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

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

RESPONSE OF UNITED STATES POSTAL SERVICE WITNESS MUSGRAVE TO INTERROGATORIES OF UNITED PARCEL SERVICE (UPS/USPS–T8–5-9)

The United States Postal Service hereby provides the responses of witness Musgrave to the following interrogatories of United Parcel Service: UPS/USPS–T8-5-9, filed on March 7, 2000.

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

Respectfully submitted,

UNITED STATES POSTAL SERVICE

By its attorneys:

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March 21, 2000

RESPONSE OF UNITED STATES POSTAL SERVICE WITNESS MUSGRAVE TO INTERROGATORIES OF UNITED PARCEL SERVICE

UPS/USPS-T8-5. Refer to Technical Appendix A, TA A-I, of your testimony. Provide the details of all specification tests that were performed to justify the (log-log) functional form that you employ in your estimating equations.

Response:

Tests for incorrect functional form include the RESET (Regression Specification Errors Test), the Rainbow test, the Psi test and the CUSUM (Cumulative Sum of recursive residuals), (See Kmenta, *Elements of Econometrics*, pages 452-455 and pages 576-578). Library Reference I-232 contains the technical details of the econometric test results. All of our tests are conducted at the 5% level.

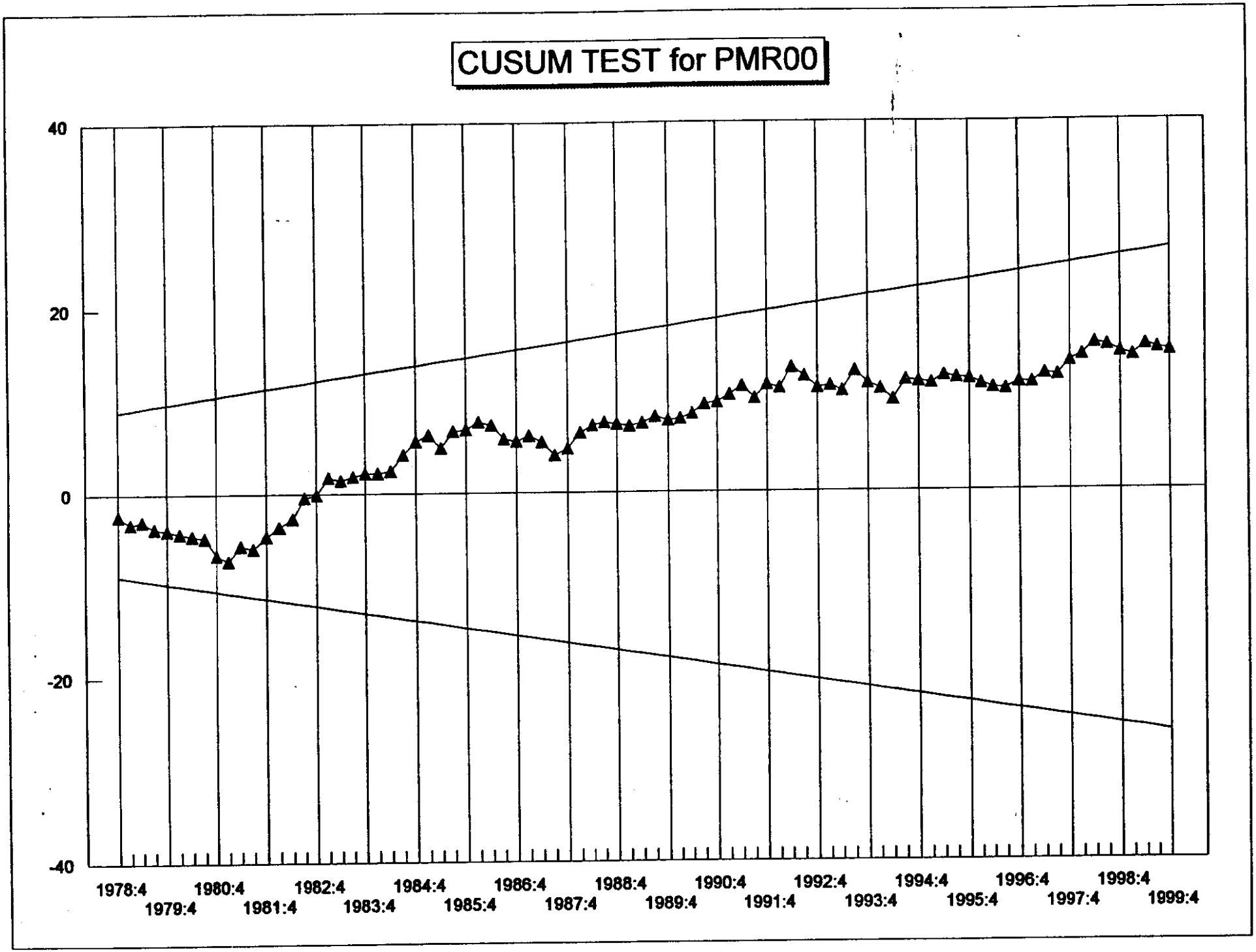
The RESET test and the Rainbow test are tests for incorrect functional form and also test that no relevant explanatory variables have been omitted from the regression equation. The computed F value for the RESET test is 0.427, the critical value is 2.716, and we cannot reject the null hypothesis of no specification error due to incorrect functional form. The computed F value for the Rainbow test is 1.056, the critical value is 1.716, and again we cannot reject the null hypothesis of no specification error due to incorrect functional form.

