}\left(\frac{1}{n}\right)\frac{\sum_{i=1}^{n}(t_{yi}-T_y)^2}{n-1}$$

The standard error estimates for adjusted NetPost volume for each of its first five years in the marketplace, under each price and product configuration scenario, are displayed in Table 20:

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[*]More information on bootstrapping can be found in An Introduction to Bootstrap, G. Efron and R. Tibshirani, 1993, Chapman & Hall

Table 20

Standard Error and Coefficient of Variation Estimates for NetPost Volume

(in 000,000)

	25% Contribution Margin Rate Schedule		50% Contribution Margin Rate Schedule	
	Basic NetPost	Enhanced NetPost	Basic NetPost	Enhanced NetPost
Year 1 Standard Error	68	72	43	51
Year 2 Standard Error	118	125	76	89
Year 3 Standard Error	184	195	118	139
Year 4 Standard Error	258	274	166	195
Year 5 Standard Error	301	320	194	228

Thus, if the total basic NetPost volume for the 25% price point is 296,000,000 pieces and the standard error is 68,000,000, then, for a 95% confidence interval, the range for the basic NetPost volume would be 163,000,000 to 429,000,000 pieces (296,000,000 ±1.96 x 68,000,000).