COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

A REVIEW OF THE RATES AND CHARGES INCENTIVE REGULATION PLAN OF SOUTH CENTRAL BELL TELEPHONE COMPANY	)))	CASE NO. 90-256

ORDER

On October 11, 1991, the Commission received from SCB responses to an information request. On October 18, 1991, SCB supplemented item number two. The formulation contained in item two is reproduced below:

$$(\%\ \Delta \text{ revenue}) = (NTR - OTR)/OTR = [(NP/OP)_{\Delta}(1+e)] - 1$$

Where NTR is new total revenue, OTR is old total revenue, NP is the new price, OP is the old price, e is the price (own) elasticity of demand and (NP/OP) is an approximation of the percent change in price. Strictly speaking, (NP/OP) equals one plus the percent change in price.

In light of SCB's responses and the equation above, consider the following derivation using a generic demand function.

Define demand as a function of price, P, such that Q=Q(P). Total revenue, TR, as a function of price may then be derived by multiplying price times quantity, as shown below:

$$TR = P*Q(P)$$

In order to see the effects of changes in the own price on total revenue, take the derivative of total revenue as shown below:

$$dTR = Q(P) + P[\partial Q(P)/\partial P]dP$$

This equation can be rearranged in order to see the effects of

a percent change in price on total revenue. Divide the equation by total revenue, TR, to obtain the percent change in total revenue, as shown below:

$$dTR/TR = 1/TRQ(P) + P[\partial Q(P)/\partial P]dP$$

Noting that TR = P*Q(P) and rearranging terms yields the following equation:

$$dTR/TR = Q(P)/Q(P) + P/Q(P)[\partial Q(P)/\partial P]dP/P$$

or

$$dTR/TR = (1 + e)dP/P$$

Where e is the price elasticity of demand. This equation says that the percent change in total revenue equals one plus the price elasticity of demand multiplied by the percent change in price.

IT IS ORDERED that SCB shall file the original and 10 copies of the following information with the Commission, with a copy to all parties of record, by November 4, 1991.

1. Explain the rationale for using SCB's equation for estimating the percent change in total revenue, as opposed to the equation derived above using a generic demand function. Provide documentation, citing economic theory if possible, supporting the use of SCB's equation.

2. Would using the generic demand function equation instead of SCB's equation for calculating the percent change in total revenue yield inappropriate results? If so, fully explain why.

3. Provide a revenue forecast comparison using the original spreadsheet data submitted earlier under confidentiality based upon

each of the equations mentioned above, that is SCB's percent change in revenue equation and the generic demand function.

Done at Frankfort, Kentucky, this 25th day of October, 1991.

PUBLIC SERVICE COMMISSION

For the Commission

ATTEST:

Executive Director