The PSI test is a test for incorrect functional form as well as systematic under prediction or over prediction. The computed test statistic is 1.631 and has a t distribution with the critical value of 1.989. Again we cannot reject the null hypothesis of no specification error.

Finally, the CUSUM test is a test for incorrect functional form leading to parameter instability. Parameter instability may also come from omitted variables and structural changes. CUSUM does not have one constant critical value. One computes

recursive residuals and statistical boundaries. If the CUSUM value crosses the boundary, the null hypothesis of no specification error is rejected. As can be seen from the graph, the computed value is within the boundaries.

The model passes all of the tests.


CUSUM TEST for PMR00
40
20
0
-20
-40
1978:4
1979:4
1980:4
1981:4
1982:4
1983:4
1984:4
1985:4
1986:4
1987:4
1988:4
1989:4
1990:4
1991:4
1992:4
1993:4
1994:4
1995:4
1996:4
1997:4
1998:4
1999:4

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UPS/USPS-T8-6. Refer to your testimony, page 7, where you state, "[a] change in deflated price is estimated to lead to a volume response in the quarter in which the price change occurs and the three following quarters." Provide the details of all sensitivity tests that were performed to justify your assumption that all volume responses to changes in deflated prices occur within one year.

Response:

To determine if all volume responds to changes in deflated prices within one year, we performed statistical tests for the significance of additional explanatory variables. The F test statistic is described in Kmenta, *Elements of Econometrics*, page 248. We begin by expanding the lag in the current model to one additional quarter, two additional quarters and finally three additional quarters. Library Reference I-232 contains the technical details of the econometric test results. All of our tests are conducted at the 5% level. When the fourth quarter is added, the computed F test statistic is 2.196 and the critical value is 2.484. We therefore cannot reject the null hypothesis that one additional quarter does not improve the model. When the fourth and fifth quarters are added, the computed F test statistic is 1.112 and the critical value is 2.063. We therefore cannot reject the null hypothesis that two additional quarters do not improve the model. When the fourth, fifth and six quarters are added, the computed F test statistic is 1.002 and the critical value is 1.891. We therefore cannot reject the null hypothesis that three additional quarters do not improve the model. As the statistical importance of each additional lag became smaller, we stopped. It appears that the current specification of the lag structure is sufficient to capture the volume response.

RESPONSE OF UNITED STATES POSTAL SERVICE WITNESS MUSGRAVE TO INTERROGATORIES OF UNITED PARCEL SERVICE

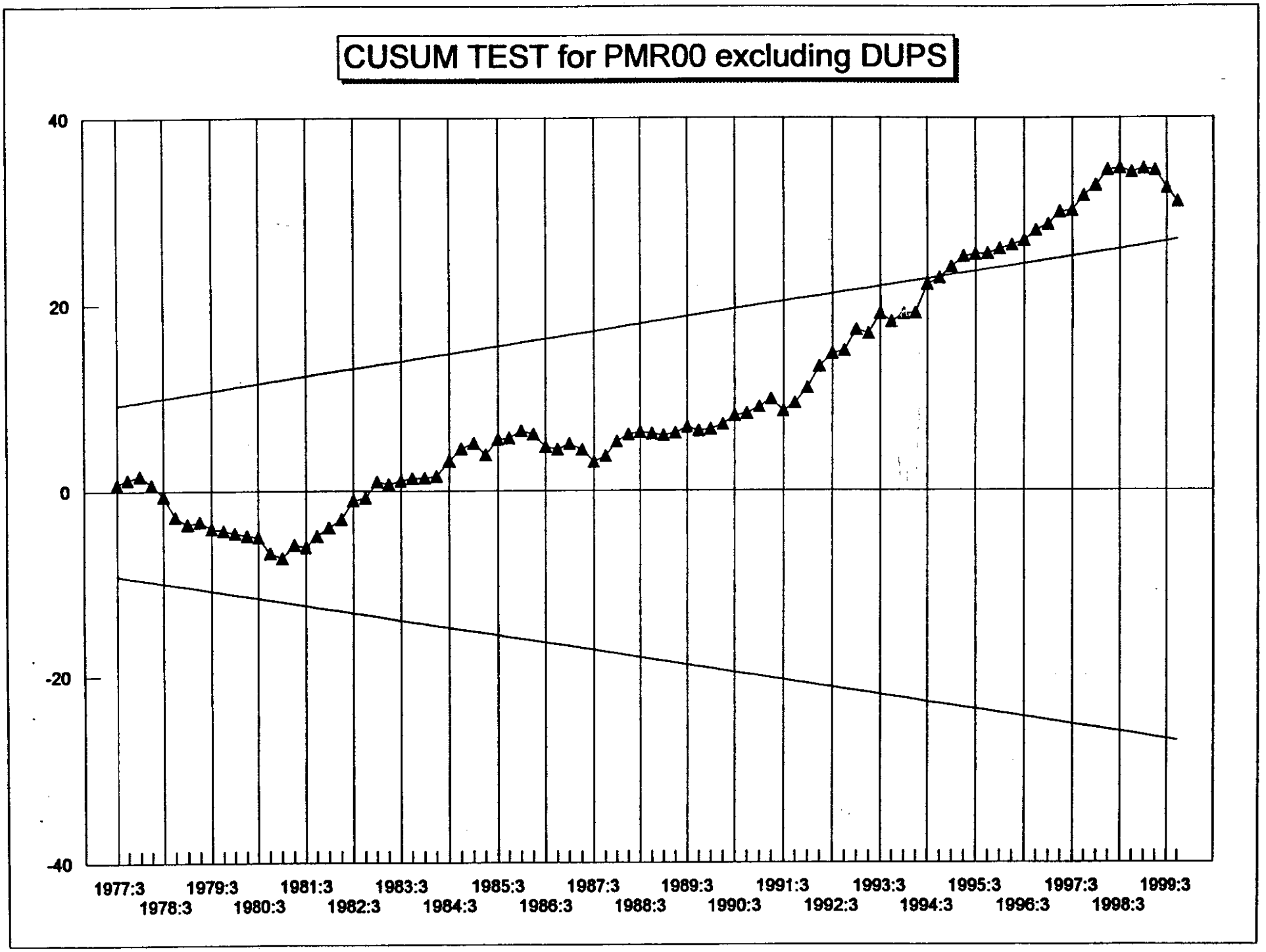
UPS/USPS-T8-7. (a) Explain what event the "binary shift variable" described on pages 23-24 of your testimony is designed to capture.

(b) If the event in question is the Priority Mail rate increase of 1991, explain why the effect of this rate increase (but not others) is presumed to last more than four quarters.

Response:

(a) The event was a change in the pricing behavior of UPS. Prior to that period, UPS real price increases were generally less than 10 percent on a SPLY basis. Beginning in 91:3, they were double digit and continued generally to be larger than those of Priority Mail. We can see the result with a second Psi test. Library Reference I-232 contains the technical details of the econometric test results. All of our tests are conducted at the 5% level. Here the binary variable in question was omitted from the model. In this case, the computed Psi t value is 3.268 and the critical value is 1.987. We reject the null hypothesis that there is not an omitted relevant explanatory variable. Also, a second CUSUM is presented where the binary variable in question was omitted from the model. The positive slope of the graph in the CUSUM test, beginning in 91:3, coincides with this period. Comparing the graphs of the CUSUM test, with and without the binary variable, shows that the current formulation with the binary variable passes the test and without it, it would not pass.

(b) Not Applicable.


CUSUM TEST for PMR00 excluding DUPS
40
20
0
-20
-40
1977:3
1978:3
1979:3
1980:3
1981:3
1982:3
1983:3
1984:3
1985:3
1986:3
1987:3
1988:3
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1991:3
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1993:3
1994:3
1995:3
1996:3
1997:3
1998:3
1999:3

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UPS/USPS-T8-8. Explain all tests that were conducted to ensure that multicollinearity is not a concern when you employ UPS Ground Service prices in "the current period and the four lagged quarters" simultaneously in your estimating equations at page 20 of your testimony.

Response:

There are no econometric tests for multicollinearity (see Kmenta, *Elements of Econometrics*, page 431). However, since it can be a concern, we took the precaution of Shillerizing the UPS prices. The procedure is intended to reduce the impact of multicollinearity on the parameter estimates of UPS prices. The details of this procedure are presented in the testimony of witness Thress (USPS-T7) in the section on Multicollinearity (see section III, B.3.b).

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UPS/USPS-T8-9. Explain how your coefficient estimates would change if volume were assumed to vary with nominal price levels rather than (or in addition to) real price levels.

Response:

I do not know, as I have not conducted that experiment.

DECLARATION

I, Gerald L. Musgrave, declare under penalty of perjury that the foregoing answers are true and correct to the best of my knowledge, information, and belief.

G. Musgrave

Dated: 3/16/00

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.

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